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JAFFNA MEDICAL JOURNAL

Volume XVI No. 1. March 1981.

Contents

BINOTAL

Bactericidal broad spectrum Antibiotic - Ampicillin

The Key to Success in Modern Antibiotic Therapy

Effective against all gram negative and gram positive bacteria of Practical Importance

*rapid and direct bactericidal effect
*without risk of toxicity

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Bottle of 60 ml.

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JAFFNA MEDICAL JOURNAL

Volume XVI No. 1. March 1981.

Contents

PFIZER INTRODUCES

Fasigyn*

TINIDAZOLE

AN ANTI-PROTOZOAL YOU CAN MAKE YOUR DRUG OF CHOICE

- **Simple three day dosage regime for Amebiasis, both intestinal and extraintestinal.**
- **Single dose oral treatment for Trichomoniasis.**
- **Single dose treatment for Giardiasis.**
- **Excellent tissue penetration.**
- **Marked amebicidal, trichomonicidal and giardicidal activity.**
- **Rapid relief of symptoms.**
- **Extremely well tolerated.**
- **Cure rates of over 95% in Amebiasis, Trichomoniasis and Giardiasis.**
- **No need for drug combinations or multiple therapy.**

PRODUCT INFORMATION

DESCRIPTION

Fasigyn (tinidazole) is a new agent for the systemic treatment of infections due to the protozoa Trichomonas vaginalis, Entamoeba histolytica and Giardia lamblia.

Fasigyn is a novel derivative of the substituted imidazole group of compounds. It is a pale yellow crystalline solid.

INDICATIONS

Fasigyn is specifically indicated for the oral treatment of
Urogenital trichomoniasis in both female and male patients.
All forms of amebiasis. Giardiasis.

When infection with Trichomonas vaginalis has been confirmed or is suspected, simultaneous treatment of the consort is recommended.

SIDE EFFECTS

Mild side effects related to the gastro-intestinal tract have been reported;these are rarely disturbing. Nausea and vomiting in particular occur only infrequently.

TOXICITY

Biochemical changes indicative of drug allergy have been reported in one patient.

As with metronidazole and other related compounds Fasigyn may produce transient leucopenia.

CONTRA-INDICATIONS

As with drugs of similar chemical structure, Fasigyn is contra indicated in patients with a history of blood dyscrasia and should be avoided in patients with organic neurological disorders. Fasigyn passes the placental barrier and is present in the breast milk when administered to nursing mothers. Thus as it is not known whether compounds of this class are harmful to the foetus or newborn, Fasigyn is contra indicated in nursing mothers and during the first trimester of pregnancy. While there is no evidence that Fasigyn is harmful during the latter stages of pregnancy, it should be used, like similar compounds, with caution and discretion.

PRECAUTIONS

As with closely related drugs, Fasigyn may produce transient leucopenia and neutropenia. Alcoholic beverages should be restricted during therapy with Fasigyn since abdominal cramps, vomiting and flushing have occurred when related compounds were taken together with alcoholic beverages. Drugs of similar chemical structure have also produced various neurological disturbances such as dizziness, vertigo, incoordination and ataxia. If during therapy with Fasigyn, abnormal neurological signs develop, therapy should be promptly discontinued.

SUPPLIES

Film coated oral tablets of 500 mg. tinidazole base.

RECOMMENDED DOSAGE FOR ADULTS

DISEASE	TABLET STRENGTH	FREQUENCY OF DOSAGE	DURATION (DAYS)
Amebiasis (a) Amebic dysentery & all forms of Amebiasis.	500 mg.	Single daily dose of 4 tablets	3
Hepatic Amebiasis (b) Amebic Liver abscess and other forms of Extra-intestinal amebiasis	500 mg.	Single daily dose of 4 tablets	3
Urogenital Trichomoniasis	500 mg.	Single dose of 4 tablets.	1
Giardiasis	500 mg.	Single dose of 4 tablets.	1

RECOMMENDED DOSAGE FOR CHILDREN

DISEASE	FREQUENCY OF DOSAGE	DURATION (DAYS)
Amebiasis (a) Amebic dysentery and all forms of Amebiasis.	50-60 mg/kg bodyweight once daily.	3
Hepatic Amebiasis (b) Amebic Liver abscess and other forms of extra-intestinal amebiasis.	50-60 mg/kg bodyweight once daily.	5
Urogenital Trichomoniasis	50-75 mg/kg bodyweight as a single dose.	1
Giardiasis	50-75 mg/kg bodyweight as a single dose.	1

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Editorial

POLLUTION.

One has to move with the times. Environmental pollution is the "in phrase" in every assembly from the palace of the United Nations to the humblest village council and as often as not it is the least knowledgeable that speak longest and loudest Notwithstanding this shortcoming the subject itself deserves our attention as medical practitioners for it is obvious that pollution must lead to deterioration in health, and consequently must result in disease. However it does not require pronouncements from palaces for the initiation of action to reduce pollution. In his presidential address, published in this issue, Wijeyrajah has drawn attention to the higher incidence of infectious and communicable diseases amongst the less privileged sections of the community and even if he hasn't laboured the point it is obvious that pollution has a large part to play in disease incidence. It is all too easy to draw inferences from statistics, pointing the finger at someone else in calling for remedial action. Should we not stand still for a moment and take stock of the situation as it confronts most of us practising in Jaffna. The premier institution for this part of the country is the Jaffna General Hospital, which serves a population of just over a million people. The hospital stands on its original site selected by the Friend in Need Society in 1850 in the centre of the town which has grown around the hospital, One often hears returning Ceylonese refer to hospitals in other countries as being clean, which ofcourse most of them are, but the reason for the comment is that the majority of the hospitals in our country are filthy. That they need not be so is made apparent by visits to some institutions in this country which are maintained in that same state of cleanliness as is seen abroad. For instance Nawalapitiya Hospital. And closer to home the Jaffna Secretariat. So that it is possible to maintain clean institutions in this country too, but it takes people and discipline to do so. Let us assess the situation at the Jaffna General Hospital. In close proximity is that area exotically called the Grand Bazaar, complete with crowds, bustling streets, narrow inadequate pavements often blocked by obstructions in the form of bicycles and even grabage, blaring radios and cassetes from many establishments and a general air of neglect. Pot holes in the streets, and dust everywhere, all of which permeate the hospital. Was it not Hilton who said that rest was essential in the cure of a disease, and Ambroise Paré who said that he treated the patient but God cured him? Should it not be possible to give God a helping hand by providing, these conditions in the Jaffna Hospital? In most cities the area surrounding hospitals is designated as a Silent Zone and even the blowing of a car horn is punishable under the by-laws, but the cocophony of raucous sounds that constantly surrounds this hospital makes a mockery of the very idea. Dust swirls around the haspital from the sand-strewn streets making the task keeping the hospital clean somewhat laborious for the nurses. Should it not be possible to have macadamised roads right up to the edge of proper, well designed, and wide pavements eliminating these hazards and providing ample space for most of the population who are on foot? And then horror of horrors, is the large open drain that runs along the boundary wall on two sides of the hospital,

often covered with weeds and, rains permitting, with stagnant water, leading to the ideal conditions for the breeding of those noxious conveyors of disease. What an awful lot of money, mostly foreign exchange, is spent on drugs to combat disease and yet the most elementary precautions to prevent it are not taken! Inside the hospital conditions are scarcely better. The un-planned additions of buildings over the past century has led to the development of a non-functional hospital (in terms of structure), and administration of such an unit is difficult. Mnltiple points of access, numerous cul de sacs, crooked corridors all add to the problems of administration. It is not uncommon to find unauthorised visitors within the hospital at all hours of the day, some within the wards themselves and some on the corridors, smoking, chewing betel etc. Some even bring their meals and have it in the same wards and corridors and often the paper or leaf that wrapped the meal is just thrown on the ground. More pollution. More flies. More disease. Whose responsibility is it to maintain discipline and keep the hospital clean? Outside, we can only advise, but within the walls it must surely be the responsibility of everyone working in the institution. If Parkinson were to extend his laws to this country he might have added that every untoward situation demanded the appointment of yet another subcommittee, the weight of whose report is directly proportional to number of its members and inversely proportional to its effectiveness.

Instructions to Authors

Original articles aud Case Reports are welcome and should be submitted to the Editor Jaffna Medical Journal, The Library, General Hospital, Jaffna. Articles are accepted on the understanding that they are submitted to only this journal, and that articles and their illustrations become the property of the journal.

Communications regarding business matters aud advertising should also be addressed to the Editor.

Manuscripts. As from 1981 the Jaffna Medical Journal will subscribe to the policy of uniform requirements for manuscripts described in the British Medical Journal (1979) **1** : 532 - 535 and the Lancet (1979) **1** : 428 - 431· Intending authors are advised to consult these instructions. Two copies of manuscripts, typed on one side only of good quality white paper with double spacing and 3 cms margins at both left and right. Each manuscript should have the following sections in sequence :- title page (on a separate page) with authors names and listing their highest degrees and diplomas, their positions at the time of the study, and present post if different from the above, the institution where the work was carried out and the address of the author who will deal with correspondence and reprints; summary; introduction; materials and methods; results; discussion; references. Tables should be typed on separate sheets of paper and numbered in sequence with Roman numerals. Figures should be numbered with Arabic numerals. Both tables and figures should have accompanying legends. Photographs should be good quality, unmounted, glossy prints. All illustrations should have a label pasted on the back indicating the name of the author and the figure number.

References: In the text references should be numbered consecutively in Arabic numerals. The reference list should be typed in numerical order, and abbreviations may be used in accordance with the form adopted in Index Medicus. Where a journal is not listed by Index Medicus the full title should be given, Where the number of authors is six or less, all names with initials should be given. Where there are more than six authors, only the first three names followed by et al should be used. In citing references give in sequence author (s) name (s), year of publication, full title of the paper, name of the journal, *volume* number (underlined), and first and last page numbers. In the case of books, the author(s) name (s), year of publication, editors names where relavant, title of book, page numbers place of publication and publishers name should be given.

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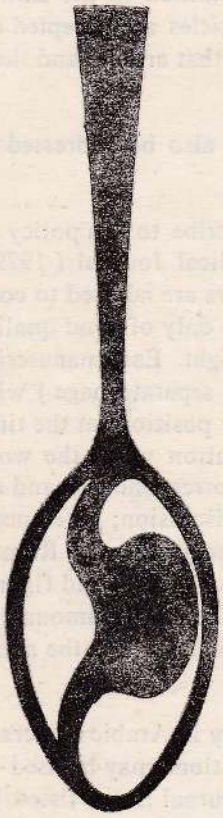

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PRESIDENTIAL ADDRESS 1980/1981

Charles Wijayarajah, MBBS. (Cey.) DPH. (Liverpool) MFCM.

Members of Council, Ladies and Gentlemen,

The Office of Presidency of this Association is the supreme honour that members can bestow on one of their fellows and it is with a sense of humility that I express my gratitude for this distinction. The office is not merely an honorific, it carries an implied obligation for delivering a Presidential Address, which by custom dwells commonly on the field of academic interest of the incumbent, setting forth his own work and achievements. Less commonly the address has been based on a general topic or matter of national interest and I have adopted the latter as the times in which we live demand the attention of all members of the medical profession and, more particularly of those members of this Association. I have chosen my subject,

JAFFNA MEDICINE AT THE CROSS ROADS

In order that we might properly conceive the situation, perhaps even the dilemma in which we are placed, firstly, it is necessary to retrace the path that has been trod by our forebears; secondly, to realise the current situation and then to assess the various options open to us before we chose which path to follow in the future.

The Jaffna Medical Association was established only in 1969 during the Presidency of Dr. Kolitha Karunaratne, but it was only a change of title for an active body termed the Jaffna Clinical Society founded in 1941 and the President was the late Dr. S. Subramaniam Provincial Surgeon. However, this was merely the formal establishment of a society for the advancement of medical knowledge in the Northern Region of Ceylon as it was then called.

The influence of Western Medicine had its impact in Jaffna in the early part of the Nineteenth Century when 5 members of the American Mission Society arrived here in September 1816. It is possible that some form of Western Medicine was practised for the benefit of the Portugese, Dutch and early British establishment in Jaffna, but they were not intended for the local population. The intention of the American Mission Society had been to establish this Mission in India, but the East India Company forebade such an intrusion into what was considered a British Preserve and so the five members arrived at Point de Galle and travelled by the highly scenic coastal road to Colombo. Previous correspondence with the Governor had implied that they would be allowed to practice in Ceylon, but at the time of their arrival the then Governor, Sir Henry Brownrigg was about to depart. The Lieutenant-Governor Sir Edward Barnes vigorously opposed the granting of permission of the American Missionaries, to settle and practice in Ceylon. However, Sir Henry Brownrigg overruled him, asserting that. while he still remained in the Island, he retained all the rights of governorship, and had given his consent to the Mission. Contrary to popular opinion, these 5 Missionaries were not banished to the arid north but had probably sought the region as being closest to the Indian Mainland and where a language

that was in usage in India, too was spoken. Two of their number Mr. Richards and Mr. Warren had attended the Medical College at Philadelphia and had received some tuition in the practice of medicine in the hospital of that city prior to embarking for Ceylon. They became the first practitioners of Western Medicine in Jaffna. However, their period of stay was brief for they had contracted tuberculosis and succumbed to the disease in 1821 and 1822 respectively. However in the brief period available to them, they brought Western Medicine to the people of Jaffna, where it was received in lukewarm fashion.

In the 1820s Dr. John Scudder a medical missionery arrived in Jaffna and was followed some years later by Dr. Samuel Green. They were New Englanders of the American Mission Society with its headquarters in Boston, Massachussets. It is to the dedication, enthusiasm and zeal of these 2 men that western medicine was established in Jaffna 150 years ago.

Practice of Medicine by Scudder (Slide 1)

Dr. John Scudder established his dispensary at Pandatherippu on June 18, 1820 and worked long hours attending on patients with diverse diseases and taught medicine to a few local men. Dr. Scudder performed many heroic and successfull operations in the 1820s, to quote just a few, successful plastic reconstruction of mutilated ears, amputation above the knee, excision of large tumours, and even cataract operations. These were stupendous feats in those days when there were no facilities for anaesthesia, blood transfusion and sterility as obtains today.

He and his wife had many trials. They lost 3 children in 18 months. Neither work nor calamity overwhelmed them. In 1832 he erected a dispensary building at Pandatheruppu which still stands (slide 2). A memorial tablet placed in the dispensary building by a grateful mission in recognition of his 16 years of labour in Jaffna can yet be seen (slide 3).

Dr. Scudder left Jaffna for Madras and later shifted to Vellore. Many of Scudder family lived and died in India. Dr. Ida Scudder, Founder and Principal Emeritus of the Vellore Christian Medical College was a grand daughter of Dr. John Scudder.

Practice of Medicine by Green (Slide 4)

Dr. Samuel Green sailed from Boston in 1847 and arrived in Madras on September 14th and in Jaffna on October 6th crossing the Palk Strait. Dr. Green surveyed the field. Ignorance and superstition was rife and people were in hands of untrained Physicians for medical relief. The common diseases prevalent in Jaffna are obtained from his recordings-frequent, epidemics of cholera and smallpox, fever and lung infection during dewy season, an itch of a virulent kind perhaps scabies, fever and ague with enlarged spleen which we now know as malaria, cancer of the mouth arising from habitual use of quicklime with betel quid and the wealthy died of diabetes, the effect of vegetarianism and indolence combined. He decided that for his work to be of any lasting benefit to the people, he should in his town words, 'stud the province with well educated Physicians'.

In February 1848 he set up a dispensary at Manipay (Slide 5) and organised the Mission Medical school with 7 students (Slide 6) selected from Batticota Seminary now known as Jaffna College giving iustruction in Western Medical Science in English.

The medical curriculum was based on the lines as those followed by the Medical Faculties of the American Univer-

sities. The students used standard text books of Medicne and passed an examination at the end of the course. In 1861-64 the following text books were in use (Slide 7)

1. Anatomy by Wilson
2. Physiology by Carpenter.
3. Chemistry by Constock.
4. Dispensatory by Christison and Griffith.
5. Physician's Vade Macum by Hooper.
6. Surgery by Druitt
7. Dublin Practice of Midwifery by Mansell.
8. Diseases of Children by West.
9. Diseases of Women by Churchill.
10. Medical Jurisprudence by Taylor.

The students attended the Mission Dispensary regularly and twice weekly clinic at the Friend in Need Society Hospital at Jaffna established by Mr. Ackland Dyke the Government Agent N.P. with the assistance of Dr. Green and in collaboration with the Friend-in-Need Society of Jaffna. This hospital has grown into what is now the General Hospital, Jaffna.

After successfully completing the examination the students had to gain practical experience before the certificate of qualification was issued. The first batch graduated in 1850.

To make medical education available to a wide group, Dr. Green initiated medical teaching in the vernacular which was a revolutionary idea—at least 100 years ahead of his time. He translated the standard texts and journals into Tamil.

From 1850 - 1907, the medical staff of the Friend-in-Need Society Hospital were drawn almost totally from the graduates of Dr. Green's Medical School. Few of his outstanding students were Gould, Town, Evarts, Danforth, Mills and Paul (Slide 8). They eventually manned and pioncered the Government Medical Services of the country, However, the establishment of the Colombo Medical School in 1870 resulted in the closure of Dr. Green's Medical School in 1875.

Dr. Samuel Green was a surgical giant of his days and was the first Visiting Surgeon of the Friend-in-Need Society Hospital. When he commenced surgery there was first just a trickle and then a flood of patients. This is well illustrated by quoting from a letter written by him to his brother John in January 1849. To quote ".....the number on my register today is 2544 (in 13 months). Many of these are surgical cases, one third of them or more. I have removed cataract several times, operated on strangulated hernias, amputated the arm once, removed several cancers, amputated fingers, toes, and portions of hands several times, treated a good many fracures and several burns, attended some very bad cases of childbirth ..... Last Monday I removed the left upper jaw and cheek bones for a cancerous fungus in the antrum filling the whole mouth and left nostril....." Since Dr. Green practised abdominal surgery it is likely that he brought with him the news about anaesthesia first demonstrated at Massachussets General Hospital on October 16th 1846 by Morton.

Scott and Nursing Education

Dr. Green left Jaffna in 1873 but did not return. Dr. & Mrs. Scott arrived at Manipay in 1893. Dr. Scott had qualifications in Arts, Theology and Medicine. But his biggest asset was his wife, also a doctor—the first lady doctor to serve in Jaffna. Mrs. Scott started a Nursing School, another pioneering effort at Manipay (Slide 9). The present School of Nursing in Jaffna was established only in 1960 almost 70 years later.

Jaffna Medicine 1907 - 1950

The Friend-in-Need Society Hospital administered by the Friend-in-Need Society of Jaffna as a voluntary one in 1907 came under Civil Medical Department of the Government. The Civil Medical Dept. was the successor to the Military Medical Department of the Nineteenth Century. The hospital was renamed the Jaffna Civil Hospital. The Provincial Surgeon Northern Province had his office inside the hospital. The Provincial Surgeon was a purely administrative officer and did not usually operate.

Sir William Twynam Government Agant N. P. writing on the medical institutions in 1906 has this to say to quote. "In 1848 there was not a hospital with the exception of the military and goal hospital and the so called immigration hospital in the Province. There are now besides the FINS Hospital and Dispensary, a Government Outdoor Dispensary, the American Mission Hospitals at Manipay and Inuvil, a small hospital at Karaidivu, ... hospital and dispensary at Chavakachcheri worked by the lady doctors at Inuvil, Government Hospital at Point Pedro, Mannar, Mullaitivu, Vavuniya and a hospital at Mannar Island. What were Immigration Hospitals were still kept at Pesalai, Vankalai and Pulliadirakam. And in abdition to these, there are about 15-20 village dispensaries. Good permanent buildings have been erected at the back of Fort to serve as Cholera and Smallpox Hospital. And Fort Hammonheil near Kayts has been converted into an excellent Quarantine Station.....".

Inspite of the knowledge explosion since 1920s followed by the therapeutic explosion in 1940s no significant development was observed at the Jaffna Civil Hospital during this period. A prejudice prevailed among the people against the Civil Hospital and the hospital was referred to as the Pauper Hospital.

However 3 qualified Surgeons worked at the Jaffna Civil Hospital from the mid 1920s to early 1930s. They were Dr. I. T. Kunaratnam F. R. C. S , Dr. A. H. C de Silva F. R. C. S. and Dr. Milroy Paul F. R. C. S. The total bed strength of the hospital was 200 (includiug a 6 bed ward for private patients - the Thirunavakarasu Memorial ward). The total medical staff consisted of 4 doctors in the capacity of Physician, Surgeon and Eye Surgeon and one houseman. Dr. Milroy Paul on his arrival got an experienced Theatre Sister appointed, got down a high pressure sterilizer from Colombo, trained a Theatre Attendant and did Casualty Operations even at night under petromax and torch light Dr. Paul records in 1931, post operative sepsis was uncommon in elective surgery which he felt was due to lack of overcrowding, the total lack of visitors except during prescribed hours, the strict observance of asepsis and mostly to the excellent nursing in both the Theatre and the Ward.

During this period Dr. W. Jameson dominated the medical scene from Manipay Hospital (slide 10). He was the builder of the modern Manipay Green Memorial Hospital. With his arrival in 1923 he transformed this hospital scene for the next 15 years and enjoyed tremendous popularity in Jaffna. He was an able surgeon - he performed over 500 operations annually, efficient administrator and fluent in Tamil. There was development and planned extension of the hospital. He secured grants from the Government and donations from the people and erected several buildings and built up endowments. He raised the professional standard of his assistants by sending the doctors for

post-graduate training abroad to such centres as London. Edinburgh, Berlin and Vienna. He equipped the hospital with X'Ray Plant, E C.G. Recorder, B.M.R. Apparatus and Choul Apparatus for the treatment of cancer. He attracted patients not only from Jaffna but from all over Ceylon.

Jaffna Medicine 1950-1978

Rapid expansion and development commenced in the 1950s in the Government sector of the Health Services of Jaffna. With the appointment of specialists, to the basic and sub specialities, Jaffna Civil Hospital became a General Hospital. In the 1960s Jaffna General Hospital was a recognised centre for Post-Graduate training of doctors for the final examinations of the Royal Colleges of England.

Many Surgeons and Physicians followed in the trail of Dr. Samuel Green with the gradual development of surgery and gynaecology in the province.

However, medical practice in Jaffna seems to have been confined to the treatment of Physical ailments.

Psychiatry was not given consideration or the importance it deserved. Psychiatric illness remained largely submerged in the population until 1966 when the first Psychiatric Unit was opened in Jaffna. Until this time patients had to travel to Angoda Hospital which was over-crowded. The term Angoda became a term of abuse and synonymous with insanity. In fact, most psychiatric patients remained in Jaffna. A few were perhaps treated inadequately by Physicians qualifield in western medicine but the majority were treated by Ayurvedic Physicians, spiritualists and faithhealers. A popular method of treatment employed included ritual baths after which the disturbed patient was mercilessly assaulted to quieten him. It is difficult to imagine that this state of affairs was prevalent up till only 15 years ago.

From the start ot the Psychiatric Unit in Jaffna there was a rush of patients who were admitted voluntarily into 2 hospitals at Pt. Pedro and Kankesanthurai. A special mention must be made of the pioneer Psychiatrist the late Dr. T. Arulampalam who worked relentlessly to popularise Psychiatry and dispel false beliefs and misconceptions. In his first year he treated 9000 patients. He gave several talks to the public—about 40 talks in 4½ years. He established a society called 'Friends of the Psychiatric Unit at K. K. S' to encourage welfare of the mentally ill patients.

This was a period of time when Community Hospitals developed by the people on a co-operative basis became popular. The most Important hospital in this category was Moolai Co-operative Hospital. From 1950s until early 1970s this hospital was the scene of much development and popularity centred around the personality of Dr. N. T. Sampanthan FRCS. The Co-operative Hospitals are now failing probably due to poor management.

The Present Jaffna General Hospital.

The increased health needs and demands brought about in the Jaffna General Hospital extensions and costructions of new buildings without a comprehensive long term plan resulting in a clumsy overcrowded hospital.

The impact of social and political changes and the rising cost of drugs, hospital equipment and consumable items began to have an effect in the health services. It has now become a common occurrence for many to be told that treatment cannot be given or operations carried

out due to shortages of various sorts. To make matters worse, there has been a large scale migration of doctors to other countries from about 1968, and more recently of nurses and para-medicals leaving grave deficiencies. Despite vast advances in medicine in the past 20 years, it would be correct to say that the quality of patient care has not improved appreciably.

Dr. J. F. Stokes W. H. O. Consultant in Medical Education who was in Sri Lanka in 1979, in his Stokes Report speaks of Jaffna Hospital as a hospital that has run down. He comments that the hospital is not clean, security poor with a general laek of administration and seriously deficient nursing staff. He concludes that Jaffna Hospital is unsuitable for Post Graduate education at present.

Present Health Needs and Demands.

For the purpose of ranking health needs and demands with regard to their importance to the population 3 major problems groups have been indentified.

1. Demographic problem.
2. Disease control problem.
3. Problems of demand for medical care.

It is clear that such a breakdown is more or less artificial, since all these 3 categories of problems are interlinked very closely. However from the point of view of quantification of problems such a division is very convenient.

1. Needs arising from population dynamics. (Table I). The distribution of population by age and sex influences the special distribution of health services and size of the health problem. The proportion of population between the ages O - 14 and over 65 shows an increase in comparison to the proportion in the age group 15-65 years, over the years (slide 11) This tends to increase the dependency ratio and the health problems pertaining to these groups.

2. Disease Control problems or the problems arising from the spread of diseases. In this area improvement of environmental sanitation especially water supply, sewerage disposal and vector control and preventive health technology will reduce the problem. In the rural Jaffna District 91·2% of the households obtain their water from open wells - 58% of these wells are shared and therefore are considerably exposed to the risk of pollution (Table II). For the district as a whole 49% of the houses do not have any toilet facilities while the situation is worse in rural areas with 57% of the households being devoid of any latrines. (Table III)

3. Problems of demand for Medical care. Any citizen of Sri Lanka has the option to express his demand for medical care services either to Government or private sector; and in each sector; he can choose between Western medicine and Ayurveda. In the private sector there are also homeopathic doctors and quacks. (Table IV)

Although the district is well served with medical institutions, the General Hospital is over crowded providing even primary health care (Table V). The smaller institutions are under utilised due to lack of basic facilities and lack of proper referral system. The relationship between the health problem areas and health functions by the Health Care system are shown in Table VI.

Criteria for Selection of Priority Health Problem

(Slde 14) In making decisions to give priority to some Health Problems

and pay less attention to others we are guided by several criteria based on different aspects of the health problems. The order of importance of these criteria as I see it is as follows:-

1. Leading causes of morbidity.
2. Leading causes of mortality e. g. heart diseases, Diarrhoeal diseases.
3. Diseases showing increasing trend e. g. Cancer, VD, Road traffic accidents.
4. Diseases for which there are effective and relatively inexpensive control and treatment measures available e. g. Vaccine preventable diseases, Polio, whooping cough, Tetanus, T. B. and prevention of deaths from diarrhoeal diseases by popularising oral rehydration solutions.
5. Diseases of primary concern to the community e. g. Heart diseases, Poliomyelitis.
6. Problems related to Government policy e. g. Malaria will have adverse effect on the government's Mahaweli Development programme.
7. Diseases having negative influence on socio-economic Development in the country e. g. Malaria, heart diseases.
8. Diseases which adversely affect the image of the country—trade, tourism e. g. cholera, Malaria.

Morbidity

Infectious diseases still dominate the morbidity pattern. The trend of Morbidity Rates of the common infectious diseases treated at Govt. Hospitals from 1950 - 1980 is shown in Slide 12.

Mortality

There are 2 reasons why a study of the patterns and causes of mortality may be important. First, mortality is a useful indicator of the major health problems of community. Unlike morbidity which is difficult to define and measure, mortality is more readily identified and easily counted. Second, our understanding of the epidemiology of mortality is fundamental to effective health planning. The trend of mortality rates of the leading causes of death from 1950 - 1980 is shown in Slide 13.

Leading causes of death today are heart diseases, accidents and suicides, Diarrhoeal diseases and diseases of infancy and immaturity. Malignancies show an increasing trend. (Table VII).

Medical School - Jaffna University 1978.

With the intention of increasing the out - put of doctors to meet the needs and demands of the country 2 new medical schools were established in Sri Lanka at Jaffna and Galle. Jaffna has thus once again became a centre for medical education. The Jaffna medical school started functioning by admitting the 1st batch of medical students in a temporarily acquired building at Kaithady designed for an Ayurvedic medical school, (sited 5 miles away from the University and Hospital centre) for the pre - clinical studies in 1978. After effecting make shift arrangements in the already congested Jaffna Hospital, the batch of medical students moved into Jaffna Hospital for the clinical and para clinical studies in June 1980.

As a consequence of the establishment of Jaffna medical school, Jaffna Hospital became elevated to the status of a Teaching Hospital. The change of title means nothing unless changes necessary to effect its new role are implemented.

In the teaching hospitals 3 types of outputs are possible-

1. **Patient Care** - The patient health state can be changed for the better.

2. **Teaching** - The provision of care presents the opportunity to pass knowledge on to others.
3. **Research** - The provision of care presents the opportunity to develop new treatment or improve existing ones.

Adoption of teaching status brings about three groups of changes -

Group 1 - Extra resources are required to facilitate the teaching and research outputs e. g. extra rooms, extra power

Group 2 - Therapy may be slightly modified in order to meet teaching and research objectives e. g. extra diagnostic tests may be requested, patient's stay may be lengthened.

Group 3 - More advanced facilities and highly trained staff provide the scope for the pursuit of more complex, more advanced treatment.

The facilities in the Medical School and the associated Teaching Hospital in the way of buildings, personnel and equipment must be upgraded to a standard of medical education and patient care that is in keeping with the needs of the society and the aspirations of the personnel in service.

Under-Gaduate Medical Education.

The objectives of medical education have changed through the ages and is still changing. The present trend is to make medical education relevant to meet the needs and demands of the society. It should be also inconsonant with the times we live.

The age old system of apprenticeship led to a system of clerking and dressing in the wards where the physicians and surgeons imparted the clinical skills and knowledge by the bed side. This has been the foundation on which the British System of Medical Education has been built over the years. We have adopted this system to our advantage and every effort should be made to preserve the system. The trend is moving towards an integrated, interdepartmental patient orientated teaching.

Work in hospitals alone emphasises solely on disease, diagnosis and therapy against promotion of health and prevention of disease that work in the field with communities and families would entail. This is more important today since the young doctors do not want to take to Community Medicine as a career speciality because of the gross disparity of the earning pontetial between a hospital oriented doctor and a Community Physician.

The curriculum should be designed to train doctors who would be competent in clinical and community medicine to staff the future Integrated Health Services of the Health Centre Innovation with the Teaching Hospital as a referral centre along with the other upgraded base hospitals.

Since the under graduate training will not include the entire body of knowledge necessary, the students should be trained to seek knowledge actively by themselves.

Student research should be encouraged and facilities provided for continuing medical education after graduation. Tutory style of education should be discouraged as it denies the doctor passing out the impetus for continued medical education.

Post-graduate Medical Education.

The major eause of frustration in young doctors here is the lack of facilities

for continuing medical education. This results in the emigration of many bright and enthusiastic students and is an important cause of 'Brain Drain'.

The establishment and functioning of the Post-graduate Institute in Colombo brings in a series of Post-graduate examiation. In themselves they are mere paper degrees. The Institute has recognised the importance of a proper course of Post-Graduate Medical Education initially in the four University towns of Colombo, Kandy, Galle and Jaffna and later extending it to other provincial capitals. But any such programme must be implemented within the existing hospital system. However good the course and however excellent the teaching, Post-graduate medicine cannot be learnt unless such medicine is practised in the Wards. It goes without saying that the University Centre with its associated hospital must be upgraded by way of buildings, trained personnel, equipment and library facilities in keeping with the standards for Post-graduate Medical Education and should encourage research in both basic and clinical medicine and should become a referral centre for the region.

In the training of Specialists in the various disciplines of medicine it is necessary to make use of the technological advances we have today in the diagnosis and treatment of patients. The question often asked today is whether such advanced instruction is necessary for those who work in this country. An important point in favour of such instruct ion is that unless there are doctors who are aware of the advances, we shall never know how far away from this we are and as a consequence no improvement in the Health Services will occur.

Medical Research.

The importance of research in the field of medicine is only too well known to need emphasis. The goal of medical research should be directed towards solving the health problems relevant to the country. But to my mind, the most important aspect of training in research is the acquisition of the methodology and the discipline which are necessary for one's continued medical education.

Whilst we are on the subject of medical research I would refer to a matter which may appear somewhat trivial and unworthy to address our attention on this August occasion. I refer to the need for the proper maintenance of the clinical records of patients in hospital. I think you will agree that our maintenance of records leave much to be desired. If we are to take part and make our contribution to medical research the proper maintenance of such records is a sine-quo-non. Documentation, filing and retrieval systems should be well developed.

Ladies and Gentlemen,

We have come 150 years from the times of Scudder and Green, when infectious diseases dominated the scene, when the out look of medical men were befogged by miasmata and other emanations, when epidemics of cholera, smallpox and malaria were frequent bringing in their trail infirmity and death.

The land marks in medical progress over the years have reduced the infant mortality rate, maternal mortality rate and crude death rates (Table VIII). Today Jaffna is reported to have the lowest infant mortality rate in Sri Lanka (Slide 14). Perhaps, the low infant mortality rate recorded in Jaffna (21 per 1000 births) (National rate - 36/1000 births) compared to the other districts is due to wrong compilation of statistics. Jaffna mothers living outside the district generally return

to Jaffna for their confinement thereby increasing the denominator used in the calculation of the infant mortality rate. The increase in the expectation of life (Table IX) resulting from the control of infections meant that people were surviving, to suffer diseases of middle and old ages. Such diseases like C. H. D and degenerative diseases are immensely complex and are attributable not to a single noxious agent such as a micro - organism but to a combinatian of risks and factors closely connected to the structure and values of society. The consequence of these diseases unlike the swift dcath brought by the scourges and infections was to place a chronic burden on the society that created them. The success of the public health movement has brought a new challenge resulting in the metamorphosis of Public Health into Social Medicine and recently to Community Medicine. Hitherto hidden illnesses such as heart diseases have assumed increasing importance and today heart disease is reported to be the leading cause of death in Sri Lanka

Historically progress in medicine has followed 2 lines. The first line of progress was by observation and description of diseases. This method has reached its zenith by the middle of the 19th Century. When Scudder and Green arrived here they were quick to observe a disease profile different from that was prevalent in their country. They adapted measures for the treatment and prevention of these diseases and thereby popularised Western medicine in this area. The second line of progress was by clinical experiment and research. These two lines of progress should be fostered and preserved, in our medical education, for the progress of medicine in this country.

Traditionally medicine has been viewed as the art of healing the sick. To this role has been added, in more recent times, the prevention of specific diseases. Recently, however a broader concept has been emerging in many counries - that of improving the quality of life. This is a concept that is embodied in the W. H. O. constitution which defines health as a state of complete physical, mental and social well being and not merely, the absence of disease or infirmity.

The Cross Roads.

Having traced the history of medicine in Jaffna from early part of the last century, we must rationally plan the direction for the future. There are 3 options open to us. The first course is to disseminate medical skills to the community. The secnnd course is to meet the demands of the society.

The third direction is to centralise and develop centre of learning and expert medical care. It is pertinent to point out that Sammuel Green attempted to develop all these lines of action (Slide 15)

Now 70% of the population live in rural areas and we could in the words of Samuel Green 'Stud the province with educated Physician'. This is intended to deliver primary health care and improve the health status of the majority of people This idea has been more recently advocated by persons such as David Morley of the Dept. of Tropical Child Health in London.

40% of the diseases seen in our hospital are preventable by the application of preventive health technology at low costs. Therefore a well organised preventive health system will render a higher quality of life to the people.

Health Technology is an important aspect of any health system and has to be made available to those in need. Health Services in future should be developed, centred round a New General Hospital which will function as the main teaching centre and as a referral centre for the region.

The Medical profession cannot remain complacent in only meeting the needs and demands of the society. Then we will be drifting in the horizontal direction from the cross roads. The vertical path of progress leading to better health services, in keeping with the times can only be pursued, if the academic and professional standards are improved, by better patient care, research and better medical practice. This means that the Jaffna medical School and its associated hospital should be a centre for training of doctors of high quality both at the undergraduate and Post graduate levels. It is the obligation and responsibility of the Teachers and consultants to ensure this and maintain high standards.

Sri Lanka has had a tradition of training doctors of good quality able to fill the vacancies in many parts of the globe. We should not allow these standards to fall. There is a romantic notion among certain people that we should retrace the course of action taken by China. But we live in a different context. We have a long heritage of good medical education. So a solution worked out for a country like China cannot be applied here.

John Scudder and Samuel Green have left a tradition of pioneering efforts, scholarship and service to the profession which should be preserved and followed.

Members of the Jaffna Medical Association-

The present is a time of considerable importance in the history of our Association. The establishment of the Medical School in Jaffna in 1978 has not only increased the number of participants in the activities of the Association but has imposed a responsibility to share in the under graduate medical education and continuing medical education of the doctors in the region. Of great importance to the J. M. A is the establishment and functioning of the Post Graduate Medical Institute in Colombo still in its infancy. Jaffna Medical Association has the responsibility to encourage post graduate medical education by improving standards of medical practice and not merely organising classes and courses.

The future is a matter of crucial concern to all of us. By creative thinking nurtured by experience we can plan for the future judiciously, directing our efforts to achieve our objectives. Let us make a joint effort, based on good will and understanding to make the future meaningful and rewarding for us all.

TABLE — 1

Age Distribution of Population

% Distribution

Age Group	Total
0 — 14	38.91
15 — 24	20.73
25 — 34	13.27
35 — 44	10 34
45 — 54	7.59
55 — 64	4.86
Over 65	4.24

TABLE — 2

Occupied Housing Units in Jaffna District by Source oi Water Supply (Per Cent)

Source of Water Supply	All Sectors	Urban	Rural
Piped Water ...	7.1	17.4	2.7
Well ...	87.1	77.3	91.2
Others ...	2.0	1.5	2.2
Unspecified ...	3.8	3.8	3.9
Total ...	100.0 (127,608)	100.0 (37,958)	100.0 (89,650)

TABLE — 3

Occupied Housing Units in Jaffna District Classified by Type of Latrines (Per Cent)

Type of Latrine	All Sectors	Urban	Rural
Flush Toilets ..	3 . 7	5 . 7	2 · 9
Water Seal ..	18 · 7	18 · 7	18 · 8
Bucket ..	8 · 9	27 · 1	1 · 2
Pit ..	16 · 9	16 ' 1	17 · 2
None ..	49 · 0	30 . 0	57 · 0
Not specified ..	2 · 8	2 · 4	2 · 9
Total	100 . 0 (127,608)	100 · 0 (37,958)	100 · 0 (89,650)

TABLE — 4

Demand for Medical Services by Sector of Health System. National Socio - economic Survey Department of Census and Statistics.

Sector		% of Expressed Demand
Govt. Sector	— Total	54 · 5
Western		49 · 4
Ayurveda		5 · 1
Private Sector	— Total	40 · 2
Western		24 · 9
Ayurveda		15 . 3
Unspecified		5 . 3
	— Total	100 . 0

TABLE — 5

Distribution of Govt. Medical Institutions in Jaffna District.

Category	Institution	Number
Tertiary Health Care	General Hospital	1
Secondary Health Care	Base Hospital	1
Primary Health Care	District Hospitals	6
	Peripheral Units	9
	Rural Hospitals	5
	Central Dispensaries with Maternity Homes	12
	Central Dispensaries	22

TABLE — 6

Relationship between Health Problem Areas and Health functions.

Health Problem Areas	Health Functions
1. Population Dynamics	Maternity Child Health Family Planning School Health Curative Services Geriatrics Health Education,
2. Disease Control	Curative Services Tuberculosis Control Malaria Control Leprosy Control Veneral Diseases Control Control of other communicable diseases Environmental Sanitation Health Education.
3. Demand for Medical Care	Curative Services — Primary — Secondary — Tertiary Health Education.

TABLE 7

Leading Causes of Mortality in 1966 and 1976 showing the Rate Per 100,000 population

1966			1976		
Rank	**Cause**	**Rate**	**Rank**	**Cause**	**Rate**
1.	Diseases of Infancy & Immaturity	99 . 6	1.	Heart Disease	68 . 5
2.	Diarrhoeal Disease	19 . 3	2.	Respiratory Disease	64 . 0
3.	Heart Disease	60 . 2	3.	Accidents & Suicide	61 . 8
4.	Respiratory Disease	53 . 0	4.	Diseases of Infant and Immaturity	58 . 4
5.	Accidents & Suicide	46 . 7	5.	Diarrhoeal disease	56 . 5
6.	Anaemia & Malnutrition	38 . 7	6.	Anaemia & Malnutrition	38 . 9
7.	Malignancies	26 . 7	7.	Malignancies	31 . 8
8.	Other Infectious Diseases	20 . 8	8.	Other Infectious Diseases	15 . 9
9.	Tuberculosis	15 . 0	9.	Tuberculosis	11 . 1

TABLE — 8

Vital Statistics — Sri Lanka

Year	Death Rate	Infant Mortality Rate	Maternal Mortality Rate
1881-1890	23.97	158	—
1921	31.13	192	21.0
1931	22.06	158	20.8
1941	18.77	120	15.3
1945	21.6	140	16.5
1950	12.6	82	5.6
1955	10.8	71	4.1
1960	8.6	57	3.0
1965	8.2	53.2	2.4
1970	7.5	47.5	1.5
1975	8.5	45.1	1.0
1977	7.4	42.4	1.0
1980	—	36.4	0.8

TABLE — 9

Expectation of Life at Birth — Sri Lanka

	1920-22	1946	1953	1962	1967	1971
Males	32.7	43.9	58.8	61.9	64 8	64.2
Females	30.7	41.6	57.5	61.4	66.9	67.1

Source: Department of Census & Statistics.

The use of uterine stimulants in General Practice Obstetrics in Jaffna

Dr. S. S. Senathirajah,
M. B. B. S. (Ceylon), D. C. H. (London), M. R. C. O. G

Fellow Members, Ladies and Gedtlemen,

One year ago, you honoured me by entrusting me with the august position of our association. It was with much trepidation and anxiety that I accepted it. It was all the more awesome because the period saw the gradual establishment of a medical school in Jaffna and an interim period in the history of the Jaffna Medical Association when we decided to register our association to give it a legal personality. The fact that I have to deliver a Presidential address at the end of the term gave me still more anxiety. I have tried my best to fall in line with the call of office and I crave your forgivenness if I have not come up to your expectation.

I have chosen the subject of The Use of Uternine stimulants in General Practice Obstetrics in Jaffna. I have chosen this subject to pin - point the fact that uterine stimulants have got to be used with utmost circumspection when there are no facilities to do a Caesarean section in the event of a failed induction. The facilities available in private practice in Jaffna are so inadequate that it is futile to start a systematic study in any branch of medicine, let alone obstetrics. The lack of adequate, qualified and trained and above all dedicated staff puts off any research worker. Secondly, the cost of maintaining a private nursing home with adequate staff and facilities is prohibitive. Thirdly, the average mother in Jaffna can ill-afford the nursing home charges. This is only to show you that the mothers admitted for delivery in my nursing home are highly selected because only mothers with normal pregnancies are admitted.

By normal I mean :

(a) a primigravida who at term has an engaged foetal head, who has no pre - eclampsia or the HOP syndrome, essential hypertension, diabetes, obesity, is not elderly, who has had no previous consecutive abortions and who is not Rh negative.

(b) a multipara who has not had a Caesarean section, no post - partum haemorrhage unexplained still - births and not had instrumental delivery.

(c) Any gravida without signs of post - maturity, without ante - partum haemorrhage and without malpresentation including breech. Twins of average size are booked for delivery after excluding by X - ray more than two foetuses. This care in selection is to ensure maternal and foetal safety and to avoid unnecessary distress to me.

The essential difference between pregnancy and labour is the conversion from a non - progressive uterine activity into a progressive uterine activity. Once that conversion has taken place we can accelerate the process reasonably easily by amniotomy. But amniotomy alone cannot be considered as a reliable means of promoting labour, but only as a means of precipitating (accelerating?) the very

earliest stages of the parturition proccess (Beazley 1975).[1] That is, amniotomy does not convert a non-progressive into a progressive situation. The conversion is probably chemical; and whereas we can accelerate labour easily, we can induce labour only with difficulty, If we have reason to belicve that the conversion will not be easy we should be circumspect before we set out to induce labour (Beazley 1975).[2] This warning is all the more appropriate in general practice obstetrics.

The uterine stimulants available are (a) oxytocin (b) Prostoglandins F 2 a and E 2. The final common event (Marshall 1973)[3] in the action of all myometrial smooth muscle stimulants involve the release of calcium ions into the cytoplasm of cells where it reacts with myometrial contractile protein to cause contraction Eigl. It has been shown that the ability of oxytocin to inhibit binding of calcium ions to the sarcoplasmic reticulum increases 10,000 fold during pregnancy and 100 fold for prostoglandin (Carsten 1974)[4]. This may explain why the increase in sensitivity of the uterus to oxytocin during pregnancy is much greater than that to prostoglandin. From the above it is also evident that oxytocin and prostoglandin inhibit the A P T action and thereby increase the level of free calcium ions in the cytoplasm enhancing contractility.

Although oxytocin and prostoglandin overtly have the same net effect, there are clear differences :

(a) The lag phase between starting an effective dose of prostoglandin and commencement of uterine activity is longer than with oxytocin.

(b) Cessation of an infusion of prostoglandin generally results in a much more gradual decline in uterine activity than with oxytocin.

(c) doubling the dose of prostoglandin administration generally has a much less dramatic effect on uterine activity than doubling the dose of oxytocin infusion.

Thus, in some ways the prostogalandins appear to have a much less fiercer action on the uterus than oxytocin.

The prostoglandins are local hormones being rapidly broken down in lung and liver (Karim & Hillier 1979).[5] The level of prostoglandin in the amniotic fluid rises as pregnancy advances, A further and much larger increase occurs during labour-about 10 to 30 fold and even 80 fold (Hillier et al 1974).[6] In pharmocological use therefore, postoglandins have to be given in high dosage intravenously with resulting unpleasant side effects. Because of this, prostoglandins are being used to induce labour by local intra—uterine extra-amniotic infusion. A foley catheter is introduced through the cervix, its tip lying just within the internal os and PGE 2 solution instilled into the extra-amniotic space in a dose range of 1-3ug/ml. When the cervix is effaced and 3 cm or more dilated, amniotomy may be performed. If one hour after amniotomy uterine contractility is inadequate it may be supplemented with intravenous oxytocin. Recently PGE2 in the form of vaginal pessaries has been used in induction of labour with success. It could be used even after the membranes have been ruptured.

Comming to my practice it is obvious that prostoglandins are not available in Sri Lanka and even if made available it is beyond the means of an average mother. Therefore I am left with only oxytocin. Oxytocin appears to be secreted into the circulation in spurts by the posterior pituitary gland in the course of spontaneous human labour (Gibbens. Boyd & Chard 1972).[7] But no attempts have been

reported to utilise the phenomenon in clinical practice. The most commonly used method is infusion through a gravity fed intravenous infusion set. Because of the difficulty in controlling the drip rate a great variety of motor driven infusion pumps are commercially available in the west.

The most advanced infusion set suitable for oxytocin administration was devised by Francis, Turnbull and Thomas in 1970.[8] This infusion set combines the advantages of a positive pressure peristaltic pump with those of an easy automatic or manuel regulation of the dose rate.

I have used oxytocin for two purposes :

(a) induction of labour at term

(b) augmentation of labour

The indication for induction in my practice in prolonged pregnancy of not more than 14 days. Definite cases of postmaturity are not induced by me for obvious reasons. The main reason for the use of oxytocin in my practice is for augmentation of labour.

The induction of labour and augmentation or acecleration of labour I practice cannot be included in active management of labour. Active management means a comprehensive policy. It is a concept and not a technique. It is based on a premise that the limitation of duration of labour to a maximum period of twelve hours is to the benefit of the mother, to the benefit of the child and to the benefit of the attendants, particularly the nursing staff and to the benefit of the hospital administration as well. But, it does involve active participation by the consultant staff in the delivery unity on an hour to hour basis. It dose involve them becoming interested in labour from the beginning and not after complications have arisen. Prof. O'Driscoll of Dublin who advocates this policy of active management of labour says that it is important to realise that the complications of labour almost always arise after the patient has been admitted. That is they arise in hospital. Hence, in any case, whether actively managed or not, the essential points in the practical application are :

(a) Diagnosis: A patient's diagnosis of labour should never be taken for granted. It should be confirmed by objective evidence.

(b) Progress in labour should be measured in terms of dilatation of cervix alone. Progress should not be measured by the reaction of the patient or the impression of the nurse.

I personally do not believe thet ripe cervix means that the gestation is at term. Anderson and Turnbull[9] have shown in 1968 that the process of cervical ripening starts as early as the 34th, week and quite often the cervix is found ripe at 34 to 36 weeks gestation. I do not attempt SURGICAL induction of labour in a primigravida only on a finding of ripe cervix. Once you start the process of surgical induction then it has to be carried to the finish which may mean Caesarean section for failed induction. This is a demoralising event to a primigravid mother particularly in private practice. I do rupture membranes only when the contractions are established and that too when the contractions are decreasing in efficiency when augmentation with oxytocin is also started :

I have deliberately omitted mentioning the use of oxytocin in abortion and premature and pre-term induction as these procedures have to be carried out under supervison in well equipped Hospital or Nursing Home. In my practice I always

use the gravity fed oxytocin titration method. Intra-buccal and intermittent half-hourly intramuscular injections have no place, because they produce unpredictable effect on the uterus and can endanger the life of the foetus. I start with 2.5 units of oxytocin in a pint of dextrose 5% and 5ml. of 10% calclum gluconate. The rate of infusion is set at 15 drops a minute for fifteen minutes and then the rate is increased gradually at fifteen minutes intervals to 20 to 24 drops a minute depending on the uterine response. If the respouse is not satisfactory the balance 2.5 units in the ampoule of 5 units is added to the infusion bottle and the rate is set at 15 drops a minute and then gradually increased as before. I have never needed and not used oxytocin in drip infusion at a strength more than this. If labour did not start within four hours, the infusion is stopped for the day. *(Table 1)*

You would thus appreciate that I have used oxytocin mainly to augment labour and that too in very selected mothers. I have had no untoward effect or complication like uterine tonicity, accidental haemorrhage or foetal death in utero. In fact by accelerating labour in these mothers I have only helped them out of prolonged labour and the mothers after acclerated labour beamed with thanks and appreciation.

I feel it is not out of place if I mention the present trend in doctor patient relationship in the west. The doctor-patient relationship has undergone a radical process of change. It is now a case of Professional-consumer relationship. Consumer assessment is now accepted as being an important part of the complete evaluation of a service. Although we are not faced with this problem now, yet it is wise to know the trend of things to come. The management of labour has important psychological implications for, and effects on, the mother and her infant which the professionals involved should be aware of. Patient satisfaction is an important, if hitherto neglected, aspect of patient care and it will continue to increase in the future. The study of Nadelson (1973)[10] and Bardon (1973)[11] showed that even now some doctors and nurses in the U. K. and the U. S. A. may fail to understand or meet the social and psychological needs of mothers during labour. The comments of mothers who were not satisfied with the doctors and nurses related mainly to the manner in which care was given rather than the technical competence of the staff. Therefore bearing this in mind, when I select my mothers for induction or augmen tation of labour, I assess whether I can give the mother the attention and care she needs in my nursing home.

Table I

Mothers admitted for delivery during the year 76/77

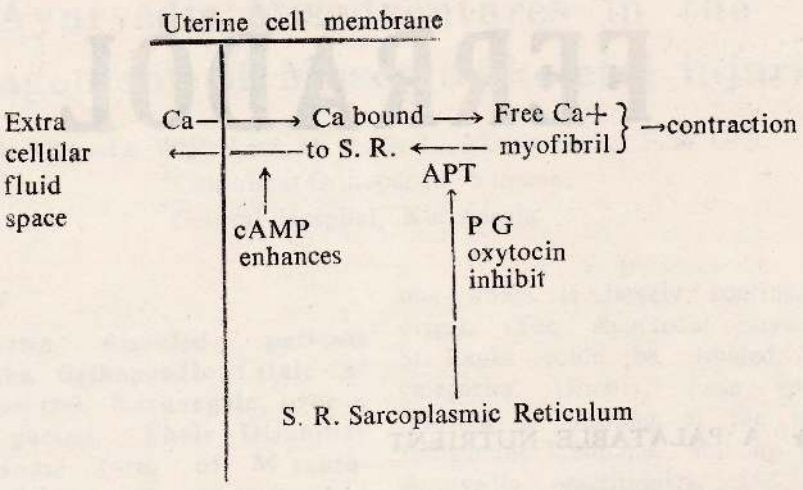
Number admitted	194
Number induced	11*
Number delivered	6
Number accelerated	23
Number delivered	23

Induction — Delivery Interval ranged from 8 - 16 hours

Acceleration - Delivery interval ranged from 2 - 6 hours

* Out of the five who did not go into labour at the time of induction. three went into spontaneous labour on the second day and delivered normally. Table 1.

Fig. 1



Acknowledgement

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Ayurvedic Misadventures in the Management of Musculo-Skeletal injuries

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SUMMARY

Ninety-two disabled patients attended the Orthopaedic Clinic at General Hospital, Kurunegala, over a two year period. Their Disability followed some form of Musculo-skeletal Injury. All of them had received Ayurvedic treatment soon after the injury. 63% had a severe degree of functional impairment, while 7% had total loss of the use of whole or part of a limb. Two amputations became necessary as a direct result of the initial Ayurvedic Treatment.

The injuries and their presenting complications are analysed. Both the delayed orthopaedic treatment given and the orthopaedic treatment that the patients would have received had they been seen soon after injury is discussed and the prognosis compared.

Only six patients returned to the pre-injury state after delayed treatment while eighty-six remained disabled for life.

It is concluded that initial mismanagement of their injuries by the Ayurvedic Physicians is the cause of the disability in these patients.

The Ayurvedic system is one of the four different systems of medicine practiced in Sri Lanka today. The others being Allopathy, Homeopathy and Acupuncture. The Ayurvedic system is one which is largely confined to the orient. The Ayurvedic physicians in Sri Lanka could be divided into two categories. Firstly, those who have received a training at the school of Indigenous Medicine, and are registered Ayurvedic practitioners, and secondly, those whose knowledge is inherited, from the father or an uncle. Their knowledge is handed down verbally and is traditionally done by the teacher on his death bed. Hence whatever knowledge that is handed down is often incomplete. They are not registered ayurvedic practitioners. They however, form a large proportion of those who indulge in the management of musculo-skeletal injuries.

The methods adopted by the ayurvedic physicians in the treatment of musculo-skeletal injuries were obtained from patients who attended the orthopaedic clinic in Kurunegala, and who had earlier received ayurvedic treatment. The methods were as follows:

(1) The application of oils to the injured region. These oils are extracted from medicinal plants, and its application is often accompanied by massage, and passive stretching of the joints.

(2) The local application of a preparation termed a "Pattu". It is prepared from the bark and leaves of plants minced into a powdery

form. A "pattu" is also applied over the injured area and is held in place by a cloth bandage.

(3) Application of wooden splints. Thin strips about 2 to 3 cms. broad, carved out from the bamboo stem are applied around the circumference of the limb (Fig 1). They are held in place by cloth bandages. In this manner a limb is immobilised.

(4) In a few cases of fractures, a mixture made from the powdered bark of the tree Terminalia arjuna (Kumbuk) and cows milk had been administered orally.

It is still an established practice amongst the rural folk of this country to consult an ayurvedic practitioner for treatment soon after an injury. This study was undertaken because a number of patients attended the Orthopaedic clinic in Kurunagala, disabled, after having received ayurvedic treatment initially, for bone and joint injuries. The purpose of this study is to analyse the injuries of these patients and assess their prognosis after delayed treatment in a hospital, and to compare this with the prognosis if treatment had been carried out in a hospital at the first instance.

METHOD :

Ninety-two patients were studied over a period of two years ending 15th May 1980. They had all sustained some form of bone or joint injury, and had been first seen by an Ayurvedic physician. The length of time they underwent this form of treatment ranged from two weeks to nine years.

A clinical assessment of the degree of disability, at the first consultation in an Orthopaedic clinic, ie. after ayurvedic treatment, was made and the patients were graded into four categories.

Grade I :- Patients in this group presented because of deformity only and did not complain of any disability. These patients were however, disabled to a mild degree, that is, they were capable of managing their own affairs as before, but were not able to perform skilled or complicated manouvres with the affected limb.

Grade II :- These patients were disabled to a moderate degree. They were able to manage their own affairs either by making use of the unaffected joints to overcome their disability or by totally eliminating a particular movement.

Grade III : The patients in this group were severely disabled, not able to attend to their routine affairs unaided or without suffering severe pain,

Grade IV :- These patients had suffered total loss of the use of either the whole or part of a limb.

RESULTS :

In Table I, the age incidence and the extent of their disability is shown. Table II indicates the nature of the injuries, the presenting complaint, the ayurvedic treatment received, the delayed orthopaedic treatment given if any, and the results of such treatment. It also offers a comparsion with the orthopaedic management that those patients would have received if they were seen soon after the injury. Table III summarises the results of delayed surgical treatment that was given to some of the patients.

DISCUSSION :

Twenty-eight (30%) of the patients examined were grouped as having a mild or moderate degree of disability (Grade I and II). Seventeen of them, that is, those with Grade I disability attended the clinic only for cosmetic reasons. On

TABLE I

AGE (Yrs)	No. of Cases	%	Disability Grade			
			I	II	III	IV
0—10	10	11	2	1	5	2
11—20	22	24	3	2	13	4
21—30	23	25	4	1	18	—
31—40	13	14	3	—	10	—
41—50	12	13	3	3	6	—
51—60	6	6.5	1	1	4	—
61—70	6	6.5	1	3	2	—
Total	92	100%	17 (18%)	11 (12%)	58 (63%)	6 (7%)

Figure 2 (a) Myositis Ossificans of Elbow

Figure 2 (b) Myositis Ossificans of Elbow

Figure 3 (a) Postero - lateral Dislocation of the Elbow Joint

Figure 3 (b) ,, ,, ,,

Figure 3 (c) ,, ,, ,,

Figure 4 (a) Fracture - Dislocation of Elbow Joint

Figure 4 (b) ,, ,, ,,

Figure 5 Supracondylar Fracture - Humerus

Figure 6 Monteggia Fracture Dislocation

Figure 7 Non - Union of Humeral Fracture

Figure 8 Fracture Forearm Bones with Cross - Union

Figure 9 Fracture Forearm Bones with Non - Union and Angulation

Figure 10 Old Dislocation of MCP Joint of Thumb

Figure 11 (a) Old dislocation of the hip

Figure 11 (b) Old dislocation of the hip

Figure 11 (c) Old dislocation of the hip with formation of a false acetabulum

Figure 12 Supracondylar femoral fracture with severe displacement

Figure 13 13 year old boy who presented with gangrene of his toes and foot after applying ayurvedic medicines to his injured leg. He had a tibial fracture which was undisplaced.

Figure 14 Xray of a 10 year old boy with a dislocated elbow who was admitted after ayurvedic treatment with gangrene of the hand. Gas shadows are seen in the soft tissue.

Figure 15 A greenstick fracture of the radius in a 12 year old boy who had taken ayurvedic treatment resulted in Volkmann's ischaemina.

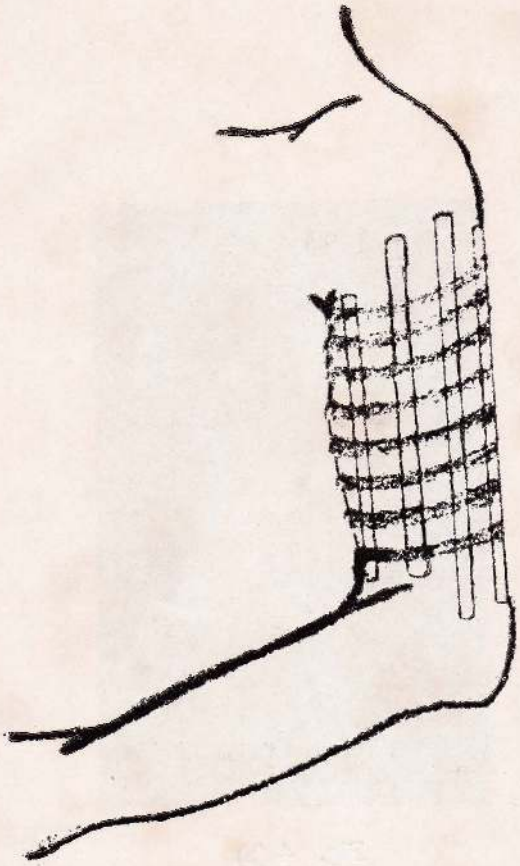

Fig 1

Fig. 2 (a)

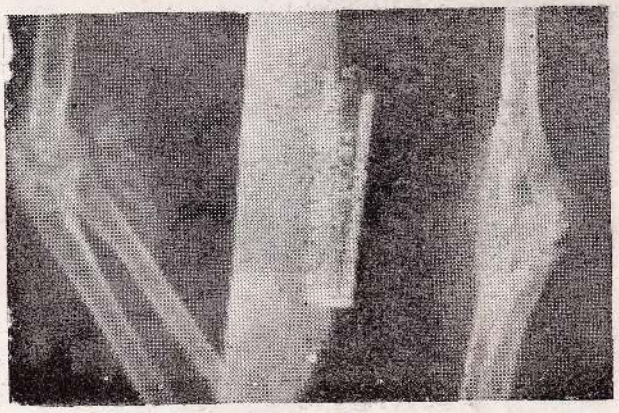

Fig. 2 (b)

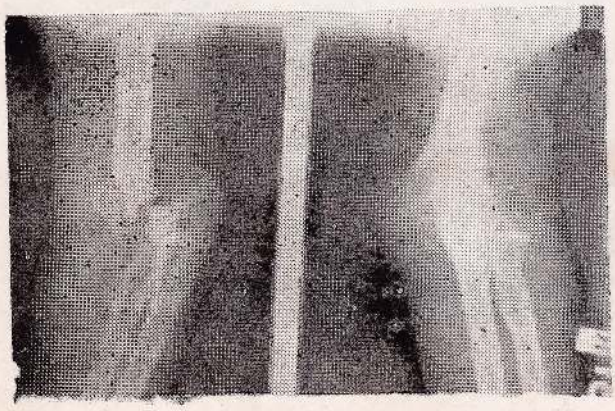

Fig. 3 (a)

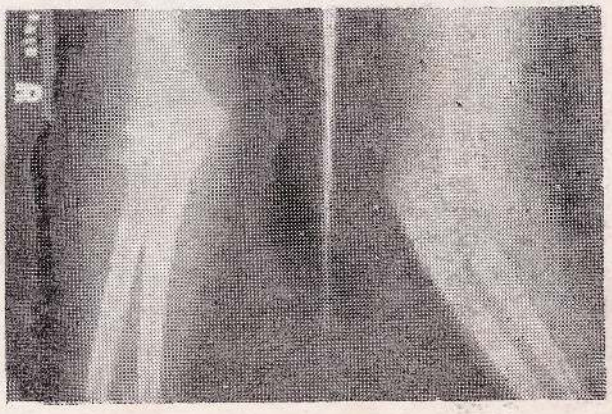

Fig. 3 (b)

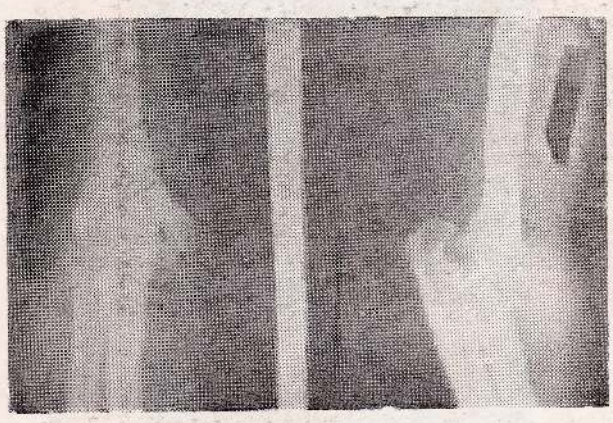

Fig. 3 (c)

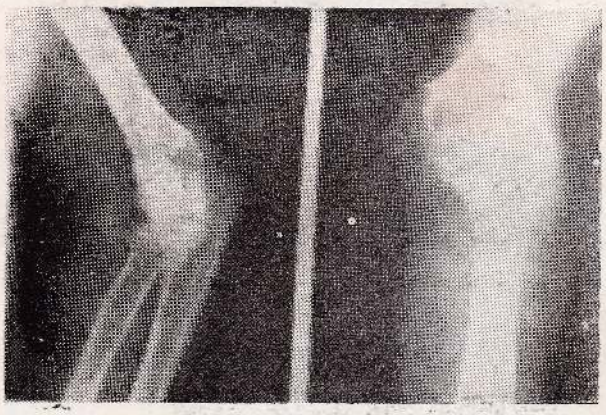

Fig. 4 (b)

Fig. 4 (a)

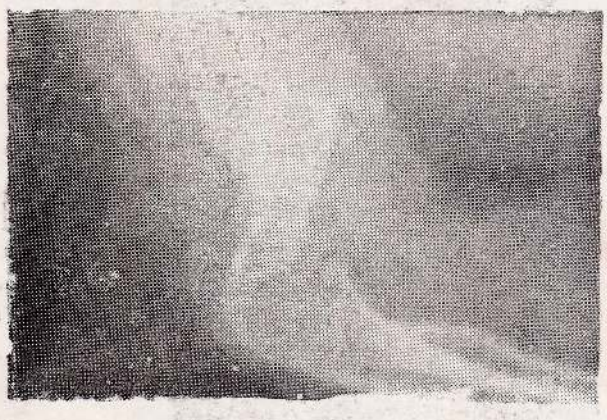

Fig. 5

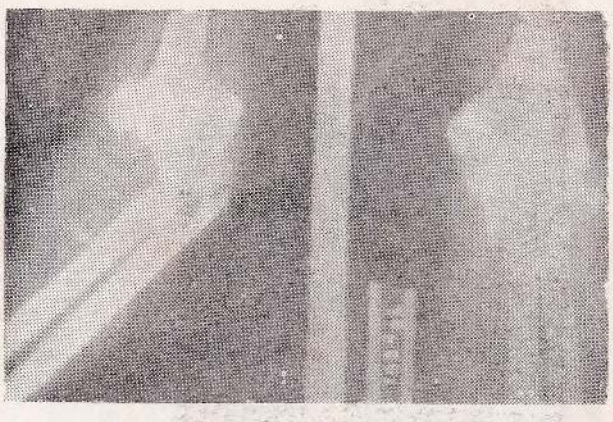

Fig. 6

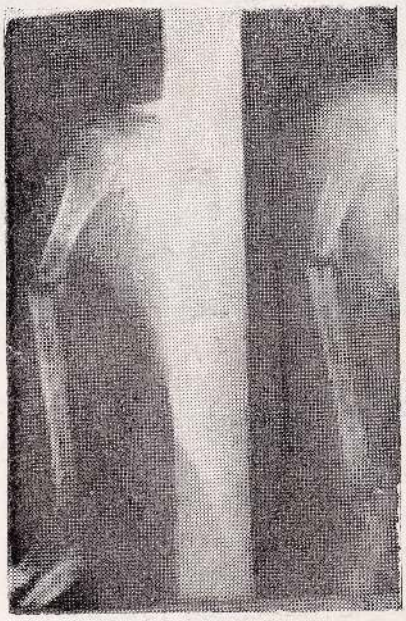

Fig. 7

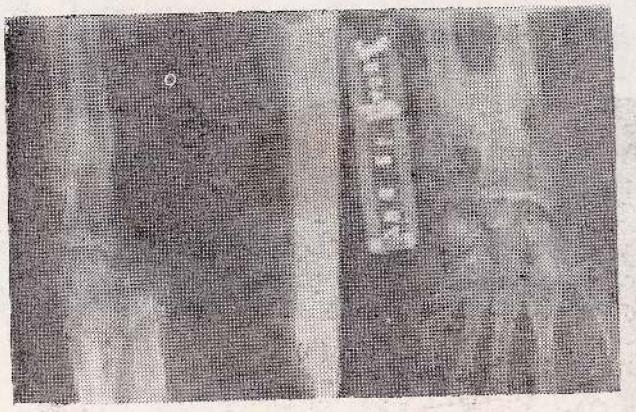

Fig. 8

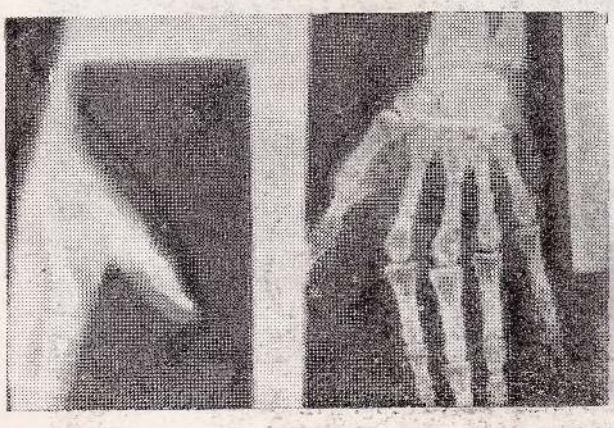

Fig. 10

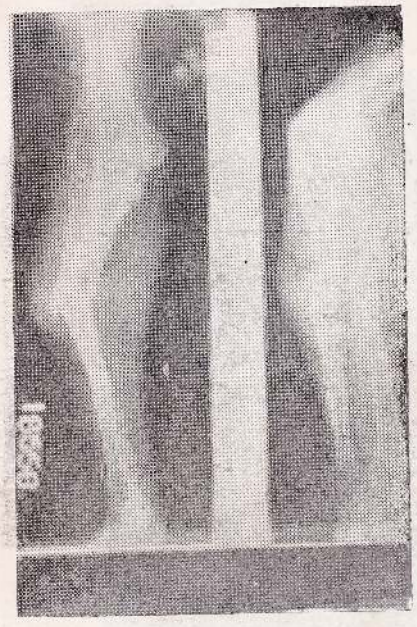

Fig. 9

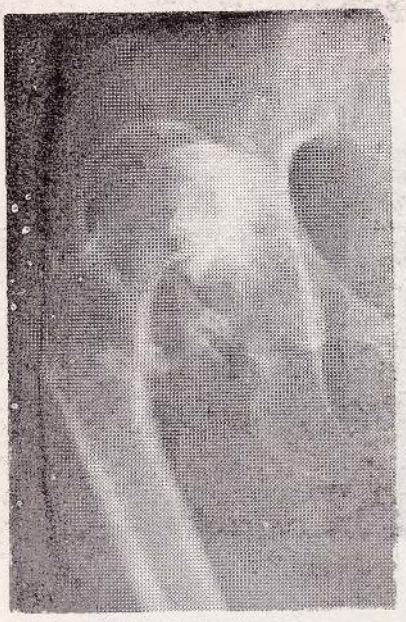

Fig. 11 (a)

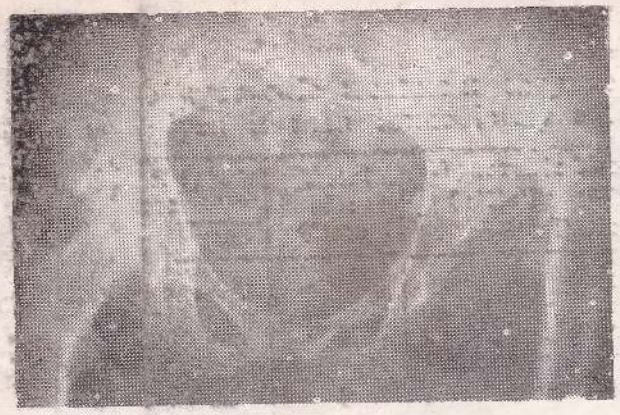

Fig. 11 (b)

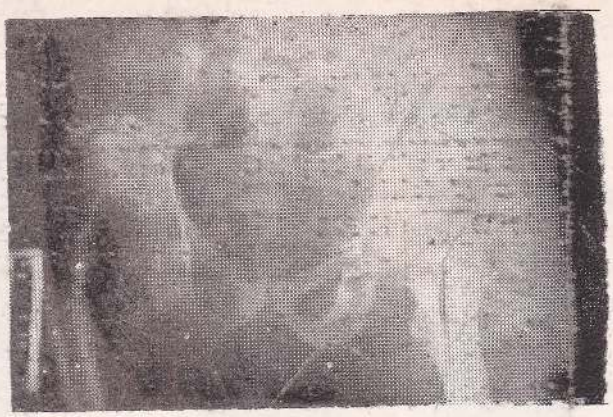

Fig. 11 (c)

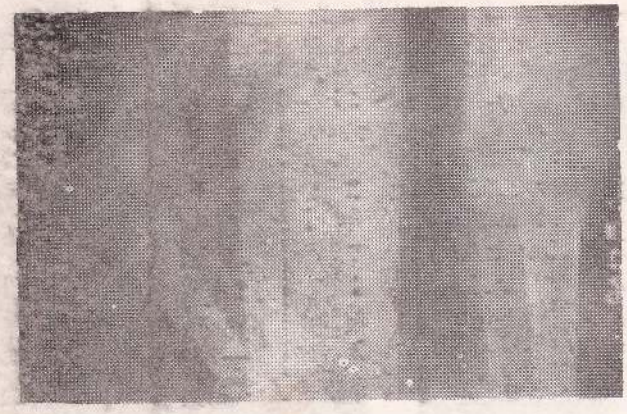

Fig. 12

Fig. 13

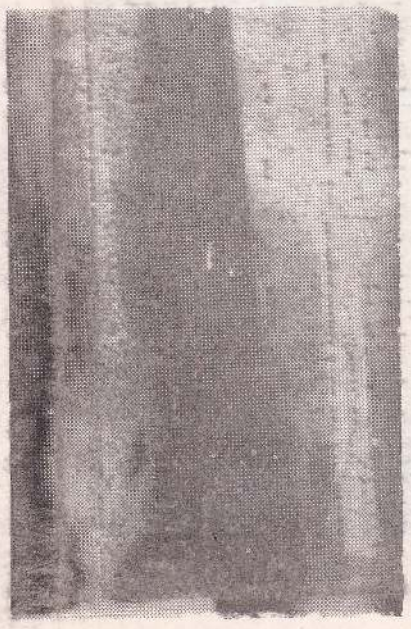

Fig. 14

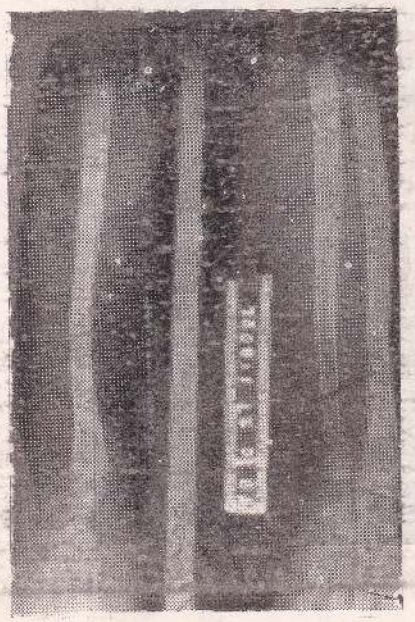

Fig. 15

examination however, a mild degree of disability was detected in these patients. The eleven patients with grade II disability, sought orthopaedic treatment because they felt they were not able to use the injured limb as efficiently as before These patients when assessed were found to be, not greatly handicapped. Nevertheless the results of ayurvedic treatment in them were not satisfactory because, cosmetically and functionally these patients had not returned to their pre-injury state after treatment. As surgical treatment at this late stage, ie. after a course of ayurvedic treatment, could not guarantee an improvement in their functional state, it was not attempted in these patients. Instead an effort was made in some to improve the performance of the affected limb by supervised physiotherapy.

Fifty-eight (63%) patients had a severe degree of functional impairment. Of them thirty-three had Injuries around the elbow joint, all of whom had very little or no motion at the joint. Eight of these patients had a joint in correct anatomical location, with varying degrees of radiologically visible myositis ossificans around it (Fig 2). The nature of the original injury could not be exactly ascertained from the radiographs taken when first seen, but would most likely have been a haemarthrosis of the joint. All eight patients had applications of oils to the elbow with massage and forced passive movements of the joint from the Ayurvedic physicians. Loss of function in them was due to restriction of elbow movement caused by the myositis ossificans. It is well known that myositis ossificans follows elbow injuries that have been improperly managed. Passively stretching injured joints that are painfully stiff defeats its own object. Attempts to mobilise a joint with myositis around it in its active phase almost invariably lead to an increase in the deposits and a greater degree of disability.[1] It is possible that some of the local applications (oils) used by the ayurvedic physicians may in some way promote the formation and stabilization of myositis ossificans. These eight elbows required nothing more than rest during the painful period, and thereafter controlled active physiotherapy to achieve a normal joint.

There were seven uncomplicated postero-lateral dislocations of the elbow joint (Fig 3). They had remained dislocated for a period ranging from three months to two years. They all had bad similar treatment. The local application of a "pattu" and the limb immobilized with splints in the fully extended position. When seen in the orthopaedic clinic the arm was almost fixed in extension and only a few degrees of flexion was possible, resulting in severe disability to the patient. Delay prevents manipulative reduction, and hence open reduction was performed in all cases. The findings at operation were similar to those described by Silva (1958).[2] They were -

(1) Extensive myositis ossificans around the joint.

(2) Extensive amounts of osteoid tissue around the olecranon, radius, coronoid and olecranon fossa of the humerus.

(3) Marked shortening of both medial and lateral ligaments of the elbow.

(4) Fibrosis and sometimes ossification of the capsule of the elbow joint.

(5) Destruction of the articular cartilage which tended to peel off from the bone.

After open reduction the patients regained only a moderately useful range of motion, but the results on the whole were not very encouraging, and the policy

of treatment was altered. Prosthetic replacement is recommended for this condition,[2] but the non-availability of elbow prostheses in Kurunegala made me resort to excisional arthroplasty, which was performed in the six patients with delayed presentation of fracture dislocations of the elbow joint (Fig 4). A better range of motion was obtained but, at the expense of strength and stability of the joint.

There were eight patients with malunited supracondylar fractures of the humerus with deformity and limitation of elbow movement (Fig. 5). In all the distal fragment was displaced posteriorly. Extension at the elbow is normally limited by the olecranon process locking in the olecranon fossa of the humerus. If a supracondylar fracture unites with lower fragment of the humerus (which carries the olecranon fossa) tilted anteriorly or posteriorly, flexion and extension of the elbow joint will be affected. Moreover, if union occurs with lateral tilting of the lower fragment, the forearm is carried with it and there is a corresponding degree of cubitus varus or cubitus valgus. Limitation of flexion or extension and alteration in the carrying angle persists into adult life and are not corrected by growth.[3] The importance of accurate reduction of supracondylar humeral fractures cannot be overemphasized. Closed reduction with radiological control is today successful in nearly every case when carried out by appropriately trained individuals.

In the four Monteggia fracture-dislocations seen, the ulna was united in angulation and the radial head remained dislocated in all (Fig. 6). Full flexion of the elbow joint was not possible. The ayurvedic treatment they had received was similar to those with the elbow dislocations. Monteggia type of injuries are difficult mechanical problems. The ulna is usually fractured at the junction of the middle and proximal thirds; fractures in this region are notorious for either slow union, malunion or non-union, since the fragments usually bow towards the radial side of the forearm. Thus restricted motion and progressive traumatic arthritis at the radiohumeral joint will eventually develop. When the fragments of the ulna overlap and produce shortening, the dislocation of the head of the radius recurs. Because of these probable complications after closed reduction, open reduction and rigid internal fixation of the fracture is the best treatment.[4]

One case of non-union of a fractured humeral shaft (Fig 7) was treated with an iliac bone graft and intra-medullary pin fixation. At operation soft tissue was found interposed between the fracture ends. Hence this fracture failed to unite with conservative methods of treatment. However if this patient was followed up in a fracture clinic, with repeated radiological examination slow union would have been detected and appropriate treatment given early.

One of the two forearm bone fractures with grade III disability, showed cross-union (Fig 8), while the other was ununited and mal-aligned (Fig 9). resulting in loss of pronation and supination. Conservative treatment of forearm bone fractures in adults produce the dismal picture of 71% unsatisfactory results.[5] With internal fixation using intramedullary pins this has been drastically reduced to 6.2%.[6] In recent years with the availability of AO compression equipment interest in securing more rigid fixation by plates and screws has increased. Anderson (1968)[7] has reported a 2% incidence of unsatisfactory results using this technique. Almost every diaphyseal fracture of the radius and ulna, or both, in adults should be treated by open reduction and

rigid internal fixation. The exception being undisplaced fractures of the proximal fifths of the radius and the distal half of the ulna.[8]

There were two cases of unreduced dislocations of the metacarpophalangeal joint of the thumb (Fig 10). Delayed open reduction was performed in both cases and extensive damage to the articular cartilage observed. Inspite of accurate reduction a stiff joint was the outcome. Soon after injury closed reduction is simple and the result excellent.

There were six patients with posterior dislocation of the hip, all of whom had received similar types of treatment viz Bed rest for 1 to 2 weeks and the application of oils and "pattus" to the entire affected limb. They had remained dislocated for a period ranging from six months to nine years (Fig 11). In four of them open reduction was performed shortly after attending the orthopaedic clinic. Extensive destruction to the articular cartilage of the head of the femur and the acetabulum was noted in all, and the articular cartilage peeled off the head of the femur quite easily. The hip joint after reduction was painful and stiff in all cases. Two of the four patients in whom the hip was reduced, soon developed radiologically visible changes of avascular necrosis of the head of the femur. In the fifth and sixth cases too destruction of the articular cartilage was very advanced. The results of the earlier cases prompted a change in policy and arthrodesis was done in these latter two patients.

A hip dislocation must be considered an emergency, and reduction performed as soon as the patient is ready for anaesthesia. After reduction of a dislocation of the hip, function can usually be expected to be excellent, provided that neither avascular necrosis of the head nor traumatic arthritis of the hip joint develop. The one most important factor in preventing these complications is prompt and accurate reduction of the dislocation. Good results are not obtained when the reduction was notwithin the first 24 hours after injury. [9] & [10]

In trochanteric fractures of the femur union is no real problem. Deformity, viz. coxa vara is easily prevented by adequate internal fixation of the fracture with a sutiable pin and plate. All six patients with trochanteric fractures and coxa vara complained of a limb resulting from a shortened lower limb. Valgus osteotomy was performed in all cases with satisfactory results.

Adequate conservative treatment or intramedullary nail fixation should not produce any deformity in femoral shaft fractures. The results of intramedullary fixation of the femur are superior to any other form of treatment.[11] Osteotomy of the femur at the site of malunion followed by heavy skeletal traction corrected the deformity and shortening in both cases with grade III disability.

The supracondylar femoral fracture (Fig 12) would have produced a superior end result if treated by traction in a Thomas' splint. Neer et al (1967).[12] reviewed 110 patients treated by traction and the results were satisfactory in 90% of patients.

There were three patients with ununited fractures of the patella with complete loss of function of the quadriceps mechanism. The ayurvedic treatment they had received was local application of oils with the knee immobilized in full extension. These patients were allowed full weight bearing immediately. Patellectomy and repair of the quadriceps mechanism was performed in the orthopaedic unit in all cases, after which they

returned to almost a normal state. After patellectomy much of the normal increase in power as the knee is extended is lost. Since extension is the most important position of the knee, it must be concluded that patellectomy definitely impairs the efficiency of the quadrieeps mechanism, but this may not be enough to interfere with ordinary activity.[13] A displaced transverse fracture of the patella is easily fixed with a circumferential wire loop or a wire loop through both fragments. Excellent results are obtained by any procedure in which the articular surfaces of the fragments are accurately apposed and internal fixation is secure.[14]

The six patients who had grade IV disability were all under 20 years of age (Table I). Four of them had established Volkmann's ischaemic contracture, while the other two presented with gangrene of the distal part of the limb. The latter two required amputation. One of them had an undisplaced Tibial fracture with gangrene of the toes and foot, a below knee amputation was necessary soon after admission (Fig 13), while the other had a posterior dislocation of the elbow with gangrene of the fingers and hand. The dislocation was unreduced at the time of admission (Fig 14). A through elbow amputation was performed in this case. They had both been treated with local applications and tight splints. These two skeletal injuries if correctly diagnosed and treated would have resulted in limbs both anatomically and functionally normal.

In two of the four patients with Volkmann's ischaemia the original injury was a supracondylar fracture of the humerus. Volkmann's ischaemia is the most serious complication associated with this injury. Its incidence has been considerably reduced in recent times. Large series pulished recently report no cases of Volkmann's contracture even in the presence of brachial artery damage in 8-18% of the patients.[15] & [16] A supracondylar fracture of the femur was the third case. A greenstick fracture of the radius was the fourth (Fig 15). In this case tightly applied splints were the cause of the ischaemia Except in the most severely mutilating injuries ischaemie complications should now be easily avoided.[17]

It would thus be a fair conclusion, that if all of these patients had the benefit of adequate hospital orthopaedic treatment, their complications would have been avoided and a normal limb the end result. It is indeed a pity that six young patients with a full life ahead of them should find themselves severely handicapped, without the use of a limb as a result of improper management of their injuries.

From Table III it is seen that only sixty of the ninety-two patients received some form of surgical treatment. Two patients with grade IV disability had an amputation, while the other four in this grade were not considered for surgical treatment. As discussed earlier patienst in grades I and II were not surgically treated. In fifty-eight patients (ie. all in grade III), surgery was performed with the intent of reducing their disability. Fifty-two of them improved but still possessed some residual disability. Only six patients returned to normal after delayed treatment. Therefore in all eighty-six patients (94%) had some residual disability and some even after delayed orthopaedic treatment. Many of them were handicapped for life as a result of their injuries being mismanaged at the early stages.

Analysis of the methods of treatment adopted by the Ayurvedic physicians, in the initial treatment of these patients, indicated that the fundamental principles of Orthopaedic Surgery bad been ignored, and fracture mechanics ill understood.

If basic Surgical principles had been correctly applied in their initial treatment, it is certain that the eighty-six patients who remained disabled for life would not be in this predicament.

TABLE — I

AGE (Yrs)	No. of Cases	%	Disability Grade			
			I	II	III	IV
0—10	10	11	2	1	5	2
11—20	22	24	3	2	13	4
21—30	23	25	4	1	18	—
31—40	13	14	3	—	10	—
41—50	12	13	3	3	6	—
51—60	6	6.5	1	1	4	—
61—70	6	6.5	1	3	2	—
Total	92	100 %	17 (18%)	11 (12%)	58 (63%)	6 (7%)

TABLE — III

A Summary of the Results of Surgical Treatment.

Grade	No. of Patients	No: given delayed surgical treatment	No: returned to normal	No: improved, but remained disabled.	No surgical treatment given No: of cases
I	17	—	—	—	17
II	11	—	—	—	11
III	58	58	6	52	—
IV	6	2*	—	—	4
Total	92	60	6	52	32

* Includes the two patients who had amputations.

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Therapy of Amoebiasis
Recent Advances*

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The earliest consistently successful treatment of amoebiasis occurred following the introduction of emetine in 1912. Around 1950 chloroquine was shown to be effective in treating amoebic liver abscess but less so than emetine. In 1961 dehydroemetine was demonstrated to be as effective as emetine but with fewer and less severe side-effects. Several other drugs were also discovered to be of value in treating patients with amoebiasis at this time but until recently the recommended schedule involved the complicated use of several drugs either concurrently and or sequentially.

TABLE

Average Duration of Therapy in Days

Drug	Intestinal Amebiasis	Amebic Liver Abscess
Emetine	7	7 — 10 (?)
Dehydroemetine	7	7 — 15
Arsenicals	7 — 10	
Halogenated Hydroxyquinolines	15 — 21	
Diloxanide Furoate	5 — 10	
Paromomycin	5	
Chloroquine		15 — 21
Metronidazole	5	1
Ornidazole	3	1
Tinidazole	3	2

Such a situation prevailed for several reasons. There were few studies comparing the efficacy and optimal utilization of the many drugs available and the drugs were limited in their sites of action against the amoebae. This made a multiple-drug combination approach to therapy necessary. There were "direct-acting" or luminal amoebicides such as the hydroxyquinolones and the arsenical derivatives, the "indirect-acting" drugs such as tetracycline which act on amoebae in the bowel lumen and bowel wall, and the "tissue" amoebicides such as emetine

* Presented at a Jaffna Medical Society Symposium on Amoebiasis, September 1980.

and dehydroemetine which are effective for intestinal wall and liver amoebic infection and chloroquine which is only effective for amoebic liver abscess.

The usual treatment for a severe amoebic infection could therefore consist of emetine or dehydroemetine and or chloroquine for liver involvement, diiodohydroxyquinoline to eradicate the luminal amoebae and/or tetracycline to eliminate amoebae in the bowel wall.

Such a confused situation gave rise to a statement in a WHO publication in 1978[1] that "opinions tend to outstrip evidence and until more comparative trials are undertaken in accordance with clearly-defined and widely-accepted criteria amoebicides can only be rationally selected on the basis of tolerance, toxicity and expense".

An important advance in the treatment of amoebiasis followed the discovery of metronidazole as an effective single agent in the management of amoebic dysentery and amoebic liver abscess by Powell and colleagues in 1966[2].

However, the early studies with metronidazole to determine optimal dosage schedules were incomplete and later when the question of the carcinogenicity of the drug in some animal systems was raised, Kean in 1976[3] in an article provocatively entitled "The Treatment of Amoebiasis - A Recurrent Agony", wrote "I have spent most of my life working in the field of Tropical Medicine and have treated hundreds of patients with amoebiasis. Today after this clinical experience... I no longer know how to treat the infection".

Although Powell and his colleagues used different dosage schedules and durations of therapy, a 7 - 10 or even 14 day treatment course became accepted so that today even the latest texts (1979)[4-5] recommend metronidazole 750 mg. x3 daily for 10 days for amoebic liver abscess and intestinal amoebiasis.

However, Powell in 1969[6] studied 80 patients with intestinal amoebiasis and 105 patients with amoebic liver abscess and found that a single dose of 2.4 g. of metronidazole combined with aspiration was effective in amoebic liver abscess and that "a course of 3 daily doses of 2.4g. may prove to be the optimal regimen in amoebic dysentery".

Apparently no Western workers in the field carried out further dose-finding trials and those studies performed by local experts were published in limited circulation journals and failed to reach a wide-enough audience to change the recommended practice approved by established textbook authorities.

In 1974[7] Aswapokee and colleagues reported their successful results in treating 34 patients with uncomplicated amoebic liver abscess using a single-day low dosage regimen of 800 mg. of metronidazole three times over a 24 hour period following an initial aspiration.

Bunnag and colleagues in 1975[8] also published their results on 15 patients with uncomplicated amoebic liver abscess treated with a 2.4 g. single dose or single day metronidazole schedule.

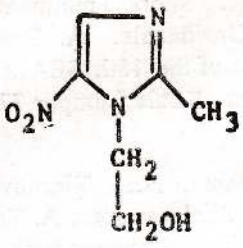
The follow-up in both studies was for 6 months and the first study concluded that "the clinical responses were rapid and the abscess cavities were reduced in size in short duration. There was only one relapse. The drug was well tolerated".

Dannag and colleagues concluded that "...all patients responded well and there was no relapse or failure. No serious side-effects or toxicity were observed".

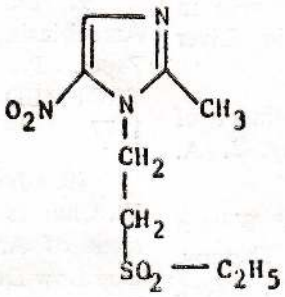
In the early 1970's newer nitro-midazole derivatives (Figure) similar to metronidazole were developed and tested in

FIGURE

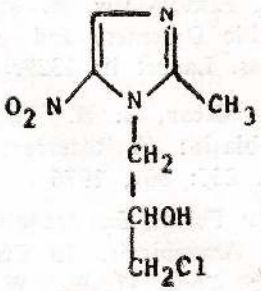
Metronidazole
(Powell 1966)



Tinidazole
Miller 1969



Ornidazole
(Powell 1972)



trichomoniasis, giardiasis and amoebiasis and later anaerobic infections. Initially open pilot trials and then controlled comparative studies were carried out in intestinal amoebiasis aud in patients with hepatic amoebic abscess using a short 3 day and a single day course respectively. Some of the studies investigating these new drugs such as ornidazole and tinidazole and have been published or reviewed.[9-13] All demonstrate that a 3 day course for intestinal amoebiasis and a single-does or single-day treatment of amoebic liver abscess are effective.

In 107 cases of intestinal amoebiasis treated in eight different centres with a schedule of 2.0 g ornidazole daily for 3 consecutive days the cure rate was 97·2%. For amoebic liver abscess in 28 patients the cure rate for the single day treatment using 2.0 g of ornidazole was 26.3%.[9]

In South America open multicentre trials in intestinal amoebiasis in 176 patients using 2.0 g ornidazole daily for 3 days gave a clinical and parasitological cure rate of 92.0%.[13]

A multicentre double-blind trial comparing ornidazole and tinidazole in 100 patients with amoebic liver abscess using a single-day treatment of 2.0 g is completed except for the 6 month follow-up. The results of this study should establish whether the single-day approach is effective enough to be recommended as acceptable treatment.

The advantages as regards cost and need for prolonged hospitalisation are apparent.

In conclusion, therefore, the most significant recent advance in the therapy of amoebiasis is the single-drug, short-course treatment schedule using a nitro-imidazole derivative such as metronidazole, ornidazole or tinidazole.

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Indirect Immunofluorescence Test in the diagnosis of Amoebiasis

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Introduction

Till late the methods available for laboratory diagnosis of amoebiasis were the microscopic demonstration of **Entamoeba histolitica** in specimens of stools or "pus" from amoebic liver abscess or by culture of these materials in various mono-phasic or di-phasic culture media. In cases of amoebic dysentery and in amoebic "carriers" (patients passing cysts without clinical symptoms) these are still the tests available for accurate diagnosis of the condition, supplemented with the concentration methods available. A complement fixation test using polyvalent antigen prepared from a number of different strains of **E. histolytica** was also available at some of the sophisticated laboratories. This test was positive in cases af amoebic liver abscess but negative in intestinal amoebiasis. However this test had all the drawbacks of complement fixation tests such as lack of sensitivity, specificity and reliability. Therefore the test was not made use of to any great extent.

With the development of parasitic immunology and serology in the last two decades certain serological and immunological tests have been developed with a view to producing diagnostic methods that are more sensitive, specific, reliable and easily reproducible without technical assistance of a high degree. This development has been considerably helped by similar advancements in microbiological immunology and serology. With the advancement of these disciplines common standardised reagents became available commercially facilitating the work of the serologists and immunologists. Some of these tests are the indirect immunofluorescence test or the indirect fluorescent antibody test (I F A) or the fluorescent antibody test (F A T), the indirect haemagglutination test (I H A), counter current immunoelectrophoresis, immunoelectrophoresis, immuno-diffusion, enzyme - linked immunosorbent assay (ELICA), radiommune assay, immobilisation tests, precipitin tests etc. These microbiological tests have been adapted for use in the diagnosis of amoebiasis. The development of axenic strains of **Entamoeba histolytica** has given an impetus to the prepration of antigens without the presence of contaminating bacteria for these tests.

Some of the tests for amoebiasis have been of theoretical interest to serologists and immunologists, still others are in the course of evaluation for routine diagnostic use. The sero-immunological tests that have been extensively studied are the indirect haemagglutination test and the indirect immuno-fluorescence test. The main advantages these tests have over the others are availability of the reagents and instruments commercially and therefore in most laboratories. Secondly the tests do not require a high degree of competence in carrying them out and hence laboratory technicians could be trained to perform the routine tasks connected with the tests. There is

a high degree to sensitivity and reliability. The disadvantages are the increasing costs of equipment for which we have to depend on the developed countries and the reagents which are also imported but could easily be prepared in most developing countries at a fraction of the cost of the imported material.

The indirect immunofluorescence test and the indirect haemagglutination test were first introduced to Sri Lanka by Jayewardena and Wijaratnam[1] who in 1973 reported their studies with these two tests in cases of hepatic amoebiasis. amoebic liver abscess, intestinal amoebiasis and controls from temporary residents in this country. The IHA was performed using microtechniques while the IFA was carried out using amcrotechniques. The IHA antigen was imported while the IFA antigen was prepared locally. The tests were carried out on 105 proved or suspected cases and 52 controls. Rajakulendran[2] (1974) carried out the IFA for amoebiasis using an imported antigen and a micromethod but the number of studies done by her was limited.

At this stage it was felt that a more elaborate aud sustained study was necessary to provide a routine diagnostic test and for its evaluation. The work reported in this paper is the outcome of this study.

Materials and Methods

At the outset it was quite clear that due to the financial situation of the country, both tests could not be adopted for routine use as the cost of commercially available antigen was prohibitive. The facilities for culturing axenic amoebae for the preparation of the IHA antigen was not available, Therefore it was decided to concentrate on the indirect immunofluorescence test (IFA), the antigen for which could be produced locally at a fraction of the cost of imported antigen.

The first task before us was to establish the pattern of amoebic antibodies in the normal population to act as a guide to the interpretation of values from clinical cases. We did not prescribe to the idea of using foreigners as control subjects for this evaluation as they live in surroundings different from those for whom this test is being evaluated. Therefore we used for the initial study blood from donors calling at the Blood Bank, General Hospital, Colombo, who were more representative of the local population. Samples of blood from donors calling at the above blood bank were collected from October 1974 to July 1975. Most of the samples came from donors from the city or areas surrounding the city but some of it came from other parts of the island, the samples being collected by mobile units. The separated sera were stored in the deep freeze (—20°C.) till required for examination but the period of such storage did not exceed a few weeks. A total of 1020 sera were examined.

The antigen was prepared from a strain of **Entamoeba histolytica** isolated from a patient with acute intestinal amoebiasis and cultured in a modified Dobell and Laidlaw[3] (1926) medium and maintained in it by serial subculture twice a week for about six months at the start of this study. The strain is still being maintained in the same medium, a period of six years. At the start the isolate contained a variety of coliform bacteria but now it contains only **Escherichia coli,** a monoxenic culture. During the preparation of the antigen a differential centrifugation was done to separate as much of the bacteria as possible but the

prepared antigen showed a fair amount of floccules of bacteria. However these did not interfere with the test. The commercially available antigens are from axenic strains but these are not more advantageous than those from polyxenic or monoxenic strains compared with the price differences. The antigen is formalin fixed and stored in the frozen stage.

The dilutions of test sera were carried out using microtitration methods as developed by Takatsy, The antigen was dried on standard microscopical slides and all subsequent procedures were done on the slides. The conjugate used was commercially available fluorescin-labelled anti-human globulin sheep immunoglobulin optimally diluted with phosphate-buffered saline (pH 7.2) containing 1:2000 solution of Evans blue as counter stain. The conjugate contained IgM, IgG, and IgA. The dilution of the conjugate varied with various batches and ranged from 1:50 at the start to 1:20 with the present batch. Microscopy was carried out with a "Dialux" (Leitz) microscope fitted with HBO 200 (Osram) or CS 200 (Phillips high pressure mercury vapour lamb. The filters used were BG 12, 4 mm. exciter filter and BG 38 ultraviolet filter and k 530 ocular filter. Dark ground illumination was used. The sera were first screened starting from a dilution of 1:4 upto a dilution of 1:32 and those positive at this dilution was then repeated upto a dilution of 1:512 and those still posttive were repeated for still higher dilutions. Those negative at a dilution of 1:4 were considered negative.

The slides with the sera were incubated in a moisture chamber for 1/2 hour at a tempture of 37°C. and then further incubated for 1/2 hour after the addition of the conjuga,e. The readings were taken on the following day, the prepared slides being stored in the refrigerator overnight.

The clinical specimens were those sent for routine examination from hospitals during the period September 1974 to August 1980. Altogether 2578 sera were tested but only those sera which were from patients suspected of liver and/or lung complications due to amoebiasis on the clinical history were analysed in this series. In a number of cases more than one specimen of blood was sent but only one of the results was considered. Sera where no clinical history was given though the results suggested an amoebic aetiology for the condition were not considered. The blood was sent mainly from the Thoracic units I and II of the General Hospital, Colombo, General Hospital, Chilaw, General Hospital, Ratnapura and lately General Hospital, Jaffna. We did get samples from General Hospitals at Galle, Kegalle, Kurunegala and Nuwara Eliya but these were few and far between. The results of 1000 specimens were analysed.

Patients mainly from the Thoracic Units I and II from the General Hospital, Colombo and some from the surgical unit, General Hospital, Chilaw were followed up for varying periods to study the regression in the titres during the recovery process and to compare the persistance of such antibodies in this country. Although 88 patients both from Colombo and Chilaw were taken for follow up a full study was done only in a few as the patients did not turn up after a few visits.

Results

The results of the examination of donor blood for amoebic antibodies are shown in Table I. A total of 1020 sera were examined. The number showing the end positivity at each dilution and the percentage thereof is shown. In the Graph I the

TABLE I

Showing the number of end positive at each of the dilution and their percentages.

Dilution	Number	Percentage
Negative	104	10.2
1:4	228	22.4
1:8	319	31.3
1:16	240	23.5
1:32	95	9.3
1:64	25	2.5
1:128	08	0.8
1:256	01	0.1
Total	1020	100.1

broken line shows the percentage of end positives at each dilution plotted against the respective dilutions and in the histogram I this data is shown as bars with diagonal lines. From the Graph it is seen that the titre of highest frequency of distribution is 1:8. The distribution is a little skewed to the left suggesting that the distribution is not normal. This apparent fault in the distribution is due to the fact that the sera were not tested at a dilution of 1:2 and all sera that did not show reaction at 1:4 were considered negative. If the sera were tested at a dilution of 1:2 more than half of those shown negative would have been in all probability be positive at this dilution showing a normal distribution. It is seen from the table that at a dilution of 1:32 the percentage of positives wns 9.3 which point is 1/3 the way down in the slope. From the 1:64 the slope flattened out. Due to these considerations all sera showing titres of 1:64 and above were considered diagnostic.

Table II shows the distribution of the titres of the sera of patients suspected of hepatic and/or pulmonary amoebiasis. In Graph I the continuous line shows these results in graphic form and in the histogram they are shown as darkened bars. At a

TABLE II

Distribution of titres of the sera of patients suspected of hepatic and / or pulmonary amoebiasis.

Dilution	Number	Percentage
Negative	117	11.7
1:4	81	08.1
1:8	124	12.4
1:16	160	16.0
1:32	55	05.5
1:64	85	08.5
1:128	149	14.9
1:256	122	12.2
1:512	82	08.2
1:1024	18	01.8
1:2048	05	00.5
1:4096	02	00.2
Total	1000	100.0

glance at both these it is seen that there are two peaks in the distribution of titres, one at the titre of 1:16 and the other at the titre of 1:128. The interpretation of the presence of two curves is that the sample has sera with amoebic antibodies and those without amoebic antibodies, the numbers being more or less equal.

Table III shows the decline of antibodies with time after treatment. Except in ten cases, Nos. 16, 18, 21, 25, 27, 30, 33, 35, 73 and 77, in the other 23 cases the antibody levels have fallen to non-significant levels (1:32) or lower) within six months of treatment. In cases 16, 21, 27, 33. 35, 42 and 73 the titres have fallen (or would have fallen) if followed more systematically) within one year. The exceptions from this series are cases 18 and 30. In case 18 a titre of 1:512 has been maintained for a period of nine months without any alterations. This is difficult to explain except on the hypothesis that treatment did not completely eradicate the foci of infection. In case 30 there was a drop in the titre

TABLE III

Antibody levels at various times in follow up cases.
The numbers are reciprocals of titres

Case No.	0	1	2	3	4	5	6	7	8	9	10	11
2	1024	—	256	—	—	—	—	—	—	—	—	—
7	1024	256	—	—	—	—	—	—	—	—	—	—
10	256	128	128	—	—	—	—	—	—	—	—	—
12	256	256	256	256	256	—	—	—	—	—	—	—
15	512	512	256	—	—	64	—	—	—	—	32	—
	64 (13)		—	—	—	—	—	16(19)		—	—	—
16	512	1024	—	512	—	256	—	—	—	64	—	—
17	64	128	256	—	—	—	—	—	—	—	—	—
18	1024	512	—	—	—	—	512	—	—	512	—	—
19	256	256	288	128	64	—	—	—	—	—	—	—
20	256	256	128	—	64	64		—	—	—	—	—
21	512	512	—	—	—	—	—	128	—	—	—	32
23	512	256	—	128	—	—	—	—	—	—	—	—
25	512	256	—	—	64	—	—	—	64	—	—	32
	—	—	32(14)	—	—	—	—	—	—	—	—	—
26	256	512	—	—	32	—	—	32	—	—	—	—
	32(12)		—	—	—	—	—	—	—	—	—	—
27	16	32	256	128	—	—	64	—	—	—	8	—
29	128	256	128	64	64	64	32	—	—	32	—	—
30	512	64	—	—	—	32	—	—	128	—	—	128
32	64	—	—	—	—	—	16	—	—	—	—	8
33	128	64	64	—	—	64	—	—	—	—	—	32
35	256	128	—	—	—	118	—	—	—	—	—	—
36	512	512	512	256	—	—	—	—	—	—	—	—
37	128	512	—	—	—	—	—	—	—	—	—	—
39	256	256	—	64	—	—	—	—	—	—	—	—
41	128	512	64	128	—	—	—	—	—	—	—	—
42	256	256	128	128	128	—	—	—	—	—	—	16(27)
56	128	128	256	64	—	—	—	16	—	—	—	—
63	512	256	128	—	—	—	32	—	—	—	—	—
65	128	256	128	—	64	—	—					
71	512	1024	—	—	128	—	—					
73	256	256	—	—	—	64	—					
75	512	128	256	—	—	—	—					
77	256	—	—	—	—	128	—					
82	127	121	64	—	16	—	—					

from 1:512 in the preliminary determination to 1:32 at the end of the 5th. month as would be expected and then a rise to 1:128 and this titre was maintained at the end of the 11th. month when the last estimation was done. Again the explanation is that the foci of infection were not completely removed or reinvasion of extra-intestinal areas from the intestine.

Discussion

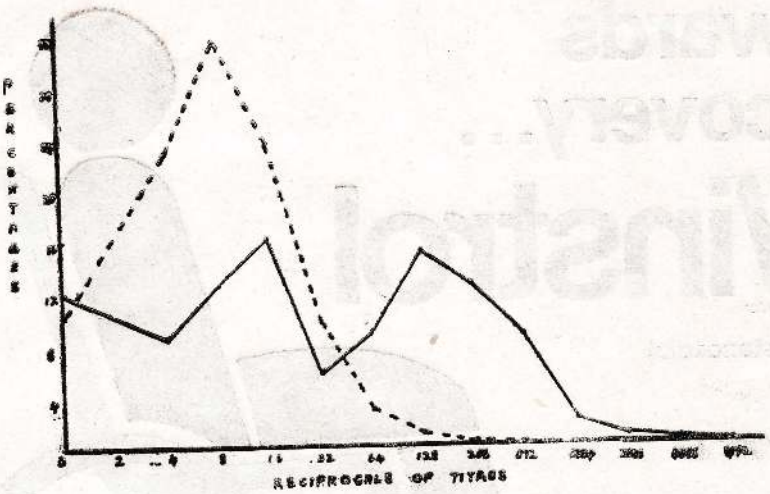
From the results of the amoebic antibody determinations in blood bank sera a titre of 1:64 or over was considered diagnostic if the clinical finding warranted it. It should be remembered that in serological diagnosis only a rising titre is suggestive of active infection and this rise should be over fourfold. This assumption was justified on the analysis of the antibody determinations of the blood sent from suspected clinical cases which were a heterogenous group.

Jeannes[5] (1964) accepted a titre of 1:64 as sufficiently specific for diagnosis while Ambroise-Thomas and Kien Truong[6] (1972) considered a titre of 1:50 as acceptable though most of their cases gave higher titres and inspite of the fact that their method was very sensitive as they got titres of 1:25600. Agarwal, Mahajan, Dutta and Chuttani[7] (1971) accepted a titre of 1:32 as diagnostic and so did Norcott[8] (1973). Wery-Pashoff, Renoirte and Wery[9] (1974) suggested a titre of of 1:100 whereas Jayewardena and Wijayaratnam considered 1:160 as diagnostic. The latter workers used a tube test with over-night incubation which definitely gave a higher titre and adopted an arbitrary figure. Comparing these titres considered as diagnostic, our figure obtained from considering the distribution of titres in a normal population and substantiated from the hospital cases, agree quite closely.

Ambroise-Thomas and Kient Truong (1972) found that there is a rapid drop in titre in two months after treatment and then a progressively slow decline taking about a year to become negative. On the other hand Wery-Pashoff et al. (1974) found that the titres maintained their levels upto three months and dropped rapidly after about six months and reached a normal level after about an year. Norcott (1973) also found the fall in titre slow in the first six months. Our results closely follow this pattern. The rapid decline in the antibody titres reported by Amroise-Thomas and Kien Truong (1972) may be due to the fact that their tests were so very sensitive.

Wery-Pashoff et al. (1974) reported a case where a titre of 1:100 was maintained for a period of three years. Two months later he was readmitted for an amoebic liver abscess. Patient No. 18 in our series would have had a similar episode.

As mentioned by all the above cited workers the indirect immunofluorescence test is not positive in intestinal disease in diagnostic titres. The few sera we did were also equivocal. However if it is positive in diagnostic titres it means that the amoebae have reached the liver. The test is therefore a test for extra-intestinal amoebiasis. It is advisable to carry out the test in every suspected case of amoebiasis to exclude involvement of the liver and if so give adequate treatment.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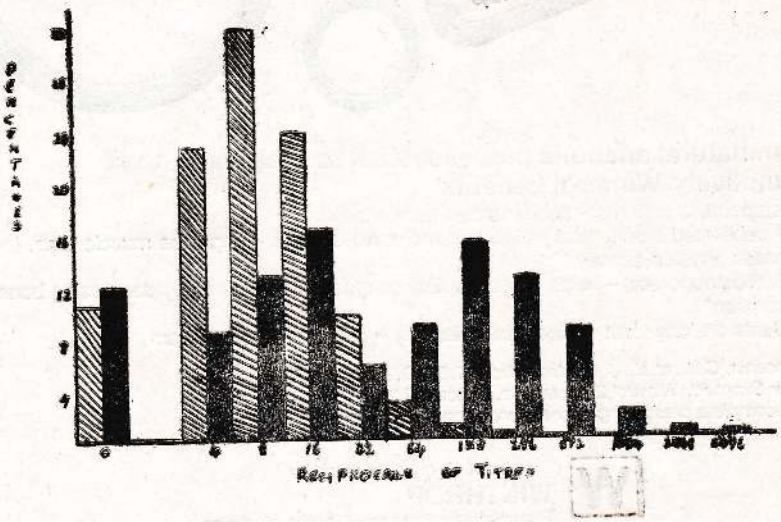
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Bridging Hepatic Necrosis in Hepatitis B Virus Infections of the Liver

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The pathological appearance of the liver in the acute phase of acute viral hepatitis is characterised by scattered foci of parenchymal cell loss, acidophil necrosis of individual hepatocytes, plecmorphism and swelling of the remaining parenchyma, a diffuse predominantly mononuclear inflammatory reaction with proliferation of reticuloendothelial cells and evidence of hepatocellular regeneration[1, 2]. In 1970, Boyer and Klatskin[3] while studying 170 cases of viral hepatitis in the acute phase noted that in 52 cases, in addition to the predominant small foci of necrosis there were also multiple larger zones of necrosis which bridged adjacent portal tracts or central veins or both, and which often extended into adjacent lobules giving rise to an irregular branched pattern. 10 patients (19%) from this group died and 37% went on to develop eirrhosis. While admitting that their cases may have been selected, these authors while comparing the outcome of these cases with the 112 cases which showed the classical picture of acute viral hepatitis and all of whom recovered completely and uneventfully, suggested that the prognosis of patients showing this particular histology which they termed sub acute hepatic necrosis (a term now replaced by bridging hepatic necrosis)[4] was poor.

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We decribe two patients with acute viral hepatitis (Hepatitis B virus) and bridging hepatic necrosis and comment on the significance of this finding.

Case Report

Case 1. H. P. a 60 year old previously healthy businessman was admitted with a two week history of progressive yellow discoloration of the eyes and anorexia, of insidious onset and not accompnied by fever. He denied a history of taking any drngs including Ayurvedic preparations, any injections and any alcoholic intake. He did not vomit at any time during the illness though he felt nauseated. Through he noticed that his urine was darker than usual his stools were of normal colour and consistency. He did not complain of pruritis. Apart from icterus and a palpable liver 4cms below the right costal margin which was firm, smooth and non tender. clinical examination did not reveal any abnormality. The initial investigations were as follows: Haemoglobin 11 grams/dl; WBC 10,000/cu mm with neutrophils 66%, lymphocytes 20%, eosinophils 8% and monocytes 6%; ESR 20mm/1st hour; total serum bilirubin 20mg/dl; direct reacting bilirubin 12mg/dl; serum alkaline phoshatase 13KA uuits/ml; SGOT 60 i.u/.ml SGPT 60 i.u ml; The first liver biopsy, 1 week after admission (i. e 3 weeks after onset of symptoms) showed the normal liver architecture to be retained. The portal tracts were enlarged aad heavily infiltrated with acute and chronic inflammatory

cells. A heavy inflammatory reaction was also seen in the lobules with a little bile stasis. Bridging hepatic necrosis between the portal tracts and central veins was seen. (2240/u/80) Hepatitis B surface antigen was indentified in the blood. The patient was given no specific therapy and was asymptomatic. The serum bilirubin and liver enzymes retuned to normal 6 weeks after admission. A repeat liver biopsy 3 months after the first admission (70/U/81) showed that the hepatic architecture was preserved with an excess of mononuclear cells in the portal tracts with a few fibrous septa extending from its edges. No necrosis of liver cells was seen and when compared to the previous biopsy a marked improvement was seen. The patient continues to be asymptomatic.

Case 2. K. R a 42 year old son of H. P., but who did not live in the same house as H. P. was admitted with a 5 week history of jaundice. The earliest symptom he noticed was a darkening of the colour of his urine 5 weeks after the onset of symptoms in his father. Jaundice was noticed 2 days after the urine became dark. He had no other symptoms. Diabetes Mellitus was discovered 6 months earlier when he noticed polyuria and thirst and for which he was being treated with insulin injections. Hepatitis B surface antigen was found in his blood at another hospital. On examination he was a healthy looking man whose only abnormal finding was deep jaundice. His admission laboratory data were normal except for a serum bilirubin of 30mg/100ml and an increased SGOT. He was treated with only oral Chlorpropamide for his diabetes. His first liver biopsy 7 weeks after onset of his symptoms showed (127/c/81) the normal hepatic vascular architecture to be preserved. The portal tracts were enlarged, oedematous and contained excess mononuclear cells, mainly lymphocytes. Bridges of necrosis were seen between portal tracts and centrilobular veins. The liver parenchyma showed areas of hepatocellular necrosis, regenerating hepatocytes and bile stasis. The sinusoids contained excess mononuclear cells. The appearances are compatible with a very severe degree of vital hepatitis. The orcein stain for Hepatitis B antigen particles was negative. The serum bilirubin and liver enzymes took a further 4 weeks to return to normal and have remained normal since. A second liver biopsy 6 weeks after the first (320/U/81) showed an improvement when compared to the previous biopsy. The portal tracts are enlarged and contain excess mononuclear cells mainly lymphocytes with an occasional plasma cell. There was no bridging necrosis. Fibrous septa extend from the edges of the portal tract into the parenchyma and clusters of hyperplastic and swollen hepatocytes seem to be trapped in them. The parenchyma shows foci of hepatocellular necrosis and lymphocytic infiltration. Many twin cell plates are seen indicating regenerative activity. There is no bile stasis. The liver seems to be in the recovery stage.

The patient has remained asymptomatic.

Discussion

The complete infective virus of the Hepatitis B virus (a DNA virus) is the 40 nm Dane particle which contains a central core (HBc Antigen) covered by an envelope containing the surface antigen (HBs Ag) and its subtype markers adw, adr. avw and ayr. A third Antigen/Antibody system (HBe Ag/anti HBe) has also been discovered and is thought to be related to the Dane particle and infectivity. Anti HBe antibody seems to be capable of reacting with the Dane particle but a structural relationship of HBe Antigen to the Dane particle has not been established. HBs Ag material

is produced in excess and appears in the blood as 20nm spherical and tubular particles in addition to Dane particles. Both HBc Ag and HBs Ag can be identified in liver tissue by immunofluorescence and electron microscopy. While HBc Ag and HBs Ag can be seen in the same cell, more often they appear independently in different cells. HBc Ag is found mostly in the nucleus and less in the cytoplasm and is seemed to be formed in the nucleus and released into the cytoplasm to form the Dane particle. HBs Ag on the other hand is found only in the cytoplasm and membrane[5].

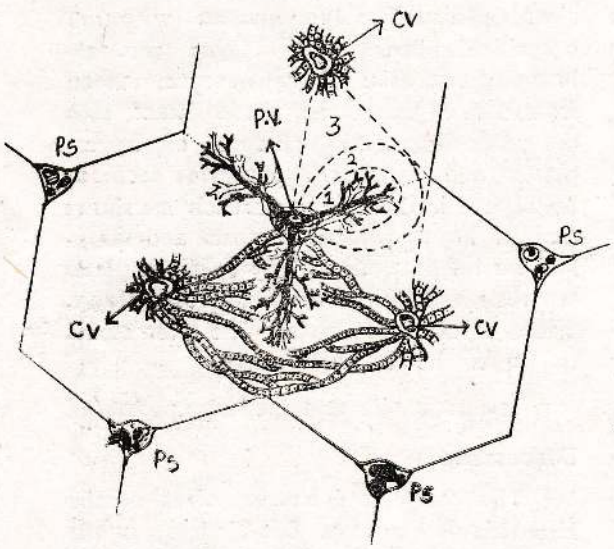

Figure 1.

Diagrammatic representation of liver (after Rapaport) showing its acinar structure. An acinus consisting of a pear shaped collection of hepatocytes around a branch of the portal vein (PV). 3 acini comprising a complex acinus is represented in this diagram. Each acinus is divided into 3 zones; 1, 2 and 3. PS = Portal Triad CV = Central vein (branch of hepatic vein)

The traditional earlier concept of the liver was that of polygonal shaped lobules, lying adjacent to one another and in the centre of which was a branch of the hepatic vein, called the central veinr Recent studies of the microcirculation of the liver[6] show the hepatic lobules to be pear shaped collection of hepatocytes separated by venous sinusoids but centered around a terminal division of the portal vein. These collections are termed simple acini; A complex acinus consists of 3 simple acini plus a sleeve of hepatocytes grouped around a preterminal portal vein and its accompanying arterial and biliary vessels. An acinar conglomerate is composed of 3 to 4 acinar complexes. Within an acinus the hepatocytes may be divided into 3 zones, Zone 1 in close proximity to the portal vein branch and zone 3 furthest away. Zone 3 is the least vascular and therefore bears the brunt of any injury or insult to the liver. (Fig. 1)

This newer knowledge helps in the understanding of the pathogenesis of the changes seen in acute viral hepatitis and one of its complications, chronic aggressive hepatitis.[7] In the classical variety of acute viral hepatitis the lesion is diffuse and evenly distributed in each lobule. There is a balance between the lymphocytes and histocytes in the portal tracts. The presence of both degenerating and regenerating tissue gives a mottled appearance. The necrosis is mostly around the branches of the hepatic vein and no significant reticulin collapse or fatty change is seen. Just as spotty necrosis is characteristic of classical acute viral hepatitis, the hall mark of bridging hepatic necrosis is confluent necrosis connecting different structures. Thus when the necrosis occurs at the periphery of a simple acinus, the bridging is central vein to portal tract and the lesion tends to heal unless there

is an adverse factor. Similary when the lesion occurs at the periphery of a complex acinus, the bridging is from central vein to central vein and the lesion will heal unless there is an adverse factor. The fall out of liver cells in the areas of confluent necrosis causes a collapse of the structure with an approximation of the reticulin producing a septal appearance. Within this, a few individual cells may lie and appear isolated. If these cells are the foci of regeneration, a nodule is formed. However in most cases healing by regeneration without fibrosis is the rule as evidenced by full recovery in near fatal cases of severe hepatic necrosis. But when there is one or more of the following (i) piecemeal necrosis (defined as necrosis of the liver cells at the interface of hepatic parenchyma and connective tissue) (ii) marked lymphocytic infiltration (iii) large numbers of hepatocytes trapped in the collapsed reticulin network, the prognosis becomes unfavourable as the lesion progresses into a state of chronic active hepatitis.[5] Reverting to the acinar concept, when the bridging is from portal tract to portal tract and necrosis piecemeal around the terminal portal tracts, chronic hepatitis is likely to ensue.

There is now sufficient evidence that the Hepatitis B virus is not directly cytotoxic and that the damage found in viral hepatitis B is caused by an immune response. Thus in healthy carriers and in immuno suppressed individuals the virus may be present in the body without any hepatic lesions at all. The damage found in viral hepatitis is due to an immune response on the part of the host to get rid of hepatocytes infected with the virus. Where the response is concerted and effective the result is a short illness with complete recovery in about 2 weeks which is the natural course of the vast majority of both epidemic and endemic cases of hepatitis B virus infection. But where the immune response for one reason or another is ineffective then the virus affected hepatocytes are not eliminated completely, and the virus propagates in other hepatocytes producing a chronic hepatic lesion. A study of the presence of the virus antigens in the liver and the blood at different stages of the disease supports this view. In the very early stage of the illness HBs Ag and HBc Ag may be identified within the hepatocyte and Dane particles in the blood. But at the height of the illness, with the jaundice and necrosis maximum, HBc Ag and HBs Ag cannot be found in the liver but Dane particles continue to found in the blood until early convalescence. Anti HBc antibodies may be found in the blood for some time. But in patients with chronic aggressive hepatitis, even 30% of the hepatocytes can show HBs Ag in the cytoplasm and membrane and 60% of the hepatocytes show HBc Ag. Dane particles are plentiful in the blood and anti HBc antibodies too are present in the blood. The corresponding changes in the liver would be confluent necrosis of the bridging type, marked lymphocytic infiltration and an appreciable number of hepatocytes trapped in the collapsed reticulin appearing as rosettes. This clinical state known as chronic hepatitis requires liver biopsy for diagnosis.[5] Pointers to the diagnosis of bridging hepatic necrosis are the appearance of the disease in those over 40 years, presence of complicating disease, and insidious onset with a preicteric phase over 2 weeks, deep and prolonged jaundice (serum bilirubin over 15mg/100ml) that takes longer than two weeks to reach a peak, hypoalbuminemia and hypoprothrombinaemia. But the more important aspect of bridging hepatic necrosis is whether the lesion goes on to chronic hepatitis and later even cirrhosis of the liver.

Three forms of chronic hepatitis are now recognized (1) chronic active hepatitis (also referred to as chronic aggressive hepatitis) where the hallmark is piece meal necrosis in addition to the other changes mentioned above. It is this form which can lead to fibrosis and cirrhosis with nodule formation. (2) chronic persistent hepatitis where the main lesion is collection of lymphocytes in the portal tract and where there is little distortion of the hepatic architecture and (3) chronic lobular hepatits. Here the spotty necrosis and inflammatory infiltration characteristic of the acute phase of viral hepatitis persists sometimes even for years but does not progress and where complete recovery is the rule. Bridging hepatic necrosis is distinctly uncommon[7].

In view of the more unfavovrable prognosis of patients with bridging hepatic necrosis in patients with viral hepatitis in the series reported by Boyer and Klatskin, Spitz et al[8] reviewed 42 consecutive cases of bridging hepatic necrosis seen at Johns Hopkins Hospital. Of the 42 cases, 18 were due to drug induced hepatitis (methyl Dopa 8, Isoniazid 6, Halothane 3 and Oxyphenisatin 1) and 16 sf these recovered completely. One died within a month of onset from hepatic failure and one went on to develop a post necrotic cirrhosis which resolved only after oxyphenisatin which she had been taking for 3 months was stopped. Of the 10 patients who were HBs Ag positive, 8 recovered and 2 went on to develop chronic hepatitis. In 14 patients the aetiology was unknown (either the test for HBs Ag was negative or not done) and 6 of these progressed to chronic hepatitis. These authors concluded that bridging hepatic necrosis when it occurs as a result of drugs has a benign prognosis (after the drug is withdrawn) when compared to the Hepatitis B viral type. But these authors did not detail the histological findings with respect to the areas of necrosis that were bridged and the presence or absence of piecemeal necrosis.

Even in viral hepatitis the incidence of chronic hepatitis is very variable. For example Stewart, Farrow, Clifford et al[9] carried out a 3 year prospective survey of all cases of febrile jaundice in a total population survey of West London. Out of 784 cases 480 were accepted as having viral hepatitis. 93 out of 455 who were tested for HBs Ag were positive. Yet while mention is made of 2 patients who died with fulminant hepatitis no mention is made of any who went on to develop chronic hepatitis. A better incidence may be obtained from a study[15], carried out in a Californian hospital. In a 18 month follow of 227 cases of acute viral hepatitis 13 out of 134 cases of Hepatitis B (9 7%) and 13 out of 93 cases (12.2%) of Hepatitis non B became chronic. Out of 705 cases studied earlier when tests for hepatitis B virus were not being done, 85 (12%) became chronic. Another study from the same hospital involved a follow up of 429 cases for 1—5 years. 386 (89.9%) cases healed completely. Of the 43 cases (10%) that went on to chronicity, persistent hepatitis accounted for 6.9% and chronic active for 3%. Peters[11] reported on the autopsy data from the same hospital. Out of 84 autopsied cases of acute viral hepatitis in a 10 year period, 82% died in a clinically fulminating disease with either massive or submassive necrosis but 18% who had a less severe initial disease had a progressive down hill course.

The two cases mentioned above had very severe bridging hepatic necrosis due to hepatitis B Viral infection. Yet they both made a full recovery on no specific treatment. The unfavourable prognosis reported by others may not be due to the bridging hepatic necrosis itself but rather on the areas bridged and inflammatory reaction.

Summary

Two cases of severe viral hepatitis B infection in the same family with histological evidence of extensive necrosis and who made a full recovery are noted. The relavance and importance of bridging hepatic necrosis is reviewed.

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The Severity and Duration of Illness in Viral Hepatitis

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Summary:

The association between the severity and duration of illness in viral hepatitis and selected variables such as, age, activity, diabetes, carbohydrate metabolism, glucose-6-phosphate dehydrogenase deficiency, pregnancy, and HB Antigen were analysed. Older patients were more prone to prolonged illness. Activity, as measured by the duration of illness prior to hospital admission, was of no significance in relation to the total duration of illness. Diabetics had a more prolonged illness and were difficult to control. The high incidence of HB Antigen in diabetics may account for the severe, prolonged illness. Occurrence in pregnancy was bad for mother and child and imposed a strain on the liver with impairment of glucose, tolerance. G6PD deficiency was not detected in the 60 cases tested. Death, and serious complications were seen in HB Ag positive patients.

The factors causing prolonged illness in viral hepatitis are not known, and the majority of such patients make uneventful recovery. Boughton[1] gave a median value of 4 weeks total illness in a survey of 4000 hospital patients. From reported observations it seems that a fifth of the patients are likely to have delayed or abnormal convalescence[2].

This report deals with the associations between the severity and duration of illness in viral hepatitis and certain selected variables such as age, activity, diabetes, carbohydrate metabolism, pregnancy HB Antigen and glucose-6-phosphate deficiency.

Patients and Methods

The patients in this study were drawn from a thousand hospital patients with viral hepatitis, the diagnosis being indicated from the clinical course and biochemical findings. Routine liver function tests were carried out in all on admission and at varying interval thereafter. 787 patients were studied in relation to their ages and the duration of the illness. Activity, measured as the number of days at home prior to hospital admission, was analysed in 469 cases with regard to the number of days in hospital. Sixty three non-diabetic patients with viral hepatitis and 21 healthy controls uuderwent glucose loading tests. They were given 100 grams of glucose after a fasting blood specimen was taken and the blood sugar wsa subsequently measured at 2 hourly intervals. Sixty patients with viral hepatitis were screened for glucose - 6 - phosphate deficiency by the methaemoglobin reduction test as described by Brewer and his colleagues[3]. Four cases of viral hepatitis complicating pregnancy were included in this study. HB-Ag was determined by immunodiffusion.

Results :

Age : The percentage of patients whose duration of illness exceeded 4 weeks

was II.4 and 28.5 in the 5-24 year group and in the over 45 year group respectively.

Activity : Up to 14 days stay at home prior to admission was not found to be significant.

Diabetes and carbohydrate metabolism : There was a difference in the mean values of the fasting blood sugar levels in non-diabetic hepatitis patients and in controls. This was significant up to the 5% level, Between levels after overloading there was no significant difference. In the presence of diabetes the course of hepatitis was prolonged. The average duration of treatment of the diabetic patient with acute hepatitis was 6 weeks. Of 24 HB-Ag positive cases, 17 were diabetics.

Glucose - 6 - phosphate dehydrogenase deficicncy : None of the 60 patients screened for G6PD deficiency was positive.

Pregnancy : Four cases were studied. One died, and she was HB-Ag positive. The other 3 had stillbirths with prolonged jaundice. Two of them had marked impairment of glucose tolerance.

HB-Antigen : Of the 24 HB-Antigen positive patients 17 were diabetics, one gave a history of parenteral infections. Of the remaining 6 who gave no history of parenteral infections one died of a fueminant illness. In all the serum bilirubin was above 14.5 mgms/100 mls and the duration of all but one (that died of an acute fulminant hepatitis) was 12-16 weeks. The one non diabetic - who gave a history of parenteral infections the illness lasted 8 weeks.

Discussion :

Little is known of the factors which lead to the persistence of the illness. There have been several reports of viral hepatitis in elderly patients associated with a prolonged, and eventually fatal, course. Saint[4] in a study of infectious hepatitis in the older age groups found that in 20 patients over the age of 40 with a mean of 55 years, 4 had fulminant hepatitis and 4 chronic hepatitis. In a further communication involving 123 patients Saint and associates concluded that the fulminant form with a high mortality was more common in the elderly[5]. Though there are no obvious explanations for the severity of viral hepatitis in the elderly, Fenster[6] observed that patients in this group presented features characteristic of an aged population which often complicated diagnosis and treatment. For instance the long delay between the onset of symptoms and hospitalisation, the high incidence of associated medical disorders, and the frequency of mental changes, among others.

Many believe that an insidious onset in hepatitis, and therefore associated with continued activity, is more likely to be followed by a prolonged course than an acute illness which puts the patient rapidly to bed. There is no evidence that physical activity during convalescence produces any ill effects, but Krikler[7] found that strenuous physical activity during the acute stage of the illness could be dangerous. Krikler and Eilberg[8] described 5 patients with fulminant hepatitis who had all undertaken vigorous exercise during the early stage of the illness. Physical activity in the pre-icteric phase may be one of the many factors which contributes to the severity of the illness[7]. In this study however there was no evidence that delay in hospitalisation, and therefore continued activity, had any influence on the subsequent duration of hospital stay.

In diabetics the course of hepatitis was both more severe and prolonged. Stabilisation of the diabetic state was difficult in the early stages of the illness.

In the patients analysed here the average duration of treatment in the diabetic patients with viral hepatitis was 6 weeks. Severe forms of hepatitis were marked by chronicity. It is possible that the nature of the hepatitis in the diabetics is of the HB-Ag positive type, - a more severe illness. There have been conflicting reports on the nature of liver function in diabetes. Some have found them to be impaired, while others found uncomplicated well controlled diabetics had normal liver function. In a study of 318 diabetics it was found that the liver function tests showed higher values in comparison with those obtained in healthy non-diabetics[9]. In this study the loading tests however did not show any stastically significant difference in non-diabetic patient with hepatitis and normal controls.

Liver fnnction tests show alterations in normal pregnancies. There is an interaction of female sex hormones and the liver and it is believed that oestrogens are primarily responsible for the development of cholestasis. Oestrogens also cause a reduction in the Glucose tolerance in women[10]. In 2 of the 4 cases in this series with viral hepatitis, the glucose tolerance curves were abnormal and only returned to normal after the pregnancy. Conflicting reports exist as to the complications and mortality rates of viral hepatitis in pregnancy. In the Delhi epidemic there was a high mortality[11]. One Patient in this study also died. Europe and the United States report lower mortality rates. Complications affecting the foetus too have been reported and in this series 3 of the 4 had stillbirths.

Edington and Giles in West Africa associated the cholestatic type of viral hepatitis with glucose-6-phosphate dehydrogenase (G6PD) deficiency[12]. Morrow and associates[13] found a high frequency of G6PD deficiency among patients with viral hepatitis, and noted prolonged hyperbilirubinaemia and the histopathological change of prominent canalicular cholestasis. The incidence of G6PD deficiency in the Singhalese in the area is 1.28 per 100[14]. In a previous study we found that there were 2 G6PD deficient patients with viral hepatitis whose course was complicated by haemolytic anaemia[15]. Their serum bilirubin levels were 72 mgms/100 mls and 25.2 mgms/100 mls. In G6PD deficient patients where haemolysis was induced by other factors the bilirubin levels never exceed the normal range of 0.6 mgms to 1.2 mgms/100 mls. Similar findings were seen in normal subjects (i. e without G6PD deficiency) where viral hepatitis had caused haemolytic anaemia. Kivel[16] reported high bilirubin levels in a patient with congenital nonspherocytic haemolytic anaemia (CNHA) due G6PD deficiency due to viral hapatitis. The reason for hyperbilirubinaemia in G6PD deficient patients with viral hepatitis is not clear; haemolysis alone cannot be implicated. Wong[17] thought it was due to disturbances of bilirubin metabolism, a predisposition in which these enzyme deficient patients have. Liver biopsies in some of his cases showd no changes other than those of viral hepatitis. Morrow and associates[13] speculated that these patients also had a hepatic parenchymal cellular deficiency of the same enzyme and this impedes the repair of hepatic injury. Since commencing this paper, one further patient with G6PD deficiency and prolonged hepatitis showed at liver biopsy some glandular arrangements of the liver cells with minimal cholestasis similar to some of the cases described in Africa and Delhi.

Generally, the frequency of HB-Ag was greater in patients with documented post injection hepatitis than in patients with no history of parenteral exposure. Eighteen of the 24 HB-Ag positive patients gave a history of parenteral exposure. There is a high incidence of HB-Ag in viral hepatitis. HB-Ag positive hepatitis is associated with a more severe illness[18].

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Antibiotic Resistance Patterns of Enteric Bacteria from Hospital Patients, Healthy Adults, and Contaminated Drinking Water in A Developing Country (Sri Lanka)

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ABSTRACT

Specimens of Gram negative enteric bacteria from the bacteriological diagnostic service of Government hospitals and private laboratories and also from stool cultures of healthy adults and from samples of drinking water were examined for occurrence of antibiotics resistance. More than 90% of the isolated bacterial strains exhibited resistance to more than one of the commonly used antibiotics. Recurring patterns of antibiotic resistances could be discerned within each group of samples and also between samples from different sources. The high incidence of multiple drug resistance probably reflects a liberal use of antibiotics. It was also concluded that under poor sanitary conditions antibiotic resistance could be borne and spread by otherwise harmless stool bacteria. Contaminated drinking water sources through-out the Jaffna peninsula could have lead to limited choice in antibiotic therapy. Improving the facilities for bacteriological diagnosis and antibiotic sensitivity test will reduce the drug bill and minimise the incideuce of multiple drug resistance.

INTRODUCTION

In Sri Lanka, one of the developing countries in the East, with a population of fourteen millions, the use of antibiotics in the organized health care system was started at about the same time as in the industrialized world. Today antibacterial drugs are freely used. The out—patient department in one of the district hospitals (Jaffna General Hospital) is visited daily by 850 patients of which about 55% are given antibiotics. Furthermore, other state medical institutions and and also private hospitals and clinlcs in the Jaffna district reeeive about three thousand patients a day, and show a similar frequency of antibiotics prescriptions.

In the whole Jaffna district there are only two pathological laboratories with facilities for bacteriological tests. One is that at the General Hospital, where about 70 samples a day are handled for bacteriological diagnosis, the other is a private medical laboratory, where 5-8 samples a day are similarly examined. The samples received at the General Hospital laboratory are mainly from in-patients (80%) but also from rural government hospitals.

Diagnosis of infectious disease at both government hospitals and private

istitutions is mainly by symptoms. That is, limited facilities available for testing, makes it necessary to prescribe most antibiotics without any bacteriological reports The free availability in the open market of some of the antibiotics, such as penicillin V, ampicillin and tetracycline, also contributes to the large and increasing consumption of antibitotics. The annual consumption of tetracycline, ampicillin and chloramphenicol in Sri Lanka has thus increased subsantially over the last five years (Fig. 1). The high and increasing usage of antibiotics could facilitate the selection of resistant pathogenic bacteria.

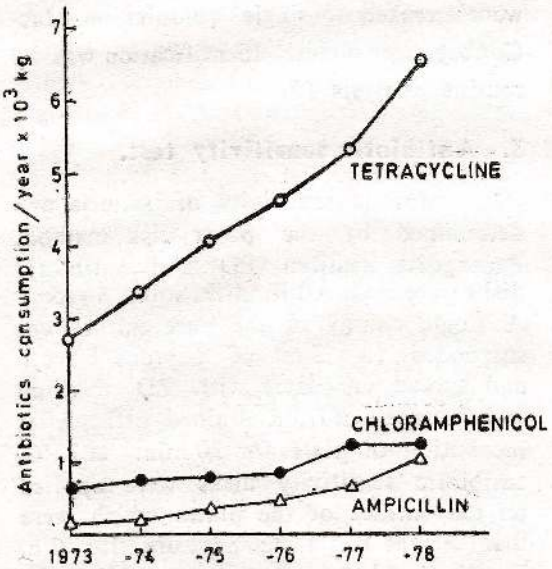

Fig. 1.

Annual consumption of tetracycline, ampicillin and chloramphenicol in Sri Lanka. Data obtained from State Medical Stores, Colombo, Sri Lanka.

High resistance to antibiotics like ampicillin, penicillin V, tetracycline, streptomycin, trimethoprim, chloramphenicol, sulphonamides, erythromycin and nitrofurantoin is in most cases borne on extrachromosomal genetic elements known as plasmids (1). Many of these can transfer by conjugation between different enteric species of bacteria such as **Escherichia, Klebsiella, Proteus, Salmonella** and **Shigella** (2) This genetic mechanism could then effect the spread of antibiotics resistance in response to a high selection pressure.

In Sri Lanka, only the main towns have a pipe-borne supply of purified water. Thus less than 25% of the population has access to treated water. All others have to rely on own or public wells, irrigation channels, streams, rivers, tanks or spouts for their water supply. Regarding these water sources the study in 1973 by Fonseka, Kulasooriya, Vinayagamoorthy and Kathekesu (3) showed, that samples from all of them contained more coliform bacteria than the allowed limit (10 organisms per 100 ml). It then follows, that there is a high possibility for polluted water to function as a vehicle for the spread of antibiotic resistance plasmids in the community, also with otherwise harmless enteric bacteria.

Resistance plasmids can transfer from normal intestinal bacteria to pathogenic species, such as **Salmonella** or **Shigella** (4). Due to the wide usage of antibiotics, otherwise harmless intestinal organisms, resistant to one or several antibiotics by plasmid-borne genes, increase in occurrence. These then form a reservoir of resistance plasmids which could transfer resistance traits into other pathogenic bacteria (1). The final effect of antibiotics therapy is thus not confind to the treated individual, but should be judged for the entire population in the community, especially, where sanitary conditions are poor.

MATERIALS AND METHODS

1. Collection of Samples.

Bacterial samples were collected from three sources ;

(a) Pathology-bacteriology laboratories situated in Colombo, Kandy, Kurunagalla, Anuradhapura and Jaffna. Each of the provincial hospitals, where the mentioned laboratories are located serves a population of about 100,000 pepoles.

Since the general hospital in Colombo reccives patients both from that city and from the rest of the island, this hospital serves a population of about one million people. In addition, samples were Collected from private pathological laboratories in Colombo and Jaffna. The hospital specimens were from in-patients of different ages and of both sexes. Those from the private pathological laboratories were from patients referred from private practitioners. Gram negative bacteria isolated from urinary tract infections, pus and stools were collected. The sampled bacteria strains were stored on nutrient agar slopes and brought to Microbiological Section, Department of Botnay every fortnight. Totally 491 strains of enteric bacteria were collected and isolated from hospitals and private medical laboratories.

(b) Stool cultures were obtained from 98 healthy adults in the age group 25-40 years (army personnel). Normal intestinal bacteria were isolated from stool cultures. Of the sampled persons, 70% had antibiotics therapy during the last three years. The most common antibiotics used had been ampicillin, tetracycline and sulphonamide. The average period of antibiotic therapy was three days. Stool samples were collected with sterile wabs and kept in Stuart's transport medium.

(c) Private and public wells for drinking water in the Jaffna district, where there is no pipe-borne water supply. Samples were collected both from the lime stone and sandy areas. None of the sampled wells had been chlorinated during the previous year. The wells are not covered and most of them are improperly built to keep away pollution. Samples were collected with sterile swabs in sterile peptone broth. From 95 different public and private wells in Jaffna district 119 strains of enteric bacteria were isolated.

2. Identification.

The hospital specimens were bacteriologically identified by the respective pathological laboratories. Stool cultures from healthy adults and water sample cultures were streaked to single colonies on MacConkey agar plates. Identification was by routine analysis (5).

3. Antibiotic sensitivity test.

Antibiotic sensitivity of bacteria was determined by the paper disk method. Paper disk medium (PD) and antibiotic disks were from AB Biodisk, Solna, Sweden. A single colony of the pure culture was suspended in 3 ml of peptone broth and spread on plates with PD medium and the excess of fluid drained off. After incubation of plates for 30 min. at 37°C, antibiotic sensitivity disks were applied on the surface of the plates which were then left at room temperature for 2 h. Final incubation was at 37° C for 18 h. The diameters of the inhibitory zone were measured with a slide caliper. In the assays, care was taken to use inocula resulting in plates with distinctly observable colonies, just touching each other. Plates with confluent growth or too thinly distributed colonies were repeated with appropriate changes in the initial inoculum or in the initial incubation period, in order to obtain the correct inoculum size. The antibiotic disks were

periodically checked for potency by carrying out the sensitivity test as described above and with the standard organism. **Staph aureus,** Oxford 209.

There is a defined relationship between zone size and minimum inhibitory concentration (MIC). Crude MIC evaluations could thus be obtained from zone diameters with the help of experimentally determined regression curves (6).

RESULTS

Hospital isolates

463 strains exhibited resistance to more than one of the tested antibiotics. The resistance patterns shown by these organisms are given in table 1. The com: bined resistance to ampicillin, sulphamethoxazole, tetracycline, trimethoprim, erythromycin, nitrofurantoin and chloramphenicol did occur at a high frequency among **Proteus** (34%) and **Klebsiella** (12%) but was also found in **Pseudomonas** as well as in **Escherichia.** The resistance patterns exhibited by **Klebsiella** and **Escherichia** were quite similar. Of all the isolated enteric pathogens including **Salmonella typhi,** 75% were resistant to ampicillin, which is widely used in Sri Lanka (Table 2). It was also found that 90% of the isolated enteric organisms were resistant to sulphamethoxazole. Trimethoprim is always used in combination with sulphamethoxazole (Septran) in Sri-Lanka. 91% of the studied enteric organisms were found to be resistant to trimethoprim when tested singly for this drug. Althongh clinical use of Septran started in early 1970 already, 9/10 of the enteric organisms seem to have developed resistance to one of its components. Nitrofurantoin which is extensively used in urinary tract infections was introduced in Sri Lanka in 1960 and here 68% of the examined enteric species were found to be resistant, Although 80% of the studied **Klebsiella** strains, 95% of the **Pseudomonas** and 87% of the **Proteus** strains were resistant to nitrofurantoin most of the **Escherichia** strains isolated, were sensitive (75%). This was also the case with the three isolated, strains of **Salmonella typhi.**

Stool cultures of healthy adults

114 strains of enteric bacteria were isolated and of those 99% exhibited resistance to more than one of the tested antibiotics (Table 1). The most common resistance pattern observed among **Escherichia, Proteus, Klebsiella** was ampicillin, sulphamethoxazole, trimethoprim, erythromycin, nitrofurantoin and chloramphenicol (Table 3). Some of the resistance patterns exhibited by the isolated organisms *(***Escherichia, Klebsiella-Proteus***)* from these healthy adults were the same as those of corresponding orga, nisms from hospital patients (cf. Tables 1 & 3). The resistance combination of nitrofurantoin, sulphamethoxazole, trimethoprim and chloramphenicol occurred with a similar frequency in bacteria from hospital patients and from the group representing the healthy population.

Drinking water

118 strains exhibited resistance to more than one of the tested antibiotics. The isolated strains showed resistance patterns similar to those from strains of healthy adults and from hospital patients. Thus the pattern of resistance to ampicillin, sulphamethoxazole, timethoprim, erythromycin, nitrofurantoin and choloramphenicol was common among the different strains isolated from water. This particular resistance pattern was also observed in the different enteric species isolated from healthy adults and in **Klebsiella** isolated from hospital patients (cf. Tables 1, 3 & 5).

TABLE 1

Antibiotic resistance patterns in strains of enteric bacteria collected from five Government hospitals and from a private laboratory

Bacterial species	No. of tested strains	No. of Multiple resistant strains	Antibiotic resistance pattern and number of strains showing it	
1. Shigella	16	15	TR-SX-NI-CL———————AM	1
			TR-SX——CL-TC———-AM	2
			TR-SX——CL———————AM	4
			——SX——CL-TC———-AM	3
2. Salmonella	15	11	TR-SX-NI-CL-TC—EM—AM	1
			TR-SX———————EM	2
			TR-SX———————————	2
			——SX———————————	2
			TR———— ———-EM———	2
			——SX-NI-CL———————AM	1
3. Proteus	82	80	TR-SX-NI-CL-TC—EM—AM-NA	4
			TR-SX-NI-CL-TC—EM—AM	28
			TR-SX-NI——TC—EM—AM	6
			TR-SX—— CL-TC—EM—AM	2
			TR-SX-NI-CL-TC—EM	3
			TR-SX-NI-CL-TC———AM	4
			TR-SX——CL-TC———AM	3
			TR-SX-NI——TC—EM———	4
			TR——NI——TC—EM———	6
4. Pseudomonas	107	107	TR-SX-NI-CL-TC—EM—AM-NA	37
			TR-SX-NI-CL-TC—EM—AM	8
			TR-SX-NI-CL——EM—AM-NA	18
			TR-SX-NI-CL———————AM-NA	6
			TR-SX-NI-CL-TC———AM-NA	4
			TR-SX-NI-CL-TC——— AM	3
			TR——NI-CL———————AM-NA	3
5. Klebsiella	152	150	TR-SX-NI-CL-TC—EM—AM-NA	6
			TR-SX-NI-CL-TC—EM—AM	18
			TR-SX-NI——TC———AM	30
			TR-SX——CL-TC—EM—AM	3
			TR-SX——CL-TC———AM	6
			TR-SX-NI-CL———————AM	11
			TR-SX-NI———————EM—AM	6
			TR-SX-NI———————-AM	17
			TR-SX-NI——TC———AM	6
			TR-SX———TC———AM	4
			TR-SX-NI-CL———————AM	6
6. Escherichia	119	110	TR-SX-NI-CL-TC—EM—AM	6
			TR-SX——CL-TC—EM—AM	3
			TR-SX——CL-TC———AM	13
			TR-SX———TC———AM	7
			TR-SX-NI———————————	5
			——SX———TC-————————	4
			TR-SX———TC-————————	8
			TR-SX	13
			——SX———TC———AM	3
			——SX——CL-TC—EM—AM	3
			TR-SX-NI-CL-TC———AM	6
			TR-SX———————————AM	3
			TR-———————————————	7

AM = Ampicillin; SX = Sulphamethoxazole; TC = Tetracycline; TR = Trimethoprim; EM = Erythromycin; NI = Nitrofurantoin; CL = Chloramphenicol; NA = Nalidixan.

TABLE – 2

Frequencies of Antibiotic resistance among enteric bacteria collected from five Government hospitals and a private medical laboratory.

Bacterial species	No. of tested strains	Number of strains resistant to different antibiotics							
		AM	SX	TC	TR	EM	NI	CL	NA
1. **Shigella**	16	14	15	8	11	0	3	13	2
2. **Salmonella**	15	3	11	1	9	5	5	2	0
3. **Proteus**	82	55	66	75	77	71	72	53	6
4. **Pseudomonas**	107	101	97	60	105	75	102	90	78
5. **Klebsiella**	152	131	141	89	148	47	123	98	15
6. **Escherichia**	119	64	107	73	100	24	32	46	8
Total :	**491**	**368**	**437**	**306**	**450**	**222**	**337**	**302**	**109**

* AM = Ampicillin; SX = Sulphamethoxazole; TC = Tetracycline; TR = Trimethoprim; EM = Erythromycin; NI = Nitrofurantoin; CL = Chloramphenicol; NA = Nalidixan.

* Antibiotics tested in this study.

TABLE 3

Antibiotic resistance patterns of enteric bacteria in stool cultures from healthy adults in the age group of 25 40 years.

Bacterial species	No. of tested strains	No. of Multiple resistant strains	Antibiotic resistance patterns and number of strains showing it	
1. **Escherichia**	88	87	TR-SX-NI-CL-TC—EM—AM	5
			TR-SX-NI-CL-— —EM—AM	3
			TR-SX-NI-CL-TC———AM	3
			TR-SX-NI-CL— —EM ——	3
			TR-SX-NI——TC———AM	3
			TR-SX-NI-CL-TC———	4
			TR-SX——— —TC--EM—AM	3
			TR-SX-NI——TC———	3
			TR-SX-NI-CL-————	14
			TR-SX-—-CL————	4
			TR-SX-NI————	11
			TR-SX————	4
2. **Proteus**	15	15	TR-SX-NI-CL-TC—EM—AM	6
			TR-SX-NI-CL———EM—AM	3
			TR-SX-NI-CL———AM	2
			TR-SX- NI-CL-TC— ———	2
			TR-SX-NI-CL———EM———	1
			TR-SX ———TC———AM	1
3. **Klebsiella**	11	11	TR-SX-NI-CL———EM—AM	4
			TR-SX-NI-—-TC———AM	2
			TR-SX-NI———— EM—AM	1
			TR-SX-NI-CL———AM	1
			TR-SX-NI-CL ———————	1
			TR-SX ————————	2

AM = Ampicillin; SX = Sulphamethoxazole; NI = Nitrofurantoin; CL = Chloramphenicol; TC = Tetracycline; EM = Erythromycin; NA = Nalidixan; TR = Trimethoprim.

TABLE — 4

Frequencies of antibiotic resistance among enteric bacteria in stool cultures from healthy adults.

Bacterial species	No. of tested strains	Number of strains resistant to different antibiotics							
		AM	SX	TC	TR	EM	NI	CL	NA
1. **Escherichia**	88	26	81	31	84	20	61	50	3
2. **Proteus**	15	12	15	9	15	10	14	14	0
3. **Klebsiella**	11	8	11	2	11	5	9	6	2
Total :	**114**	**46**	**107**	**42**	**110**	**35**	**84**	**70**	**5**

AM = Ampicillin; SX = Sulphamethoxazole; TC = Tetracycline; TR = Trimethoprim; EM = Erythromycin; NI = Nitrofurantoin; CL = Chloramphenicol; Na = Nalidixan;

TABLE 5

Antibiotic resistance patterns of enteric bacteria isolated from water in public and private wells in the Jaffna district.

Bacterial species	No. of tested strains	No. of Multiple resistant strains	Antibiotic resistance patterns and number of strains showing it.	
1. **Escherichia**	7	6	TR-SX-NI-CL————	2
			TR-SX——-CL-——EM——	1
			TR-SX-NI————	1
			TR-SX————	1
			TR——— ———-EM ——	1
			TR———— ——-AM	1
2. **Pseudomonas**	30	30	TR-SX-NI-CL-TC—EM—AM-NA	2
			TR-SX-NI-CL——EM—AM-NA	7
			TR-SX-NI-CL-TC—EM—AM	1
			TR-SX-NI-CL——EM—AM	16
			TR-SX-NI———-EM—AM	2
			TR-SX———— AM	2
3. **Proteus**	7	7	TR-SX-NI-CL-TC—EM—AM-NA	1
			TR-SX-NI-CL— —EM—AM-NA	1
			TR-SX-NI-CL——EM—AM	4
			TR-SX-NI-CL———-AM	1
4. **Klebsiella**	75	75	TR-SX-NI-CL-TC—EM—AM-NA	2
			TR-SX-NI-CL——EM—AM	33
			TR-SX-NI-CL———AM	2
			TR-SX-NI-———EM—AM	7
			TR-SX-NI-CL——EM———	4
			TR—-NI-CL——EM—AM	3
			TR-SX-NI-CL————	2
			TR-SX-NI———EM———	2
			TR—-NI-CL———AM	7
			TR—-NI———EM—AM	1
			TR-SX ———EM—AM	1
			TR—-NI-CL————	8
			TR—-NI—— ————	1

TR = Trimethoprim; SX = Sulphamethoxazole; NI = Nitrofurantoin; CL = Chloramphenicol TC = Tetracycline; EM = Erythromycin; AM = Ampicillin; NA = Nalidixan.

DISCUSSION

Susceptibility of bacteria to antibiotics is generally expressed as the minimum inhibitory concentration (MIC) of the single antibiotic. Most conveniently the MIC is obtained by the disk diffusion technique, where a paper disk impregnated with the particular antibiotic produces a concentration gradient in the solid medium on which bacteria to be tested are inoculated. Since the bacterial sensitivity patterns obtained by this technique depends on a number of variables such as type of medium, size of inoculum. nature of disk, amount of solid medium, it is valid only if carried out under standardized conditions.

The MIC value determination **in vitro** by the disk diffusion technique could be regarded as a vital step in antibacterial therapy, where a quantitative measure is obtained for the antibiotics sensitivity of the causative organism. The physician could thus for each case evaluate the potency of available antibiotics and avoid the use of inefficient drugs. This will in turn diminish the selection of resistant pathogenic bacteria.

There are 8 water supply schemes (one major and seven minor) in the Jaffna district serving less than 5% of the population in the area. Most of the homes have their own wells. The state has constructed fresh water public wells throughout the district and each well is used by 100 to 200 persons. In addition to this, the temple wells serve as public wells especially in the sandy area. Practically none of either the private or the public wells is properly covered or otherwise protected, and they are open to pollution. It was seen for example, about 50% of the visited wells lacked proper linings to prevent seepage, which occurs especially during the rainy season. Bacteria isolated from water samples were mostly. **Klebsiella** (62%). Few **Escherichia** were found. This is due to the fact that **Escherichia** strains survive only for a limited time (about a week) in water, whereas **Klebsiella** organisms survive longer. Therefore the presence of only **Klebsiella** in water samples could still be due to old faecal pollution. The main cause for contamination of drinking water is probably the improper well construction.

Some of the resistance patterns observed in the bacterial species were common in samples isolated from hospital patients. healthy adults and drinking water respecti. vely, suggesting that there is a flow of bacterial organisms or at least of resistance genes between these three sources of specimens. The same resistance pattern was also observed in different bacterial species isolated from the same source of specimens, implying that there is a dynamic spread of bacterial genetic material carrying antibiotics resistance in the community and could reflect a high selectivity of resistant organisms.

More than 90% of antibiotics are prescribed without any bacteriological examination both at government medical institutions and in medical clinics managed by general practioners. In Sri Lanka treatment for a suspected infection regularly seems to include at least one of the broad spectrum antibiotics or ampicillin. This liberal use of antibiotics effects a strong selection of resistant, normal intestinal bacteria. This selection effect could be suspected to be particularly strong at hospitals, where the use of antibiotics is intense. A tenfold increase in the frequency of nitrofurantoin resistant organisms, and a twofold increase in ampicillin resistance frequency had taken place since an earlier study made about eight years ago (7). Resistant bacteria from hospitals might

TABLE – 6

Frequencies of antibiotic resistance among enteria bacteria isolated from water in public and private wells in the Jaffna District

Bacterial species	No. of tested strains	Number of strains resistant to different antibiotics							
		AM	SX	TC	TR	EM	NI	CL	NA
1. Escherichia	7	1	5	0	7	2	3	3	0
2. Proteus	7	7	7	1	7	6	7	7	2
3. Klebsiella	75	58	55	2	75	55	74	64	2
4. Pseudomonas	30	30	30	3	30	28	28	26	9
Total :	**119**	**96**	**97**	**6**	**119**	**91**	**112**	**100**	**13**

AM = Ampicillin; SX = Sulphamethoxazole; TC = Tetracycline; TR = Trimethoprim; EM = Erythromycin; NI = Nitrofurantoin; CL = Chloramphenicol; NA = Nalidixan.

find their way back to the community by different routes such as visitors, staff members and discharged patients.

Poor sanitary conditions in the community finally facilitate the spread of the resistant bacteria in the healthy human population. More than 90% of the drinking water sources including that of district hospital in Jaffna peninsula were contaminated with multiple resistant organisms. Infections caused by these organisms will lead to a limited choice of antibiotic therapy. Hence it is of utmost importance to make all drinking water sources suitably treated.

The fact that more than 90% of the antibiotic prescriptions do not accompany bacteriological report makes it necessary to adopt multiple antibiotic therapy which could include the inactive ones also. This inturn increase the drugbill of our country. Hence it would be much economical to set up more bacteriologica. laboratories to cope up with such heavy demand. This will minimise the prescription of unnecessary antibiotics which will also reduce the incidence of multiple drug resistance.

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Nutrition Survey of a Rural Sri Lankan Village: Bambarabedda (Kandy District)

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Introduction

The Sri Lanka Nutritional Status Survey (1976)[1] indicated that the population from the Superintendent of Health Service areas of Kandy and Ratnapura suffer most from undernutrition. A study conducted by Hettiarachchy and Sri Kantha (1980)[2] in Uda-Peradeniya, an urban village in Kandy district revealed that energy deficiency was more prevalent than protein deficiency. The present study is an extension of our investigation into a rural village, Bambarabedda, in Kandy district for further confirmation in this respect.

The rural village surveyed in this study belongs to the programme of the village development project, sponsored by the National Youth Services Council in collaboration with the University of Peradeniya (Fernando, 1980)[3]. This programme is aimed at the improvement of nutrition ,sanitation, agriculture, communications and general living conditions.

Bambarabedda is located in a semi—mountatainous region in the Central Province, about 25 miles from Kandy and five miles off Hunasgiriya. It belongs to the Uda Dumbara electorate and had an estimated population of 268 households. Access to the community was only possible by jeep, through narrow, untarred roads.

1 *Senior Lecturer*
2 *Assistant Lecturer*
3 *Medical Student*

The objectives of the study were to provide an assessment of the nutritional status and dietary pattern of the population. Similar studies on the rural population of Sri Lanka have been reported by Nicholls and Nimalasuriya (1941)[4], Bibile **et al.** (1949)[5], Gunasekera (1958)[6] and De Mel and Abeyratne (1976)[7]. Though Bambarabedda village had been mentioned by Clements and Bocobo (1957)[8] in their report on the nutritional status of samples of the population of Ceylon, detailed information on the date pertaining to nutritional information of this remote village was not provided.

Materials and Methods :

Materials : Bambarabedda village is composed of 268 households. Ninety nine percent of the inhabitants are Sinhala Buddhists. The main occupation of the inhabitants is cultivation. There are 6 tobacco barns and the young girls found employment in these, during the "season", i. e. when the tobacco leaves were harvested and graded. The area is comparatively poverty-stricken.

Ten percent of the total number of households residing in this villege, i. e. 26 households were randomly selected for the dietary survey. The distribution of individuals in the sample according to age group is shown in Table 1.

Dietary survey : The dietary survey team consisted of a Senior-Lecturer, two Assistant Lecturers and two Medical under-

TABLE — 1

Distribution of Individuals in the Sample according to Age Group.

Age group	Number	Percent
Infants	06	3.4
Pre-school children	18	10.2
School children (boys)	27	15.3
School children (girls)	19	10.8
Adolescent (boys)	19	10.8
Adolescent (girls)	19	10.8
Adults (males)	35	19.9
Adults (Females)	28	15.9
Lactating females	05	2.8
Total	176	100.0

graduates. Due to the constraints of time, money, equipment and personnel, only three members of the team lived in the village throughout the survey period thereby enabling them to observe the village life pattern at a closer range. Two physicians attached to the Medical Faculty and two technicians of the Dept. of Biochemistry were involved in the nutritional assessments. A Senior-Lecturer in the Dept. of History was associated with the team in the collection of socio-economic data.

All food consumed by the subjects of the 26 households (176 individuals: 96 males and 80 female) were weighed and recorded for three consecutive days from breakfast till dinner. This included all the snack foods also which were consumed in between meal hours. The survey team went to the residences of the subjects early in the morning before cooking commenced. All raw foods to be prepared for the day were weighed and recorded and the investigators repeated the same procedure right throughout for all the meals. Data collected also included the cooked weight of food and inedible portions of the food. By this process, data was collected on the quantities of all types of food consumed daily by each household during the three-day observation period. These data were then pooled to calculate the average daily intake. The nutritional requirements of each household was calculated using the Medical Research Institute Nutritional Requirements Chart,

Physical Measurements : Stature on length was measured in the subjects using a sturdy portable wooden board which allowed values to be read to the nearest O.1 cm. Subjects were weighed fully clothed but bare-footed. Weight was measured in kilograms using a scale which allowed values to be read to the nearest 0.1 kg. Boards and scales were checked periodically to ensure their accuracy of measurement.

Clinical examinations : Clinical examinations were performed on two days of the survey-period; 121 subjects of all age groups were examined for nutritional deficiency diseases and symptoms which included corneal xerosis, Bitot spots, night blindness, dry skin, rickets, angular stomatitis, glossitis, protein energy ma nutrition, hepatomegaly, anaemia, dental caries, phrynoderma and fluorosis. Individuals presenting with physical complaints or pathological symptoms at the time of examination were either treated immediately by the visiting physician or referred to the government hospitals for further evaluation and treatment.

The survey pattern adopted was based on the information provided by Burgess and Burgess (1975)[9]. The field work began on March 23, 1980 and was completed on March 31, 1980.

Results and Discussion

Socio-economic survey: The socio-economic status of the sample was analysed by collecting data on the (i) housing conditions (ii) total income per household

TABLE — 2

Housing Conditions of the Selected Households in the Sample.

Household number = 26

Household size:

Mean = 6.8

Range = 2-13

type of house	roof	floor
thatched = 18	tiled = 06	mud = 19
brick = 06	straw/ leaves = 12	cemented = 07
wooden = 02	metal = 03	
	cadjan = 05	

and (iii) literacy of the adults. Table 2 shows the housing conditions of the selected households. The mean household size was 6.8 with a range from 2 to 13. This figure is higher in comparison to that of rural Sri Lankan mean of 5.6 (Perera, 1976)[10]. The majority of the houses were of thatched nature, with straw/leaves as roof and floor cemented with mud. The study area was comparatively poverty stricken. Fifty percent of the households in the sample were at the income level of 200-399 rupees/month while approximately 35 percent of the sample received between 100-199 rupees/month (table 3). The village had no electricity and subjects obtained water from spouts and creeks. Sleeping conditions were usually crowded. In almost all the households surveyed, members of both sexes slept together either in the same room or in the same bed. Sanitation was also very poor School facilities were inadequate. The only village school present had classes upto Grade 5 attended by only a few children. Literacy among the adults of the sample were found to be low with approximately 50 percent of the selected sample being illiterate (table 4). These observations reveal that the sample selected for the nutrition survey were typical of the lower social strata of the island's population.

TABLE — 3

Total income per household (Rupees/month)

Income level	Sri Lanka +		Bambarabedda *
	All island (percent)	Rural sector (percent)	(percent)
below 100	2.2	0.6	15.4
100 - 199	18.2	20.6	34.6
200 - 399	35.7	38.6	50.0
400 - 599	18.8	20.0	—
600 - 799	10.2	9.8	—
800 - 999	5.2	3.9	—
1000 and over	9.7	4.4	—

\+ Dept. of Census and Statistics, Sri Lanka (1971)

* Present study (1980)

TABLE — 4

Literacy of the Adults of the Sample.

(number)

Education grade attained	males	females
illiterate	16	17
2nd std	00	02
4th std	00	05
5th std	07	07
7th std	05	00
SSC	07	02
Total	35	33

TABLE — 5

Height and weight of male individuals in the Sample

Age Composition of the sample (year)	Number	Height (cm)		Weight (kg)	
		mean	range	mean	range
Infants (O-1)	01	70.0	—	8.0	—
Pre-school children (2-5)	06	86.9	71.3- 98.8	11.8	8.5-16.0
School children (6-12)	21	115.9	101.3-131.3	18.5	14.0-26.0
School children (13-20)	12	146.9	127.5-165.0	39.3	24.0-53.0
Adults (21-77)	17	161.3	150.0-173.3	48.5	39.0-57.0
* Well nourished					
School children (6-12)			112.0-160.0		18.1-44.9
School children (13-20)			140.0-180.0		30.4-66.2

* Dept. of Census aud Statistics, Sri Lanka (1978)

TABLE — 6

Height and weight of Female individuals in the Sample

Age composition of the sample (year)	Number	Height (cm)		Weight (kg)	
		mean	range	mean	range
Infants (O-1)	04	66.0	58.8- 75.0	6.4	5.0- 8.5
Pre-school children (2-5)	11	86.2	71.3-101.9	11.2	7.0-15.0
School children (6-12)	16	113.6	93.0-134.4	18.7	12.0-30.5
School children (13-20)	12	152.5	136.3-158.8	39.6	25.0-51.0
Adults	21	147.1	140.0-156.9	40.7	34.5-51.0
* Well nourished					
School children (6-12)			102.0-158.0		15.4-45.8
School children (13-20)			138.0-165.0		34.0-51.7

* Dept. of Census and Statistics, Sri Lanka (1978).

Physical stature : Since anthropometry allows one to assess protein energy under-nutrition by usiug the body measurements of weight and height, the results obtained in these parameters for the sample studied are shown in tables 5 and 6. The ranges in both body weight and height of children between the ages 6 and 19 in the sample were comparatively lower than figures available for well-nourished children of the country (Dept. of Census and Statistics 1978)[11]. The growth retardation was more marked in the adolescent boys than in the girls of same age group.

Foodstuffs consumed : Rice was the chief cereal which was consumed. The majority of ths households surveyed ate country-rice. The consumption of fleshy foods was very low while that of milk and eggs were negligible. The diet of the sample surveyed consisted mainly of plant origin.

TABLE 7

Nutrient intake per household per day

House-hold series no	House-hold size	Energy (calories)	protein (g)	Ca (mg)	Fe (mg)	Vit. A (ug)	thiamin (ug)	riboflavin (ug)	Niacin (mg)	Ascorbic acid (mg)
01	4	8501	225	3346	57	175	4350	2760	62	110
02	3	6792	216	22	61	642	4590	2300	58	376
03	6	8810	209	574	62	134	6230	3360	73	266
04	7	7434	213	749	57	143	14290	2810	68	224
05	6	4803	233	429	69	167	5020	2460	68	159
06	13	15681	502	1409	134	482	11040	3290	160	156
07	6	7650	233	474	82	3462	3860	1105	50	55
08	10	13405	432	2101	144	723	10620	2360	148	513
09	6	5164	163	1302	46	276	4410	1410	39	192
10	7	15021	360	628	101	82	8890	1420	127	78
11	4	7327	190	1161	69	747	4650	1250	52	129
12	7	11914	290	2732	112	94	7718	2034	90	98
13	7	15453	504	244	317	785	9630	2520	117	369
14	10	13276	406	1333	173	196	9580	2040	139	143
15	7	15672	351	1768	374	132	8010	1730	115	255
16	4	7840	218	1260	85	580	5316	1170	78	185
17	2	5353	131	272	38	42	3730	7700	46	206
18	5	3151	133	1031	56	652	3340	1860	31	240
19	6	13286	412	2170	125	864	10230	3080	129	376
20	6	14051	442	7978	202	5569	11580	5250	122	1387
21	5	9107	280	4720	106	587	7300	2510	65	117
22	9	18048	409	1166	134	1224	9840	2640	142	362
23	11	5362	174	574	35	70	2430	1950	32	360
24	10	9809	307	4193	164	1443	8811	4193	74	217
25	8	12454	371	1964	121	2071	8820	1940	123	588
26	7	10944	372	1243	89	172	7280	2050	100	143

Dietary observations showed that a usual breakfast was completed with plain tea and sugar in the case of adults. Lunch and dinner consisted mainly of a combination of rice and starchy vegetables. The majority had no home gardens or did not raise vegetables for their consumption. Cooking facilities were inadequate with 80 percent of the families preparing their meals on three stones hearth. The nutrient intake of the 26 households surveyed in the study is shown in table 7.

Food constituents : Sixteen of the families surveyed received adequate energy from their diet while 10 families ate diets low inadequate energy value (table 8). The protein in the diet were chiefly of vegetable origin; even so 9 families did not show adequacy in this nutrient. The calcium content of the diet is very low and 19 families consumed inadequate amounts of calcium-containing diet.

Table 8 further reveals that the diet consumed by the sample was very deficient in vitamins. The chief sources of vitamin A in their vegetable-based diet were the carotenes and as the consumption of green leaves was negligible, the diet of the population studied were deficient in vitamin A values. Thiamin was present in sufficient quantities due to the homepounded nature of the rice consumed. Deficiency in riboflavin and niacin was prominently seen because little meat, milk and eggs were taken by these peasants. It is inferred that a sufficiency of vitamen D was obtained by the action of sunlight on the skin of individuals.

In table 9 the nutritional data obtained in the present study is compared with the results of some rural dietary surveys carried out by the Medical Research Insitute (Jogaratnam and de Mel, 1976)[12]. Resemblance in the figures relating to the intake of energy, total protein, calcium, iron, vitamin A and riboflavin reveal an inadequcy of energy, calcium, iron and riboflavin. A very low intake of vitamin A in the Bambarabedda sample is striking. This may be correlated with a high incidence of vitamin A deficiency symptoms such as corneal xerosis, Bitot spots and

TABLE — 8

Adequacy of some nutrients / household / day

Nutrients	* Number of households exhibiting adequacy of nutrients	
	adequate	inadequate
Energy	16	10
Protein	17	09
Calcium	07	19
Iron	16	10
Vitamin A	04	22
Thiamin	19	07
Riboflavin	01	25
Niacin	09	17
Ascorbic acid	17	09

* Total number of households sampled = 26

The adequacy of the diet in respect of any nutrient was determined by expressing consumption of the nutrient as a percentage of the recommended allowances on a per family per day basis (Jogaratnam and de Mel, (1976).

TABLE – 9

Nutrition intake per capita per day in Bambarabedda sample compared with the studies on other rural villages

Rural village studied with year	Energy (calories)	Total protein (g)	calcium (mg)	iron (mg)	vitamin A (ug)	riboflavin (ug)
1. Kudirippuva (1969)	2080	53	405	19	455	650
2. Hirigollagama (1970)	2018	45	219	18	286	544
3. Hiripitiya (1970)	1979	50	391	16	745	648
4. Kukulpone (1970)	1863	43	280	13.5	494	527
5. Kataragama (1971)	1721	39	354	19	626	618
6. Kandalama (1971)	2310	58	347	20	510	882
7. Ganthiriyagama (1971)	1955	51	357	18	683	800
8. Bambarabedda (1980)	1513	44	245	17	122	382
* Recommended allowance for Sri Lanka	2000	45	519	23	642	1220

1-7: Data from Jogaratnam and de Mel (1976)—Forty households random sampled out of about 200 households in each village.

8: Present study (1980) — Twenty six households randon sampled out of 262 householdes. Nutrition intake for other vitamins were as follows: Thiamin = 1,088 mg; Niacin = 13 mg; and Ascorbic acid=42 mg.

$$\text{Nutrient intake per capita per day} = \frac{\text{Nutrient intake/household/day}}{\text{Number of individuals in the household.}}$$

* Jogaratnam and de Mel (1976)

night blindness reported in table 10. In this aspect the results of this study shows resemblances to the data reported by Bible **et al.** (1949)[5].

Under-nutrition symptoms : The incidence of under-nutrition in this village was fairly high Of the 176 individuals among 26 households sampled 70 were children of under 12 years. The total incidence of deficiency symptoms exhibited at above 5% level were as follows:- dental caries = 46%; phrynoderma = 29% anaemia = 16%; corneal xerosis = 12%; glossitis = 7%; Bitot spots = 6% (table10).

Thd dental caries was probably the most widespread defect of nutritional origin affecting the sample. It may be generally agreed that diet and particularly the intake of calcium and vitamin D must play a part in its aetiology. A high incidence of dental caries in the sample may be correlated to the poor oral hygiene of the subjects as well as to the dietary pattern. Despite the apparent adequacy of the intake in iron (16 out of 26 families exhibit adequcy in iron), 15.7 per cent of the subjects exained gave evidence of anaemia. Incidences of phrynoderma, corneal xerosis, Bitot spots

TABLE — 10

Clinical signs in the Sample of Bambarabedda (percent prevalence)

(N= 121)

Deficiency symptoms	Incidence of disease in different age groups (years)					Total incidence
	Infants 0-1	Pre-school children (2-5)	School children (6-12)	School children (13-19)	Adults (20 and above)	
1. Corneal xerosis	—	—	5.8	3.3	2.5	11.6
2. Bitot sports	—	—	—	0.8	5.0	5.8
3. Night blindness	—	2.5	—	—	—	2.5
4. Phrynoderma	—	1.6	15.7	5.8	5.8	28.9
5. Dry skin	—	0.8	1.6	—	—	2.4
6. Rickets	—	1.6	—	—	—	1.6
7. Angular stomatitis	—	0.8	0.8	—	0.8	2.4
8. Glossitis	—	—	0.8	—	5.8	6.6
9. * P. E. M. (i) sparse hair	0·8	0.8	—	—	—	1.6
(ii) hair-flag sign	—	—	0.8	—	—	0.8
(iii) moon-face	—	0.8	—	—	—	0.8
(iv) marasmus	—	0.8	0.8	—	—	1.6
10. Hepatomegaly	—	0.8	2.5	—	—	3.3
11. Anaemia	—	1.6	3.3	5.8	5.0	15.7
12. Dental caries	—	6.6	6.6	10.7	22 3	46.2
13. Flurosis	—	—	—	0.8	0.8	1.6

* Protein energy malnutrition

and night blindness may also be related to the poor vitamin A intake. Riboflavin inadequcy may be attributed to the incidence of glossitiss.

Conclusions : The diet of the peasant in Bambarabedda consisted mainly of starchy vegetables and rice. It was basically deficient in energy, calcium, iron, vitamin A and riboflavin. The ingestion of protein, thiamin and niacin was comparatively adequate in majority of the individuals. Vitamin C intake was also adequate, except in older individuals. The most revealing clinical deficiency signs were dental caries, anaemia, phrynoderma and corneal xerosis. The poor dietary pattern exhibited by the study population may be related to low literacy rate prevailing among them. The data presented in this study provides futher supporting evidence to the fact established by the Sri Lanka Nutrition Status Survey (1976)[1] that protein-energy undernutrition in rural Sri Lanka is general problem that needs solution.

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Summary

This study reports the findings of a nutrition survey carried out in the rural village, Bambarabedda, of Uda Dumbara electorate (Kandy district), during 23rd - 31st March 1980. The survey included the collection of dietary and clinical data. Dietary survey included 26 randomly selected households, that represented 10 percent of the total population of 268 households in that village. Results obtained were analysed with respect to the nutritional status, incom levels. educational level and food habits of this community. Sixteen out of the 26 households consumed diet which was deficient in energy rather than in protien. Vitamin A in the diet was very low. In addition, the diet of most of the households was found to be deficient in calcium, iron and riboflavin. Most Revealing clinical symptoms noticeable in the subjects were, dental caries, phrynoderma and anaemia. Few cases suffering from corneal xerosis, Bitot spots, night blindness, dry skin, rickets, glossitis and protein energy malnutrition were also detected.

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Cardiac Tamponade due to Pyopericardium

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Summary :

A case ef cardiac tamponade due to pyopericardium following an anastomotic leak after oesophago-gastrectomy is presented.

Introduction:

Since the introduction of antibiotics septic pericarditis has become rather uncommon, even in spite of the fact that empyema thoracis is still seen sporadically in this country. The fibrous pericardium affords some protection against the spread of the septic process from pleural to pericardial sacs. A patient who developed pyopericardium and cardiac tamponade following a leaking anastomosis after oesophago-gastrectomy is presented.

Case Report :

Mrs L, a 44 year old estate worker complained of dysphagia of short duration and was found to have an adenocarcinoma at 39 cms. Oesophagogastrectomy with oesophago-jejunal anastomosis was carried out on 4th June 1980 and parenteral Ampicillin commenced the same day. Cloxacillin was added on the second post operative day. On the fourth post operative day an anastomotic leak was demonstrated and Gentamycin 80 mg intramuscularly / day was added to the antibiotic regime. From the first post operation day her course had been stormy and her poor general condition at this time precluded immediate re-exploration. On the 14th June, (the tenth post operative-day) a massive anastomotic leak due to jejunal gangrene was demonstrated at re-operation, and after further mobilisation of the jejunum a new oesophago-jejunal anastomosis was fashioned. During the operation she had gross cardiac irregularities and hypotension, and the latter persisted into the post-operative period. On the following day her condition remained poor, with persisting hypotension and chest X-ray showed an enlarged

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cardiac silhouette (Fig: I). She had a central venous pressure of 12 cms of saline and digitalisation and a slow metaraminol infusion did not change her clinical state. A diagnostic pericardial aspiration on 15th June yielded 130 mls of purulent fluid and following which the CVP dropped immediately to 3 cms of saline and the systemic arterial pressure rose from 60 mm Hg to 85 mm Hg. On the 16th June a further 115 mls of purulent fluid was obtained at pericardiocentesis and continuous pericardial drainage was then established through a tube inserted under local anaesthesia. Over the next 4 days her systemic blood pressure remained between 80 and 90 mm Hg. and the CVP was in the range of 3 to 5 cms of saline. On the 19th June a leak was again demonstrated from the new anastomosis and she died on the 20th June. No. post mortem was performed.

Discussion.

Pleural empyemas are not uncommon in this country, and carcinoma of the oesophagus is one of the more common malignancies and although oesophageal resections are carried out in many institutions with its attendant complication of a leaking anastomosis, in neither group of cases is septic pericarditis of common occurrence. From personal communications with some of the surgeons who perform these operations it would appear to be distinctly rare. The subsequent development of cardiac tamponade, although expected, is even more uncommon. The occurence of septic pericarditis in this patient is then probably due to the initial development of a localised perianastomotic leak, walled off partially by the pericardium, and the absence of any sphincter mechanism such as the pylorus to prevent reflux has resulted in the leakage of a pancreatic enzyme containing fluid into the abscess cavity and which in turn has caused a lysis of the fibrous pericardium, and hence allowed the septic process to be carried into the pericardial sac. No complete dissolution of the pericardium had occurred for in that case tamponade would not have been possible.

Recurrent delayed haemorrhage from splenic rupture

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Summary :

Assumptions in the available short history led to delay in both diagnosis and effective treatment in a case of splenic rupture which caused recurrent delayed haemorrhage.

Introduction :

No one disputes that a detailed history is the cornerstone on which diagnosis is based and yet examination of patients' case notes in this country demonstrates its brevity and brings it to a position of almost no importance. Excessive work load and a host of other irrelavent reasons are often adduced to justify the position. In most cases then, the diagnosis is based on physical signs assuming that the patient has been referred to the appropriate clinic or ward. The following case report illustrates this situation.

Case report :

A 25 year old woman was transferred from a peripheral unit to the Jaffna General Hospital. She was admitted through the Outpatients' Department to a gynaecological unit and the brief history recorded states that she had abdominal pain and bleeding per vaginam since the previous day. She also gave a history of about six months amenorrhoea. One week previously she had been admitted to another gynaecological unit in this hospital then giving a history of abdominal distension and bleeding per vaginam and apparently, after excluding the presence of ectopic pregnancy she had been discharged.

Her obstetric history was two previous pregnancies, the first ending in spontaneous abortion and the second ending in a normal delivery five years ago.

At the peripheral unit she had been given 100 mgms Hydrocortisone I. V, and an infusion of 5% Dextrose had been set up. Clinical examination showed a pale, slightly orthopnoeic woman who had a low volume radial pulse, heart rate 100 per minute and blood pressure 100/70 m.m. Hg. Her abdomen was slightly distended, apart from the bladder which was full. Palpation above the umblicus revealed a soft, relaxed abdominal wall while in the lower half tenderness was elicited bilaterally on light palpation. Percussion showed shifting dullness in the flanks. Pelvic examination revealed an almost normal size uterus with a cervix which was soft. The fornices were full and tender. Although not typical, a diagnosis of ruptured ectopic pregnancy was made and she was prepared for immediate operation. At laparotomy, the peritoneal cavity contained about a litre of blood, both clotted and fluid. The uterus, both fallopian tubes and the left ovary were normal. A cyst 2 inches in diameter was present in the right ovary. There was no evidence of bleeding from any of these organs. The incision was extended cephalad and a large clot was now revealed overlying the costal surface of the spleen which was contused and in the middle of the contusion was an irregular rupture of the splenic capsule. Splenectomy was carried out. She made an uneventful recovery.

In view of the surprising operative findings, she was questioned again but was evasive and admitted vaguely to a fall 10 days previously. Her husband was appraised of the findings and when questioned he made the surprising statement that he had not hit her. Re-examination of the patient's left lower chest now revealed a linear abrasion lying along the longitudinal axis of the 8th rib.

Discussion :

Splenic rupture is one of the more common abdominal emergencies and in the classical case there is a history of trauma to the left lower chest or left upper abdomen. Shortly afterwards, the patient presents with the features of intraperitoneal harmorrhage and emergency splenectomy saves the day. There is usually a clear relationship between the trauma, which is usually of moderate or severe degree and early presentation and operation. It used to be said that the enlarged spleen could be ruptured by even trivial trauma but since the disappearance of the "malarial spleen" the present generation of the junior medical staff have been denied that experience. In the days when the hoola-hoop was a popular sport with young girls, splenic rupture was reported with even this activity. Spontaneous rupture of the spleen has also been reported. More recently splenic rupture has been seen at operation at a distance of some days from the injury and two possibilities may account for it:- a) delayed diagnosis of splenic rupture and b) delayed rupture of the spleen. Initially most of such cases were ascribed to the latter category but it is now felt that the majority belong to the former. However there is no doubt that the delayed rupture of the spleen may occur, in which the trauma causes disruption of the splenic tissue while its capsule initially remains intact and repeated haemorrhage within the capsule distends it until finally delayed rupture occurs. The present case probably falls into that category but although capsular rupture did not occur at the time of trauma it is likely that the contused capsule was breached within 3 days leading to some haemoperitoneum and the first admission. Recurrent haemorrhage, although probably by small increments, led to the second admission but even then her history of trauma being missed, the correct dianosis was not made prior to operation. The history taking on the second admission too was inadequate. A more detailed history and examination should have indicated the correct diagnosis.

Ruptured Spleen

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Ruptured Aneurysm of the Common Hepatic Artery

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Summary :

A case of ruptured aneurysm of the common hepatic artery which presented as an emergency is presented.

Introduction :

Aneurysms of the Common Hepatic Artery are rare and in reporting another case Aluvihare and his colleagues[1] found only 176 cases in the literature in 1972, of whom 44 had undergone successful surgical treatment. Aneurysmal rupture is one of its more common complications, and is often fatal[2,3]. The present report deals with the successful surgical management of such a case.

Case Report :

A 40 year old man was admitted as an emergency on 15th June 1977 to Jaffna General Hospital with a history of sudden severe abdominal pain since the previous day. The pain radiated from the abdomen to both shoulders. He had vomited on a few occasions after the onset of the pain. There was no history of fever. One month previously he had had a similar attack, although of shorter duration, and for which he had been treated by his general practitioner. His bowels had been open, and he had passed urine. Clinical examination showed a pale, anicteric, afebrile man whose pulse rate was 110/minute, and his systemic blood pressure was 100/70 mm Hg. The abdomen was moderately distended and palpation showed a soft abdominal wall but with tenderness all over on deep palpation. Bowel sounds were absent. The cardiovascular and respiratory systems were normal. He was taken up for laparotomy a few hours later, 4 pints of blood being found in the peritoneal cavity due to a ruptured saccular aneurysm of the common hepatic artery, bleeding from which had however ceased and only clot was seen within the sac through the tear on its anterior wall. Removal of the clot resulted in a resumption of active arterial bleeding which was controlled by the application of clamps both proximally and distally. The redundant portion of the saccular aneurysm was excised and the arterial wall repaired with atraumatic silk. After repair, pulsation was felt in the artery on removal of the clamps. The patient left hospital on 3rd July 1977, and review in late 1980 showed that he remained well and continued working as a labourer.

Discussion :

Aneurysms may occur in any artery but those in the hepatic are rare, although cases have been reported in both intra—, and extra-hepatic portions, or even in an anomalous hepatic artery. Occasionally both intra- and extrahepatic aneurysms exist in the same patient[3]. The more common presentation is that of an abdominal lump, while rupture remains its most common complication, often with fatal results. In the elective case accurate preoperative diagnosis may be made by coeliac arteriography, while the presence of calcification in the right upper quadrant of the abdomen or a smooth filling defect of a barium outlined duodenum may also suggest the diagnosis[4]. Aneurysmal rupture may

occur into the free peritoneal cavity as in this patient or into a viscus in the vicinity such as the stomach, duodenum, gall bladder or bile duct, or even into the portal vein[2,3]. In most cases rupture is followed by death, a fate from which this man was saved by his general good health and the temporary occlusion of the vessel by clot. Intra-aneurysmal clots are common and they may even prevent flow during life, the hepatic arterial supply being then maintained by collateral vessels. As far as the surgical treatment is concerned it obviously depends on whether the operation is an elective or emergency one, and the various options include proximal and distal ligation without excision of the sac, obliteration of the lumen, aneurysmal excision and reanastomosis, aneurysmorraphy as was done in this case, luminal obliteration, insertion of saphenous vein graft or prosthesis, spleno-hepatic anastomosis and hepatic lobectomy for intrahepatic lesions.

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Dr. V. T. Pasupati - An Appreciation

S. G. Luther, S. Sabaratnam

Dr. Pasupati was born in a leading Hindu family on the 9th of may 1894 in the ancient village of Thirunelvely in Jaffna. He had his early education at Jaffna Hindu College and later at Trinity College, Kandy. where he excelled in studies. After completing his secondary education, he proceeded to India to pursue a course in medicine and in 1921 he graduated with honours at the University of Madras.

On his return to Sri Lanka, after practising for a short period in Kurunegalle, he joined government service and was attached to the General Hospital Colombo.

In 1924 he married the eldest daughter of the eminent Ayuverdic Physicion Sri. Kasturiar Muthucumaru by which union he had five sons and a daughter.

After serving in various parts of the country in different capacities he proceeded to U. K. to specialise in medicine which he had to interrupt due to the outbreak of the second world war.

He continued to serve the State and in 1950 he was appointed the Medical Superintendent of the Jaffna General Hospital. It was at this period of his career that we had the good fortune, as we passed out as young doctors to work under Dr. Pasupati. He made a deep impression on us which we could never forget. The lessons we learnt from him, the high professional standards he followed in the discharge of his duties, the example he set by practice rather than by precept have stood us in good stead, not only in our medical career but in our personal lives too. There was a perfect blend in him of the skilled doctor and a great gentleman. His interest in medical science was combined with his interest in philosophy. He was both the ideal Hindu and the ideal scientist. His scientific training helped him to practice the essentials of Hinduism which in its content is love with compassion. It was this love and compassion which made him the ideal doctor. He was patient, sympathetic, understanding and devoted to his work. These qualities with his skill as a doctor made him stand out as a great example to the young doctors. He used to be the first to arrive at the hospital and the last to leave. He was always on call and ever ready to help a patient, a friend or another human being. When we look back, we can say without any hesitation that although we have met greater physicians and greater surgeons later in our lives, we never met such a saintly doctor with these human qualities and stature. It was during 1951, he was actively involved organizing the Jaffna Clinical Society (the present J. M. A.) and was elected its first President.

Dr. Pasupati was deservedly promoted S. H. S. Jaffna in 1952 and retired as such in 1953. After retirement, he involved himself with the same zeal in several social activities and worked for the upliftment of the people of Jaffna. The beneficiaries were several. He was the founder president of the Thirunelvely Y. M. H. A. which still continues to function. He was President of the Friend in Need Society, President of the Death Benevolement Association, Vice President, Jaffna Well-Fair Association, President O. B. A. J. H. C, President, King George's Home for the Underprivileged, President CNAPT Jaffna, Chairman Jaffna Hospital Committee and as a member of the Northern Province Cancer Socity agitated for the establistment of the cancer treatment centre in Jaffna etc, etc.

Although death has snatched him away from us and thereby deprived the several institutions and the community of the services rendered by him, it may be stated without exaggeration that the good work done by him is being continued by his children. His five sons are each in the pinnacle of success of his own profession-among them are three medical luminaries.

Though his example was too high for us to emulate in every way, it always set us a standard for our guidance. We salute him as a great gentleman and a great doctor.

News and Notes

Editor : As from Ist July 1981 Dr. V. Krishnarajah FRCS, FRCSE takes over the editorship of the Jaffna Medical Journal. All communications, both medical and business relating to the Journal should be addressed to him at The Library, Jaffna General Hospital, Jaffna.

News & Events

Clinical Cytopathology for Pathologists - Postgraduate Course

The Twenty-third Postgraduate Institute for Pathologists in Clinical Cytopathology is to be given at the Johns Hopkins University School of Medicine and The Johns Hopkins Hospital, Baltimore, Maryland, March 22- April 2, 1982. The full two week program is designed for pathologists who are Certified (or qualified) by the American Board of Pathology (PA), or its international equivalent.

It will provide an intensive refresher in all aspects of the field of Clinical Cytopathology, with time devoted to newer techniques, special problems, and recent applications. Topics will be covered in lectures, explored in small informal conferences, and discussed over the microscope with the Faculty. Self-instructional material will be available to augment at individual pace. A loan set of slides with text will be sent to each participant for home-study during February and March before the Institute. Credit hours 125 in AMA Category 1.

Application is to be made before January 27, 1982. For details, write: John K. Frost, M. D., 610 Pathology Buildings, The Johns Hopkins Hospital, Baltimore, Maryland 21205, U. S. A.

The entire Course is given in English.

Instructions to Authors

Original articles and Case Reports are welcome and should be submitted to the Editor Jaffna Medical Journal, The Library, General Hospital, Jaffna. Articles are accepted on the understanding that they are submitted to only this journal, and that articles and their illustrations become the property of the journal.

Communications regarding business matters and advertising should also be addressed to the Editor.

Manuscripts. As from 1981 the Jaffna Medical Journal will subscribe to the policy of uniform requirements for manuscripts described in the British Medical Journal (1979) **1**: 532 - 535 and the Lancet (1979) **1**: 428 - 431. Intending authors are advised to consult these instructions. Two copies of manuscripts, typed on one side only of good qulaity white paper with double spacing and 3 cms margins at both left and right. Each manuscript shonld have the following sections in sequence:- title page (on a separate page) with authors names and listing their highest degrees and diplomas, their positions at the time of the study, and present post if different from the above, the institution where the work was carried out and the address of the author who will deal with correspondence and reprints; summary; introduction; materials and methods; results; discussion; references. Tables should be typed on separate sheets of paper and numbered in sequence with Roman numerals. Figures should be numbered with Arabic numerals. Both tables and figures should have accompanying legends. Photographs should be good quality, unmounted, glossy prints. All illustrations should have a label pasted on the back indicating the name of the author and the figure number.

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