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EDITORIAL

LIFE AND DEATH – ETHICAL DILEMMAS

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WITH POWER comes responsibility. The power that the doctor wields over life and death places a heavy responsibility upon him. Consequently, in the couse of his work, the doctor often must choose between two or more alternatives none of which seem to be a satisfactory solution to the problem. The choice is difficult enough for an older experienced doctor but is a nightmare for the young inexperienced but conscientious physician. Examples of such ethical dilemmas abound. Thus in respect of the incurable patient, the doctor is often faced with the dilemma of whether the truth may lead to the loss of "will to live". Consequently, some doctors deliberately deceive their patients. Another dilemma concerns euthanasia. Should the doctor preserve life when he knows that the patient's existence will be without human dignity and be a burden to his loved ones? Is not the quality of life more important than the prolongation of life? Should he intervene to save a severely deformed neonate with low survival potential? Yet another dilemma revolves around the allocation of priorities. Should one category of patient or another have greater priority when it comes to the use of scarce resources such as renal dialysis, the respirator and intensive care? Should limited financial resources be channelled into an expensive therapeutic or diagnostic procedure such as renal dialysis, radiotherapy and CAT when large numbers of rural people have difficulty in obtaining even simple primary medical care provided by the lowest category of paramedical or auxiliary? These are but three examples of the ethical dilemmas faced by doctors in the course of their work.

THE DYING PATIENT

The medical profession's preoccupation with saving lives and postponing death has left many doctors both unwilling and ill-equipped to deal with the dying patient. Undoubtedly, the hearing of bad news can bring on severe depression and the loss of the "will to live". Consequently many doctors are unwilling to disclose the true seriousness of an illness particularly in the case of cancers. In the case of a small number of patients, a disclosure would be an act of needless cruelty. However, according to Gerle *et al.* (1960), a large proportion of patients have a positive reaction. Further, Kubler-Ross (1969) demonstrated that nearly all of 200 dying patients in a Chicago hospital came to realise what was happening even when efforts were made to conceal information, and that with adequate assistance, the denial, depression and anger could be replaced with hope and acceptance. However, it would need a sensitive and patient doctor or nurse with sufficient time on his hands to adequately assist the incurable or dying patient to adjust to the truth. In the face of competing demands on his time, the doctor seldom can put the dying high on his list of priorities. Nevertheless this problem cannot be ignored or brushed aside.

EUTHANASIA

The term literally means a "good" or "easy" death, even though in the modern sense it often means permitting death. A severely damaged cerebral cortex may leave a patient in coma with no likelihood of recovery of consciousness. Only his brain stem sustains his life. To his relatives he is dead. If such a patient develops pneumonia, should

every effort be made to treat him? Would it be better to withhold treatment? Should a severely deformed neonate with low survival potential be sustained for a few months by intensive treatment or should treatment be withheld? Should the patient with severe pain from cancer be provided with dosages of drugs that relief pain but which might "hasten" his death?

Decisions to withhold treatment or provide near lethal doses of pain-killing drugs can lead to death. It would seem that this is contradictory to the doctor's duty to preserve life. However, is the doctor's duty purely to prolong life irrespective of the quality of life? Surely the duty of the doctor is to respect life and to contribute to the quality of life. However, the definition of what constitutes a "good" quality of life is in itself a philosophical question.

PRIORITIES

In medicine, resources are almost always scarce. At the doctor-patient level every diagnostic and therapeutic procedure has to be distributed among those demanding for these. In the case of the common inexpensive procedures and therapies, it is easier to meet almost all demands. However, many procedures are prohibitively expensive. Renal dialysis, organ transplants with attendent need to monitor immunological reactions, and intensive care, are but a few of the more expensive procedures that drain the National Health Budget out of proportion to the benefit that accrue out of their use. Intensive care requires three times the equipment and five times the staff needed for normal patient care (Illich, 1975). Consequently, the demands for these very expensive procedures and therapies cannot be fully met even by the National Health Budgets of the most developed countries. Doctors are thus compelled to decide which of several patients requiring an expensive but scarce resource has greater priority than others – an ethical dilemma most would rather avoid.

In such a situation one is often tempted to seek and obtain a larger allocation of the National Health Budget for these expensive procedures in an attempt to meet the demand. However, the dilemma is even more acute when it is realised that such expensive procedures will benefit only a few urban patients perhaps at the expense of large numbers of rural people many of whom do not even have access to simple primary medical care. Illich (1975) notes that large-scale random samples have been used to compare mortality and recovery rates of patients served by intensive care units with those of patients given home treatment, with no indication that there are any advantages in intensive care. National Budgets are always limited. Expenditure on one expensive procedure such as a renal dialysis machine, intensive care, or CAT must necessarily mean that there are less funds for other programmes. Nevertheless, allocation decisions are ethical dilemmas that demand careful examination of all available data and a choice of one of several alternatives none of which seem to be a satisfactory solution to the problem.

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REVIEW OF CASES OF FRACTURES OF THE SPINE AT THE UNIVERSITY HOSPITAL

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SPINAL INJURIES are not an uncommon problem the world over. In Malaysia, with its rapid development and expansion towards industrialisation, there have been many injuries to the cervical and dorsi-lumbar regions of the spine. Hitherto, the management of spinal injuries has been controversial, whether to change from the didactic teaching of earlier masters of our field like (Watson Jones, 1955) in England and (Bohler, 1956) or to the more conservative approach of (Nicoll, 1962; Bedbrook, 1969) and (Guttmann, 1959).

Today, it is accepted that compression fractures do not require perfect reduction for functional independence nor is disability proportional to residual deformity.

In the management of these fractures, a clear appreciation of the damage to soft tissues is essential. For it is indeed the consequences of such damage that often cause a persistance of pain or more seriously increases the neurological defect, (Apley, 1970). The causative factors of such injury are generally a combination of flexion and rotation. Extension injuries occur particularly in the cervical spine in the elderly, causing tetraplegia, (Barnes, 1948).

As the mechanism of the injury to the cord is uncertain in patients with cervical spine injuries hence they are best held in neutral position, for indeed flexion can aggravate the injury in flexion fractures, as extension would in an extension injury. The mechanism is probably chiefly due to rotation much more so than flexion (Roaf, 1960). Another possible cause of damage to the spinal column is vertical compression, though it is by no means common.

CLINICAL MATERIAL

Dorso-lumbar spine

During the period under review, there have been ninety-four thoraco-lumbar fractures and twenty-seven cervical column injuries. The ninety-four patients studied in this category include the patients who have had lesions above the ninth dorsal. There have been six patients with wedge fractures in this region.

Male patients have been more than females, there being seventy-three as compared to twenty-nine females. The incidence of the lesion has been highest in the twenty to twenty-nine and thirty to thirty-nine year groups. Table I.

Table I

Age and sex distribution of patients with fracture of the spine

Age Group	Males	Females	Total
0 – 9	0	0	0
10 – 19	5	4	9
20 – 29	30	5	35
30 – 39	17	2	19
40 – 49	8	2	10
50 – 59	8	2	10
60 – 69	3	5	8
70 and above	2	1	3
Total:	73	21	94

A study of the ethnic distribution showed that fifty-six patients were Chinese, fifteen Malays, nineteen Indians and four others. The Chinese preponderance is presumably due to their being more in urban areas while the Malay population is largely rural. With development and industrialisation, this pattern is changing. Table II·

Table II

Causative factors of spinal fractures at the University Hospital 1967 – 1974

Mode of Injury	Males	Females	Total
Motor vehicle accidents	23	6	29
Falls	43	13	56
Other causes	7	2	9
Total	73	21	94

The chief causative factor affecting the spine in this region has been due to falls in both sexes. There have been fifty-six patients in the category, fory-three of whom were males and thirteen females. Motor vehicle accidents including motor cycles have been the cause of injury in twenty-nine patients, twenty-three of whom were males and six females. Table III.

Table III

Level of injury and associated neurological deficit in spinal fractures at the University Hospital 1967 – 1974

Level of Vertebrae Involved	With Neurological Deficit	No Neurological Deficit	Total
D9	1	0	1
D10	1	0	1
D11	0	1	1
D12	0	5	5
T12	6	13	19
L1	11	30	41
L2	2	10	12
L3	3	11	14
L4	1	3	4
L5	0	5	5
Others	3	6	9
Total	28	84	112

In this region a total of one hundred and twelve vertebrae have been involved in the ninety-four patients. In those patients with a neurological deficit, the twelfth dorsal in six patients and the first lumbar in eleven patients have been the commonest level for the complication. On the other hand in the patients without a neurological deficit too the twelfth dorsal and first lumbar vertebrae have had the highest frequency of involvement, there being thirteen patients having lesions at the twelfth dorsal and thirty at the first lumbar vertebra. The total number of vertebrae involved with a neurological deficit have been twenty-eight, while eighty-four vertebrae have been fractured without any spinal cord lesion. Table IV.

Table IV

Analysis of patients with cervical spine fractures by age and sex

Age Group (Years)	Number of Cases		Total
	Male	Female	
0 – 19	1	2	3
20 – 39	19	3	22
40 – 59	0	1	1
60 and above	1	0	1
Total	21	6	27

In developing countries the time interval between injury and admission is an important factor. In spinal injuries, unlike in those involving both the upper and lower extremities there is a definite improvement in the right direction. Fifty-two patients having been admitted in less than twenty-four hours while twelve have been brought to casualty between twenty-four to forty eight hours. However, thirty patients, nearly one-third of the total have taken over forty-eight hours for admission The reason for this change in the right direction is probably two-fold. First the realisation that spinal injuries are a more serious problem, particularly when a neurological deficit is present hence the desire for hospitalisation. Secondly, the injuries being due either to falls at work sites or motor vehicle accidents the patients are brought by ambulance or passers-by to hospitals. Table V.

Cervical Spine

During the period under review, twenty-seven cases of fracture of the cervical spine have been admitted for treatment. The age most affected has been in the twenty to thirty-nine year group, with

nineteen males and three females. Twenty-one of the patients have been male and the rest females. Table VI.

Table V
Causes of injury in cervical spine fractures

Mode of Injury	Number of Cases		Total
	Males	Females	
Motor vehicle accident	14	5	19
Fall	3	0	3
Other causes	4*	1†	5
Total	21	6	27

* 1 patient had a plank fall on his head.
2 patients dived into shallow water.
1 patient had his neck twisted.
† Head caught in generator

Table VI
Level of lesion in cervical fractures with and without neurological deficit

Level of Injury	Tetraparesis	Tetraplegia	No Neurological Deficit
C1	0	0	2
C2	4	0	10
C3	0	0	1
C4	1	0	1
C5	0	4	2
C6	1	1	0
Total	6	5	16

Unlike in the dorso-lumbar spine, the commonest cause of the injury has been motor vehicle accidents. There were nineteen patients, fourteen of whom were males. Table VII.

Table VII
Treatment and combinations of treatment given at the University Hospital to cervical spine fractures

Treatment Given	With Neurological Deficit	Without Neurological Deficit
Skull traction	10	9
Cervical collar	5	7
Minerva plaster	3	2
Operative treatment	1*	2†
Total	18	20

* Patient had hand surgery.
† Patients had posterior spinal fusion.

Analysis of the level of the lesion shows that fourteen of the twenty-seven patients have had fractures at the second cervical vertebra, ten patients with no neurological involvement and four with tetraparesis. Tetraplegia has been highest at the fifth and sixth cervical vertebra level.

MANAGEMENT

Dorso-Lumbar Spine Fractures

The management of these patients have been largely conservative. Of the total of twenty-four patients with neurological deficits, nine have been operated on because of pain, instability, or increase of the neurological deficit thus interferring with nursing care. Although operating for pain and instability is controversial, (Bedbrook, 1969), one patient with no neurological deficit has been operated for a fracture dislocation.

Fifteen patients with neurology and sixty-nine without have been treated by initial bed rest and physical therapy consisting largely of exercises for the spinal musculature in the non-paraplegic, while for the paraplegic it has been an intensive effort to develop the upper extremities and trunk muscle above the lesion.

Cervical Spine Fracture

The management of these patients have been largely conservative and rightly so. In cervical fractures whether they be flexion or extension injuries, it is not possible to state whether they are stable or not at this stage. (Bedbrook, 1969).

Stability of the cervical spine is due to the ligaments, particularly the anterior common ligament, the intervertebral disc, and the facet joints (Holdsworth, 1963; Bedbrook, 1969). That the need for surgery is limited has been advocated by (Guttmann, 1959; Bedbrook, 1969) and others, particularly early surgery. Generally it is about six per cent. In the present series, twelve patients have had skull traction for six weeks, followed by a collar. When indicated owing to pain or because of mild instability, a Minerva plaster is applied for a further period of six weeks. Figures 1a – f.

Routinely, all patients have flexion and extension x-rays after initial traction. This is done under careful supervision. There is considerable danger in early surgery because of disturbing the fracture haematoma anteriorly and thus interferring with interbody and anterior fusion. In instability there are more chances for anterior grafts to slip after fusion when surgery is carried out early, while,

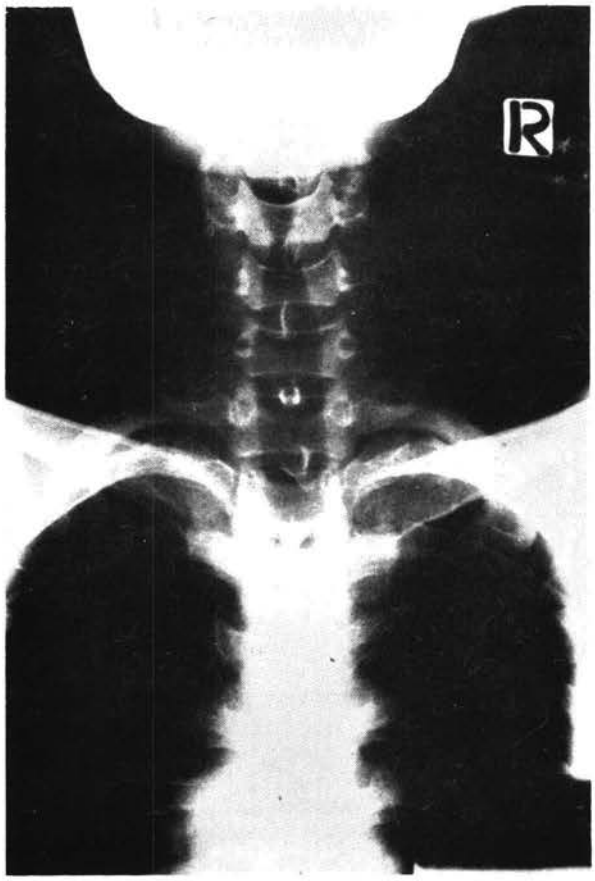


Figure 1a – Antero-posterior view of cervical spine with fracture of C5.

posterior fusion on the other hand may endanger the blood supply of the cord by the dissection and stripping of the muscles and ligaments from the spinous processes and laminae. Ten patients with neurological deficit and nine without, have had skull traction. This had been followed by a lighter cervical collar or Minerva plaster jacket. One patient had reconstructive hand surgery and another a posterior spinal fusion.

ANALYSIS OF RESULTS

Dorso-lumbar Spine

Sixty-three patients have made a complete recovery, two a partial recovery, while there has been no improvement in nineteen patients. Ten patients have been lost to follow-up. In the complete recovery group, four were paraplegic and fifty-nine were not.

Both patients with partial improvement were initially paraplegic, three patients without neurology complained of pain and disability at follow-up. Eight patients without neurology were lost to follow-up.

The duration of hospitalisation has been more in patients with a neurological deficit and markedly less in those without; five patients with a neurological deficit have been in hospital between one to four weeks while sixteen have been from one to six months. On the other hand, the majority of patients – fifty three with no neurological involvement, have been hospitalised between one week to one month.

Cervical Fractures

In the management of cervical spine fractures with a neurological deficit, there have been partial

Figure 1b – Lateral view of the same patient.

Figure 1c – Flexion x-rays to demonstrate instability after initial period of immobilisation.

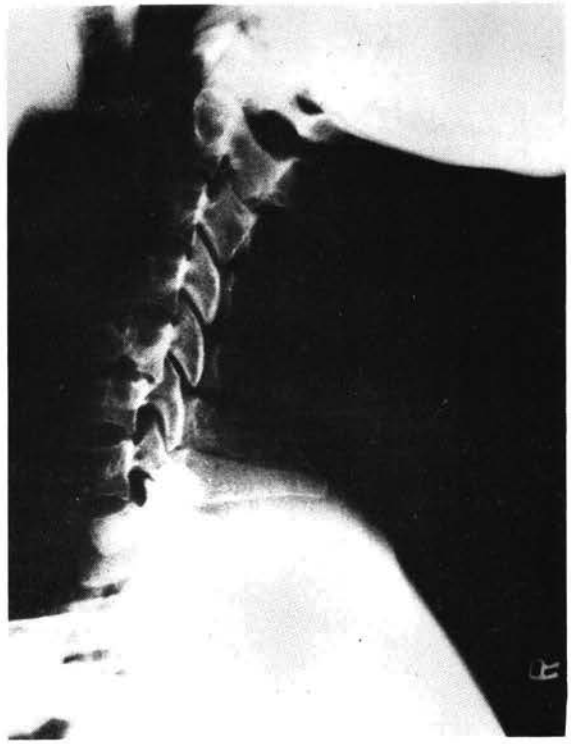
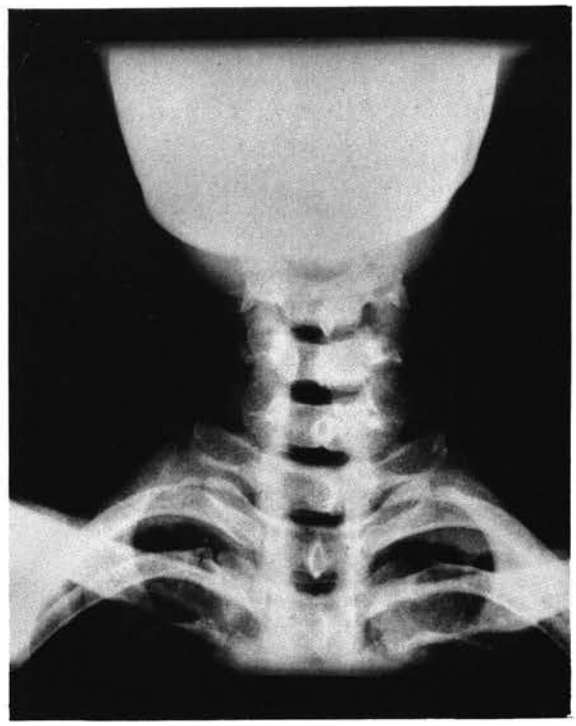


Figure 1d – Extension view to show same.



Figures 1e, 1f – Stabilisation of the fracture after further conservative treatment.

recovery in one patient with a fracture and complete recovery in another. On the other hand there has been partial recovery in three patients with fracture dislocations. Two patients have been lost to follow-up and two have died.

In those patients with no neurological lesion, there has been complete recovery in eleven patients with fractures and in three with fracture dislocations One patient was lost to follow-up.

DISCUSSION

The controversial history of the managemet. of spinal fractures is outlined as well as the mechanisms of the injury. The ninety-four patients with dorsi-lumbar injuries and the twenty-seven with fractures and fracture-dislocations of the cervical spine are evaluated. The study of the clinical material shows that injuries of the dorsi-lumbar spine are due chiefly to falls from heights, while the cervical injuries are due to motor vehicle accidents. The mechanism of cord compression is discussed. The ethnic group that is chiefly involved are Chinese, and males are in general more often affected that females. It has been more common for fractures of the spine to come in early for management than in those with extremity injuries.

The treatment has been chiefly conservative both in those with cord involvement and without. The hazards of surgery in both groups have been highlighted and the need for conservatism stressed.

The results of both groups have been evaluated. As would be expected, those patients with neurological involvement have had more problems and the final outcome has been less satisfactory than in those without.

SUMMARY

This paper evaluates ninety-four patients with dorso-lumbar fractures and twenty-seven patients with cervical spine fractures which have been treated at the University Hospital, Kuala Lumpur. These cases have been analysed as to age, sex, the number of vertebrae involved, and their ethnic groups as well as causative factors. In discussing the management of this series, the need for a conservative approach has been high lighted. The results of treatment in the two groups have been analysed to justify such conservatism.

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MANAGEMENT OF CONGENITAL RIGHT CORONARY ARTERY TO RIGHT ATRIAL FISTULA

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INTRODUCTION:

CONGENITAL CORONARY ARTERY to cardiac chamber fistula is a rare condition. Krause initially reported a fistulous communication between a coronary artery and a cardiac chamber in 1865. The first surgical correction of this condition was performed by Bjork and Crafoord (1947) when they successfully ligated a fistula between a branch of the left coronary artery and the pulmonary artery. The need for surgical closure of the fistula is clear in symptomatic patients. When the lesion is discovered in infancy in symptomless patients, it is generally accepted that the operation should be performed electively during childhood as the mortality and morbidity following closure of the fistula has been shown to be low (Rittenhouse *et al.*, 1975).

We wish to report on a patient with a right coronary artery to right atrial fistula successfully operated on at the University Hospital, Kuala Lumpur.

CASE REPORT:

N.E.O. is a four year old male child who was initially discovered to have a heart murmur at the age of six months when he was seen for a respiratory tract infection. Apart from frequent respiratory infections he was asymptomatic when initially assessed at the age of 8 months.

Physical examination revealed that he was an active child. The peripheral pulses were of a large volume and the arm blood pressure was 90/40 mm of Hg. There was cardiomegaly associated with a forceful apex beat. A thrill was palpable in the second right intercostal space parasternally. Auscultation revealed a grade 3/6 continuous murmur maximally heard over this same area. Chest radiographs showed that the heart was enlarged and there was pulmonary plethora. The electrocardiogram was within normal limits.

The child was followed up and when he was reassessed at the age of 3 years he was still asymptomatic apart from an increase in respiratory tract infections. With the exception of obviously collapsing pulses and clinical left ventricular hypertrophy confirmed on electrocardiography, the physical signs remained essentially unchanged.

In view of these progressive changes clinically and on the electrocardiogram, a right heart catheterization was performed on the 30th July, 1976. This revealed a step up of oxygen saturation at right atrial level with a pulmonary-to-systemic flow ratio of 2: 1. The pulmonary arterial wedge pressure and pulmonary artery pressure were 20 mmHg and 52/25 mmHg (mean 38 mmHg) respectively, while the pulmonary vascular resistance was 192 dyne-sec-cm^5. On the 23rd November 1976 a left heart catheterization was performed. The left ventricular and aortic pressures were 105/0 mmHg and 105/52 mmHg respectively. There was no systemic arterial desaturation. Aortography revealed a large right coronary artery (RCA) to right atrial fistula (Fig. 1). The proximal RCA and its sino-atrial node branch which emptied into the upper right atrium were noted to be grossly dilated. The distal RCA and the left coronary artery appeared normal. Left ventricular angiography excluded the presence of a ventricular septal defect.

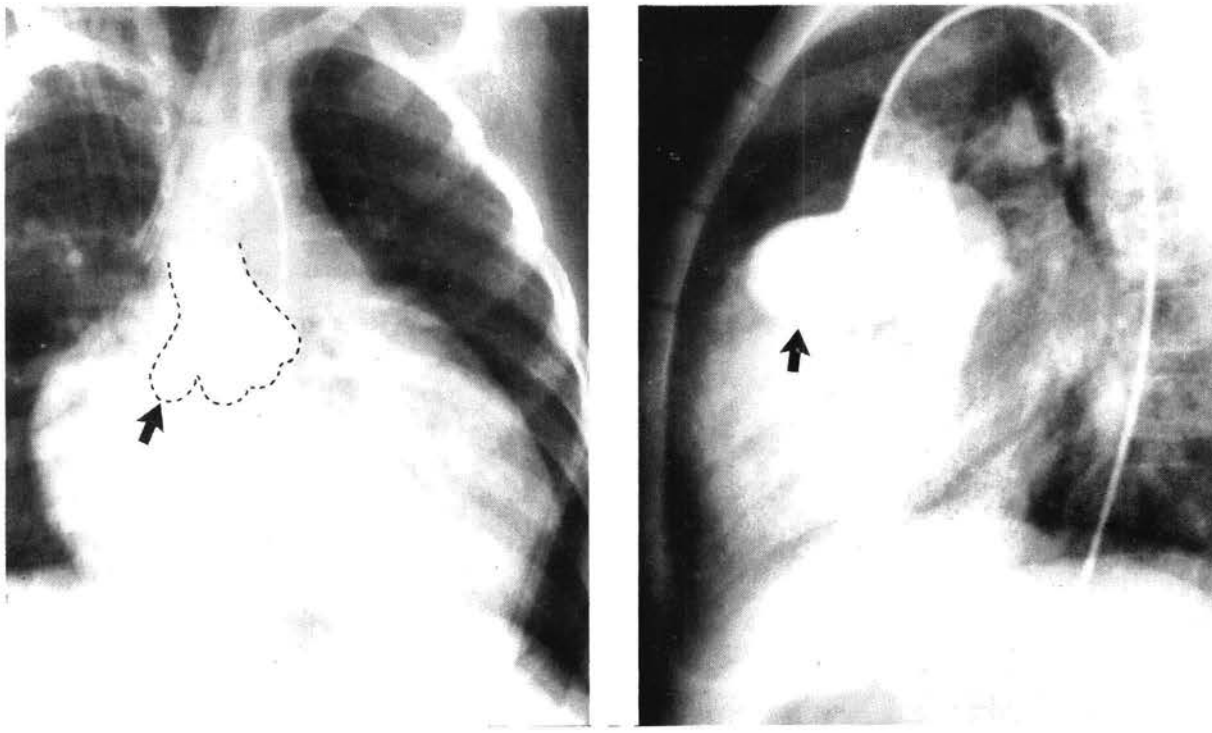

Figure 1: Aortogram showing the dilated proximal right coronary and sinoatrial node arteries (arrowed). (A) P.A. view. (B) lateral view.

In view of the presence of marked elevation of the pulmonary arterial wedge pressure, raised pulmonary arterial pressure, a large pulmonary to systemic flow ratio and progressive changes on electrocardiography the patient was digitalised. At thoracotomy through a midsternotomy incision on the 7th of December 1977, the proximal RCA and its sinoatrial node branch were both noted to be dilated (7mm. diameter). The distal RCA was of normal calibre (Fig. 2). The sinoatrial node artery was mobilised and ligated with multiple heavy silk ligatures so as to obliterate it throughout its entire length. The child tolerated this procedure well and had an uneventful postoperative course.

DISCUSSION:

In a collected series of 163 patients and 8 personal cases of congenital coronary artery to cardiac chamber fistula, Rittenhouse and associates (1975) noted that 89 fistulae originated from the RCA, 66 from the left coronary artery and 8 from both coronary arteries. The right ventricle was also found to be the commonest site of termination (44%), while a right atrial termination was the next in order of frequency (22%). Other sites of termination include the pulmonary artery (17%), the coronary sinus (8%), the left atrium (4%), the superior vena cava (2%), the left ventricle (2%) and the pulmonary vein (1%).

This case illustrates the clinical course in the majority of cases. Symptoms in childhood are exceptional. In contrast, they may arise later in life in untreated patients when the shunt volume is large. In the collected series reviewed by Rittenhouse *et al.* (1975), 59% of patients were symptomless. Dyspnoea at rest or effort, fatigue, features of heart failure, angina, palpitations, bacterial endocarditis, pulmonary hypertension and frequent respiratory infections formed the presenting features or conditions in symptomatic patients. The most frequent and diagnostically useful physical sign is the presence of a continuous murmur which differed from that of a patent ductus arteriosus (P.D.A.) in that it is best heard in the third or fourth intercostal space at the left or right parasternal edges. Other than a P.D.A., the differential diagnosis entertained should include aorto-pulmonary window, aortic

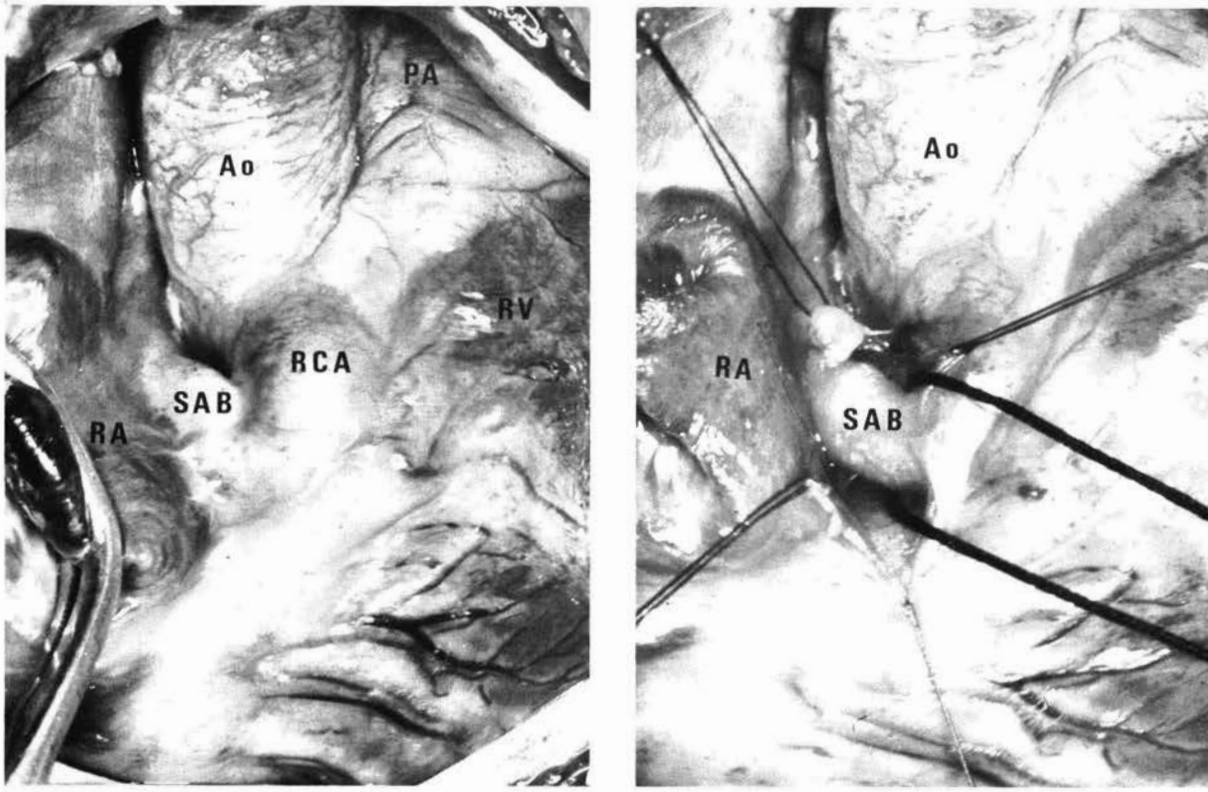

Figure 2: Operative Findings
(A) Before mobilization of the sinoatrial node artery.
(B) After freeing the artery.

(AO = Aorta, PA = Pulmonary Artery, RA = Right Atrium, RCA = Right Coronary Artery, RV = Right Ventricle, SAB = Sino-atrial Node Branch)

sinus of valsalva fistula and ventricular septal defect with aortic regurgitation. Newfeld *et al.* (1961) have noted that the site of maximum intensity of the murmur may vary according to the chamber in which the fistula terminates. Fistulae draining into the right ventricle may have the murmur best heard along the left sternal edge at the fourth or fifth intercostal space parasternally. For right atrial fistulae and fistulae terminating in the pulmonary artery and left atrium the murmur is best heard in the second right intercostal space parasternally as is borne out in our patient. Left ventricular fistulae usually have murmurs which are best heard along the right fourth or fifth intercostal space.

Pathologically, fistulae may occur at any point along the course of a coronary artery. In fistulae from the sinoatrial node artery, the artery may originate from the RCA and course between the aortic root and the right atrium as was the case in our patient (Fig. 3A). More infrequently, the anomalous sinoatrial artery may arise from the left circumflex coronary artery and follow a course through the transverse sinus. (Fig. 3B).

Aortography followed by surgical correction was advocated by Haller and Little (1963). It is presently generally accepted that aortography is essential for definitive diagnosis and identification of the arteries involved and for confirming the site of termination of the fistula.

In most cases simple ligation of the fistula will adequately deal with the problem; if an aneurysm of the coronary artery is present as a result of a long standing fistula, Cooley and Norman (1975) are of the opinion that it should be excised.

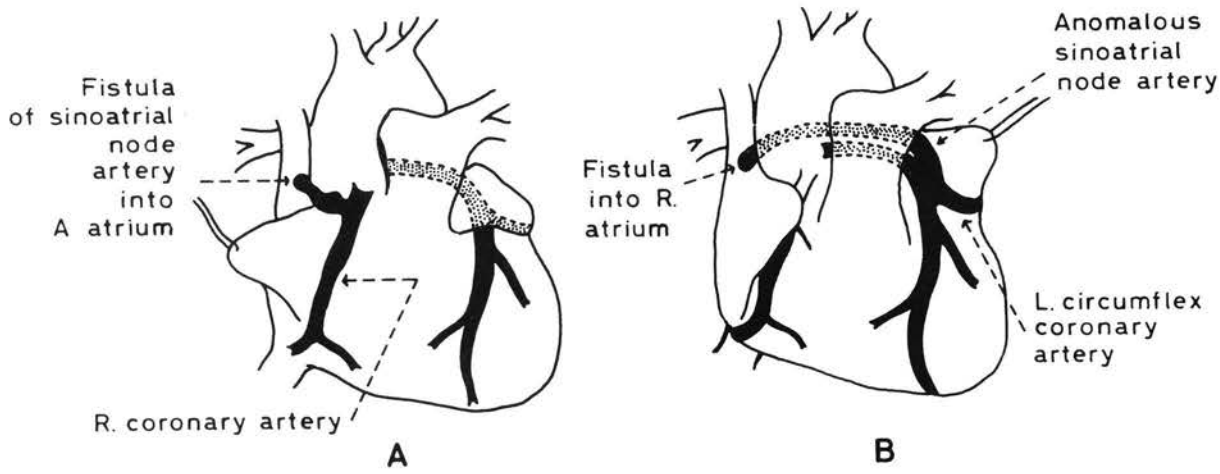

Figure 3: Illustration to show the course normally taken by the sinoatrial node artery.

SUMMARY:

The management of congenital right coronary artery to right atrial fistula in a 4 year old child initially diagnosed at 8 months of age is discussed. The effect of chronic circulatory overload from a large left to right shunt required surgical interruption of the fistula at the age of 4 years. The most consistent clinical clue is a continuous murmur at an atypical site. Cardiac catheterization and aortography are essential for a definitive diagnosis. Surgical correction can be successfully carried out with low risks in the majority of patients and hence should be performed in all symptomatic patients and electively in symptomless children to avoid circulatory problems associated with a long standing cardiac shunt.

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PARAQUAT POISONING

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Seremban

INTRODUCTION

PARAQUAT (1,1 di-methyl 4,4' bi pyrilium chloride) a potent herbicide was introduced to Malaysia in 1961. Since then the number of fatal cases due to accidental or suicidal consumption of paraquat has been increasing. It is sold under various trade names – e.g. (Gramoxone (I.C.I.) Gramixel Priglone weedol etc) and is available in two forms – the granular form containing 5% paraquat and the liquid concentration containing 20% to 40% solution of the herbicide. Ingestion of large amounts of paraquat is invariably fatal even though the minimum lethal dose has not been ascertained. It appears that as little as 7 ml. may be fatal (Materson and Rodie, 1970) and a subcutaneous injection of 1 ml. has also proved to be fatal (Almog and Tal, 1967). Severe poisoning due to large doses of paraquat may kill within 24 to 72 hours with extensive necrosis of heart, liver and kidneys at autopsy, whilst small amounts produced variable degrees of damage of renal or hepatic function which may be reversible. Death is usually due to progressive respiratory failure; the onset of pulmonary oedema and haemorrhage bearing a temporal relationship to the amount of paraquat ingested, smaller doses being associated with a slower development of pulmonary lesions. In general, after a small dose there is an initial asymptomatic period of several days then respiratory functional impairment sets in which hypoxaemia, decreased lung volumes, low lung compliance and impaired DLCO (Carbon monoxide diffusing capacity). Chest roentgenograms will show pulmonary infiltrates and electrolyte studies reveal renal impairment.

When pulmonary manifestations appear, the prognosis is poor and while few cases have recovered (Douglas *et al.*, 1973) in this series it has proved invariably fatal. The local effect of paraquat on contact have included nail loss, epistaxis due to toxic effect on the nasal mucosa, eye injuries and in one of our cases (not reported here) necrosis, dermatitis and desquamation of the scrotal skin due to accidental splashing. For those of us who have used paraquat this is understandable as we can see that within 8 to 10 hours after paraquat is sprayed, the leaves turn brown and within 3 days, the weeds have died. The contact with the oral mucosa sometimes takes up to 48 hours to develop with ulceration and desquamation. The most remarkable effect is the complete inactivation of paraquat when clay is present and Fullers earth or bentonite when given very early after gastric lavage may save a life.

The following is a report of five fatal cases admitted over the period 1/6/76 to 1/6/77 to the Seremban General Hospital and while this is written several more have died. No blood gas estimation or respiratory volumes measurement were done in our cases.

CASE I

An Indian boy of 18 years was referred from Tampin District Hospital on 27/8/76 with a history of fever, sore throat, hoarseness of voice and cough productive of yellowish sputum of about a week's duration. His sputum was blood tinged and he had dysphagia with epigastric pain and dyspnoea. He admitted to have taken paraquat after prolonged questioning even though he denied intentional suicide.

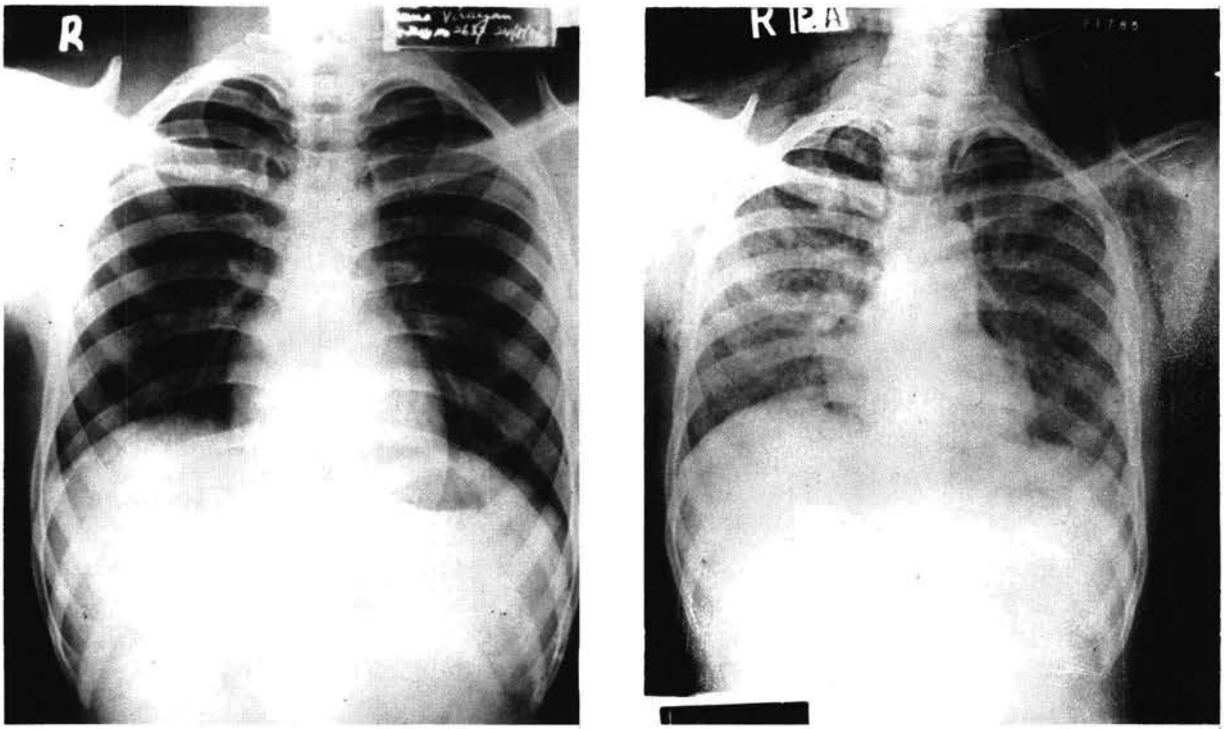
General examination revealed a very ill boy with dyspnoea, jaundice and fever. His tongue was swollen, coated and congested and so were the oral mucosa, lips and the pharyngeal wall.

Other salient features included gross surgical emphysema extending from the neck to the subscapular areas on both sides, slightly impaired chest expansion but adequate air entry and without adventitious sounds. The respiration was 40/min, pulse 102/min and blood pressure was 130/80. The liver was palpable and there was epigastric tenderness. Investigations revealed a leucocytosis of 16,400, a erythrocyte sedimentation rate of 48/hour, a raised urea of 276 mg % and normal electrolytes. X-rays of the chest showed extensive mottling of the lung fields and surgical emphysema on 27/8/77 compared with the film taken in Tampin on 24/8/77 (both shown in Fig. 1 for comparison). Serum creatinine was 6.6 mg %, serum bilirubin 21 mg % and alkaline phosphatase 48 K.A. Units. A barium swallow was done to look for any perforation and was essentially normal.

Over the next 3 days inspite of steroids and attention to fluid balance the patient deteriorated with increasing dyspnoea, crepitations in both lungs and succumbed on 30/8/76. Autopsy revealed a deeply jaundiced man with extensive necrosis of the fauces and tongue; the kidneys showed bilateral cortical haemorrhage, and the liver was enlarged, yellow and haemorrhagic. Both lungs were oedematous and showed haemorrhages. Examination along the trachea and oesophagus reveal no area of perforation.

CASE II

A Malay lady of 21 years was admitted on 10/12/76 with a history of consuming 1 teaspoonful of a 'Coffee coloured' weedkiller by mistake. She was slight drowsy but had reactive pupils. There was oral ulceration but no chest signs or jaundice. On 11/12/76 the blood urea was 54 mg %, electrolytes were normal and there was a trace of albuminuria. Chest X'ray was normal. There was paraquat in the urine. She was given Fuller's earth 30% suspension (200 ml. every 2 hours × 5 doses) and intravenous fluids but the urine output was poor and blood urea was 90 mg % on 12/12/76. Later the same day she became dyspnoeic with bilateral chest crepitation and inspite of high dose lasi she deterio-



1a 1b

Fig. 1 Chest X-Rays of case 1 showing the effect of paraquat on the lung. 1a before and 1b after the ingestion of paraquat.

rated with the 'Paraquat' lung syndrome with mottling of bases shown on chest X'ray. Urine for paraquat on 14/12/76 was negative but she deteriorated further and died in the early hours of the next day.

CASE III

A Chinese child of 11 years was referred from Jelebu District Hospital on 23/2/77 with history of taking 1 teaspoon of paraquat after her father had reprimanded her, and she was given a stomach washout before referral. Her main complaints were of intractable nausea and vomiting, sore throat, and several loose motions over the previous evening. General condition was satisfactory with haemorrhagic spots over the tongue and palate (which progresses to ulceration later) but no jaundice or chest signs. Paraquat was found in the urine and a trace of albuminuria was detected but urea and electrolytes were normal. Bilirubin was 1.1 mg % with leucocytosis. On 3/3/77 the urea rose to 237 mg % with urinary output of 600 – 700 mls. daily and a swinging prexia and chest crepitations. A dialysis was contemplated but her urea decreased to 122 mg % with serum potassium 5.1 meq/L on 8/3/77 with increased urinary output. However her chest X'ray had features typical of the 'Paraquat' lung syndrome and inspite of steroids, controlled oxygen therapy, she died on 12/3/77 after a total of 18 days in hospital.

CASE IV

A 34 years Chinese male apparently drank one mouthful of paraquat on 27/5/77 in a bout of depression over family and financial problems. He was admitted to Kuala Pilah District Hospital the next morning with complaints of sore throat, vomiting and retrosternal discomfort and referred to Seremban on 11/6/77 with severe jaundice, severe ulceration of the oral mucosa and moist sound in both lungs. Fuller's earth and prednisolone was administered in Kuala Pilah but the bilirubin had increased from 11.3 mg % to 24.6 mg %. Investigations revealed leucocytosis of 29,000, a trace of albuminuria, blood urea of 93 mg %, serum sodium 118 meq/L, serum potassium 3.1 meq/L and serum chloride 69 meq/L. There was no paraquat in the urine and urinary output was adequate and 1500 ml. of 3% saline corrected his electrolyte over 3 days. The urea on 18/6/77 was 104 mg %. However he was hypoxic, delirious and went into shock and coma and died on 19/6/77.

CASE V

One example of fulminating poisoning involved a self confessed heroin addict. This Malay boy, 20 years old drank half a gallon of diluted 'GRAMOXONE' at 4.30 p.m. on 21/7/77 and was admitted to Jelebu District Hospital where a stomach washout was performed and he was referred to us. He was in very poor condition with severe retching and in shock. Intravenous fluid, atropine and 100 gm. of Fuller's earth 2 hourly was given but he deteriorated, becoming cyanotic, delirious and later comatose. Paraquat was present in large amounts in the urine but except for leucocytosis and a trace of albuminuria, other investigations were negative. He had cardiac arrest 23 hours after taking the paraquat.

DISCUSSION

The above cases illustrate most convincingly the methodical precision with which paraquat kills and that the salvage rate is nil in our cases and that any desperate measure which has even the remotest chance of success is worth trying. Successful treatment will depend on very early intervention by the repeated administration of 30% suspensions of Fuller's earth orally to inactivate paraquat and rapid reduction of the circulating compound using haemoperfusion through a charcoal column. One effective substitute for Fuller's earth is bentonite suspension consisting of 70 gm. of bentonite in 100 mls. of glycerine and made up to 1 litre with water. Haemodialysis and peritoneal dialysis have not shown any success in removing paraquat and recent reports have shown that the charcoal column is not as effective as when first reported probably because the lung appears to concentrate the paraquat from the blood and thereby produce an alveolitis before the blood levels can be lowered. Steroids, azathioprine and other drugs have been used to suppress the severe alveolitis but have not been successful. Case I also demonstrates that subsequent to the alveolar membrane damage (our contention) the patient can develop extensive surgical emphysema without any perforation of the trachea or the oesophagus.

Paraquat poisoning has been said to represent adult respiratory distress syndrome (Mantelow, 1967) and the mechanism of its toxicity has been ascribed to the formation of superoxide ion (02^-) (Gaje, 1968, Conning *et al.*, 1969). Paraquat seems to act as an electron acceptor when nicotinamide adenine dinucleotide phosphate is oxidised in cellular and subcellular fractions of rat or rabbit lung and then reoxidised by oxygen to molecular paraquat with subsequent formation of superoxide ions (02^-) which is highly unstable and thought capable of tissue damage. Superoxide ions are decomposed to hydrogen peroxide and oxygen in the presence of free H^+ radical, catalysed by a tissue enzyme, superoxide dismutase ($20^- + 2H^+ \rightarrow H_2O_2 + O_2$). H_2O_2 is thought to damage the lipid cell membrane. In an attempt to preserve lung function and maintain oxygenation, lung transplantation was performed by

several investigators (Cooke *et al.*, 1973) but it was found that the transplanted lung also showed signs of paraquat poisoning which was confirmed at autopsy. At the time of operation paraquat was still present in the blood and in the intact lung but on postmortem no paraquat was detected in the transplanted lung suggesting an inexorable progress of the pathological process once initiated. Animal studies also suggest that oxygen administration may accelerate the development of lung lesions. Our own management is as follows:-

1) Gastric lavage

2) Oral administration of 200 ml. of 30% Fuller's earth every two hours for 48 hours.

3) Intravenous fluid with careful monitoring of output and peritoneal dialysis where indicated.

4) Steroids and other symptomatic therapy. We are now considering haemoperfusion. The kidneys excrete paraquat and maintaining a good diuresis is most helpful as paraquat has been detected in the urine 31 days after ingestion.

CONCLUSION AND SUGGESTIONS

Paraquat is of great economic value as planting can proceed a few days after spraying and has resulted in 3 crops per annum instead of 2 in places like Sri Lanka but it is lethal to man. We would advise that Fuller's earth be given immediately if paraquat has been taken and gastric lavage done before transferring the patient from a district hospital as this offers the only hope of survival in Negri Sembilan. In the hope that the number of accidental poisoning be lowered we hope the manufacturers of GRAMOXONE I.C.I. (MALAYSIA) will 'stench' the compound as many labourers and their family refer to GRAMOXONE as coffee and have drank it accidentally with fatal results as there is no strong smell.

ACKNOWLEDGEMENTS

We are indebted to Dr. John Loh Kim Yew without whose help this report would never have been published. Mr. Tan, Biochemist, Hospital Besar, Seremban was most gracious to have carried out for us the urine test for paraquat and his ingenuity in getting the sodium dithionite. We also wish to express our sincere thanks to Cik Kasimah bt. Hj. Abdul Karim for typing the manuscript and Mr. C. Gnaneswaran, Administrator of Kuala Pilah District Hospital for his help. Dr. Charanpal Singh very kindly carried out the barium swallow studies.

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PERFORATION OF TUBERCULOUS ENTERITIS
Report of a Case

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WITH THE general fall in the incidence of tuberculosis, one is apt to forget the profound aftermaths of the infection. With the decline in the number of pulmonary tuberculosis the incidence of intestinal affections have become notably uncommon and rarer still, the free perforation of tuberculous ulcer of the bowel (Mitchell & Bristol, 1954). Indeed, the recorded morbidity and mortality arising from these are high but with early diagnosis and an aggressive management regime the final outcome of these cases with otherwise poor prognosis, can be favourably modified, (Sweetman & Wise, 1959; Bhausali *et al.*, 1968).

This paper reports an uncommon case of perforated tuberculous enteritis which was diagnosed in the late stage of the disease. It is the object of this paper to draw fresh attention to the severe implications of this condition and to plead for its inclusion into the differential diagnosis of gastro-intestinal disorders, more so in areas where tuberculosis is prevalent.

CASE REPORT

The patient was a 26 year old female clerk with a history of malaise, anorexia, weight loss, intermittent low grade fever, central abdominal pain and diarrhoea for six months duration. She was first admitted to a district hospital where on physical examination no significant clinical abnormality could be detected.

The following investigations were carried out. Blood study revealed haemoglobin of 6.0 gm%, total white cell count of 9,000/c.mm, platelet count of 400,000/c.mm, and a sedimentation rate of 20 mm/hour. Serum protein was in the order of 4.4 gm% (Albumin 1.4 gm%, globulin 3.0 gm%), alkaline phosphatase 14 KA units and the total serum bilirabin was 0.6 mg%. Urine analysis was normal and stool for occult blood was positive. The Mantoux test was negative. Radiological examination of the chest revealed no abnormality.

During her stay at the district hospital her condition deteriorated with loss of weight and development of dependent oedema and generalized ecchymosis. Empirically, she was started on a course of ampicillin pending a definite diagnosis. She developed abdominal distension and four days later was transferred to the medical unit, General Hospital, Kuala Lumpur.

On review of the history, her husband was found to be a known case of pulmonary tuberculosis who had defaulted treatment. On physical examination her general condition was noted to be poor, associated with severe pallor, mild clubbing, ankle oedema and generalized ecchymosis. The pulse rate was 80/min. and the systemic blood pressure was recorded at 120/70 mm Hg. On auscultation of the lungs basal crepitations were heard. The abdomen was distended, resonant on persussion with decreased bowel sounds. A working diagnosis of pyrexia of unknown origin was made and several differential diagnosis considered.

Blood investigation revealed haemoglobin of 10 gm%, total white cell count of 12,000/c.mm, differential count showing a neutrophil concentration of 95% and lymphocyte of 6% with sedimentation

rate of 4 mm/hr. Biochemical estimation of electrolytes showed sodium 115 meq/litre, potassium 2.4 meq/litre, and chloride 101 meq/litre. The blood urea concentration was 14 mg%. Sputum examination for acid bacilli was positive.

For the treatment of her diarrhoea she was commenced on lomotil and intravenous fluid therapy was instituted to combat the electrolyte imbalance. Daily injection of 1 gm streptomycin and 400 mg of INH orally were added to this therapy.

After four days, she was referred to the surgical unit as a case of sub-acute intestinal obstruction. On physical examination, she was now found to be cachexic with poor general condition. The pulse rate was 100/min. and the blood pressure was recorded at 90/60 mm Hg with a sub-normal temperature of 96.8F°. The abdomen was markedly distended with tense and shiny skin. No mass was palpable and on percussion the liver dullness was obliterated. Bowel sound was absent and per rectal examination revealed no abnormality. A diagnosis of tuberculous enteritis with perforation of gut was made. Scout film of the abdomen confirmed the pseumoperitoneum.

Immediate resuscitation measures were commenced with intravenous injection of hydrocortisone 500 mg and blood transfusion. As the patient was already on ampicillin 500 mg six hourly, intramascular injection of clindamycin 150 mg was added in eight hourly doses.

An emergency exploratory lapatotomy was performed revealing gross pneumoperitoneum and peritonitis yielding 1000 mls. of purolent aspirate from the pelvic cavity. Examination of the bowel showed multiple small whitish follicle on terminal ileum and caecum. The ileum was observed to be oedematous with multiple small perforations and the caecum was thickened with enlarged mesenteric lymph nodes. The liver, gall bladder, stomach and colon were found to be normal.

A right hemicolectomy with end to end ileocolic anatomosis was performed and two drains were inserted – one in the pelvic cavity and the other in the right para-colic gutter. Post-operatively the intramascular injection of streptomycin was reduced to 0.75 gm, INH 400 mg, Rifampicin 600 mg and pyridoxin 10 mg daily were added to the drug therapy. To combat her poor general condition intravenous hyperalimentation was started.

Following surgery slight post-operative improvement was noted as recorded by a rise in the blood pressure to 100/60 mm Hg, the return of normal pulse rate and a normal body temperature. Slight improvement was noted in her general condition but the urine output remained poor.

Blood investigation revealed haemoglobin of 14.8 gm%, total white blood cell of 14,000/c.mm with differential count showing neutrophil of 86% and lymphocytes of 14%. Blood urea was 34 mm%. Serum electrolytes were as follows:- sodium 136 meq/litre, potassium 5.2 meq/litre and chloride 101 meq/litre.

On the fourth post-operative day, the patient developed high fever together with hypotension, tachypnoea but no cyanosis. Clinical examination of chest revealed bilateral basal crepitations and the abdomen was soft with audible bowel sounds. Solumedrol 1.5 gm was instituted, oxygen therapy through mask commenced and one litre of plasma was given. She remained refractory to the resuscitative measures and succumbed the same day.

Histolopathological examination of tissues taken at laparotomy confirmed the diagnosis of tuberculous enteritis with ulceration and perforation.

DISCUSSION

It is stated that the rate of intestinal tuberculosis is directly proportional to the incident of pulmonary tuberculosis (Mitchell & Bristol, 1954). Prior to the advent of anti-tuberculous drug 70% of patients with advanced pulmonary tuberculosis developed concommitant tuberculous enteritis commonly at the ileo-caecal region (Weisburgh & Luongo, 1961). The reason advanced for this was the presence of abundant lymphoid tissue anatomically located in these areas (Bombart *et al.*, 1961).

Tuberculosis enteritis commonly manifests in either of the three gross patholigical forms, namely – ulcerative, hypertrophic or mixed ulcerative hypertrophic type. Prior to the advent of antituberculous chemotherapy perforations of these lesions were rare but since its introduction have become more prevalent (Jordan & De Bakey, 1954). This is alleged to result from the reduction of local tissue inflammatory reaction to the infection thereby reducing fibrous tissue formation. When the lesion affects the Payer's patches the perforations are longitudinal but when the lesion takes the form of a diffuse involvement these are usually pinhead in nature. Haemorrhage and fistulae formation have also been known to occur in the severe cases.

The clinical presentation of tuberculous enteritis is determined by the type of pathological reaction it provokes. Hypertrophic tuberculosis results in

stenosis with manifestations of obstruction. The more common ulcerative form causes diarrhoea or constipation and only occasionally is it known to cause progressive inaniation. General symptoms of fever, night sweats, anorexia, malaise and weight loss may occur in all these variety of symptoms but these symptoms are often falaciously ascribed to any co-existent pulmonary lesion. A helpful physical sign is the presence of a mass, often tender, in the right ilac fossa. Barium study (barium meal with follow through or enema) may be helpful in confirming the diagnosis.

The treatment recommended for tuberculous enteritis *per se* is non-operative consisting of anti-tuberculous drug therapy with general supportive measures. When associated with complications they warrant surgical intervention. With perforations, suture of the perforation or limited bowel resection is the recommended treatment. With the less aggressive simple sutures the mortality is quoted to be in the region of 50%. In view of this, he had recommended resection of the lesion with primary anastomosis (Sweetman & Wise, 1959).

In this case the lesion was of the ulcero-hypertrophic variety. Procrastination in the diagnosis of tuberculous enteritis led to perforation which even with concentrated resuscitative measures and surgical resection failed to control the peritonitis that led to fatal septicemia.

SUMMARY

Following pertinent features emanate from the study of this case:-

(a) That the duration of ill health and the general symptomatology were suggestive of tuberculosis.

(b) Despite this the diagnosis of tuberculous enteritis was never entertained; hence no specific therapy was instituted.

(c) And, only when the pathology was advanced and complications had set in was tuberculosis considered.

(d) The failure to arrive at a provision diagnosis early in the course of the disease and the empirical use of ampicillin precluded the timely use of antituberculous drugs with disastrous consequences.

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AN EVALUATION OF B-MODE GREY SCALE REAL TIME ULTRASONOGRAPHY

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ULTRASONIC SCANNING is simple, safe and non-invasive and hence has become increasingly popular over the last two decades. In this article I would like to review the theory and application of this technique based partly on our local experience with a Grey-Scale Real-Time scanner.

THE THEORY OF ULTRASONIC IMAGING

Short pulses of high frequency sound (usually of around 2.25 megahertz) are transmitted and objects (and their relative distance away) are detected from the resulting echo (and the time taken for the echo to arrive).

Piezoelectric crystal transducers are used and these function both as transmitters and receivers. When the transducer is applied to the human body, echoes will be detected from the various organs and tissue planes. The intensity of these echoes is proportional to the difference in the acoustic impedance of the tissues.

Organs are not acoustically homogenous but consist of ramifying ducts, blood vessels etc, hence small intensity echoes will be seen within all organs. Any structure containing fluid (blood, bile or cystic fluid) is acoustically homogenous and will appear as transonic i.e. free of echoes. An ultrasonic examination through the ventricles of the heart may therefore be represented as in Figure 1.

MODES OF DISPLAY

A-Mode (Amplitude Modulation)

In an A-Mode display, the echoes appear as vertical deflections on a horizontal base with the height of the deflection corresponding to the intensity of the echo. A-mode displays are commonly used for echocardiographic studies and in echoencephalography.

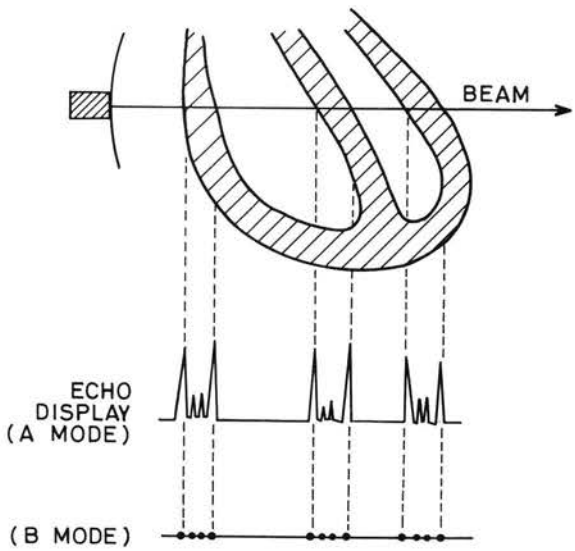

Figure 1: Diagramatic representation of an ultrasonic examination of the ventricles of the heart.

B-Mode

The disadvantage of the A-mode is that two dimensional images cannot be produced. This can be done with B-mode where each echo is only represented by a dot, the intensity of which correlates with the intensity of the echo.

If a storage oscilloscope (one that is designed to retain images for a period) is used, then a two dimensional picture will be obtained by moving the transducer along a plane. The final image is therefore rather like a tomogram at a particular level or plane (See Fig. 2).

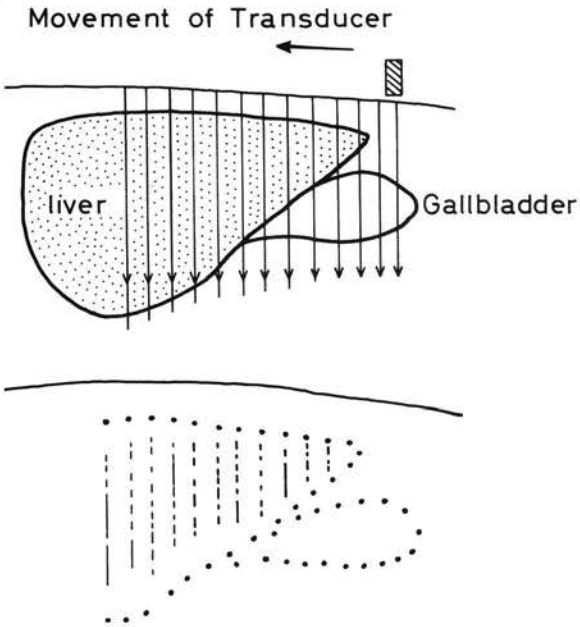

Figure 2: Diagramatic representation of a longitudinal scan of the right upper abdomen. The upper drawing shows the direction of the ultrasonic beam and the direction the transducer is moved. The lower drawing shows the resulting echo image being built up. In actual scans there would not be any gaps between the lines of echoes.

Grey-scale display: Early machines produced pictures in just black and white. Current machines have shades of grey in between. This allows far better visualization of the internal structure of organs.

Real-Time: This is a relatively new facility. Most ultrasonic machines (B-mode) produce just one picture at a time. Real Time machines produce continuous imaging rather like fluoroscopy as opposed to single x-ray plates. Figure 3 shows a real time machine in use.

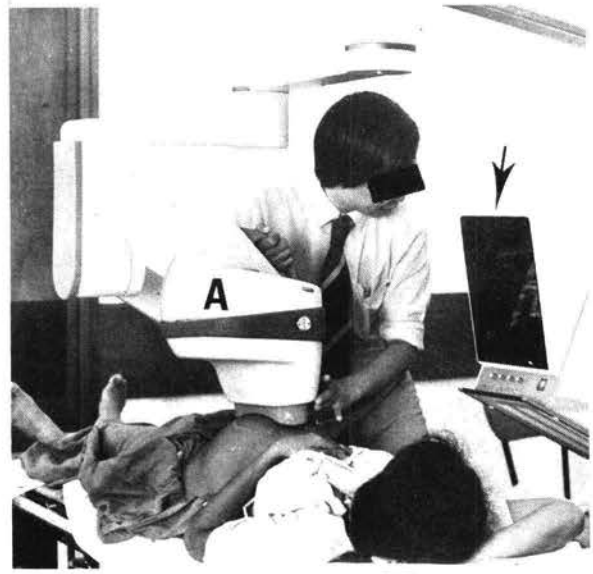

Figure 3: A real-time ultrasonic B-mode scanner in use. The transducer (A) is applied to the patients body and the image appears on the screen (arrowed).

DIAGNOSTIC ULTRASOUND IN MAN

Diagnostic ultrasound is currently used for the examination of:-

1. The brain (mid-line shifts and ventricle size, etc.)
2. The eye (retinal lesions, ocular tumours foreign bodies etc.)
3. The Heart and blood vessels.
4. Obstetrical and gynaecological conditions.
5. Abdomen: particularly the liver, biliary tree and kidney.

We are currently not doing cerebral or ocular examinations, and so will not discuss these further.

Echocardiography cannot be covered within the context of this paper. Suffice to say, it has proved exceedingly useful particularly in the detection and quantitation of mitral stenotic lesion and in the diagnosis of pericardial effusions and cardiomyopathies.

Gyncaeological Studies

Uses include detection of uterine or ovarian tumours and intra-uterine contraceptive device.

Cystic ovarian tumours are particularly easily detectable by this technique.

Obstetrical Studies

In many centers, ultrasonic examination in pregnancy is routine. We have conducted studies here mainly for:-

1. Early diagnosis of pregnancy. The gestational sac may be visualized from about the 5th week. (MacVicar and Donald, 1963). (See Fig. 4).

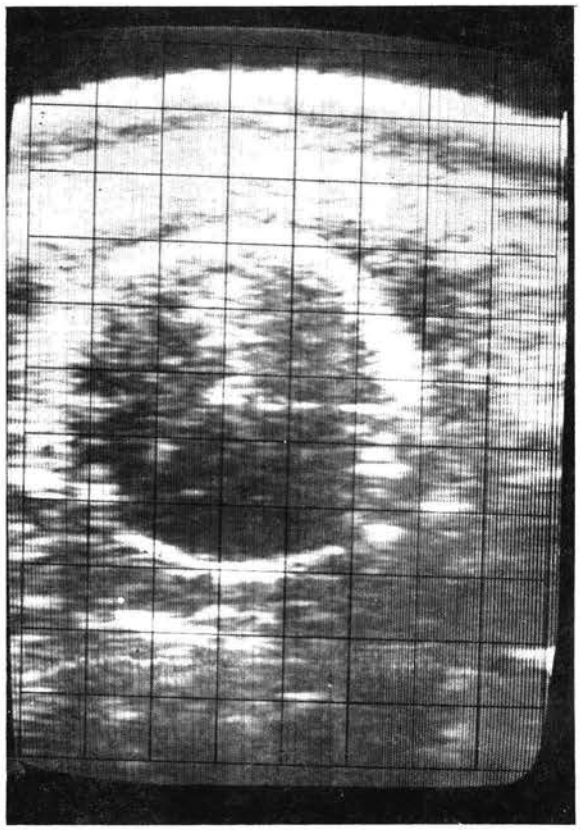

Figure 4: The foetal skull with a clearly defined midline echo. The BPD can be measured from this.

2. Foetal growth (especially in patients with threatened abortions).

3. Estimating foetal age. Foetal dimensions are measured for example the Biparietal Diameter (BPD). (See Fig. 5).

4. Abnormal pregnancies. Experience elsewhere has shown that ultrasound is extremely useful in the diagnosis of molar pregnancies, multiple pregnancies and ectopic pregnancies.

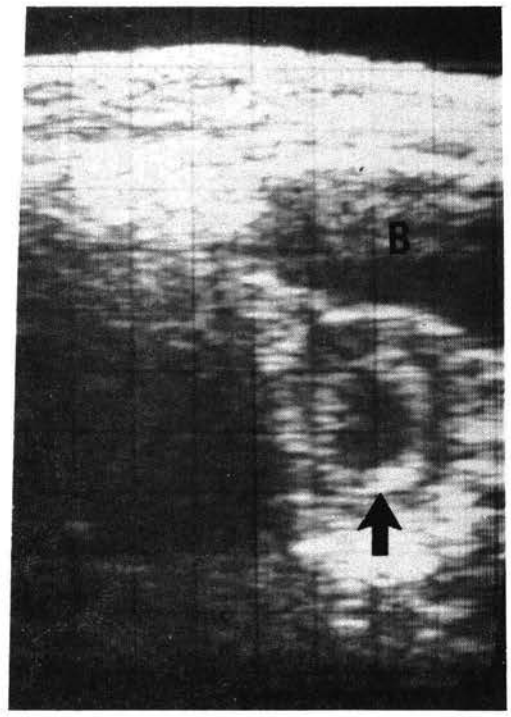

Figure 5: An early gestational sac (arrowed) in the uterus. The bladder (B) lies anteriorly. It is too early to see any foetal parts.

5. Placental localization.

Liver and Biliary Diseases

Taylor and McCready (1976) report good results in the diagnosis of liver diseases (Cirrhosis and tumours) with Grey-Scale ultrasonography. Our own experience has so far been disappointing. This may be related to the resolution and type of transducer used.

However, our results in the diagnosis of obstructive jaundice have been excellent. (See Fig. 6). This is in line with other reports (Stone *et al.*, 1975). Real-time machines have an advantage here in allowing easy differentiation of portal veins and bile ducts.

Other Abdominal Studies

We have found ultrasonic imaging to be very useful in the confirmation of splenomegaly and in the diagnosis of abdominal masses and renal lesions.

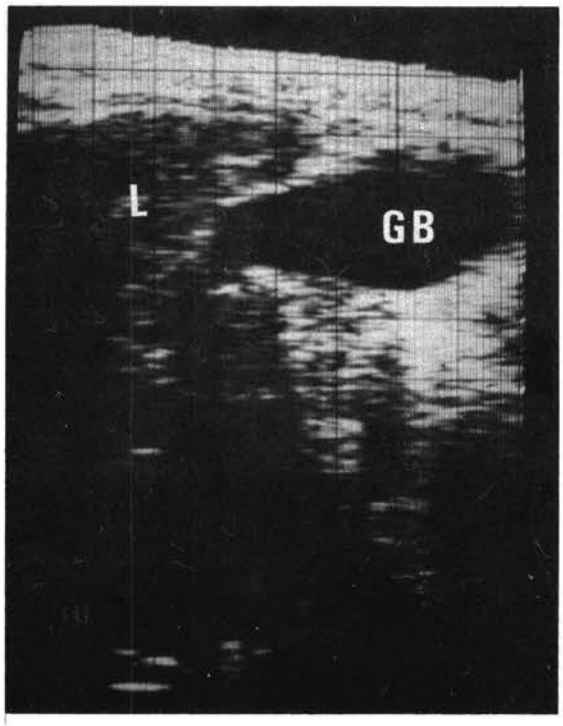

Figure 6: Longitudinal right upper abdominal scan showing part of the liver (L) and a dilated gallbladder (GB).

However gross obesity and the presence of abdominal gas often interfere with the scans. Gas causes absorption and scatter of the sound beam and this explains why the lung cannot be ultrasonically examined.

SAFETY

The great attraction of ultrasonic techniques is their safety. It should be pointed out that it is possible to cause cellular disruptions and chromosomal changes in vitro (MacIntosh and Devey, 1970; Serr *et al.*, 1970). However, these occur at very high energy levels. No such changes have been observed at normal diagnostic energy levels. What is particularly reassuring is that studies have not revealed any increased incidence of abnormalities in the children of mothers who were ultrasonically examined during pregnancy.

CONCLUSION

We have found that ultrasonic imaging to be extremely useful in resolving diagnostic problems in our hospital, particularly for obstetrical patients because of its safety and also for very ill patients who would not able to tolerate any invasive investigative procedures. The additional real time facility of our machine allowed more rapid studies and easier orientation even by relatively inexperienced staff.

What does the future hold? As far as machines are concerned we can expect even better resolutions and more compact devices. As far as its application in this country is concerned, it is expected that many hospitals will eventually acquire ultrasonic scanners. Their initial cost is not too expensive (around $100,000 to $200,000) and running costs are relatively negligible, and technicians can be readily trained to operate the machines.

ACKNOWLEDGEMENT

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SEROLOGICAL EVIDENCE OF GROUP B ARBOVIRUS INFECTION IN SABAH

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INTRODUCTION

DENGUE HAEMORRHAGIC FEVER (DHF) is a serious disease with a mortality rate of 5 – 10% and has recently occurred on the mainland of Peninsular Malaysia (Halstead, 1966; Rudnick, 1966 a, b; Chan *et al.*, 1967). The first large-scale outbreak of DHF in Peninsular Malaysia began in 1973 when 54 deaths had been reported (Lim *et al.*, 1974). In view of this serious outbreak and the prevalence of the primary vector *Aedes aegypti* in Sabah (Macdonald and Rajapaksa, 1972) and the frequent regular communications between Sabah and Peninsular Malaysia the health personnel was alerted for possible outbreak of DHF. As clinical diagnosis is recognised as inaccurate, a practical method is for the serological diagnosis of paired sera from patients with pyrexia of unknown origin to be made. Most of the district hospitals lacked sufficient personnel equipment or logistical support to obtain blood from all fever cases by venipuncture, separate serum aseptically and transport serum chilled to the Central Laboratory, Kota Kinabalu. As testing of paired sera against Group A and B arboviruses is expensive and time consuming only limited and representative number of patients with fever of unknown origin was tested serologically.

MATERIALS AND METHODS

20 patients admitted to the various hospitals in Sabah with a clinical diagnosis of pyrexia of unknown origin were studied. The paired sera were obtained from 2 patients in Sandakan, 7 in Labuan, 9 in Kota Kinabalu and one each in Tawau and Semporna. Blood specimens were obtained by venipuncture shortly after admission and before discharge. The clotted blood was separated aseptically by centrifugation and the serum was stored at −4°C (in district hospitals) and −20°C at the Central Laboratory, Kota Kinabalu. Sera from district hospitals were transported in thermos flask chilled in ice and salt mixture to the Central Laboratory where they were stored at −20°C before despatch to the Virus Division, Institute for Medical Research, Kuala Lumpur. Haemagglutination-inhibition (HI) tests were performed on the paired sera by the procedure of Clarke and Casals, modified for the microtitre technique (Clarke and Casals, 1958; Sever, 1962). Suckling mouse brain antigens were prepared by the sucrose acetone method. 8 antigens were used representing the prevalent group A and B arboviruses occurring in Malaysia. These are Sindbis strain P. 886 in group A and dengue 1 Hawaii strain (Den – 1), dengue 2 Trinidad 1751 strain (Den – 2), dengue 3 strain H. 87 (Den – 3), dengue 4 strain H 241 (Den – 4), Japanese Encephalitis Nakayama strain (JBE), Tembusu strain AMM 1775 (TMU) and Zika strain B24982 (ZIKA) in group B. Serial dilutions from 1:10 to 1:5120 of acetone – extracted sera were tested against 8 units of each antigen. A four-fold rise in titre between paired sera constituted a positive response and a titre of 1:1280 or greater in a single serum was considered a presumptive positive response. Both responses indicated current infection. Serologic results were termed inconclusive when the rise in titre between paired sera was less than four-fold and when the titre of a single specimen was 1:640 or less.

RESULTS

Two of the 20 patients were serologically positive for group B arbovirus infection by the HI

test on the paired sera. The HI antibody titres against group A and B arboviruses for these 2 cases were presented in Table 1. All the patients had no HI antibody to group A (Sindbis virus). 16 patients had HI antibody titres to group B viruses ranging from 10 to 80 while 2 of the patients had residual antibodies ranging from 40 to 1280 against group B viruses. There was no significant rise in titre against the viruses tested for the 18 patients.

DISCUSSION

No cases of dengue haemorrhagic fever have yet been reported from Sabah although dengue fever occurred in Labuan Island, off the West Coast of Sabah in 1969 and this was confirmed by virus isolation and positive serology (Ramalingam, 1970). In our investigation with 7 patients with fever of unknown origin from Labuan Island, there was no significant rise in HI titres against Group B arboviruses in the paired sera. 2 of the 7 patients had residual HI antibodies to Group B arboviruses ranging from 1:40 to 1:1280. This high titre of residual antibodies could possibly suggest past infection with arboviruses.

Two patients were serologically positive for Group B arbovirus infection but the exact type could not be established for certain from the serological investigation. Patient 1 was a female Malay child, aged 3 years from Semporna which is on the south-east of Sabah. She was admitted to the cottage hospital on 3rd August, 1973 with a history of high fever for the past 5 days. On admission she had a temperature of 39.4°C with purpuric rash over the entire abdomen and had joint pains and headache. Patient 2 was a 33 year old male of British nationality who had been in Sabah for a year. He was an Engineer attached to the Tractor Malaysia Company and later on joined Rasnah, a timber firm situated in Keningau, the Interior Residency of Sabah. He travelled extensively throughout Sabah especially in the timber camps. He complained of fever with joint and bone pain lasting for 5 days. No specific treatment was given.

Aedes aegypti the vector for dengue haemorrhagic fever viruses was widespread in urban towns in Sabah especially in 4 major kampungs in Semporna (Hii, 1976) and the presence of Group B arbovirus in Semporna could lead to major outbreaks in the absence of control measures against the potential vector *Aedes aegypti*. Further studies should be undertaken to establish the type of arbovirus in Semporna through virus isolation and the level of transmission by serological investigation of paired sera from patients with fever of unknown origin.

SUMMARY

Paired sera from 20 patients admitted to the various hospitals in Sabah with a clinical diagnosis

Table 1

Haemagglutination-Inhibition antibody titres against Group A and B arboviruses for 2 patients.

VIRUS ANTIGEN	HAEMAGGLUTINATION-INHIBITION TITRE*			
	PATIENT 1		PATIENT 2	
	1st serum 4th day of Disease	2nd serum 14th day of Disease	1st serum 7th day of Disease	2nd serum 21st day of Disease
Group A:-				
Sindbis	<10	<10	<10	<10
Group B:-				
Dengue 1	<10	640	640	640
Dengue 2	10	5120	640	640
Dengue 3	<10	1280	640	1280
Dengue 4	10	⩾10240	1280	2560
Jap. Encephalitis	10	⩾10240	2560	2560
Tembusu	10	5120	5120	5120
Zika	10	5120	⩾10240	⩾10240

* Reciprocal of serum dilution.

of pyrexia of unknown origin were serologically tested against Group A and B arboviruses by the haemagglutination inhibition test. Two of the patients were serologically positive for Group B arbovirus infection.

ACKNOWLEDGEMENTS

We wish to thank Dr. Mechiel K. C. Chan, Director of Medical Services, Sabah, for his kind permission to publish this article. We are grateful to the Laboratory Technicians and Assistants at the respective hospitals for collecting the blood specimens. Our gratitude to Dr. Garcia in Semporna and the respective Medical Officers at the respective hospitals for their keenness in investigating the cases. Finally the typing assistance of Miss Helen Chong is gratefully acknowledged.

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DETECTION OF PERICARDIAL EFFUSION BY ECHOCARDIOGRAPHY

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INTRODUCTION

OVER THE YEARS various methods have been employed for the detection of pericardial effusion. Of these, detection of pericardial fluid by ultrasound have been shown to have a high degree of accuracy (Feigenbaum *et al.,* 1965). The purpose of this paper is to review our experience at the University Hospital, Kuala Lumpur using this method for detection of pericardial fluid.

METHOD

All patients referred to the Echocardiographic Laboratory of the University Hospital for detection of pericardial effusion over an 18 month period ending March 1978 were studied. Echocardiographic recordings were performed using a Smith Kline Instruments, Ekoline 20A ultrasonoscope with a polaroid photographic recording system. A 1.5 cm diameter 2.25 MHz transducer prefocused at 10 cm and repetition rate of 1000 per second, permitting an examination of up to 20 cm tissue depth with excellent resolution was used. Simultaneous electrocardiographic recordings were obtained in all patients. The patients were examined in the supine or propped up position. The transducer was positioned in the 4th left intercostal space parasternally. Both anterior and posterior pericardial effusions were scanned for using the standard technique. False positive posterior pericardial effusions were excluded by scanning the posterior left atrial wall. A large pericardial effusion was defined by the finding of anterior pericardial fluid and at least 1 cm depth of posterior pericardial fluid; a moderate effusion showing only posterior fluid exceeding 1 cm in depth; and a small effusion less than 1 cm in depth of posterior pericardial fluid (Feigenbaum, 1976; Horowitz *et al.,* 1974). A total of 26 patients had technically satisfactory echocardiograms and these were used for the study.

FINDINGS

Eight patients were noted to have large pericardial effusions and were confirmed by pericardiocentesis or surgery. One of these patients who had 950 mls at pericardiocentesis has his echocardiogram illustrated. It demonstrates a small pericardial effusion between the chest wall and anterior right ventricular wall (Fig. 1) and a large posterior pericardial effusion measuring 2.25 cm in depth posteriorly (Fig. 2). In 8 patients moderate sized posterior

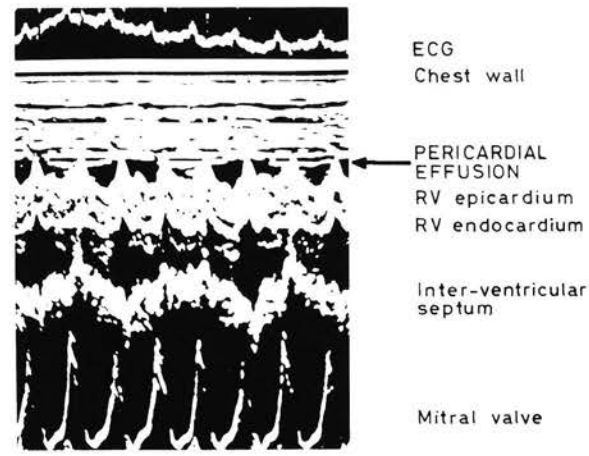

Figure 1
Anterior pericardial effusion
(RV = Right Ventricle)

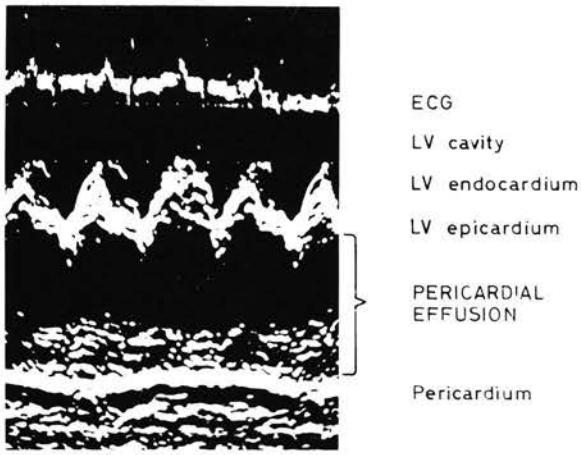

Figure 2
Posterior pericardial effusion
(LV = Left Ventricle)

pericardial effusions were present, while in the remaining 10 patients only small pericardial effusions were noted. No attempt has been made in this study to correlate echocardiographic findings with the quantity of fluid obtained at pericardiocentesis or surgery as these procedures were performed by the referring physicians at variable intervals after echocardiography. Hence, an attempt at quantitative correlation was not possible.

DISCUSSION

The basis for the ultrasonic method of detecting pericardial fluid is simple. The pericardial sac is only a potential space and the pericardium is in contact with the heart except for the area posterior to the left atrium which is free of pericardium. When a pericardial effusion develops this space fills up. As the fluid is relatively transonic, an echo-free separation occurs between the anterior right ventricular wall and chest wall (Edler, 1955) and the posterior left ventricular wall and posterior pericardium (Feigenbaum, 1965). As there is no pericardium covering the posterior left atrial surface, echocardiographic separation should not be seen in that area. This can be detected by scanning the heart from the left ventricular cavity to the aortic root. If separation is present then a pleural effusion is present either isolated or in association with a pericardial effusion. Hence, if care is not exercised a false positive posterior pericardial effusion may be diagnosed. However, false positive results are commonly due to poor technique.

Efforts to quantitate the amount of pericardial effusion using ultrasound (Horowitz *et al.*, 1974) have been punctuated with some obvious difficulties. There are various limitations of the present technique in attempting to quantitate the amount of pericardial effusion (Feigenbaum, 1976). However, moderate to large pericardial effusions can easily be predicted by ultrasound. It is worthy of note that echocardiography is very sensitive in detecting even small pericardial effusions and is currently the most sensitive method available for this purpose.

It has been our experience, that this is a relatively easy and rapid method of diagnosing pericardial effusion with a high degree of accuracy. Other advantages are that it is a non-invasive technique and may be performed with total safety to the patient. It may be used in critically ill patients for distinguishing cardiomegaly from pericardial effusion and the machine can be wheeled to the bed side if required. To assist in pericardiocentesis a special ultrasonic transducer with a central lumen may be used to direct the needle into the pericardial sac (Goldberg and Pollack, 1973) providing additional safety to the procedure.

SUMMARY

Investigatory confirmation of pericardial effusion has been a problem in clinical practice for several years. Our clinical experience with echocardiography for the detection of pericardial fluid has shown that it is a relatively easy, rapid and accurate method of diagnosing pericardial effusions with complete safety to the patient.

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THE PREVALENCE OF SILICOSIS AMONG CHINESE TOMBSTONE MAKERS IN MALAYSIA

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INTRODUCTION:

SILICOSIS occurring among stone cutters has been well documented in Literature (Ahlmark *et al.*, 1960, Futherland and Bryson, 1930), whereas silicosis occurring especially among workers of the tombstone making profession has less frequently been described.

The custom of using tombstones, made of granite, for the graves, is very predominant among the Chinese in Malaysia. Even the Malays use granite tombstones, which are much smaller in size, but they are also made by the Chinese. Most Indians do not use tombstones as they being mostly Hindus, cremate their dead.

It is estimated that approximately 250 tombstone making industrial establishments, employing about 1,000 workers, exist in Malaysia. All the workers are traditionally Chinese and almost all males. Most of the establishments are family concerns, with hardly any hired labour. The father usually starts the business and the sons and other relatives join in. Some originally learnt the trade in China and then migrated here. Once the worker joins this profession he seldom leaves and this accounts for a stable population, with long standing exposures. The stone most commonly used is granite and the silica content of this is approximately 76%. The granite slabs are manually cut into the required size (2 feet by 3 feet). The surface is then polished by hand and finally the inscriptions are carried out. All of these are "dry" processes. Modernisation has brought in motorised cutting saws which generate more fine (dry) dust particles.

The majority of the establishments are located in crowded surroundings. They are small temporary sheds which are sandwiched among other similar neighbouring sheds. The rear sections of some of them are used as dwellings, for the family. The status of lighting and ventilation is invariably poor. No personal protective equipment is being used by any of the workers.

METHODOLOGY AND MATERIAL:

A pilot study was done among all the tombstone workers from establishments located in or near three major urban centres, namely Penang, Kuala Lumpur and Malacca. The Bukit Mertajam District, in Penang State is the largest producer of tombstones in the country and exports them to many other parts of the country. The trade flourishes here since the quality of granite is famed to be the best. Chest x-rays of all the workers were examined.

RESULTS:

119 workers were included in the study which showed that 43 workers (36%) had silicosis. 80% of the workers with 15 or more years of exposure also revealed signs of silicosis (Table I). 2 cases of silicosis were seen in the below 20 years age group. (17%) and 7 cases in the 50+ years age group (78%) (Table II).

5 of the workers had first started working at this trade between the ages of 12 and 13 years. There was one clerk who had silicosis, even though he had never made any tombstones. His "office" was just a desk, being situated in a corner of the dusty workshop.

Table I

The prevalence of silicosis among tombstone workers according to the duration of exposure

Exposure in years	No Silicosis		Silicosis		Total No. of workers
	No.	%	No.	%	
1 – 4	33	89	4	11	37
5 – 9	33	73	12	27	45
10 – 14	5	42	7	58	12
15 – 19	1	20	4	80	5
20+	4	20	16	80	20
Total	76	64%	43	36%	119

Table II

The prevalence of silicosis among tombstone workers according to age

Age in years	No Silicosis		Silicosis		Total No. of workers
	No.	%	No.	%	
<20	10	83	2	17	12
20 – 29	54	83	11	17	65
30 – 39	8	36	14	64	22
40 – 49	2	18	9	82	11
50+	2	22	7	78	9

Table III shows the results of the interpretations of the 43 x-ray's diagnosed as silicosis. More than 50% of the x-rays showed opacities larger than 1.5 mm. and approximately 60% had numerous opacities occupying both lung fields (i.e. category 2 and 3).

7 of the 43 workers with silicosis (17%) had radiological lesions suggestive of pulmonary tuberculosis. Two of them were actually on antituberculous therapy, at the time of the survey. The prevalence rate of pulmonary tuberculosis among the tombstone workers was found to be three times that of the general population, conforming to the well known fact that silicosis predisposes to tuberculosis (Steele, 1970).

DISCUSSION:

The hygienic conditions in these workshops are poor. The introduction of more modern techniques like dry cutting with machine saws have only aggravated the amount of fine dust generated into the atmosphere. No preventive measures exist. Several constraints, which hinder the introduction of suitable control measures, are faced e.g.:

(i) The health risks are not appreciated by the workers;
(ii) The rate of literacy among them is low which makes it difficult to obtain an effect by ordinary methods of information.
(iii) Most of these small private family undertakings are not licensed or under the perview of the law.
(iv) Their financial status does not allow expensive control installations.

The main recommendations for the improvement of the situation include:-

(i) Health education, on work hazards, of these workers, based on personal contacts.

Table III

Interpretation of chest x-ray according to the ILO classification (1971). Category 1 – III: Degree of profusion of opacities. Size of opacities: p = less than 1.5 mm, q = 1.5–3 mm, r = 3–10 mm, A,B,C = large opacities.

Size of opacities	Category I			Profusion Category II			Category III			
Type	1/0	1/1	1/2	2/1	2/2	2/3	3/2	3/3	Total	%
p	4	3	8	3	3				21	49
q			3	4	4	4			15	35
r							1	2	3	6.7
A				1		1			2	4.7
B						1			1	2.3
C								1	1	2.3
Total	4	3	11	8	7	6	1	3	43	100
%	9.1	6.8	26	19	16	14	2.3	6.8	100	

(ii) Bringing more of them under legislative jurisdiction, through local council by-laws etc.

(iii) Free x-ray of the chest every 3 years, to be done by the Government hospitals.

(iv) To introduce cheap and effective control measures on a priority and co-operative basis, e.g.: "wet" cutting and polishing, optional use of "natural" ventilation and personal protective equipment.

SUMMARY:

A pilot study of 119 tombstone workers showed that 36% of them had silicosis. 80% of the workers with more than 15 years of exposure and 11% with less than 5 years of exposure had silicosis. 17% of these workers had suffered from tuberculosis. This is evidently a very dangerous trade, from the occupational health point of view, and efforts should be made to improve the working conditions. These would include regular inspections of the work places, health education of the workers and an x-ray of the chest for each worker, every 3 years.

ACKNOWLEDGEMENTS:

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NEONATAL NARCOTIC DRUG WITHDRAWAL SYNDROME

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INTRODUCTION

IN RECENT YEARS, narcotic addiction to heroin among adolescents and young adults has become a major medical and social problem in Malaysia. E. Tan, 1972; Navaratnam, 1976; Deva, 1978). Navaratnam (1976) reported that out of 372 drug addicts seen at the Penang General Hospital, 85% were below 30 years of age and that heroin was the most commonly abused drug followed by marihuana ("ganja"), opium and morphine. He also found multiple drugs abuse to be frequent as 65% of the drug addicts had used 3 or more different drugs and 41% had used 5 or more different drug types. Although the full extend of the problem is not known because of the illicit nature of the drug traffic, it is estimated that there are about 200,000 heroin addicts in this country, seventy per cent of whom were below 25 years old (Datuk Musa Hitam, 1978). Although there are not many female addicts, recent trend shows an increase in their numbers. Since the majority of the female drug addicts are in the child bearing age (15 to 40 years) one would expect an increase in the number of infants born of addicted mothers. It is most important for doctors, nurses and social workers to recognise such infants undergoing narcotic withdrawal not only from the point of obviating unnecessary investigations but also prompt treatment does significantly reduce the mortality rate (Goodfriend *et al.,* 1956). Prior to September 1977, we did not encounter any infant of addicted mothers at the special care nursery at the University Hospital; but since then we have had 3 such infants. It is the purpose of this paper to report on one of the cases and to discuss the early recognition and management of such infants and the effects of narcotic drugs on the foetus.

REPORT OF A CASE

Baby S, a full term 2550 gram. boy, was born on 14th September, 1977 to a 17 years old unmarried primigravida Indian Muslim who had no antenatal care. The baby was delivered in the car on the way to the hospital. The physical examination was unremarkable. At 6 hours of age the neonate was noted to be hyperirritable and vomited his first feed. A few hours later, he showed continuous tremors of all extremeties (jitteriness), a high-pitched cry and poor feeding with frequent vomiting. Neonatal narcotic drug withdrawal syndrome was suspected and on direct questioning the mother admitted that she had been smoking heroin (locally called 'chasing the dragon') for 3 years and consumed approximately $20 of heroin daily. The last dose was 12 hours prior to delivery. The child was treated with oral phenobarbitone (10 mg/Kg/day divided into 4 doses) and the symptoms subsided, feeding improved and he was asymptomatic by the 7th hospital day. The phenobarbitone was gradually reduced over the next 3 weeks. Blood glucose, calcium and magnesium levels were normal and VDRL was negative. The patient developed right gonococcal ophthalmitis on the 3rd hospital day which was successfully treated with a 10 days course of parenteral penicillin and penicillin eye drops. Follow up at 4 months revealed a normal child.

Comments: Most often, addicted mothers do not volunteer any information about their drug habits.

It is important to question them closely about narcotic drug addiction whenever one suspects narcotic drug withdrawal syndrome in the newborn. Besides, syphilis and gonococcal infection are more prevalent in both the neonate and the addicted mother as she frequently has to support her drug habit by prostitution. Purulent eye discharge in such newborn had to be treated aggressively as gonococcal ophthalmitis unless proven otherwise.

EFFECTS OF NARCOTIC DRUGS ON THE FOETUS

Heroin (diacetylmorphine) is the most commonly abused narcotic drug and can be obtained by illegal means only. The heroin addict usually starts with smoking the heroin in cigarettes, then moved on to "chasing the dragon", and many subsequently used the intravenous route. (Chasing the dragon consists of heating the heroin and following the resulting curl of smoke – the dragon's tail – with a straw or empty match box through which the smoke is inhaled). Heroin is hydrolysed in the body to morphine and is excreted in the urine largely as free and conjugated morphine. Babies born to heroin addicts tend to be small for gestational age and often weighing less than 2500 gm (Naeye *et al.*, 1973; Kandall *et al.*, 1975). The low birth weight is due partly to poor maternal nutrition and health and also to heroin which had been shown experimentally to retard growth. (Taeusch *et al.*, 1971). However, these neonates have a lower incidence of neonatal jaundice due to its inductive effects on glucuronyl transferase enzyme activity in liver (Zelson *et al.*, 1971). Heroin also accelerates the lung maturation process and neonates of heroin addicts have a higher lecithin to spingomyelin ratio in the amniotic fluid and the incidence of hyaline membrane disease is lower (Gluck and Kulovich, 1973). Various types of congenital defects are found but the incidence of these defects does not seem to be any higher than in the general population. The withdrawal symptoms occur early, usually within the first 24 to 48 hours and rarely after the fourth day and relatively easy to control. Respiratory alkalosis and hyperventilation are frequently associated with the withdrawal.

Methadone differs greatly from morphine and its derivatives in both structure and detoxication. It is demethylated in the liver and excreted in the urine and bile. Methadone, when initially used to treat narcotic addicted mothers, was thought to produce little or no withdrawal effects in infants. (Wallach *et al.*, 1969). However, it was subsequently shown that 91% of exposed babies not only become symptomatic, but have more severe signs of withdrawal which were more difficult to control. These babies were usually appropriate for gestational age, had an higher incidence of hyperbilirubinaemia and convulsions (Reddy *et al.*, 1971). The withdrawal symptoms may appear late (7 to 10 days). Kandall and Gartner (1974) reported seven cases of neonatal methadone withdrawal in which severe symptoms developed between 2 and 4 weeks of age. Fortunately methadone is not commonly used in this country in the treatment of the heroin addict.

Barbiturate can give rise to withdrawal syndrome in the newborn. This may be due either to drug abuse (most often involving intermediate acting barbiturates such as secobarbital or amobarbital) or for medical reasons. Long term phenobarbital is often prescribed for seizure disorders, preeclamptic toxaemia and sedation during pregnancy. The withdrawal symptoms from barbiturates are usually more prolonged and appear late (7 days median; often seen up to 14 days) with predominance of central nervous system symptoms such as jitteriness and marked irritability (Desmond *et al.*, 1972).

RECOGNITION AND DIAGNOSIS OF NEONATAL NARCOTIC WITHDRAWAL SYNDROME

During intrauterine life the foetus has been exposed repeatedly to narcotics which is suddenly cut off at the time of delivery. If he has developed a physiological dependence to these drugs, withdrawal symptoms may be expected to follow. Unless the mother has abstained from drugs for at least 4–6 weeks prior to delivery, it is likely that at least some symptoms will occur. It has been estimated that 67–85% of infants born to mothers addicted to narcotic drugs manifest signs of withdrawal (Zelson *et al.*, 1971; Reddy *et al.*, 1971). Why some of these infants do not manifest signs of withdrawal is not known. However, the sleep pattern of every infant born to the drug addicted mother is abnormal, particularly so in the rapid-eye-movement (REM) aspect of sleep, even though some of these infants show no clinical evidence of withdrawal (Schulman, 1969).

The onset of withdrawal can occur at any time from birth to 3 or 4 days after birth. This interval depends to a degree on the mother's dosage, the type of narcotic used, the duration of addiction and the time of the last dose taken before delivery. However, it is said that withdrawal symptoms are only detectable if the mother had been taking 10–15 mg of heroin a day regularly, but histories of drug use in terms of dosage and frequency are so unreliable that it is not possible to base treatment on such data.

The diagnosis of often difficult due to lack of information from the mother who may conceal the

fact that she was using drugs illegally or due to the failure of the physician to consider the diagnosis. The importance of early recognition of newborn undergoing withdrawal symptoms cannot be over emphasized, since undiagnosed and untreated early, the infant may die or may have significant effects on growth, development and neurological status later in life. The signs and symptoms may be vague and non-specific, but the physician with a high index of suspicion may elicit a maternal and social history that corroborated with laboratory data and allow treatment of the infant and subsequent help to the mother.

Table I: Signs and symptoms of neonatal narcotic withdrawal syndrome

1. Central nervous system:	Restlessness, irritability, high pitched cry, tremors or jitteriness are most frequently encountered; and rarely convulsions.
2. Gastrointestinal:	Poor feeding, vomiting and frantic sucking activity frequently occur, and at times diarrhoea.
3. Respiratory:	Depressed respiration or respiratory distress are infrequent but occasionally do occur.
4. Others:	Fever, skin abrasions, excessive yamning, sweating, blanching and flushing of skin, nasal discharge, hiccups and poor weight gain.

The most common symptoms of withdrawal are generalised hyperactivity, coarse tremors or jitteriness and irritability. The infant develops skin abrasions on the knee, chin and elbow because of excessive movement and has an increased muscle tone. He cries fretfully most of the time especially when disturbed. He appears hungry and sucks frantically at his fists with a voracious appetite but relatively little milk goes into the stomach because of the ineffective sucking activity (Kron *et al.*, 1974). The other symptoms include sneezing, yawning, nasal congestion, sweating, loose stools, vomiting and occasionally hyperthermia. With excessive motor activity and poor caloric intake the infant may lose weight. Sleep disturbances have been reported even after the acute symptoms of withdrawal had diminished as well as an increased level of response to auditory stimuli (Sisson *et al.*, 1974). Occasionally these infants developed hypocalcaemia and its symptoms because of a respiratory alkalosis resulting from tachypnoea abd hyperventilation. (Glass *et al.*, 1972).

TREATMENT

Once the diagnosis of narcotic withdrawal syndrome is made, treatment must be considered. Drug addiction in the adult is characterised by tolerance, physical and psychological dependence and in treatment these 3 factors need to be considered. However, in neonates only physical dependence to the narcotic drugs is present and treatment is much easier compared to adults. All neonates of addicted mothers should be admitted to hospital or the special care nursery for careful observation for signs of withdrawal. If signs of withdrawal occur they should be evaluated every 1 to 2 hours and treatment to be considered. Blood should be sent for blood gases, electrolytes, glucose, calcium and magnesium levels, to rule out metabolic disorders. Whenever indicated a blood culture and a lumbar punture should be done to exclude neonatal sepsis and meningitis.

During the hospitalisation of the addicted infant, the parents should be encouraged to be with the infant as often as possible to facilitate parent-infant interaction. Supportive counselling is maximised during this period since many parents may feel guilty and depress. The nature of the infant's withdrawal should be explained to the parent and they be kept informed of the clinical condition and progress of treatment. They should be given the opportunity to express their fears and feelings concerning the withdrawal and other problems that they have. The assistance of other persons, e.g. grandparents, who might provide needed help during the crisis, should be sought.

Approximately 30% of the infants who manifest signs of withdrawal show only mild signs and will recover spontaneously within a short period of time. these infants do not require treatment. A quiet, warm and darkened environment, gentle handling, swaddling a pacifier and frequent small feeds are all that is required.

However, infants who cry continuously, have feeding difficulty, diarrhoea, marked irritability and jitteriness, should received some form of sedation to relieve their discomfort and to prevent the condition from deteriorating further. Various treatment regimens have been used successfully in controlling the signs of withdrawal. Evaluation of these different regimens are difficult. Various scoring systems based on the signs and symptoms of withdrawal have been used. (Lipsitz, 1975; Finnegan *et al.*, 1975). However, it is important to provide adequate fluid and calorie intake as the major cause of death in drug addicted infants is dehydration which has not been diagnosed and/or

improperly treated. The dehydration may be severe and of sudden onset in those infants who develop diarrhoea and vomiting. Thus daily intake and output and weight gain or loss, is an essential part of the management. The most frequently used drugs are chlorpromazine, phenobabitone and diazepam. Paragoric is used only occasionally for severe gastrointestinal symptoms.

Table II: Drugs used in the treatment of neonatal narcotic withdrawal syndrome

Phenobarbital:	8.0 – 10.0 mg/Kg/day in divided doses every 6 to 8 hourly. IM or orally (initial doses should be IM), decrease dose to 5 mg/Kg/day after 48 hours.
Chlorpromazine:	2.0 – 3.0 mg/Kg/day in divided doses every 6 hours, IM or orally (initial 2 doses should be IM).
Diazepam:	1.0 – 2.0 mg/Kg/day in divided doses every 8 hours, orally, halved the dose once symptoms are controlled.
Paregoric U.S.P. (camphorated tinture of opium)	1 – 2 drops/Kg q. 4 hourly, increased if necessary by 2 drops every 4 hourly to stabilizing dose.

Phenobarbitone is an effective and relatively safe drug and provide adequate control of symptoms for most infants (Kahn *et al.,* 1969). The starting is 8 – 10 mg/Kg/day in 3 to 4 divided doses. The initial 2 to 3 doses are administered intramuscularly and subsequent doses orally. After 48 hours, the dose is reduced to 5 mg/Kg/day, and according to the clinical condition the infant is slowly weaned off the drug. Although phenobarbitone provides good control of CNS symptoms, it affords poor control of gastrointestinal symptoms like vomiting and diarrhoea (Cobrinik *et al.,* 1959). Besides it also has a depressing affect on the respiratory center.

Chlorpromazine had been widely used in the treatment of neonatal narcotic withdrawal syndrome and considered the drug of choice by Zelson (1971). It provides good and rapid control of both the central nervous system and gastrointestinal symptoms. The initial dose is 2.0 to 3.0 mg/Kg/day in 4 divided doses. The initial 2 doses are given intramuscularly and subsequent doses orally. The dose is maintained for 2 to 4 days and then gradually tapered. In general, 25% of infants require treatment for less than 10 days, 50% for 10 to 20 days and 25% for up to 40 days. (Zelson *et al.,* 1971). However the disadvantage of this drug is that it may cause extra-pyramidal symptoms (Kahn *et al.,* 1969) and its long term effects on the developing cardiovascular, endocrine, central nervous systems are incompletely understood (Jarvik, 1970).

Diazepam had only been recently used to treat neonatal narcotic withdrawal (Nathenson *et al.,* 1971, Bauer, 1973). It provides good control of the CNS and gastrointestinal symptoms but does not seem to offer any particular advantage over phenobarbital or chlorpromazine. The initial oral dose is 1.0 to 2.0 mg/Kg/day in 3 divided doses. Once the symptoms are controlled the dose is halved and the dose interval is lengthened to 12 hours. The drug is discontinued once the dose of 0.5 mg is reached, only a short course of therapy is needed because of the extremely long half life of the drug in the newborn. The other theoretical risk of diazepam is the presence of 5% sodium benzoate used as a buffer; this is a potent competitor for bilirubin binding sites in albumin and thus not recommended in jaundiced neonates. (Cohen and Fern, 1972).

Paregoric (Camphorated tinture of opium U.S.P.) is not recommended except when diarrhoea is part of the withdrawal syndrome. The main objection to the use of paregoric is that the newborn after another narcotic drug. Besides causing constipation and lethargy, large doses must be given to control symptoms and durations of treatment is prolonged.

Once the withdrawal symptoms are under-control the same dosage of the above drugs is maintained for 1 to 3 days before gradually tapering off. The indications of adequate treatment are, decrease or complete control of clinical signs, able to sleep and feed well with no vomiting or diarrhoea and show no untoward reaction to the drugs used. (Zelson, 1975).

FUTURE CARE OF THE INFANT

The future care of the infant of the addicted mother poses a greater challenge than the acute management of the withdrawal symptoms as many of the addicted mothers are unmarried and have emotional and psychological problems of their own. Even though they express the desire to keep the baby, they may not be able to satisfy the emotional and physical needs of the child.

There is a higher incidence of child abuse and sudden infant death in these children. It is important for the physician to establish a positive relationship with the parents and provide them with guidance and emotional support. A lot of effort must go into the treatment of the addicted mother, she must be provided with medical support and treatment, psychological help and complete and honest information as to the effect of her addiction on herself and her baby. She needs to be handled with patience

and consideration. Many different factors need to be considered before discharging these infants from the hospital, that is, the home environment, the mother's drug habit and motivation of seeking treatment, the family dynamics and home help, the desire to keep the child and other social problems. The physician needs to work closely with the medical social worker and the public health nurse in following up these infants and also to provide supportive and other help to the mother.

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AN OPEN CLINICAL TRIAL COMPARING (PAIRED COMPARISONS) DESOXIMETASONE WITH BETAMETHASONE 17-VALERATE

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INTRODUCTION

THE BENEFICIAL EFFECT OF topical steroid preparation in treating skin inflammation is well established. Each new topical steroid introduced must be evaluated against a 'standard preparation' to test its efficacy. Though there are many laboratory methods including the vasoconstrictor test developed by McKenzie to test the efficiency of a topical steroid preparation, clinical evaluation is still the most suitable method. With this in mind a new preparation desoximetasone (Esperson) was compared with betamethasone 17-valerate in the treatment of various types of eczemas and psoriasis.

METHOD

One hundred patients were included in this open trial and one half of them were randomly allocated to the treatment with desoximetasone. Table I shows the number of patients with each skin disease for both topical preparations. The extent, duration and the severity of the skin changes were comparable as far as possible in both groups. None of them had any topical application for at least two weeks before they were included in the trial. The patients were instructed to apply the ointment twice daily. No other treatment was given. They were seen at weekly intervals to assess the response to treatment and were followed up for a minimum of one month.

Table I

	Desoximetasone				Betamethasone 17-valerate			
	No. of Pts.	Results			No. of Pts.	Results		
		Ex. to G	F	P		Ex. to G	F	P
Contact eczema	17	13	0	4	15	7	3	5
Photosensitivity	6	3	3	0	5	3	2	0
Discoid eczema	8	8	0	0	12	4	3	5
Atopic eczema	8	4	4	0	6	3	1	2
Psoriasis	11	4	3	4	12	6	2	4
Total	50	32	10	8	50	23	11	16

Ex. to G = Excellent to Good. F = Fair, and P = Poor.

RESULTS

The response to therapy was grouped into 3 categories: Excellent to good, Fair and Poor. In "Excellent to good" response, the skin condition cleared and remission was maintained throughout their follow-up. In "Fair" response, both symptoms and signs were less but there was no remission. If the skin change remained as it was in the first visit or the improvement was minimal, the response was categorised as "Poor".

Table I shows the results for both topical preparations and Table II shows a statistical analysis of the results. In analysis of the response in individual disease, though the difference in eczema has not reached the accepted $p = 0.05$ level, the results does suggest a superiority. In discoid eczema desoximetasone superiority is statistically significant. In psoriasis, atopic eczema and photosensitivity, the analysis does not show a significant difference in response to the two drugs. The overall response to therapy is shown in Fig. 1. The overall superiority of desoximetasone is shown by the percentage of cases showing "Excellent to good" response and by a statistical significance of the difference at the $p = 0.05$ level.

COMMENTS

The study showed that desoximetasone is a suitable preparation for the treatment of all types of eczema. In comparison with betamethasone 17-valerate, desoximetasone has proved as a more effective topical steroid application. Tachyphylaxis did not influence the observed results in favour of desoximetasone, as most of the conditions treated were acute and the patients did not have any previous topical steroid therapy. In psoriasis where previous topical steroid therapy may have been used, the response did not show statistically significant difference to the two preparations.

SUMMARY

Desoximetasone was compared with betamethasone 17-valerate in the treatment of various types of eczemas and psoriasis. The former was found to be a more effective topical steroid especially in the management of eczemas.

Fig. 1. Overall response to therapy

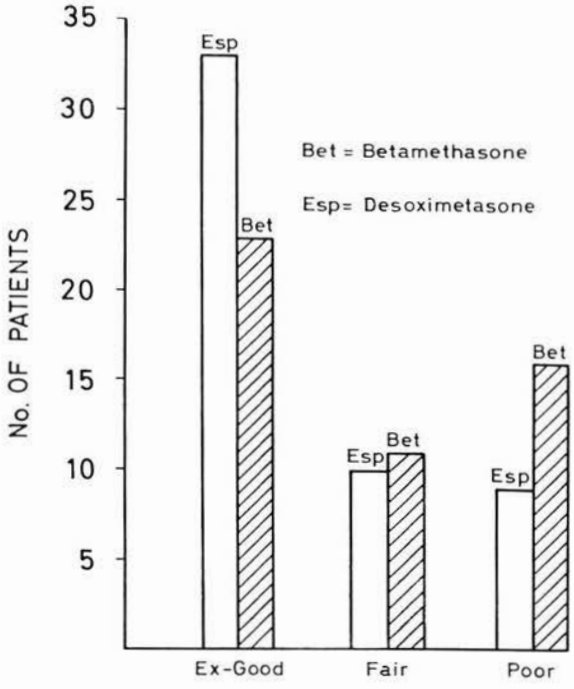

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Table II

Analysis of Response in Good to Excellent Category

Condition	Desoximetasone		Betamethasone 17-valerate		X_2 Test
	Total cases	% in category	Total cases	% in category	
Eczema	17	76.5	15	53.3	$p < 0.2 > 0.1$
Photosensitivity	6	50.0	5	60.0	n.s.
Discoid eczema	8	100.0	12	33.3	$p < 0.05$
Atopic eczema	8	50.0	6	50.0	n.s.
Psoriasis	11	36.6	12	50.0	n.s.
Overall	50	66.0	50	46.0	$p < 0.05$

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EARLY EXPERIENCE WITH THE COPPER 7, COPPER T220C AND MULTILOAD 250 INTRAUTERINE DEVICES

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THE ADDITION OF copper to an inert intrauterine device (IUD) has been shown to enhance its contraceptive effectiveness (Tatum, 1973; Zipper *et al.*, 1971). However, problems resulting in termination of use have not been eliminated and modifications in IUD design are continuously being explored in the search for the optimal device which will not only be acceptable to the patient but which would also be sufficiently reliable for mass insertion. Evaluation of new devices cannot be made by direct comparison of data from different authors since many variables are involved (Sivin, 1973; Tatum, 1972; Mishell, 1975). A valid comparison between different devices can only be made under the same field conditions.

This paper is a preliminary study to assess the progress made in the IUD project being carried out at three University centres in Kuala Lumpur, Singapore and Medan (Inter-University Collaborative Fertility Project). Three IUD's were studied: The Copper 7 (Cu-7) and two newer devices, the Copper T220C (TCu 220C) and the Multiload 250 (MLCu 250). Only the first six months of use were analysed as the number of acceptors were still relatively small.

MATERIALS AND METHODS

The study group consisted of 574 parous women who chose the IUD as the sole method of contraception. Insertions were made in the interval period namely at least four weeks after an abortion and eight weeks following a delivery. Allocation of the device was made on a random basis and all patients had been followed up for at least 6 months or had been terminated from study by 31st August, 1977.

The devices used are shown in Figure 1. Each device is supplied in a sterile package together with introducer and plunger. The Cu-7 with an exposed copper area of 200 sq. mm. in the form of wire coils on its vertical stem is well-known (Bernstein *et al.*, 1972; Newton *et al.*, 1975). The TCu 220C is a new model of the T-device with 220 sq. mm. of copper in the form of sleeves on both the transverse and vertical arms. The MLCu 250 has 250 sq. mm. of copper wire wound on its vertical stem. Its transverse wings are highly flexible and have barbs for anchorage within the uterine cavity (Van Os

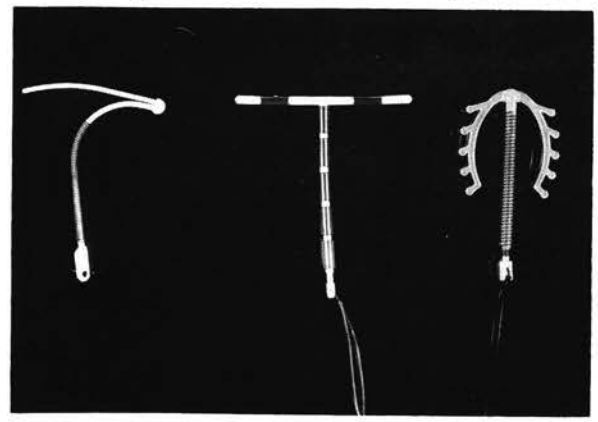

Figure 1

Cu-7, TCu 220C and MLCu 250 devices.

* Paper presented at the VIIth Asian Congress of Obstetrics And Gynaecology, Bangkok 20th–25th November, 1977.

et al., 1976). Figure 2 shows the devices ready for insertion. Note that no plunger is needed for the MLCu 250 and the device does not need to be manipulated into the introducer.

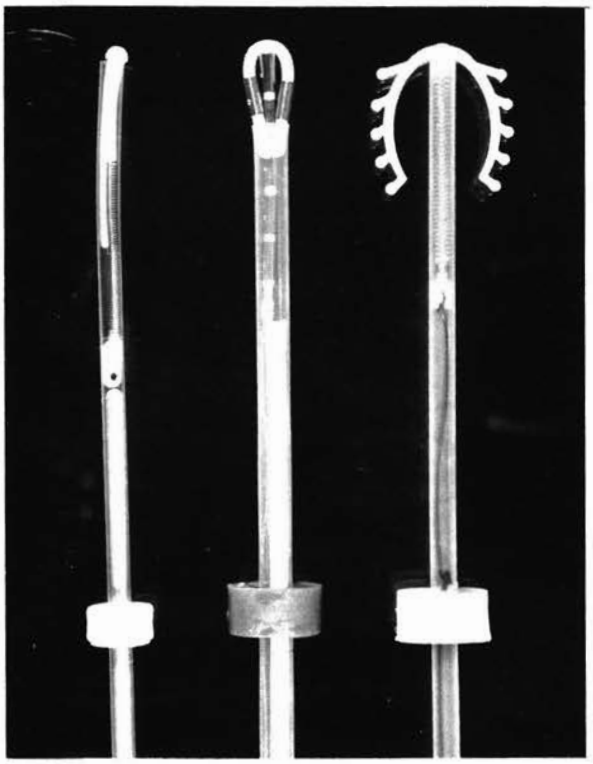

Figure 2
Cu-7, TCu 220C and MLCu 250 ready for insertion.

A full history was taken and physical examination carried out on admission to the study. A gynaecological examination including cervical Papanicalaou Smear was then performed. After swabbing the cervix with antiseptic solution, the uterine cavity was sounded to determine its depth and direction. Insertion of the Cu-7 and TCu 220C is by the withdrawal technique while the MLCu 250 is inserted directly into the uterine cavity on its applicator.

After insertion, follow-up was carried out at 6 weeks, 3 months and then at 6 months when a repeat Papanicalaou Smear was taken. Unscheduled visits were also recorded.

RESULTS

The age range of acceptors was 19–35 years. The mean age was 26.8 years and mean parity 2.6 (Table I). The three groups of patients were comparable in mean age/parity as expected from randomization. Insertion of the IUD was not possible in two patients as the uterine sound could not be negotiated into the uterine cavity.

Table I
Mean Age/Parity of IUD Acceptors

	Cu-7	Cu-T220C	MLCu 250	Total
Mean Age (yrs.)	26.6	27.0	26.7	26.8
Mean (Parity)	2.7	2.4	2.6	2.6

Of the 572 insertions made, 70 (12.2%) were terminated in the first 6 months of use. The cumulative event rates obtained (Tietze and Lewit, 1973) are shown in Table II. The overall continuation rate at 6 months was 87.7 per 100 users for a total of 3,253 woman-months of use.

Table II

Cumulative Event Rates Per 100 Users By IUD Type, 6 Months of Use

	Cu–7	Cu–T220C	MLCu250	Total
No. of First Insertions	189	191	192	572
Woman-months	1063	1096	1094	3253
Type of Termination:				
Pregnancy	1.6	0.5	2.1	1.4(8)*
Expulsion	4.2	1.6	1.6	2.5(14)
Removal:				
Pain/Bleeding	3.2	3.1	3.1	3.1(18)
Planning pregnancy	1.6	2.1	1.6	1.7(10)
Infection	0.5	0	0	0.17(1)
Other reasons	1.6	2.6	1.0	1.7(10)
Loss to follow-up	2.1	1.0	1.6	1.6(9)
Continuation rate	85.2	89	89.1	87.8

* Indicates number of patients

DISCUSSION

Being flexible and small in size, the three IUD's were generally easy to insert. The two failures of insertion out of 574 patients studied were not attributable to the device itself. The MLCu 250 is the simplest of the devices to insert and the technique does not require sterile gloves to be worn since manipulation of the device is not necessary unlike the other two devices.

The removal rate for pain/bleeding was comparable among the three IUD's. The mean of 3.1/100 users is low in contrast to the Lippes loop which is reported to have a comparative rate of 9.9 at six months (Orlans, 1974). Being small and flexible, the copper IUD's do not cause undue distortion or compression within the uterus. This may account for the low termination rate observed for pain/bleeding (Adel *et al.*, 1971; Kamal *et al.*, 1971).

The main differences between the devices lay in their rates for expulsion and accidental pregnancy. However, the data is too small at present for any tests of significance to be meaningful.

The TCu 220C appears to better retained than the Cu-7 device with expulsion rates of 1.6 and 4.2/100 users respectively. Other studies comparing the T-device with the Cu-7 have also shown that the T-device is better retained (Jain, 1975; Shaila *et al.*, 1974). This difference is attributed to the "anchoring mechanism" of the T-device whereby the tips of both its transverse arms are embedded in the myometrium whereas the Cu-7 has only one embedding arm (Timonen *et al.*, 1972; Kamal *et al.*, 1973). The barbed wings of the MLCu 250 tend to resist expulsion and this may explain the low expulsion rate of 1.6/100 which is comparable to the TCu 220C.

Partial expulsion of the device is frequently observed in pregnancies associated with the copper IUD's (Tatum, 1972; Sivanesaratnam *et al.*, 1974). Should the TCu 220C be partially expelled however, the copper on its transverse arms may still exert a significant anti-fertility effect within the uterine cavity. The accidental pregnancy rate would therefore be expected to be low (Tatum, 1975). In the present study, the pregnancy rate of 0.5/100 users of the TCu 220C is low in contrast to the MLCu 250 and Cu-7 device which have rates of 2.1 and 1.6 respectively. Tatum (1975) in a preliminary study found that the pregnancy rate with the TCu 220C was 1/3 that of the Copper T-200 which has copper wire wound only on its vertical stem. The difference observed did not reach statistical significance but is nonetheless consistent with the above hypothesis. The removal rate for planning pregnancy and the rate of loss to follow-up were acceptably low at an average of 1.7 and 1.6 per 100 users respectively. There was no uterine perforation observed in the period of study.

Pelvic infection necessitating IUD removal was found only once, a rate of 0.17%. This low figure is significant in view of the mortality and morbidity associated with this complication (BMJ leading article, 1976). Strict adherance to insertion technique and the availability of the devices in sterile packaging are probably responsible for this finding. Similar experience is reported by Fortier *et al.*, (1973).

In the successful use of IUD's on a large scale, the ease and simplicity of insertion are important factors to consider (Mishell, 1975). This is particularly so where widespread use is made of paramedical personnel to perform the insertions (Rosenfield, 1975). The copper IUD's being easy to insert and having lower event rates may be better suited to this role compared to the larger non-medicated devices like the Lippes loop (Jain, 1975; Orlans, 1974). However, in order to make a demographic impact, an IUD must be effective in-utero for at least 3–5 years (Tatum, 1977). Copper wire tends to corrode and fragment in-utero (Tatum, 1973). Their effective life-span is therefore limited. By using the copper in the form of sleeves as in the TCu 220C, its integrity should be preserved longer and an effective life-span of 15–20 years in-utero is expected (Tatum, 1977). If field studies support this view, the TCu 220C would be established as a major advance in IUD design.

SUMMARY

The results of this preliminary study so far may be considered satisfactory but they do not warrant any firm conclusions as the data is small. However, certain trends are noted and possible explanations offered. If the present trends continue, the TCu 220C may prove to be the most effective device of the three: its potential in large family planning programmes would then be tremendous.

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A PRELIMINARY STUDY OF PLASMA ESTRIOL LEVELS IN MALAYSIAN PREGNANCIES

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INTRODUCTION

THE USE OF urinary estriol in the monitoring of the fetus-in-utero is well established (Klopper, 1968). However, certain practical disadvantages exist with this method which can be overcome by plasma measurements (Biggs, 1975). The use of a radio-immunoassay kit in the measurement of plasma estriol is sufficiently simple for use in a small establishment (Craig, 1976).

The study of plasma estriol levels in normal pregnancy using radio-immunoassay has been well documented (Shearman *et al.,* 1972; Masson, 1973; Biggs *et al.,* 1975; Chew *et al.,* 1976). However, very little emphasis has been made on the quantitative values of plasma estriol in different ethnic groups within the same community. This study aims to investigate the plasma estriol levels of normal pregnant mothers amongst the Chinese, Malay and Indian patients in the University Hospital, University of Malaya, Kuala Lumpur.

METHOD

All normal pregnancies in their second trimester, attending the ante-natal clinic for the first time from the 1.1.1977 to the 31.7.1977 were approached to be volunteers for this study. All patients had regular cycles varying between 28 to 35 days, and were sure of the dates of their last period. They were followed up fortnightly until the 36th week and weekly until delivery by two of the authors (Fong and Yusof).

Venopunctures were made fortnightly to withdraw 3 mls. of blood between 9.00 a.m. and 11.30 a.m. The blood samples were collected in heparinised tubes and immediately centrifuged. The plasma obtained were then stored at . . 20°C until assay.

The plasma samples from 20 patients of each of the 3 ethnic groups (i.e. Chinese, Malay and Indian) were assayed for this preliminary report. The number of samples from each patient varied between one and ten. A total of 239 samples were assayed. There were altogether 18 primigravid and 42 multiparous patients. All had normal vaginal deliveries of a single healthy infant within the normal weight range for the community (Yusof and Sinnathuray, 1976).

The characteristics of the patients in the three different ethnic groups are shown in Table VIA and VIB.

The assay was carried out by kits purchased from the Radiochemical Centre, Amersham, United Kingdom.

A small sample of plasma is first incubated with an enzyme solution containing a mixture of glucuronidase and sulphatase enzymes. The conjugates of estriol in the samples are hydrolysed during the incubation and estriol is released. The total amount of estriol, including that liberated by the hydrolysis is then determined in aliquots of the hydrolysed samples using a radio-immunoassay method.

In the radio-immunoassay procedure, estriol is allowed to compete with ^{125}I-labelled estriol for the binding sites on a specific anti-estriol antibody. The antibody-bound ^{125}I-labelled estriol is separated

by precipitation with an ammonium sulphate solution. After centrifugation and removal of the supernatant solution the precipitated radioactivity is measured in a Pickard Compact Scaler gamma counter.

RESULTS

The mean plasma estriol levels of mothers in each ethnic group by gestational age are shown in Tables I – IV.

The mean plasma estriol levels of mothers in the three ethnic groups show three different patterns (Fig. I). The Chinese mothers had the highest, while the Indian mothers had the lowest levels.

Table I

Mean plasma estriol (E3) in normal pregnancy (Malay)

Gestation in weeks	Number of Estimations	Mean in Nanogram per ml	Standard Deviation
30 – 31	13	71.7692	34.2276
32 – 33	12	102.1667	40.1040
34 – 35	14	116.5714	59.6473
36 – 37	20	148.5500	75.0421
38 – 39	15	209.2667	92.0019
40 – 41	6	236.3333	66.0717

Table II

Mean plasma estriol (E3) in normal pregnancy (Chinese)

Gestation in weeks	Number of Estimations	Mean in Nanogram per ml	Standard Deviation
30 – 31	9	88.333	25.5147
32 – 33	13	145.5385	99.2880
34 – 35	16	172.9375	101.9160
36 – 37	14	217.3571	139.0305
38 – 39	15	252.9333	111.4114
40 – 41	8	166.3750	79.0803

At term (i.e. between 38 – 40 weeks of gestation) the mean plasma estriol levels in Chinese mothers were 230.9 ng/ml.; Malay mothers 218.6 ng/ml.;

Table III

Mean plasma estriol (E3) in normal pregnancy (Indians)

Gestation in weeks	Number of Estimations	Mean in Nanogram per ml	Standard Deviation
30 – 31	14	83.0714	25.8709
32 – 33	14	88.7857	37.9680
34 – 35	14	100.7143	43.3775
36 – 37	22	134.9545	44.4602
38 – 39	10	160.6000	54.6915
40 – 41	10	160.0000	67.5475

Table IV

Mean plasma estriol (E3) in normal pregnancy (all races)

Gestation in weeks	Number of Estimations	Mean in Nanogram per ml	Standard Deviation
30 – 31	36	80.3056	29.0820
32 – 33	39	111.8205	68.4520
34 – 35	44	132.0227	79.2941
36 – 37	56	160.4107	91.6773
38 – 39	40	213.4750	97.5040
40 – 41	24	181.2083	75.5150

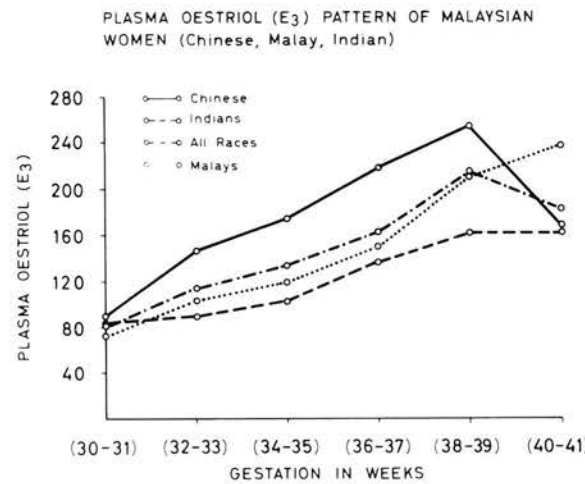

Fig. 1. Plasma estriol (E3) pattern of Malaysian women (Chinese, Malay, Indian).

and Indian mothers 154.0 ng/ml. (Tables VA and VB). It can be seen that there is a significant difference in the mean plasma estriol levels at term between the Chinese and the Indians as well as between the Malays, and the Indians but not between the Chinese and the Malays.

Table V(a)

Plasma estriol (E3) at term among the three ethnic groups (Chinese, Malay and Indian)

Ethnic Group	Mean plasma estriol (E3) values at term (x)	Standard Deviation	Number of Estimation (N)
Chinese	230.9000	110.1205	20
Malay	218.6842	87.8294	19
Indian	154.0000	58.1584	16

DISCUSSION

In this study it has been shown that the mean plasma estriol levels in mothers of all ethnic groups rose steadily from 30 weeks to 38 weeks of gestation. This pattern is similar to that reported for Caucasians (Masson, 1973) and Asians (Chew *et al.*, 1976). Our average values were comparable to those obtained with radio-immunoassay in a Caucasian population (Masson, 1973) who used the method of Gurpide *et al.*, 1971, but were slightly lower than those obtained in an Asian population (Chew *et al.*, 1976) who used the method of Wilson, 1973. This difference could be due to differences in methodology.

It may be too early at this stage to conclude that there are three significant patterns in the mean plasma estriol levels in mothers of the three ethnic groups. It has been documented that the birth weights of babies born to mothers of the three main ethnic groups in Malaysia (i.e. Chinese, Malay and

Table VI(b)

Statistical comparison of biodata of the three ethnic groups (Chinese, Malay and Indian)

Biodata	Ethnic Comparison	df	t	P Value	= 0.05
Hb (gm/100 ml)	Chinese/Indian	38	0.3145	$p > 0.10$	
	Malay/Indian	38	0.3362	$p > 0.10$	
	Chinese/Malay	38	1.3294	$p > 0.10$	
Birth Wt. (Kilogram)	Chinese/Indian	38	0.2928	$p > 0.10$	
	Malay/Indian	38	1.6244	$p > 0.10$	
	Chinese/Malay	38	1.2422	$p > 0.10$	
Parity	Chinese/Indian	38	1.9424	$0.10 > p > 0.05$	
	Malay/Indian	38	0.2333	$0.05 > p > 0.02$	Sig.
	Chinese/Malay	38	1.9074	$0.10 > p > 0.05$	
Placenta Wt. (Gram)	Chinese/Indian	38	1.3821	$p > 0.10$	
	Malay/Indian	38	2.1648	$0.05 > p > 0.02$	Sig.
	Chinese/Malay	38	3.2984	$0.01 > p > 0.001$	Highly Sig.
Age	Chinese/Indian	38	0.7892	$p > 0.10$	
	Malay/Indian	38	0.1266	$p > 0.10$	
	Chinese/Malay	38	0.6257	$p > 0.10$	
Total Household Income	Chinese/Indian	38	0.7705	$p > 0.10$	
	Malay/Indian	38	0.4070	$p > 0.10$	
	Chinese/Malay	38	0.5080	$p > 0.10$	

Table VI(a)

Biodata of the three ethnic groups (Chinese, Malay and Indian)

Ethnic Groups	Chinese			Malay			Indian		
Biodata	x	S.D.	n	x	S.D.	n	x	S.D.	n
Hb (gm/100 ml)	10.4150	0.8331	20	10.7250	0.6273	20	10.3100	1.2392	20
Birth wt. (Kilogram)	3.1600	0.3500	20	3.3000	0.3627	20	3.1300	0.2958	20
Parity	0.7500	0.9105	20	1.5000	1.5444	20	1.4000	1.1877	20
Placenta Wt. (Gram)	522.5000	138.9386	20	605.5000	103.9977	20	577.2500	109.9219	20
Age at Interview	26.2500	3.8916	20	25.3500	5.1224	20	25.1500	4.8696	20
Total Household Cash income	627.0000	748.1774	20	531.2000	389.2677	20	478.7500	424.9423	20

Table V(b)

Statistical comparison of plasma estriol at term between Chinese, Malay and Indian

Ethnic comparison	df	t	P value	= 0.05
Chinese/Indian	34	2.5213	$0.02 > p > 0.01$	SIG.
Malay/Indian	33	2.5151	$0.02 > p > 0.01$	SIG.
Chinese/Malay	37	0.3817	$p > 0.1$	NOT SIG.

Indian) are different (Yusof and Sinnathuray, 1976). As there is a possible correlation between birth weight and maternal plasma estriol levels (Coyle and Brown, 1963; Beling, 1967; Chew *et al.*, 1976) it may not be too surprising that a significant difference may exist between the mean plasma estriol levels in mothers of the different ethnic groups.

The patients in the three ethnic groups were well matched except for parity. However, it is unlikely that this is an important factor accounting for the differences observed. This can be seen by the studies of Masson (1973) and Chew *et al.* (1976) who have shown that no difference in plasma estriol levels exist between primigravid and multiparous patients.

SUMMARY

Serial levels of total plasma estriol from 60 normal pregnant patients were measured by a simple radio-immunological method. It was found that the mean estriol values increased from about 80 ng/ml. at 30 weeks gestation to about 240 ng/ml. at term.

A significant relationship was found between the mean estriol levels at term in mothers of the different ethnic groups under study, matched for age, socio-economic group and birth weight.

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TOTAL DOSE IMFERON INFUSION USING THE FIXED VOLUME/TIME TECHNIQUE

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INTRODUCTION

THE PLACE OF total dose imferon infusion (TDI) in the treatment of anaemia in Obstetrics had been established by previous studies. Kuah (1972) had shown the efficacy and safety of TDI in Obstetrics in Malaysia. The above prospective study was undertaken by the author to study the method of fixed volume and time infusion rate for total dose imferon infusion (TDI).

METHODS AND MATERIALS

The above prospective study was carried out in the Department of Obstetrics and Gynaecology General Hospital Malacca from January 1974 to December 1975. The method was as follows:

Patients for the study were selected from the antenatal clinic, antenatal wards and postnatal wards. All relevant data and investigations were recorded in the authors TDI form. The imferom requirement in cc was added to 250 ml of 5% Dextrose. In 1974, 200 ml of 5% Dextrose was used, but in 1975 250 ml of 5% Dextrose was used. All TDI drips were set up by doctors and the patient was observed for 20 minutes. The TDI drip was then allowed to run at a rate so that the drip was completed in two hours. If the patient developed any symptoms the doctor was immediately informed and the symptoms were recorded in the chart.

RESULTS

In this study a total of 125 patients were given TDI. Table I shows that the majority of patients were Malays, 76 out of 125. The table also shows that 49 out of 125 were in parity 6 and above. In this study 76 patients out of 125 had HB less than 8 gms and in the study it was noted HB were low for the rural Malays and the Indians from the estates (Table II). The patients were distributed in all the age groups (Table III). Out of the 125 patients studied, the majority (97) were postnatal most of whom were unbooked cases.

Table I

Study population according to ethnicity and parity

Ethnic Group	Primigravida	2 to 5	6 to 9	10	Total
Malays	13	23	28	12	76
Chinese	4	9	7	2	22
Indians	4	13	8	2	27
Total	21	45	33	16	125

Table IV shows that the majority of patients required between 30 to 40 ml of imferon. Table V shows that TDI can be given easily and with safety with concentration up to 25%. It is of interest to note that the recommended concentration in the Fisson imferon charts is only 5%. In terms of side effects (Table VI) in patients number 2 and 3 the symptoms were recorded after completion of the TDI. The patients were treated and all symptoms cleared. In case 4 and 5 the TDI procedure was stopped at 100 cc and 50 cc. The symptoms cleared up with treatment. No severe side effects were noted. There were no deaths recorded for this study.

Table II

Study population according to ethnicity and haemoglobin level

Ethnic Group	Less than 4	4 to 4.9	5.0 to 5.4	6.0 to 6.9	7.0 to 7.9	8.0 to 8.9	9.0 to 9.9
Malays	1	2	9	21	12	29	2
Chinese	1	0	1	5	4	9	1
Indians	1	0	6	8	5	5	2
Total	3	2	16	34	21	43	5

Table III

Study population by ethnicity and age

Ethnic Group	15 – 20	21 – 25	26 – 30	31 – 35	36 – 40	41 +
Malays	8	12	14	21	15	5
Chinese	0	6	5	5	3	3
Indians	3	9	8	3	5	8
Total	11	27	27	29	23	16

Table IV

Imferon requirement according to ethnicity

Imferon in ml	Malays	Chinese	Indians	Total
20	1	0	0	1
25	5	2	1	8
30	19	3	3	25
35	14	6	7	27
40	22	5	5	32
45	9	3	4	16
50	5	3	6	14
55	0	0	1	1
60 +	1	0	0	1

Table V

Percentage strength of total dose imferon infusion Imferon diluted in 200 ml 5% Dextrose or 250 ml 5% Dextrose

Imferon in cc	200 ml group		250 ml group	
20	0		1	8% Conc.
25	0		8	10% ,,
30	9	15% Concentration	16	12% ,,
35	7	17.5% ,,	20	14% ,,
40	12	20% ,,	20	16% ,,
45	3	22.5% ,,	13	18% ,,
50	6	25% ,,	8	20% ,,
55	0	– –	1	22% ,,
60	0	– –	1	24% ,,

Table VI

Side effects in five patients

No.	Ethnic	Age	Gravida	Hb	Antenatal Postnatal	TDI dilution	Amount Given	Side Effect
1.	Malay	28	3	5.6	Postnatal	35/200	TDI Completed	Fever Headache
2.	Malay	35	6	6.1	Postnatal	50/200	TDI Completed	Giddiness
3.	Indians	27	2	8.2	Antenatal	45/250	TDI Completed	Giddiness
4.	Chinese	32	7	6.5	Postnatal	40/250	100 cc	Headache Giddiness
5.	Indians	25	3	7.2	Postnatal	40/250	50 cc	Rigors

DISCUSSION

The above study shows the efficiency and safety of TDI using the fixed volume time technique. The advantages of the author's technique is as follows:

By using a fixed volume of 5% Dextrose, the duration for the TDI drip is reduced to 2 hours and the volume of TDI used is also reduced to 200 or 250 ml. In a busy antenatal or postnatal ward, it would be easier for doctors and nursing staff to supervise TDI drips as the drips will only last for 2 hours. It is reassuring to a patient to know that the drip will only be for 2 hours and the TDI procedure is more acceptable to the patient. The Obstetric and Medical advantage is that there is no risk of overloading the blood volume.

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HUMAN CHROMOSOMAL STUDIES IN KUALA LUMPUR

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INTRODUCTION

THIS IS a report of 233 individuals studied during the period 1973 to 1975 for a cytogenetic evaluation of some marked congenital anomalies and mental retardation. We also attempted fibroblast cultures from spontaneous abortuses material. The study was made in order to define the extent, types and variations of chromosomal abnormalities present. Such data are useful for the purpose of genetic counselling; each individual detected as 'chromosomally abnormal' in the study is in essence helping to establish the range of 'chromosomal syndromes' prevalent in Kuala Lumpur at that time.

MATERIALS AND METHODS

Samples were provided by the Departments of Paediatrics, Obstetrics & Gynecology, University Teaching Hospital K.L.; Assunta Hospital; Institute for Medical Research/General Hospital and mentally retarded schools in Sentul and Brickfields, Kuala Lumpur. Capillary blood samples were collected for the standard microculture technique. Only in certain cases were venous blood collected and similarly cultured for 72 hours. Slides were prepared using the standard air-drying procedures. Fibroblast cultures from spontaneous abortion material were initiated following the procedure of Hyman (1968).

RESULTS AND DISCUSSION

Table 1 shows the extent of chromosome abnormalities among the cases studied. Most of our samples were predominantly newborns and children. 168 normal karyotypes were encountered, presumbly factors other than chromosomal, may be involved. Of the 65 abnormal karyotypes detected, there were 48 cases of standard tri G21+ Down's syndrome (73.85%), 3 cases of Dq/Gq translocation Down's syndrome (4.62%), 3 cases of tri D13+ Patau's syndrome (4.62%), 4 cases of tri E18+ Edwards' syndrome (6.15%) and 4 cases of X0 Turner's syndrome (6.15%). 3 balanced Dq/Gq translocation heterozygotes (2n = 45) were detected in one family.

Of a wide variety of possible chromosomal aneuploidies, in general, only three common autosomal trisomies survive birth; 47, 21+ (standard trisomy G), 47, 13+ (trisomy D) and 47, 18+ (trisomy E).

The incidence at birth of Down's syndrome in populations of European origin is in the region of 1 in 700 (Smith & Berg, 1976; Hamerton, 1971). A sufficiently comprehensive incidence survey at birth in Asian populations has yet to be reported but generally the incidence appears to vary with the age of the mother. The majority of our trisomy G cases were born to older mothers above 35 and fall into the older maternal age dependent group (Smith & Berg, 1976). It is significant that our trisomy G cases comprise at least 20% of the cases referred to us and forms about 74% of all abnormal karyotypes. Clearly, this was by far the most frequent clinically diagnosed, being confirmed cytogenetically. From what is obviously a biased sampling of abnormal cases, we can only stress that standard G trisomy Down's syndrome forms a significant proportion

Table 1: Chromosomal findings in 233 Individuals

Sample Type	Normal Karyotypes			Abnormal Karyotypes												Total
	M*	F*	Total	Down's Syndrome					Balanced Dq/Gq translocation heterozygote		Patau's Syn. Tri D13+		Edwards' Syn. Tri E18+		Turner's Syn. XO	
				tri G21+		Dq/Gq Trans.		Total								
				M	F	M	F		M	F	M	F	M	F		
I Newborns/ Children	85	63	148	24	24	2	1	51	1	1	1	2	0	4	4	64
II Adults	7	13	20	0	0	0	0	0	0	1	0	0	0	0	0	1
Total			168													65

*M denotes males, F denotes females

and is present in at least 1/3 of those surveyed in the two retarded schools.

An interesting translocation Dq/Gq Down's syndrome affected family was encountered (Fig. 1). The mother was a balanced carrier of the translocation (2n = 45). Of her five children, three were balanced heterozygote carriers and look phenotypically normal and two, a boy and a girl were translocation mongols (2n = 46). The father was not available for study. The mother's age was between 25–34 years at the birth of all her affected children and agree with a lower average age group for mothers of familial mongolism generally associated with translocation. There were no normal karyotype children. The two translocation mongol children were clinically indistinguishable from standard trisomy 21 mongols. Unfortunately, we were unable to obtain the maternal grandparents for study and are therefore unable to ascertain as to whether the translocation was sporadic in the mother or was inherited from one of her parents.

Down's syndrome due to Dq/Gq Robertsonian translocation involving chromosomes of the D and G groups were first described by Polani *et al.* (1960), familial transmission was later described in a similar case by Penrose *et al.* (1960). Theoretically, in the absence of selection, equal numbers of normal, carriers and Down's syndrome individuals can be expected in offsprings of both male and female heterozygous carriers. Hamerton (1970, 1971) in pooled family data estimated in maternal transmission, a 10% chance of an infant with Down's syndrome being produced. With the father as a heterozygous carrier however, there is a marked decrease in the risk of producing an affected child (about 5%) and there appears to be more heterozygous carriers produced. Hamerton suggested that this difference could be due to selection against unbalanced sperms or a different segregation pattern with a possibly higher adjacent segregation in oogenesis compared to spermatogenesis or a differential lethality of unbalanced zygotes.

The practical importance of such a translocation family is to caution and explain to potential parents about the risks involved. In the present family studied the mother was warned against having further children and was told that her three phenotypically normal carrier children are all potentially able to transmit the translocation to future genera-

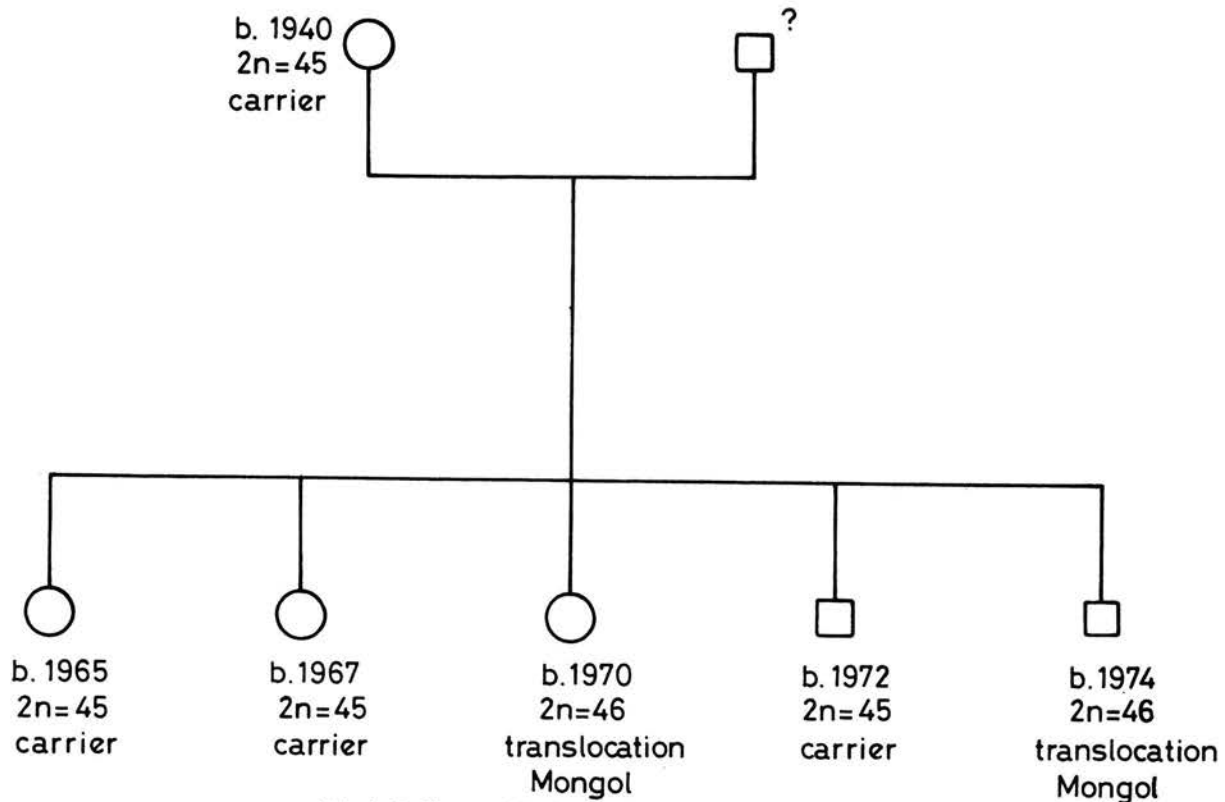

Fig. 1 Pedigree of Dq/Gq translocation affected family

tions. A single Dq/Gq index patient was also found but no follow up family study was available.

In our Down's syndrome samples, there appears to be equal numbers affected in both sexes and no sex bias is to be expected.

3 trisomy D13+ cases were karyotyped (Patau's syndrome) and no Dq/Gq translocations were observed (Table 1). Incidence at birth is about 1 per 5000 births (Hamerton, 1971). The syndrome first described by Patau *et al.* (1960) as very severe congenital malformations incompatible with prolonged life. The 3 cases studied did not survive long after birth. Like trisomy E18+ Edwards' syndrome, with severe congenital abnormalities, a failure to thrive and a short life expectation is to be expected. Incidence figures of trisomy E18+ described by Edwards (1960) are quite similar to Patau's syndrome. We detected 4 trisomy E18+ females. There seems to be a maternal age effect like Patau's syndrome but less pronounced than Down's syndrome. More females with trisomy E18+ have been reported and this is due to a greater male fatality rate in the first few weeks of life (Weber, 1967). Maternal age dependend nondisjunction primarily accounts for these standard D, E and G trisomies.

We have 4 XO, Turner's syndrome cases, the other chief sex chromosome aneuploidy, XXY, Klinefelter's syndrome was absent. It has been estimated that there's an incidence rate of 1 in 2500 female births with Turner's syndrome, (Maclean *et al.,* 1964, Mikamo, 1968) and has been frequently observed in abortuses (Carr, 1965; 1972). Maternal age is not increased.

An attempt was made to culture fibroblast cells from spontaneous abortuses material. Unfortunately, most of the specimens collected were products of conception, mainly placental tissue too macerated for culture. 8 foetuses (fit for culture) arrived in the laboratory. There were 5 successful cultures, however two mishaps at the final stage or removing the monolayer of cells from the glass surface resulted in the cells lost. Out of the three typable karyotypes, two were normal and one was an XO/XX mosaic. The usually accepted explanation for XO/XX mosaicism is loss of an X chromosome during cleavage in the early embryo. The frequency of chromosomally abnormal abortuses is about 20% (Hamerton, 1971) with the most frequent type of abnormality being trisomy, followed by triploidy, 45 XO aneuploidy is the most common single type found.

The above study gives an insight to the extent and variation of 'chromosomal syndromes' present in Kuala Lumpur at the time. The importance of coordination in such work is to be stressed. It is hoped that the above study would lay the groundwork for future such studies locally.

SUMMARY

233 individuals were analysed for a cytogenetic evaluation of some marked congenital abomalies and mental retardation. 65 abnormal karyotypes were detected. These include 48 cases of standard trisomy G21+ Down's syndrome, 3 cases of Dq/Gq translocation Down's syndrome, 3 cases of trisomy D13+ Patau's syndrome, 4 cases of trisomy E18+ Edwards' syndrome and 4 cases of XO, Turner's syndrome, 3 phenotypically normal, balanced Dq/Gq translocation heterozygotes were observed in one family. An attempt to initiate fibroblast cultures from spontaneous abortuses material provided 3 successful karyotypes, 2 normal and an XO/XX mosaic. This study provides us with an insight to the extent of 'chromosomal syndromes' present and is an useful groundwork for future such studies locally.

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PARASITIC DISEASE AMONG FISHERMEN LIVING ON PENANG ISLAND I. HELMINTHIASES

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INTRODUCTION

One of the problems associated with rural health in Malaysia is the problem of parasitic diseases. This includes both protozoan and helminthic infection which has undoubtedly a great bearing on the health and socio-economic level of rural people.

A few studies have been reported on the prevalence of parasitic infections in Malaysia and the neighbouring countries. In some of these countries, the climatic conditions are nearly similar but there are variations in the pattern of the distribution of the parasitic infections. These variations are probably caused by migrations of populations of various ethnic groups having different living habits and variations in the susceptibility to helminthic infections (S. M. Khan and Khairul Anuar A., 1977).

Ascaris lumbricoides, Trichuris trichura and Hook worm are the most important soil transmitted helminths in man in Southeast Asia (Cross *et al.,* 1970; Bisseru and Abdul Aziz Ahmad, 1970; Clarke *et al.,* 1973; Barclay, 1966; Joeco *et al.,* 1973). The pattern of prevalence of these helminths is somewhat different in Malaysia in that *Trichuris trichura* is the most common followed by *Ascaris lumbricoides* and Hook worm infections (Ow Yong, 1971).

Yap *et al.* (1968) reported on the prevalence of malaria and filariasis in Pulau Pinang and Pulau Perhentian Kecil off the east coast of West Malaysia. Dunn, (1972) made a critical study of intestinal parasitism in the aboriginal ethnic minority group, both on protozoa and helminthes.

In Malaysia, parasitic infections, especially gastro intestinal infections, still play a major role in causing ill health among the rural populations (S. M. Khan and Khairul Anuar A., 1977). Recent studies carried out by the School of Biological Sciences have indicated that intestinal helminthic infections are still rampant (K. S. Dorkha, 1974). In further studying the prevalence of this infections, a study was conducted to determine the current status of parasitic infections among the fishermen living on the island of Penang.

Description of the area

Penang is an island close to the Peninsular Malaysia separated by the Straits of Malacca by a distance of three miles (Fig. 1). The island covers an area of 110 sq. miles with a population of 764,585.

There are no regular seasons although invariably there is more rain during the months of April to May and from August to November with a relative humidity of 65%. The temperature varies from place to place on the Island and generally falls around 78–85°F.

The area understudy is sandy being close to the sea. Vegetation consists of coconut plants, herbs and trees. Dwellings comprise attap houses with wooden walls. Sanitary conditions are not satisfactory. Disposal of human faeces is carried out by the old bucket system. Indescriminate defication around the houses if quite common.

* This study was supported by Short-Term Research Grand USM to the School of Biological Sciences, Universiti Sains Malaysia, Penag.

Flies flourish well and act as carriers of a variety of disease organisms including protozoan and helminthic ova.

The villages understudy are situated on coastal areas: Teluk Bahang, Batu Ferringhi, Pantai Jerejak, Batu Maung, Gertak Sanggul, Teluk Kumbar and Balik Pulau (Fig. 1).

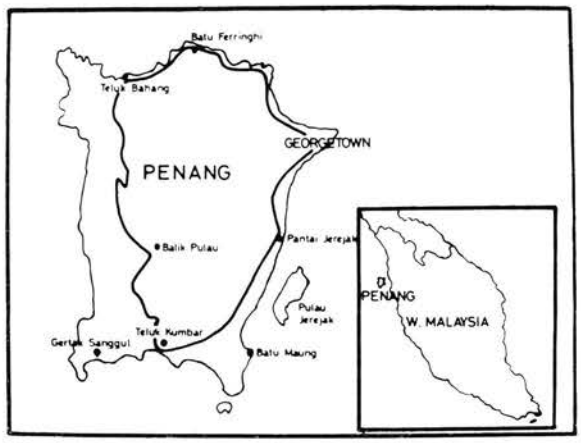

Figure 1: Showing the villages on Penang Island where the investigation was carried out.

MATERIALS AND METHODS

Samples of blood and faeces were collected over the period of one year beginning in August 1976 to December 1977. These samples were collected from a number of people not by households but at random from volunteers. Finger prick blood samples of thick and thin smear were obtained from volunteers. The blood films were allowed to dry overnight but in the case of thin smear it was fixed in methanol before it was stained with dulited Giemsa (1 drop to 3 ml of phosphate buffer) at pH 7.2 for one hour. When dried the stained films were stored in slide boxes for microscopical examination later in the laboratory (this will be reported elsewhere).

At the time when blood was taken faecal bottles were also distributed for faecal collection the following morning. The name, age, sex and ethnic group to which each person belonged was also noted. Examination of helminth eggs was made by direct smear and negative specimens were reconfirmed by using the zinc sulphate centrifugal floatation method (Faust *et al.*, 1939). In order to determine the intensity of helminthic infection specimens positive were then preserved in thiomersal-iodine-formol (TIF). Th especimens were later examined by the TIF direct smear technique (TIF-DS) (Dunn, 1968).

Sasa's modified Harada muri cultures were also set up for the differential diagnosis of hookworm larvae and strongyloides larvae (Sasa *et al.*, 1965).

Egg counts were made from TIF-DS under 22 × 22 mm cover slip and values were graded as very light (1–2 eggs/3 gm smear), light (3–19 eggs/3 gm smear). Moderate (20–79 eggs/gm smear), heavy (80 or more eggs/3 gm smear) using the modified scale of Dunn (1972).

RESULTS

Faecal samples of a total of 433 fishermen, 210 males and 223 females were examined. Out of the 433, there were 303 Malays and 130 Chinese.

The species of helminths found in all villages are *Ascaris lumbricoides, Trichuris trichura,* Hookworm, *Strongyloides, Enterobius* and Tapeworm. Table I summarize our finding in different fishermen villages on Penang Island. In all the villages examined *Ascaris lumbricoides* appear to be the most commonly occurring parasite, the next being *Trichuris trichura.* Surprisingly hookworm infection is relatively low.

Table I
Helminthic infections in the various fishermen villages on Penang Island

Village	No. examined	No. positive	Percent positive	*Ascaris*	*Trichuris*	Hookworm	*Strongyloides*	Tapeworm
Teluk Bahang	163	119	73.01	99(60.74)	77(47.23)	17(10.43)	4(2.45)	1(0.61)
Pantai Jerejak	41	22	53.66	20(48.78)	10(24.39)	1(2.44)	1(2.44)	0(0.00)
Teluk Kumbar	127	113	88.98	99(77.95)	80(62.99)	14(11.02)	0(0.00)	0(0.00)
Gertak Sanggul	20	12	60.00	10(50.00)	9(45.05)	2(10.00)	0(0.00)	0(0.00)
Batu Maung	37	36	97.30	28(75.68)	35(94.59)	1(2.00)	0(0.00)	0(0.00)
Balik Pulau	25	25	100.00	24(96.00)	25(100.00)	17(68.00)	0(0.00)	0(0.00)
Batu Ferringhi	20	12	60.00	11(55.00)	4(20.00)	1(5.00)	0(0.00)	0(0.00)

The overall prevalence of *Ascaris lumbricoides* (67.21%), *Trichuris trichura* (55.45%), Hookworm (12.24%), *Strongyloides* (1.15%), *Enterobius* and Tapeworm (0.23%) for the fishermen community as well as different ethnic groups is summarised in Table II and III.

Table IV gives the prevalence of *Ascaris, Trichuris* and Hookworm infections among the different ethnic groups. *Ascaris lumbricoides* is higher among the females than the males in both the races, while for *Trichuris* Malay females and Chinese males have higher infections. *Trichuris* is highly prevalent among the Malays, the percentage for males and females being 32.01% and 34.32% respectively.

The percentage prevalence of *Ascaris, Trichuris,* Hookworm and other helminths among different age groups with multiple infections is summarised in Table V. Age group 1–10 and 11–20 had very high prevalence of *Ascaris, Trichuris* infections. Then the prevalence rate declined with age. Table VI provides worm burden data of value in assessing the public health importance of principal soil-transmitted helminths in Malaysian fishermen living on Penang Island.

Other parasites found included occasional *Enterobius vermicularis,* but the infection rate for this parasite was not known and techniques used were not suitable to detect the eggs. *Strongyloides* were also found in a small number of people. There was one incidence of Tapeworm which was later identified as *Hymenolepis diminuta.* Hookworm infections were all by *Necator americanus.* The

Table II

Overall rate of Helminthic infections among Malay and Chinese fishermen examined on Penang Island

Ethnic group	No. examined	Positive		Total percentage
		No.	%	
Malays	303	270	89.11	79.65
Chinese	130	69	53.10	20.35
Total	433	339	78.29	100.00

Table III

Infection rate of *Ascaris lumbricoides*, Hookworm and *Trichuris trichura, Strongyloides* and Tapeworm among Malay and Chinese fishermen on Penang Island

Ethnic group	No. examined	*Ascaris*		Hookworm		*Trichuris*		*Strongyloides*		Tapeworm	
		No.	%	No.	%	No.	%	No.	%	No.	%
Malays	303	234	77.23	46	15.18	201	66.34	2	0.66	1	0.33
Chinese	130	57	43.84	7	5.38	39	30.00	3	2.30	0	0.00
Overall	433	291	67.21	53	12.24	240	55.43	5	1.15	1	0.23

The infection rate among the Malays is significantly higher than that among Chinese ($P<0.001$ by Chi-square test).

Table IV

Infection rate of *Ascaris*, Hookworm, *Strongyloides, Trichuris trichura* and Tapeworm among different sexes of Chinese and Malay fishermen examined on Penang Island

Ethnic group	Sex	*Ascaris*	Hookworm	*Trichuris*	*Strongyloides*	Tapeworm	Total
Malays	M	114(37.62)	24(7.92)	97(32.01)	1(0.33)	0(0.00)	129(42.50)
	F	120(39.60)	22(7.26)	104(34.42)	1(0.33)	1(0.33)	141(46.53)
Chinese	M	25(19.23)	3(2.30)	23(16.15)	1(0.77)	0(0.00)	29(22.31)
	F	32(24.62)	4(3.07)	18(13.85)	2(1.54)	0(0.00)	40(30.77)

N.B.: Number in parenthesis indicates the percentage.

The infection rate of *Ascaris* is significantly higher than of *Trichuris* or that of hookworm ($P<0.005$ by Chi-square test). The infection rate of *Ascaris* is significantly higher among the females than that among males ($P<0.005$ by Chi-square test).

Table V

Percentage prevalence of *Ascaris*, Hookworm, *Trichuris, Strongyloides*, tapeworm among different age group and Multiple infections among fishermen licing on Penang Island

Age group	No. examined	*Ascaris*	*Trichuris*	Hookworm	*Strongyloides*	Tapeworm	Multiple infections		
							Single	Double	Triple
1 – 10	136	104(76.47)	90(66.18)	13(9.56)	0(0.00)	0(0.00)	38(27.94)	65(47.80)	12(8.82)
11 – 20	104	81(77.88)	62(59.62)	13(12.50)	3(2.88)	0(0.00)	49(47.12)	29(27.80)	11(10.58)
21 – 30	50	31(62.00)	22(44.00)	6(12.00)	1(2.00)	0(0.00)	16(32.00)	17(34.00)	3(6.00)
31 – 40	49	25(51.02)	20(40.82)	7(14.29)	0(0.00)	1(2.04)	19(38.78)	11(22.45)	4(8.16)
41 – 50	47	25(53.19)	23(48.94)	10(21.28)	0(0.00)	0(0.00)	8(17.02)	16(34.04)	5(10.63)
51 – 60	36	19(52.78)	16(44.44)	2(5.56)	0(0.00)	0(0.00)	8(22.22)	9(25.00)	3(8.33)
61 – 70	9	5(55.56)	6(66.67)	2(22.22)	0(0.00)	0(0.00)	2(22.22)	2(22.22)	1(11.11)
71 – 80	1	1(100.00)	1(100.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	1(100.00)	0(0.00)
80 or more	1	0(0.00)	0(0.00)	0(0.00)	1(100.00)	0(0.00)	1(100.00)	0(0.00)	0(0.00)
Total	433	291(67.20)	242(55.03)	53(12.24)	5(1.15)	1(0.23)	141(32.56)	150(34.64)	39(9.01)

* Numbers in Parenthesis indicate the percentage.

differential diagnosis of the Hookworm was done through the Harada-Mori culture.

Table VI

Intensity of Helminthic infection among fishermen living on Penang Island

Major Helminths	433 persons	
	No. Infected	% Infection
Ascaris lumbricoides	291	67.20
†[a]	17	(5.84)[b]
††	112	(38.48)
†††	85	(29.22)
††††	77	(26.46)
Trichuris trichura	240	55.43
†	57	(23.75)
††	136	(56.67)
†††	32	(13.33)
††††	15	(6.25)
Hookworm	53	12.24
†	25	(47.17)
††	28	(52.83)
†††	0	(0.00)
††††	0	(0.00)
Persons negative for all helminths	94	21.71

a = worm burden scores based on direct smear egg counts; † = very light; †† = light; ††† = moderate; †††† = heavy infections.

b = figures in parenthesis show percentage of infected persons at each level of worm burden.

DISCUSSION

Several parasites show differing rates of prevalence in various villages surveyed. Teluk Bahang fishermen village is divided into two areas. One half occupied by Chinese and is called the Teluk Bahang New Village while the other part is left to the Malays. The conditions in the New village is fairly good and closer to the sea. The houses are well built and sanitary conditions can be considered good. In this area the relative prevalence of parasites is generally low for the new village while the other part with Malay population had had sanitary conditions and very high prevalence rate of parasitic infections.

Teluk Kumbar, Batu Maung, Gertak Sanggul and Balik Pulau have similar conditions. The prevalence rate of parasites in these areas almost nearly the same.

The prevalence rate of *Ascaris lumbricoides* in adults were lower than in children. The prevalence rate for *A. lumbricoides, Trichuris trichura* and hookworm were lower among Chinese than among the Malays. This findings are supported by earlier workers (Russel, 1934; Schacher and Danaraj, 1960; Lie, K. J., 1964; S. M. Khan and Khairul Anuar A., 1977). However Lie *et al.,* found that the rates were higher among communities associated with farming using night soil fertilizers. *Trichuris trichura* was prevalent in all age groups. The prevalence is second highest only next to *A. lumbricoides*. Results of examination of 1,357 faecal specimens conducted by the ICNND (1964) in West Malaysia, however, suggested that *T. trichura* to be the most common parasitic infection found, an overall rate of 88.7% was reported for all races surveyed. Figures provided by other researchers like Russel (1934), Lie (1964) and Hyneman *et al.* (1967) concur with this survey.

The fishermen population reveals a very low infection of *Necator americanus*. However, the prevalence was found to be higher among the Malays (15.18%) compared to the Chinese (5.38%). The overall prevalence of *Necator americanus* was 12.24%. Higher rates were found by Russel (1934) and more recently the ICNND (1964). There was no difference in infection rates between the males and females for the different races. Unfortunately there is no information in Malaysia correlating hookworm infections and the physical features of the area, the properties of the soil, land usage, the proportion of people using foot-wear and the predation which the hookworm may suffer. In this particular case where the fishermen have very low infection rate of hookworm could be due to the particular location of the area itself. The coastal areas are sandy, very porous, dry and exposed to direct sunlight. As such this area is generally unfavourable for the survival of the parasites. Similar results were also obtained in areas of some remote islands off the east coast of Malay Peninsular where the figures provided by Hyneman *et al.* (1967) and Balasingam *et al.* (1969) indicate the prevalence to be very low.

Among the single infections, *Ascaris* infections was most commonly encountered in all age groups. *Trichuris* was the next commonly encountered in all age groups. Among mixed infections, the commonest combinations of helminths in all age groups was mixed *Ascaris* and *Trichuris* infections usually with *Ascaris* as the predominant parasite. Thus

Ascaris appear to be tne most frequently encountered helminth in this survey.

The youngest child with *Ascaris* infection was 6 months old while for *Trichuris* it was 5 months old. It appears that the intensity of infection is more influenced by the habits and repeated infection rather than age. 26.46% of the population harbouring *A. lumbricoides* showed heavy infections and 29.22% with moderate infection. It is vital to remember that the intensity is only of public health importance and that the presence of a single worm can be a threat to the life of a person. From this survey it is also clear that *T. trichura* does not pose a threat since only 6.25% had heavy infections while hookworm infection was light. The prevalence of *Strongyloides* is 1.15% and the results show that the 11–20 year old are more infected than other age groups. Cestode infections are extremely low in Malaysia, though sporadic cases have been reported among the aborigins in Malaysia (Sandosham, 1953). In the present survey one case of cestode infection which was later identified as *Hymenolepis diminuta*. This infection was probably contracted through the usage of the intermediate host, *Tribolium confusum* in Medication. *Hymenolepis diminuta* is basically a parasite of the rats and is highly frequent among the feral rats in Malaysia (Leong, T. S. Personal communication).

The study also revealed a considerable amount of differences in the degree of infections among the different ethnic groups. The reason could be due to some inherent differences in habits and personal hygiene and other socio-economic conditions among them. Most of the Chinese fishermen lived in good houses and clean environment; in Weld Quay areas they lived in houses built on the sea. The Malays lived in Kampungs where the toilets are mainly of the pit latrine type and indiscriminate defication is also common.

A goodness of fit test showed the proportion of infections to be significantly different from that predicted by a binomial ($P>0.001$ by Chi-square test). The infections of the three types of worms are not randomly distributed. There is a greater number of people with zero and with triple infections than would be expected to occur by random. This points out that there is some external factor which influences the rate of infection. The factors could be sanitary status, mode of disposal of faecal materials, housing, mobility of the fishermen population etc.

In the context of Malaysia's socio-economic development, greater emphasis should be placed on rural health and environmental sanitation in the development programmes. Basic health education, the proper training in sanitary and hygiene habits, treatment of infected person and mass treatment may to an extend help eradicate parasitic diseases in rural population.

SUMMARY

An investigation into the helminth parasites of fishermen population revealed high infection rates for *Ascaris lumbricoides, Trichuris trichura* and *Necator americanus*. The prevalence rates were *Ascaris lumbricoides* 67.21, *Trichuris trichura* 55.43, *Necator americanus* 12.24, *Strongyloides* 1.15 and *Hymenolepis diminuta* 0.23. The Malay fishermen had higher infection rate compared to the Chinese fishermen.

The prevalence of *Ascaris lumbricoides* and *Trichuris trichura* was highest in 1–20 age group and then the infection rate declined with increasing age. *Ascaris* is highest among the females but for *Trichuris* the Malay female and Chinese male had higher infection. Also here is probably the first case report of *Hymenolepis diminuta* in adult female Malay women in the Peninsular Malaysia.

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OBSERVATION ON THE HELMINTHS IN SOME ECONOMICALLY IMPORTANT MARINE FISH IN PULAU PINANG

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INTRODUCTION

FISH is the cheapest protein available to a large proportion of the population in many parts of the world, including Malaysia. In many countries, such as Japan, Russia and Taiwan, a fairly large number of people are infected with parasites transmitted through eating raw, half cooked and/or contaminated fish.

Three types of diseases transmitted from fish to man are well-known. They are Clonorchiasis, Diphyllobothriasis and anisikiasis. Clonorchiasis is a disease of the liver, caused by a trematode, *Clonorchis sinensis* (Cobbold, 1875). At least eighty species of fish belonging to ten families, but primarily the Cyprinidae, have been reported to be suitable second intermediate host (Komiya, 1966). This disease is fairly widespread in humans, especially in China, Japan, Korea, Vietnam, parts of India, Singapore and Malaysia (Bisseru and Lim, 1969).

Diphyllobothriasis is caused by a cestode, *Dibothriocephalus Diphyllobothrium) latum* (Linnaeus, 1758), living in the intestine of man. This disease is found mainly in temperate countries, especially those bordering the arctic region such as Russia, Norway and the northern region of Canada. In North America, the normal host is probably the brown bear.

Anisakiasis is also found mainly in temperate countries and is caused by a group of nematodes belonging to the family Anisakidae. The normal definitive hosts of *Anisakis* are marine mammals, such as dolphins. However, larvae are able to survive for a shortwhile and are suspected to be a causative agent of eosinophilic granuloma in the gastro-intestinal tract.

Because of the high incidence of anisakine nematgdes in some food fish in other parts of the world (Cannon, 1977a, b; Oshima, 1972; Young, 1972), a survey was initiated to determine if marine food fish sold in fish markets in Pulau Pinang were infected with this group of parasites. In addition, other parasites which may also be potentially infective to humans or harmful to the fish hosts were examined.

MATERIALS AND METHODS

All the fish examined for parasites were obtained from the Pulau Tikus Fish Market, Pulau Pinang. Each fish was weighed, sexed and the fork length were measured. The external surfaces were examined microscopically for ectoparasites. Gills and Viscera were removed and immediately examined for parasites using standard procedures.

Copepods were killed in warm 70% alcohol and nematodes were relaxed and killed in glacial acetic acid. Both were preserved in 5% glycerine alcohol. Trematodes, cestodes and acanthocephalans were relaxed, killed in water and preserved in acetic acid-formalin-alcohol (AFA).

RESULTS

A total of 104 fish belonging to 12 species in 6 families were examined for parasites. All the fish examined were infected with one or more type of parasites (Table 1). Ikan merah, *Latjunus malabaricus* and all three species of ikan kerapu, *Cephalopholsis miniatus, Epinephelus areolatus* and *Epinephelus tavina* had a high intensity of infection.

Table 1

The prevalence (in %) and mean intensity (in parentheses) of major groups of helminths in some marine fish in Pulau Pinang.

Hosts	Copepods	Monogenea	Trematodes	Nematodes	Cestodes	Acantho-cephalan	Overall infection
Family Carangidae							
Megalaspis cordyla (Ikan cincaru; 10)	40(1)	90(3.1)	100(16.5)	90(3.1)	30(4.7)	0	100(23.9)
Selar crumenophthalmus (Ikan selar; 17)	47(1.4)	47(3.5)	88(6.3)	88(15.7)	71(25.5)	12(2.0)	100(39.8)
Family Lutianidae							
Latjunus johni (Ikan merah; 4)	50(2.0)	50(18.5)	25(4.0)	50(1.0)	0	0	100(11.8)
Latjunus malabaricus (Ikan merah;7)	100(125.9)	57(8.8)	29(1.0)	100(165.1)	0	0	100(291.1)
Latjunus russelli (Ikan tanda; 3)	67(5.5)	67(3.0)	67(13.0)	100(7.0)	33(1.0)	0	100(21.7)
Family Mugilidae							
Liza subviridis (Ikan belanak; 21)	19.1(1)	90.5(6.5)	23.8(1.4)	4.8(1.0)	0	0	100(6.5)
Family Scombridae							
Rastrelliger kanagurta (Ikan kembong; 16)	6.3(2.0)	6.3(1.0)	100(19.8)	100(6.3)	2.5(1.8)	0	100(26.7)
Family Serranidae							
Cephalopholis miniatus (Ikan kerapu; 2)	100(10)	100(3.5)	100(22)	100(47)	50(2.0)	0	100(115.5)
Epinephelus areolatus (Ikan kerapu; 3)	100(11.3)	100(34)	100(126)	100(13.3)	0	0	100(184.7)
Epinephelus tavina (Ikan kerapu; 7)	85.7(1.5)	100(104.9)	100(39.7)	14.3(2)	14.3(1)	0	100(147.0)
Family Stromateidae							
Formio niger (Ikan bawal hitam; 14)	86(3.1)	71(2.2)	93(33.9)	79(6.6)	7(2.0)	7(1.0)	100(41.1)
Pampus chinensis (Ikan bawal puteh; 10)	80(6.1)	80(1.6)	100(59.8)	10(2)	50(6.8)	0	100(69.6)

The most common parasitic groups recovered were monogenea, trematodes, nematodes and copepods. Monogenea were most abundant in ikan kerapu *Epinephalus tavina* (mean intensity of infection, 104.9, Table 1); trematodes in ikan kerapu *Epinephalus areolatus* (126); nematodes in ikan merah, *Latjunus malabaricus* (165.1) and copepods in *Latjunus malabaricus* (125.9).

DISCUSSION

Although the fish examined were heavily infected with parasites, most of the parasites found are probably non-infective to human beings if the fish is properly cooked before consumption.

The high intensity of parasites in the infested fish may cause the death of fish although there is no direct proof of mortality caused by parasites. However, indirect effects such as inferior growth poor swimming performance or aberrant behaviour due to large parasite loads may increase host susceptibility to death from other causes (Smith, 1973; Smith and Margolis, 1970). Further, the high intensities of monogenea in ikan kerapu and copepods in ikan merah should be a concern for aquaculturists. Monogenea are a frequent cause of high mortality, especially among fry and fingerlings in aquaculture (Paperna, 1960).

However, the high intensity of nematodes in the coelom of some fishes (ikan merah and ikan kerapu) examined is of some concern. This is fairly significant because ikan kerapu is an important food fish. The Chinese prefer to eat this fish just lightly cooked. As a result of this, some of the nematodes in the flesh of the infected fish may not be killed and

could be a potential source of human infection. Preliminary observations revealed that the nematodes from the coelom of these fishes belonged to the family Anisakidae, tentatively three genera have been identified, namely, *Anisakis, Contracaecum* and *Porrocaecum*.

The family Anisakidae is a member of the suborder Ascarideria. The adult worms of the family are found in all classes of vertebrates. The life cycles are indirect involving a stage in a crustacean and one or two intermediate hosts such as various types of fish and squid. Species of public health importance normally develop to adulthood in the stomach of dolphins. However, man can become accidentally infected through consuming the larvae in one of the intermediate hosts.

The larval stages of anisakine nematodes have been recognised since the late 17th century. The first severe human case of *anisakiasis* was reported in 1960 (Van Thiel *et al.,* 1960), although it was detected (not reported) by Dr. Straub in 1955 in Netherlands. Since then, there has been a renewed interest in anisakine nematodes as a potential human health hazard. In countries like Japan, Norway and Russia, whose populations prefer to eat raw fish, cases of human anisakiasis have frequently been reported.

Studies have shown that the longer the infected fish is kept before consumption, the greater is the risk of acquiring an infection. Hauck (1977) showed that parasite loads were statistically largest in the flesh of frozen, brined and smoked Pacific herring *(Clupea harengers pallasi)* from Yaquina Bay, Oregon, U.S.A., whereas flesh of fresh herring had a lighter parasite load. This is due to migration of the larvae from the coelom to the musculature. It appears that the time interval between the fish being caught and human consumption could be an important factor in the chance of infection. This problem should be carefully examined in this country since several days may lapse between catch and consumption.

There is a lack of awareness regarding the possibility of anisakiasis in this country and in the region. The clinical symptoms are usually of short duration and often have been diagnosed as gastric disturbances of some kind. However, a deeper study of immunological aspects of the infection could result in the immuno-diagnosis of the disease. This could make anisakiasis more readily detectable in the future.

SUMMARY

A total of 104 marine fish were examined for parasites. Ikan merah, *Latjunus malabaricus* and ikan kerapu, *Cephalopholsis miniatus, Epinephelus areolatus* and *Epinephalus tavina* had a high intensity of infection. Monogenea were most abundant in ikan kerapu *Epinephalus tavina;* trematodes in ikan kerapu *Epinephelus areolatus;* nematodes in ikan merah *Latjunus malabaricus* and copepods in *Latjunus malabaricus*. The high intensity of infection was discussed with regard to aquaculture and public health hazard, especially the presence of anisakine nematodes.

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AN EXPERIENCE WITH THE ACCREDITATION OF PRIVATE LABORATORIES

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INTRODUCTION:

THERE ARE a number of private laboratories in various towns in Malaysia which perform biomedical tests. There has been no restriction on their establishment and no official effort to place them under surveillance to ensure the quality of their work. This situation was rectified to a small and limited extent when the Ministry of Health introduced its "Code of Practice for the exportation of Cooked Frozen Prawns" in 1974. Under this code, batches of cooked frozen prawns would be cleared for export only if they were covered by a satisfactory bacteriological report from an accredited laboratory. Initially only Government laboratories were recognised but in view of the big work load anticipated it was decided to allow private laboratories to perform this work provided that they had passed through a stringent accreditation procedure applied by a special committee on Accreditation of private laboratories for the examination of cooked frozen prawns. This committee comprised of representatives from the Ministry of Health, The Institute for Medical Research, The Chemistry Department and MARDI, with the senior author as chairman of the committee. While the work of this committee was restricted to overseering the laboratories with respect solely to the examination of cooked frozen prawns, the experiences gathered and lessons learnt could be of value in gauging the overall standards of private laboratories in this country and the possible role that government agencies could play in ensuring their quality. This paper sums up those experiences.

ACCREDITATION PROCESS:

Laboratories desiring accreditation are requested to apply formally to the Ministry of Health. On receipt of such applications the Accreditation Committee arranges for a suitable period during which members could make an on-site visit and carry out the protocol for accreditation which is described in detail elsewhere (Jegathesan, 1977). The applicant laboratory should satisfy the following conditions:-

Physical Facilities:

There should be reasonably adequate laboratory space which should be well lit and well ventilated (or air-conditioned) and should be partitioned off or be separate from other testing or administrative areas of the laboratory. There should be sufficient supply of electricity, gas, water, washing facilities and bench space. The tops of the latter must be covered by a material that is non-porous and should be easily disinfected. There should be adequate storage space for glassware, chemicals and reagents and perishable material must be stored at refrigerator temperature. Adequate precaution must be taken at all times to prevent the spread of pathogenic organisms from specimens to laboratory personnel. All material used for work should be adequately sterilised before washing or discarding and contaminated glassware should be placed in a chemical disinfectant immediately after use and prior to cleaning and sterilisation. Contaminated material must be properly disposed of.

Equipment:

The laboratory should have the following equipment maintained in good working order. Autoclave, freezer, hot air oven, refrigerator, incubator, glassware, water bath, weighing balance,

homogeniser, colony counter, microscope and pH meter.

Personnel:

Testing staff should be adequately qualified. A minimal academic qualification would be a Diploma or Bachelor of Science degree in Microbiology, Food Technology or a related subject from a reputable institution and the candidate should have had adequate practical experience in food microbiology. The candidate should be found to have satisfactory working knowledge on all aspects related to food microbiology and bacterial enteropathogens and should be able to recognise and solve any unusual problem which may arise. Preferably there should be at least one technical helper whose experience and knowledge should be commensurate with the work on which he is engaged.

Methodology:

The Committee does not insist that any particular method be followed provided that the method employed by the laboratory is an acceptable and recognised one. The method employed should bear reference to published works and be thorough in every step of the analysis. The method should be typed out neatly and made readily available to working staff at the bench and should cover every step of the procedure including the preparation of media. A copy should be submitted to the committee with the application for accreditation. The laboratory should have at least minimal reference texts applicable to the tests performed.

Materials:

The laboratory should have available all media, chemicals and reagents necessary to follow the method. The laboratory should show evidence of sources of ready supply for these materials which should be bought from a reliable source and should be made up according to the manufacturer's instructions.

Quality Control:

The laboratory should employ some basic quality control measures such as the keeping of stock cultures to test the efficacy of media in supporting growth or in showing differential reactions; to test reactivity of biochemical tests; and staining reactions.

Test Sample:

The laboratory should satisfactorily perform a bacteriological analysis on a sample provided by the committee who will watch the entire procedure. Such samples may be doctored to contain certain enteropathogens so as to test the laboratory's capability in isolating and identifying them. This test normally takes about three days after which the laboratory is required to submit a formal report (typifying their usual report format) to the chairman of the committee.

During this examination the committee will look for:

(i) Sound bacteriological technique
(ii) Sterile procedures
(iii) Proper use and maintenance of equipment
(iv) Proper performance of the tests
(v) Suitable reporting and interpretation of results

ACCREDITATION:

If the laboratory satisfies all the requirements of the committee it will be awarded accreditation with the following conditions:

Accreditation is specifically only for the examination of cooked frozen prawns. Any notorisation used by the laboratory should state this quite clearly: "The laboratory is accredited by the Ministry of Health, Malaysia for the bacteriological examination of cooked frozen prawns." The accreditation does not cover other tests done by the laboratory.

The laboratory must notify the committee if there is any change in physical facilities, personnel, equipment and methodology and must obtain its approval of the committee. Depending on the change the committee reserves the right to withhold this approval until another site visit is made.

The committee reserves the right to make spot checks on the laboratory from time to time and whenever deemed necessary.

Accreditation is granted at the discretion of the committee and it may be withdrawn at any time should it be warranted.

RESULTS:

Four laboratories applied for accreditation during the period 1974–1976. All failed to satisfy the standards at the first examination. One did not reapply. One passed after a second examination while the remaining two did so after a third examination.

Of 4 new laboratories which applied in 1977, 3 passed at the first examination mainly because they were fully aware by now of the standards required of them. The other did not reapply.

Some of the shortcomings of the laboratories are tabled below. Figures in parenthesis indicate

the number of laboratories where a particular shortcoming was apparent until rectified.

A. *Physical facilities*
1. No separate room for microbiological work (2)
2. No sink or washing facilities in microbiology room (1)

B. *Equipment*
1. Insufficient glassware (2)
2. No autoclave/hot air oven (1)
3. Inadequate freezer space (2)
4. Inadequate supplies of media and reagents (2)

C. *Personnel*
1. No appropriately qualified microbiologist (4)
2. Insufficient knowledge leading to inability to detect pathogens (2)
3. Although there is a qualified microbiologist there was a lack of experience and working knowledge (1)
4. Inadequate preparation for the accreditation exercise (1)

D. *Methodology*
1. Not strictly following the methodology which was submitted by the laboratory itself (1)
2. Not performing coliform counts (1)
3. Homogenisation of sample is incomplete (2)
4. Colony counting plates not well dried (1)
5. Insufficient media added to plates (2)
6. Poor bacteriological technique (1)
7. No quality control of media (4)
8. Media not prepared and kept available in advance (1)
9. Improper diluent used (2)
10. Sample size too small (2)
11. Too few dilutions for colony counts (3)
12. Increments between dilutions is too wide (1)
13. Inability to perform biochemical tests and dependance on morphology alone for identification of pathogens (3)
14. No enrichment media used for isolation of pathogens (3)
15. Not enough duplicates for colony counts (3)

E. *Reporting*
1. Usage of the term "Health Certificate" instead of "Laboratory report" on reports issued by the laboratory (3)
2. Including in the report work that is not actually carried out (1)
3. Inclusion of a statement concerning "fitness for human consumption" when the limited tests carried out do not really justify such a blanket statement (4)
4. Insufficient sample identification on the report (2)

F. *Administrative*
1. Returning remaining portion of samples after testing to the requesting factory (3)

DISCUSSION:

Of 8 laboratories that applied for accreditation 6 eventually satisfied the standards expected. Two did not reapply after their initial unsuccessful attempt.

Of the 6 successful laboratories the 3 which had been in operation for some time before the implementation of the "Code of Practice", all failed in spite of the fact that they had been performing food bacteriology for quite a while. However until that time they were free to do what they liked and this first attempt at an accredition showed clearly that the standard of work that they performed was not satisfactory enough to warrant accreditation. This makes one wonder what the standard of unassessed laboratories are. It must be emphasised that the current accreditation exercise assessed the laboratory with regard to its microbiological expertise in general and the examination of cooked frozen prawns in particular. No attempt was made to look into other aspects of the laboratories' work which covered quite a wide range.

New laboratories which only applied recently had the benefit of knowing the requirements for accreditation and setting up their work on a proper footing from the very start. This is always much easier to do than to try to rectify well entrenched old practices among staff who are generally resistant to change. It was not surprising therefore to find that these new laboratories all satisfied the requirements without much difficulty.

In the initial year of the accreditation exercise none of the laboratories which applied had qualified microbiologists. The laboratories were essentially profit motivated and were reluctant to pay the relatively high salaries required by qualified personnel and considered that they could very well do with some school leavers who could be taught some simple basic techniques. What they failed to realise was that to carry out microbiological analyses one has to have sound theoretical and practical knowledge that can come only through years of systematic study. When this point was made clear to the laboratories concerned they sought qualified personnel and subsequently were able to produce a satisfactory quality of work. New laboratories, realising the unlikelihood of their gaining accreditation without qualified personnel, employed microbiologists from the very start and had little difficulty in successfully obtaining accreditation.

It is an accepted practice in many developed countries that there must be some form of surveillance over private laboratories. The legislation and mechanisms of these vary.

In Australia, for instance this function is served by the National Association of Testing Authorities (NATA) which is their organisation for the accreditation of testing laboratories. It registers laboratories which meets its standards of performance. NATA registered laboratories are authorised to issue NATA endorsed reports. NATA endorsed reports provide you with an assurance that the tests have been performed with care and competency. Every aspect of laboratory operation and management is kept under close surveillance by NATA. All registered laboratories are regularly visited by specialist assessors. Laboratories are registered for performance of specific groups of tests within a field of testing. NATA is an organisation made up of representatives from the laboratories themselves (NATA, 1966) and therefore represents a desire from within to ensure standards and maintain the good reputation of the laboratories.

In the United States, the College of American Pathologists started a voluntary programme of inspection and accreditation in the 1960's for pathology laboratories with the aim of promoting laboratory improvement. The programme is peer review in its ultimate sense and should be thought of as an educational experience for the laboratory concerned (Townsend, 1974). The accreditation is based on an inspection of the applicant laboratory to see if it complies with the "Standards for Accreditation of Medical Laboratories of the College" (Commission on Laboratory Inspection 1974). In carrying out the exercise the Inspector closely follows the "Inspector's Manual" (Carlson, 1975) and makes the necessary observations and recommendations. While this inspection and accreditation programme had been going on for some time the Federal Government of the United States passed the Clinical Laboratories Improvement Act of 1967 for licencing of clinical laboratories engaged in interstate commerce (Horn, 1974). A modification was written into the law which provided that any laboratory accredited by the Joint Commission on Accreditation of Hospitals, by the American Osteopathic Association or by the College of American Pathologist's Commission on Inspection and Accreditation would be exempt from the requirements of federal licensure. The Centre for Disease Control in Atlanta was given the responsibility to develop standards. This eventually led to the proliferation of state laboratory licensing laws. With each passing year congress and various state legislatures are enacting more and more laws which demand that laboratories meet certain standards. There are many agencies, both governmental and non-governmental that are setting standards and inspecting this or that activity within the laboratory.

The need to introduce some similar system in this country is quite apparent. The results shown from the experience with the accreditation of private laboratories for the examination of cooked frozen prawns indicate the surprisingly large number of shortcomings even in laboratories that had been functioning for some time and issuing reports on analysis. Inadequately qualified staff, poor technique, insufficient equipment, lack of quality control and bad reporting are the important ones. If any reliance is to be placed on reports issued by these laboratories, there must be assurance that there is a continuous monitoring of their quality by an independant unbiased authority. The successful implementation of the accreditation programme for cooked frozen prawn examination illustrates that high standards can be generated. It appears logical that similar programmes can be instituted to cover other aspects of these laboratories' testing facility. The question arises as to who would be given this task. It does not appear feasible at this stage to rely on a peer review system as carried out in Australia and the United States. Professional associations do not have the sufficient authority, manpower or financial resources to carry out such a task. The duty therefore appears to fall on the shoulders of government agencies such as the Ministry of Health or the Institute for Medical Research. The *modus operandi* of the Special Ministry of Health Committee on Accreditation of Laboratories for the examination of cooked frozen prawns can serve as a suitable model for a national system to cover all laboratories performing work in the medical area. A step by step programme can be implemented to gradually cover the different aspects of laboratory testing. The mechanics of carrying this out can be a subject of debate and discussion but the philosophy must be accepted to ensure that standards are established and maintained.

But it must be done, not by coercion but by friendly persuasion and an awakening of an awareness in the private laboratories themselves that inspection and accreditation is advantageous to them and will in the long run prove beneficial in enhancing their reputation.

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SUBJECTS

AUTHORS

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The Medical Journal of Malaysia welcomes articles on all aspects of medicine of interest in this Region in the form of original papers, research notes, communications and correspondence. The Journal also welcomes brief abstracts, of not more than 50 words, of original papers, published elsewhere, concerning medicine in Malaysia. Articles are accepted for publication on condition that they are contributed solely to the Medical Journal of Malaysia. Neither the editorial board nor the publishers accept responsibility for the views and statements of authors expressed in their contributions. To avoid delays in publication, authors are advised to adhere closely to the instructions given below.

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