My Student Elective

Malaria in New Guinea

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"With answers like that," said my consultant, "you should go far . . . the further the better."

It was in January 1982 that I flew into Madang, a little town on the north coast of Papua New Guinea. I was to spend my elective attached jointly to the Papua New Guinea Institute of Medical Research and the local base hospital in order to help the institute with their malaria research and to experience how a country of limited means runs a health service.

I realised I was a long way from home when I read the notice "*Lukaut long puk-puk*—beware of crocodiles." It was the rainy season, and the vegetation was lush and green. Palm trees laden with coconuts fluttered in a gentle breeze.

We drove through the town of only a few thousand inhabitants and out to the institute, passing many villages with small wooden houses on the way. They have no electricity or running water. The total population of New Guinea is three million, including many expatriates living as contract-workers and volunteers. Though the people speak over 700 languages the unifying language is Pidgin English, which is a highly simplified, phonetically spelt form of English. As there is only a limited vocabulary, the use of words is both idiomatic and uneconomical. For example, *bigpela* (big-fellow) means big, *lik-lik* means small. Middle-sized is *bigpela-liklik*.

The average day of the villager is spent looking after his allotment, from which he grows almost all of the family's food, going hunting (spears, bows), and helping fellow villagers to build and repair their houses. The women go to the market to sell some of the excess produce to enable them to buy clothes or paraffin for lamps.

Three-tiered health service

The health service is nationalised, and there are three tiers. The lowest level is that of the aid-post. This is staffed by someone with a minimum of training, with access to a few drugs, who is there to provide a first line to villagers. The next tier is the health centre, manned by someone with three years' paramedical training and armed with four manuals, which lay out in simple terms how to manage the majority of patients.

Written into the manuals are notes on warning signs to alert the user to the necessity for referral to the base hospital. There is one such hospital for each area. On the staff are doctors, usually from outside New Guinea, holding postgraduate specialist qualifications. The system works quite well, but is hampered by the fact that patients may well have a three-day

walk to the nearest centre. They need to be quite ill before undertaking it, and thus may not arrive.

I approached the hospital to find a big notice outside. "No Entry No Gat Rot" (fig 1). Self-diagnosis for patients? No, simply pidgin English (no got road). Wards were like big bicycle sheds without glass in the windows and bare concrete floors. The beds consisted of wooden blocks 18 inches (45 cm) from the floor. I was introduced to the surgeon. He was an Indian who had trained in India and had the fellowship from one of the British colleges. We went on a ward-round and saw a mixture of trauma and general surgery.

Even here there was no escape for my ignorance. He asked me the names of the three ligaments and three muscles attached to the acromion. There was one ward full of patients with vast tropical and mycobacterial ulcers. Five paraplegic patients were in a small ward, but with desperate understaffing and no physiotherapist in the hospital their prognosis was poor.

The nurses are very poorly trained. It is when basic nursing expertise is not available that you appreciate its importance. On one ward-round, we found a patient who had perforated some time before, on another, one who had been dead for several hours. The level of health education is also low. Women think nothing of a lump in the breast and present very late in the natural history of the carcinoma, quite the opposite to the concern adopted in Britain. Despite this the surgeon undertakes many operations. The theatres are well equipped and air-conditioned. Almost nothing is disposable. Hats, masks, packs, swabs, nailbrushes, all were washed, sterilised, and reused; of course, the labour costs are lower than here at home. There are basic x-ray facilities, and barium swallows and enemas can be performed, though there is no radiologist.

The laboratory can cross-match blood (98% of people are Rhesus positive) but is not as efficient in supporting the

FIG 1—No Entry No Gat Rot.

physicians. Many the form returned with "Sorry, no reagent." This somewhat hampered the physician who, though competent, spent most of the time just treating the tuberculosis.

There is also an ophthalmic surgeon. Again patients know nothing of "infection," and many present with a globe full of pus, leaving few therapeutic alternatives. So far as glass eyes go, they are all brown, and of one size. If too large then the patient with his eye is sent to the dentist who trims it down with his drill. But how do you test someone's eyes if they can't read? The solution is a set of cards with pictures of a hand, each of different size (fig 2). These are held in different directions, and the reader mimics the direction with his own hand. Refractory abnormalities are uncommon, and thus so are squints. The older patients do need glasses, however, and these are supplied free as donations from religious organisations. Boxes of ladies' cast-offs with bright flame-coloured and shaped frames are stacked in the corner of the consulting room. A man of 58 was delighted with such a pair.

There is an obstetrician, and more and more women come in for their deliveries as villagers have noted fewer deaths among those who go into hospital. In the village death in childbirth is still common.

FIG 2—Kit for testing the eyes of illiterate patients.

No lonely child syndrome

The paediatric ward was inhabited by 150 people, of which 46 were patients. They move in en famille and sleep on or around the hard beds. The lonely child syndrome doesn't exist here, and the medical students are not taught about it.

I saw one child with a severe hydrocephalus. The mother was told that nothing could be done. She understood, and accepted this completely. She did not grieve any the less for her child than a European mother, yet its death was far better accepted than it would have been here. The main priority was to have the child at home in the village surrounded by its family.

Each child has a health book (fig 3), which is retained by the mother, into which all relevant details about past admissions, immunisations, and referrals are kept. Notes are kept in English. At a glance you can see exactly what treatment a child has been having.

These health books were part of the focus for my research. The World Health Organisation had sent a detailed protocol and eight boxes of equipment for an experiment on a technique commonly used in malarial research. As New Guinea was one of the areas in which resistance to chloroquine was first described it was here that some of these tests were being carried out. I arrived in the outpatient department ready to diagnose malaria. This was not difficult, but I had to take a history in Pidgin.

FIG 3—Paediatric health book.

"Apinoon Mama, dispela pikinini em i bilong yu?" (Good afternoon, this (fellow) child, is he yours?) "Em sik, em skin hat, em kus, em hed pen, em traut?" (He sick, hot skin/fever, cough, head pain/ache, throw-out/vomit?)

Provided the mother showed some form of agreement with the suggestions, I could understand. But if she started to tell me about "the poor sweet-potato crop" then I got a bit out of my depth. Having confirmed a history compatible with malaria, I would check the health book for a surreptitious dose of chloroquine, which would invalidate my results. To assess the severity and type of infection I took a thick blood film. As a last check the protocol demanded that I test the urine for chloroquine.

Now you try getting a urine sample from a bashful 4-year-old. With my most charming voice, given the heat, and the decibels emanating from the bawling children of the paediatric outpatients, I pleaded, "Mipela laik liklik pis-pis long dispela botel, tasol." (Us people would like a little urine in this bottle, that's all.) She was not amused. Another patient lost to the trial? I was wondering how to tell Geneva that there was some delay because the little girls didn't want to give a specimen. So we asked her to go and have a try, and a few minutes later mother and daughter emerged with a coy smile and three drops of what had now assumed the importance of water in the desert. When it was negative, more blood was taken in order that I might culture the parasites and test their sensitivity to drug.

Paibak still a problem

The casualty department was the source of all sorts of gems. The commonest cause of paediatric concussion on the coast of New Guinea is a coconut falling on one's head, and this has a mortality (fig 4). In the highlands of New Guinea where tribal life is more fiery than on the coast, *paibak* (payback) is still a problem. If a youth presents with a spear through the arm then the next day you can expect a similar case from the tribe that caused it. Wars are still fought with spears and bows, usually over pigs or women. One war was broken up not by resort to a task force or UN peace-keeping forces but by the overworked casualty doctor in the war zone. Instead of the statutory 20p fee for services, he put the fee up to over £1, and the war finished in 12 hours.

Sadly, there are also patients, usually mothers, who when bereaved attempt to ablate digits of their hands with a rock or axe or whatever comes to hand (excuse the turn of phrase). Often patients were seen with several digits or parts thereof missing (fig 5).

FIG 4—Coconut concussion.

FIG 5—Mother with self-mutilated hands.

Back at the institute, the blood would go into culture, and I would have to wait several hours to harvest the parasites and see if they were susceptible to drug. I have never seen rainstorms quite like those in New Guinea. They usually come at night, and many times I was jolted from sleep by the sound of the rain beating against the roof. One such night, the parasites were due to be harvested at 4 00 am. No one mentioned this about research, but I had to run like a commando through the torrents to rescue the parasites from death from chloroquine.

All should attend, please

The other part of my work was in connection with school and village screening. We would arrive at a school one morning, interrupting the lessons taught in English. Each child would be called up and his finger pricked. We would rush back to the laboratory to return one hour later having read all the films and with a list of victims for further analysis. One of the facts required was the age of the pupil; "*Hau mani Krismas bilong yu?*" (How many Christmas belong you?) "*Mi no save*" (pronounced savvy), (I don't know).

For the village one of the members of the institute would go one evening armed with a pile of transparencies, a projector, and

a generator to power it. The slides tell the story of a child suffering from malaria who is treated by his doctor. The doctor sets about teaching him how to prevent the growth of mosquitos—for example, by not leaving areas of stagnant water. The talk heralds the announcement that the malaria team will be coming in 10 days' time to screen the whole village for the disease. All should attend, please.

Ten days later the team duly arrives and sets about measuring the heights and weights of all children (fig 6), and the sizes of the spleens of the whole population. Each villager also has blood

FIG 6—Every villager is measured, no matter how old.

taken from the finger for parasite count, haemoglobin, and serology. While I was there the sera were being sent to Paris for hepatitis analysis.

Plans are apt to go wrong, and a complete turnout is often impossible. The team returns the next evening to assess those missing before. One evening the team noticed that two people were still missing and asked a villager to find them. The villager returned with the news that the couple were consummating their marriage and would not be appearing.

This taught me two things about research. Firstly, it is surprising to what lengths people will go to avoid having their fingers pricked and, secondly, this is the sort of barrier that hinders researchers from pushing back the boundaries of science.

The institute itself has made its name in several fields. The main base is in Goroka. It is from here that a great deal of the work on the multiple sclerosis-like disease called kuru, has been done. This disease is now rare, but it was found suddenly to affect a large proportion of people living in a small valley in the highlands of New Guinea. The disease was contracted through the practice of venerating the dead by eating their brains. The man who did the lion's share of the work on the subject, Carleton Gajdusek, was awarded the Nobel Prize for medicine in 1976 for his work on kuru and the discovery that slow viruses were concerned not only in its transmission but also in other diseases, notably Creutzfeld-Jacob disease. I spent 24 hours with this amazing man while I was there. He talked non-stop about anything and everything, in particular his work and the tribes of New Guinea that he has studied. Though impossible to interrupt, I listened and attempted discussion with fascination. He really has a most remarkable brain, and you are aware of this as soon as you meet him. Here is a man who realised that out there in New Guinea there was a disease that did not conform to our knowledge

of disease patterns. Through his and other work done in New Guinea, our understanding of the aetiology of neurological disease has been potentially transformed.

Relevance of New Guinea

Many have questioned the point of my elective in New Guinea and its relevance to what I will be doing in England. New Guinea offers a perspective about the limitations of medicine today, and yet highlights the progress that has been and may still be made. It is only the absence of expected standards that makes you appreciate the measures required to attain them. Though physically far away, Papua New Guinea will remain close in my mind for many years to come. As I sat waiting for

my finals medicine viva, I pondered unlearned lists of relevant diseases, but my contemplation was arrested by the ringing of the entrance bell. "Right, well the last student didn't know much about this, let's see what you know . . . about malaria."

Finally, my happy memories of Madang have been marred by news of the tragic death of my supervisor there, Dr Helena Vbrova. She is a great loss to medicine in New Guinea and to world malariology. She will be remembered particularly for her spirit and devotion to work.

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Lesson of the Week

Nebulised salbutamol and angina

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Nebulised solutions of beta₂-adrenergic stimulants are very effective in the treatment of airflow obstruction in patients with asthma, chronic bronchitis, and emphysema^{1 2} and are often prescribed in large doses to both inpatients and outpatients. We report on three patients who developed evidence of cardiac ischaemia with this treatment. The possible aggravation of angina by nebulised salbutamol should be considered before patients with a history of ischaemic heart disease are given this treatment, and the dose of nebulised beta stimulant should be adjusted to each patient's requirements.

Case reports

Case 1—A 59-year-old retired welder was admitted to the coronary care unit after five episodes of angina over the previous four days. The last episode had lasted for one hour. He had smoked heavily until aged 56 years and had symptoms of chronic bronchitis with airflow obstruction. He had suffered from ischaemic heart disease for many years and had to retire from work aged 48 on account of angina. His medication included oral salbutamol 4 mg three times daily.

On admission there were no abnormal cardiovascular signs, but he had widespread inspiratory and expiratory wheezes. The initial electrocardiographic tracing showed no acute ischaemic changes. The airflow obstruction was treated with salbutamol respirator solution 5 mg diluted to 5 ml with saline and nebulised with oxygen. During the first administration of this treatment

Nebulised solutions of salbutamol may aggravate angina

he developed severe chest pain and the ECG monitor showed an acute rise in ST segment. The pain was rapidly relieved by stopping the nebulised salbutamol and giving sublingual glyceryl trinitrate. The change in the ST segment reverted to normal. He subsequently developed further episodes of angina that proved refractory to medical management. He underwent coronary arteriography and coronary artery grafting but developed intractable ventricular fibrillation immediately after surgery and died.

Case 2—A 73-year-old retired civil servant who was severely disabled by airflow obstruction was admitted to hospital for assessment of his airways disease, intensive treatment with bronchodilators, and treatment with steroids. He had had an inferior myocardial infarction. He had an angina attack about once a month, and these attacks were adequately controlled by sublingual glyceryl trinitrate as necessary. His electrocardiographic tracing showed the old inferior infarct and minor ST segment depression in leads V4-6.

On admission treatment was started with nebulised salbutamol, 10 mg in 5 ml saline four times per day. Immediately after the third dose of salbutamol he developed severe prolonged central chest pain at rest. He then admitted to also having had angina attacks during the two previous doses of nebulised salbutamol. The electrocardiographic tracing showed gross acute ST segment depression in leads V2 and V3 (figure), which slowly resolved over the next week. The creatinephosphokinase concentration rose to 683 IU/l (normal < 175 IU/l), and a sub-endocardial myocardial infarction was diagnosed. The salbutamol was continued in a reduced dose of 1 mg in 5 ml saline four times a day, and he had no further chest pain in hospital.

Case 3—A 49-year-old taxi driver was diagnosed as having asthma at the time of an anterior myocardial infarction in May

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