THE PROBLEMS OF ORTHOPAEDIC SURGERY IN NORTHERN NIGERIA

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NORTHERN NIGERIA, with its population of some 20 million people, provides a volume of surgical material needing orthopaedic care that makes a fascinating and rewarding occupation for those involved in the supervision of this branch of medicine in the region.

Were it not for the stoicism of its mainly Moslem people and the fact that in general they have hardly begun to learn the habit of seeking medical care, the present somewhat short-staffed medical departments would be overwhelmed. In the last few years, however, there has been a steadily increasing confidence in the benefits of modern medicine, resulting in an increased demand on the expanding medical services, with which the latter will find some difficulty in keeping pace.

Some nine years ago an orthopaedic surgeon was appointed to the Northern Region and a splendid new hospital was opened in Kano in March 1959 (Fig. 1). With the secondment of a registrar and two nursing Sisters from the Royal National Orthopaedic Hospital in London at about the same time as the opening of the hospital, it has been possible to provide a service which has just about kept pace with the demand.

At present we are only beginning to scratch the surface of the vast problem of providing orthopaedic care for the region, as we can only provide a service for those who come to see us or who are referred to us from other parts of the region. There is a great opportunity, at present almost unexplored, for the training of doctors and nurses
from outlying stations in the care and treatment of such cases, but this must await an increase in staff and accommodation. Since the treatment of accidents has in the past perhaps been one of the subjects least well taught in the medical curriculum, it is not surprising that such treatment in Nigeria still leaves something to be desired, and that there is room here, as elsewhere, for the further training of those who have to deal on the spot with so much of the acute trauma of the Region in the scattered general hospitals.

With the frequency of congenital and acquired deformities (the latter mainly from the after effects of sepsis), tropical ulcers, osteomyelitis, bone and joint tuberculosis, and the large and increasing number of accidents, it is not surprising that orthopaedic conditions comprise some 60% of the cases that present themselves to the surgical departments of our hospitals for treatment.

It is of great interest to study the differing types and manifestations of disease as seen in Nigeria and compare them with those occurring in other parts of the world. Not only is the incidence of certain types of disease quite different, but the response to treatment also shows considerable variation from that seen elsewhere.

**Congenital Deformities**

These probably occur as frequently as in other countries, but I have never seen a true case of congenital dislocation of the hip in nine years in Nigeria and it must be as rare here as it is in China—another country with which the author is familiar. Club feet are common and fortunately usually present themselves to us for treatment at an early stage. They are mostly of the equinovarus variety and results are excellent with repeated wedge plasters of the Kite type. Any wretching of the foot is harmful and unnecessary. In only a few cases has operative soft-tissue correction been necessary, although the transfer of the tibialis anticus, or better still tibialis posticus tendon to the outer side of the foot is sometimes of value. In neglected cases of club foot some bizarre deformities are seen, and patients will arrive walking on the dorsum of their feet where the skin has become thickened and where underlying bursae have often developed. These cases can be greatly improved by a radical triple arthrodesis and, although the resultant foot is a short and rather deformed structure, the patients are delighted to be able to walk more normally with a plantigrade foot. Many of these neglected cases are bilateral.

Other congenital deformities seen not commonly are syndactyly, and the congenital absence of long bones—usually of the lower leg.

Conditions such as knock knee and bow leg, and Perthe's disease of the hip, which might almost be called developmental, are very frequently seen. In the former there would usually appear to be no obvious cause for the deformity and no evidence of rickets; and, indeed, this disease is uncommon in a country so blessed with sun. Where in England minor degrees of genu Valgum would be treated with a raised inner border to the shoe—or no treatment at all—this is unlikely in Africa to help any but the most mild of cases. Patients in general do not wear shoes and the degree of deformity is often severe—up to 45 degrees from the straight line—and seen often at an early age. In most cases the bend occurs in the lower femur, although the upper tibia can sometimes contribute at least a proportion of the deformity. Simple supracondylar osteotomy at all ages seems to be most effective in correcting this deformity, and the results give great pleasure to the patients.

It has been found desirable to make little or no attempt at realignment of the limb at the time of osteotomy, and correction is delayed for two to three weeks until the divided ends of the bone are sufficiently stuck to each other to avoid the possibility of displacement—a not unlikely eventuality, especially in the more severe degrees of deformity. In this connection we have found the somewhat similar procedure of osteotomy-osteoclasis of great value in correcting other types of severe deformity of the long bones. In this operation a small portion of cortex is left undivided until, some three or four weeks later, it is broken, and the deformity corrected.

Perthe's disease of the hip is seen not only in its 'original' form, but perhaps more frequently is directly due to small infarcts in the head of the femur associated with Sickle cell anaemia, a complaint of very widespread distribution causing considerable morbidity in Nigeria. This is said to give a resistance to the malarial parasite but it carries in its train more serious sequelae than any benefits it is likely to bestow. Apart from the bone changes mentioned above—which can also occur in other parts of the skeleton—these patients are particularly susceptible to bone infection, quite apart from the debilitating effect of the anemia. Sometimes blockage of the nutrient artery to a long bone may produce X-ray changes similar to osteomyelitis, but without actual infection. However, such an area, denuded of its blood supply, is an ideal culture medium for organisms that may be circulating in the blood stream, and osteomyelitis is common.

**Sepsis**

In its various forms, sepsis provides the largest proportion of patients. Small cuts become infected and these, if not adequately treated in the early stages, develop into tropical ulcers; while
blood borne spread gives rise in some cases to osteomyelitis, and in others to suppurative arthritis.

**Tropical Ulcer.** This is a term that should be reserved for the type of acute ulcer found almost solely on the lower leg, consisting of a deep, suppurating mass of thick, pinkish-yellow pus and necrotic material from which diphtheroid and spirochaetal organisms can be cultured, a condition bacteriologically similar to Vincent's angina. These organisms are undoubtedly mainly carried from one infected sore to another by flies, and in all countries where this is a common condition the season for an increase in the number of acute tropical ulcers follows closely the season when flies are most numerous. Small ulcers of this kind often heal with careful daily dressings. But once they have become over 1 in. in diameter, and especially when they reach a size of some 3 in. or more, which is not uncommon, these ulcers will never heal satisfactorily without surgical intervention. Fortunately in the early stages surgical treatment is easy and effective. The skin edge of the ulcer is excised for about ¼ in. around the margin and the ulcer base with its juicy granulations scraped with a large curette. A considerable amount of penicillin-sulphanilamide powder is dusted into the bed of the ulcer and the whole enclosed in an occlusive dressing which is often reinforced by plaster of paris. This is left untouched for a week and then the area is grafted with split-thickness skin taken from the thigh with a Humby knife. Results are almost uniformly good in these early cases—that is in the first two or three months of the disease—because the blood supply is excellent. These procedures are now all performed by our African nursing staff who have been trained in this work.

Some time later, beginning perhaps three to six months after the onset, the ulcer, if untreated, begins to lose its initial characteristics, and changes through steadily increasing fibrosis to a chronic form, which becomes more difficult to treat as time passes. The Vincent's organisms tend to disappear from the pus and the ulcer looks like any other chronic ulcer, with pale, bloodless granulations unable to support the epithelium which is trying to grow in from the sides. These ulcers are treated in the same way, but scar tissue is frequently excised in order to produce a more vascular bed for the subsequent graft, and results seem to vary with the chronicity of the ulcer. In very chronic cases pedicle grafts are occasionally used to cover these poorly vascularized areas, and other soft-tissue and bony operations are sometimes required to correct the deformities resulting from chronic scarring. The long-term results of untreated ulcers are often tragic, as almost all, if left for periods of 10 to 15 years, become malignant and little can be done apart from amputation. So common is this malignant change in chronic ulcers that this is probably the commonest type of malignancy seen in this region and, indeed, probably exceeds the total of all other causes and sites of malignancy added together. There is, therefore, urgent need for prophylactic dressing of all minor cuts and abrasions so that these do not become infected with these organisms and progress to ulcers which so often lead to a fatal termination.

**Osteomyelitis** is a common condition and is only occasionally seen in its acute form. Perhaps this is due to a resistance to the staphylococcus developed from an early age. Anyway, cases more usually present themselves to us with an established chronic osteomyelitis and not uncommonly with massive whole shaft sequestrae, some of which are seen as blackened sticks protruding from foul-smelling ulcers (Figs. 2 and 3).

In all cases of sequestrum we have been attempting, with considerable success, to obtain primary closure by very careful sequestrectomy, massive saucization (to eliminate, as far as possible, dead space) and then primary suture of full-thickness skin flaps over the vascular and 'debrided' involucrum. Sometimes, of course, the skin is so riddled with sinuses that even a massive reduction in size of the bulky involucrum will not reduce the circumference of the limb sufficiently to allow the skin to be brought together for water-tight apposition; but it is surprising how often it is possible to secure satisfactory closure. For decades the Winnett Orr treatment of chronic osteomyelitis has been the most generally accepted treatment for these cases, and the wound, following sequestrectomy, has been packed open with vaseline gauze and immobilized in plaster. This, although leading to moderate results in most cases, takes a long time and gives a very thin and poorly vascularized scar which offers no help in the revascularization of the underlying bone and is subject to easy breakdown from any chance knock or abrasion.

The advent of antibiotics has undoubtedly made primary closure more likely to succeed, although the basic principle expounded many years ago by Sir Almroth Wright still perhaps provides the main reason for the good results obtained. He said: 'So long as a wound remains open the infection is never extinguished'. By a series of experiments Wright showed that leucocytes rapidly sterilize a wound when they are concentrated by apposition of its walls, and concluded that the proper principle when dealing with a wholesome wound is to close it in order to sterilize. It is true that few of our wounds can be regarded as wholesome, but by the time complete
Debridement and removal of avascular tissue has been performed at operation it appears possible for this type of surgery, with the help of antibiotics, to render these cases wholesome enough for nature to produce a large proportion of primarily healed wounds. Dead spaces which fill with blood are reduced to a minimum and the haematoma is kept sterile by a local injection of penicillin and streptomycin given both at the end of operation and at three-day intervals in the early postoperative period. This injection into the dead space is often preceded by aspiration of any accumulated haematoma in order to reduce this to a minimum and to allow the superficial tissues to fall in on the bone.

The ease with which primary closure can be obtained varies with the site of the disease. In the femur, humerus and forearm there is usually adequate muscle and subcutaneous tissue available to enable closure to be made in two layers; and saucerization, although more difficult, is less necessary as soft tissues tend to fall into the remaining concavities in the bone.

In the tibia, however, where muscle covers only two-thirds of the bone, closure is only possible in one layer. Fortunately the ease of approach to this bone allows a removal of scarred skin and a more radical saucerization which, by eliminating dead space and allowing the apposition of more normal skin, helps in obtaining primary healing.

*Tuberculosis of bone and joint* is common, with a site-preference in Nigeria for the spine and hip joints (Figs. 4 and 5). On the whole, patients do well and respond satisfactorily to the triad of anti-tuberculous drugs. The course of the disease seems to vary both in various parts of Nigeria and in other parts of the world. As in Muller's reports (1961) from Ceylon, sinuses heal and steady resolution seems to take place with a greater rapidity than is seen in more temperate climates. This may be due, as he suggests, to increased metabolism in the tropics. The great majority of tuberculous spines will become 'quiescent' on rest and drug therapy alone, and the Konstams' work (1958) in the University of Ibadan is startling evidence that drug therapy, even without rest, will lead to a 'cure', in the large majority of cases, at least in Western Nigeria. There can, however, be little question that operative means, where the bed space is available, lead to a more rapid and more sure healing of the tuberculous process. Necrotic tissue and sequestra can be removed, the whole area opened up to a new blood supply, and bony union more certainly obtained in a shorter time. The work of Kirkaldy Willis in Nairobi and his co-workers (Roaf, Willis and Cathro, 1959) and of Hodgson and Stock (1959, 1960) in Hong Kong shows the remarkable speed with which patients can be 'cured' of their disease.
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Fig. 4.—Tuberculosis of spine with paraplegia. In plaster bed with balanced traction.

by an anterior approach to the spine through the chest cavity or retroperitoneally through the abdomen. Anterior approach certainly leads to an excellent exposure of the area, permits a thorough removal of all diseased tissue and even allows some correction of the kyphosis before the insertion of the bone graft. This would, therefore, seem to be the treatment of choice where anaesthetic and other facilities are adequate and where trained personnel are available. Where bed space is short Konstam’s results (1961) show that, at any rate, in certain geographical situations, excellent results can be obtained from drug therapy alone. He uses plaster immobilization only to relieve pain and spasm, considering that a plaster jacket does little to prevent an increasing kyphosis and in any case welcoming this collapse as a means of healing which leads to more rapid progress to bony, or close fibrous, ankylosis. Operative interference is only called for to relieve a paravertebral abscess and the simplest costectomy is considered adequate and gives excellent results. This provides a warning against a too-dogmatic approach to the whole problem of the operative treatment of this disease (Blesovsky, Konstam and Konstam, 1961).

In Kano paraplegia is probably as common as elsewhere in Nigeria and costotransversectomy, in the very great majority of cases, is a very satisfactory means of relieving this condition. It is probably unnecessary to remove more than the posterior end of the rib, and in some cases recently we have, like Konstam, made no attempt to nibble off the transverse process. Antero-lateral decompression, despite the excellent exposure obtained, has not been a great success in our hands, and this is possibly due to the fact that so few of our cases fail to recover following costotransversectomy. In the few that show no improvement of their paraplegia and come to antero-lateral decompression, irreversible spinal cord changes have probably already taken place.

In the knee and hip-joint such relatively accept-
able results cannot usually be obtained without operation, and the best that can normally be hoped for by conservative methods is a poor fibrous ankylosis. Here, where the disease is sufficiently advanced for there to be no hope of obtaining a freely moveable joint, early excision of the diseased bone followed by arthrodesis gives excellent results. In the hip we use the Kirkaldy Willis staple (1958) which gives good immobilization at the arthrodesis site (for at least the first few weeks) and in the knee we use a Charnley-type compression arthrodesis. Stiff knee and hip-joints are an especial disadvantage in Nigerians, used to squatting, but the permanence of the complete relief from symptoms far outweighs this inconvenience.

The Charnley type of arthrodesis for the knee is one of the most satisfying operations that we do, both for tuberculosis and in other conditions which have led to disorganization or deformity of the knee-joint. One month from the time of operation patients can walk out of hospital, needing only the protection of a plaster cylinder for a further month for bony union to be assured.

The Management of Trauma

This occupies a considerable part of our time. By the standards of highly industrialized nations there is less of this work than in some countries and little or no 'industrial trauma'—finger and toe injuries usually being the result of gunshot wounds.

Nevertheless with so much of the transport of the country, both of passengers and goods, handled by lorries we see large numbers of severe fractures as a result of these vehicles overturning at speed. Many of these fractures are severely compounded with road-dirt ground into the wounds, and their arrival for treatment has often been delayed many hours or even days due to the long distances involved.

One remarkable point is the relative absence of shock. A child may be brought in with both legs amputated by a train and yet will be found to have a strong bounding pulse. This is fortunate as, with the limitations of our transfusion service, it is usually only possible to obtain blood for the critically ill patient, and the greater part of the output of the transfusion service is rightly directed towards the maternity units. Simple fractures heal well and even poor nutrition seems to have little effect on the rate of union, but there would appear to be a higher percentage of severely comminuted fractures than is seen in other countries.

Fractured shafts of femurs are treated on Thomas's splints by fixed traction with excellent results, and even fractures of the upper third are usually well controlled by reversing the uppermost sling on the Thomas's splint to counteract the pull of the psoas, and to bring the upper end of the femur into line with the lower. At least in Kano, where bed space is not yet an overriding consideration, it is felt that the use of Kuntscher nails is seldom indicated. The use of metal, in general, delays union and runs the risk of possible infection at the fracture site. These nails are, however, obviously of great value where bed space is short and there is the necessity to discharge the patient in a few weeks. The theoretical objection to the treatment of fractures of the femur in Thomas's splints—that long immobilization tends to give stiffness of the knee—has not been found to be true, as most of our patients are able to flex their knees to a right angle within two weeks of the removal of the splint. Static quadriceps exercises from an early stage must, of course, form an integral part of the treatment.

Compound fractures, if seen within the first 12 hours, are usually closed primarily after thorough debridement, and most of these do well. Compound fractures of the tibia are, however, particular problems, owing to the difficulty in covering the bone. There is little subcutaneous tissue available to convert this fracture into a closed one if skin, as so often happens, is insufficient to permit closure without tension. The portion of tibia which has lost both its periosteal and skin coverings usually sequestrates over a long time and healing is delayed for many months. There is a strong case, even in those patients where skin closure is feasible, for packing a small drain of flavine-gauze down to the fracture site, as this acts as an escape valve for the formation of any small quantity of pus. Healing usually takes place rapidly after removal of the drain in two or three days. On the whole, our results have been better on this regime than when we attempt to obtain complete closure at the time of operation; but the choice of method depends largely on the extent of the damage to the skin and soft tissues. In some cases, where portions of bone either drop out of the wound or have only minimal periosteal attachments, the process of healing has been greatly accelerated by the removal of all pieces of loose bone, even though this often leaves a gap of several inches. This allows closure of the skin and primary healing, following which, in a few weeks' time, a large bone graft from the other tibia re-establishes continuity and allows final healing within a period of perhaps five to six months.

It is important to differentiate between stable and unstable fractures, particularly in the tibia, and in the latter plaster immobilization with the knee flexed to 35 or 40 degrees to prevent rotation is combined with traction through a Steinman pin in the os calcis. This maintains fixation and length.
for the first six weeks until the fracture has become stable. Care should, however, be exercised to avoid distraction. Simple tibial fractures do well on conservative treatment but if metal plates are used there is almost inevitably considerable delay in obtaining firm union.

Fractured necks of femur are not very common as the life expectancy of the majority of the population is not yet high, but intertrochanteric fractures are frequently seen and these do well with Charnley traction or internal fixation with a trifin nail and McLaughlin plate. If conservative treatment is preferred, and this has obvious advantages, the Charnley type of traction (Charnley, 1957) makes for early mobility of the patient on the bed. This consists of a Steinman pin, inserted through the tibial tubercle and incorporated in a below-knee plaster, which leaves the calf muscles unconstricted inside a rigid cast and allows the limb to be slung from a Balkan beam by a type of modified Russell traction which the patients find most comfortable.

Fractures of the pelvis are also common and heal surprisingly well, the greatest difficulty being to keep the patients in bed for more than a week even when there has been upward displacement of the whole of one side of the pelvis.

Fractures of the spine with paraplegia present the same (or even greater) problems here as elsewhere in the world and their after-care is a serious drain on our resources. In many of these cases, especially where dislocation is present, operative reduction is performed and the fracture stabilized with spinal plates. This is not felt likely to benefit the paraplegia but it does make earlier mobilization possible. Initially treatment is in Stryker frames and after some months the paraplegic skin appears to develop some resistance to bed sores; the patients can then be fitted with calipers and given tripod walking sticks or can learn locomotion in a wheelchair. However, all of these rehabilitation procedures require careful supervision for long periods and it is difficult to continue this indefinitely. Possibly the best and most practical plan is to try to provide wheel-chairs for many of these patients and to relinquish the attempt to make them ambulant. The somewhat drastic alternative of amputation, through the upper femur, of useless and sometimes edematous legs has considerable value in some patients, increasing greatly their mobility and morale.

Dislocations of the hip and elbow are common and patients often are first seen many weeks after the initial injury. These cases are by then usually irreducible and require open reduction, but we have been surprised to find that old posterior dislocations of the hip-joint have sometimes been reduced by heavy (35 lb.) traction through the lower end of the femur, even as late as five or six weeks after the accident. Whether the end-results of this conservative treatment are really better than those of open reduction it is hard to say, as proper follow-up is impossible. Certainly the head has seemed to settle well into the acetabulum and in due course good movement has been obtained. Old dislocations of the elbow are a more difficult problem and require extensive dissection of the lower humerus to allow reduction—but results have been good.

Amputation sites of election differ from those elsewhere as expensive prostheses often hang on the wall, unused from lack of maintenance, as the patients live too far away to come in for regular attention. Sometimes an increase in girth of the limb following the improved general condition renders the prosthesis no longer the right size for the stump. The most used prostheses under these circumstances are those which are simplest, and the local carpenters make an excellent ‘Long John Silver’ type of peg-leg which is highly popular with amputees. The best stumps for this peg-leg demand an amputation just below the knee leaving about 4 in. of tibia (just below the tibial tubercle) which gives an excellent kneeling stump, is long enough to control rotation of the prosthesis and not too long to get in the way by protruding too far backwards. An amputation through the condyles of the femur also gives an excellent weight-bearing stump.

Symes’ amputation at the ankle joint is perhaps the most satisfactory of all amputations, allowing the patient to stump about without need of a prosthesis, although a simple elephant boot is supplied to those whom we think will wear it. Harris of Toronto (1956) has written in detail of Canadian experience with this operation, and the satisfactory results it has given.

In this predominantly dry climate walking plasters are fitted with portions of motor tyre fixed to the plaster (Bryson, 1954). We find that these are quite serviceable for two to three months and give the patient a much better heel-toe action than the use of the U-shaped Bohler walking-iron.

Summary
A description is given of the main problems confronting the orthopaedic services in the Northern Region of Nigeria. The methods of treatment that have been found most useful in dealing with these problems are described.

Special reference is made to the treatment of bone and joint tuberculosis, osteomyelitis and tropical ulcer.

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