and no acid-fast bacilli. Culture gave a scanty growth of *Staph. albus* resistant to penicillin. After this operation the wound broke down and further accessory sinuses developed, and suppuration was renewed in spite of intensive streptomycin therapy.

On June 7, 1951, a further unsuccessful attempt at excision of the inflamed area was undertaken; the histological pattern was the same as before, but this time with groups of giant cells suggesting a foreign-body reaction. On October 10 the clinical appearances of the axilla, with the scar of a previous operation, multiple discharging sinuses in its neighbourhood, and subcutaneous induration without lymph-node enlargement, seemed strikingly similar to the appearances usually presented by a pilonidal sinus in its usual sacro-coccygeal site. When expression was given to this similarity, the patient mentioned that during his military service he had in fact undergone two operations for pilonidal sinus, and reference to the notes afforded a record of this history, which had not been previously considered pertinent. A presumptive diagnosis was therefore made, on clinical grounds, of pilonidal sinus of the axilla.

On November 27 Mr. John Barron undertook a radical excision of the skin of the floor of the axilla with all connective tissue underlying it and with the whole area of axillary suppuration; the axillary vein was exposed. The resultant skin defect was repaired by an advancement flap. The wound healed by first intention and has remained healed since. The histological appearances confirmed the clinical diagnosis of pilonidal sinus of the axilla. Dr. C. V. Harrison reported as follows: "A piece of fatty tissue 100 by 70 by 10 mm. with attached skin was received. A small dimple was seen on the surface and a track was traced for 10 mm. A section was taken across the track; the latter lay between 1 and 2 mm. below the surface and was lined by granulation tissue. The cavity was of irregular shape and was packed with polymorphs and macrophages. Two hairs were found in the track, both surrounded by a foreign-body reaction. The appearances are those of a pilonidal sinus."

Comment

It seems clear that this patient suffered from a pilonidal sinus of the axilla, although it is not possible to say whether the axillary suppuration in his case was due originally to buried hair or whether the pilonidal effect has been consequent upon some down-growth of, or downward traction upon, hair-bearing axillary skin in the granulation tissue and scarring of an axillary suppuration due to some other cause. There are several points of interest that arise from consideration of the case history. The suspicion that a pilonidal sinus might be located in the axilla of this patient did not arise until after multiple operations had been undertaken, and the buried hair was not detected until a particular search for it was prompted by the presumptive clinical diagnosis. The possibility of a pilonidal effect in the axilla may perhaps usefully be borne in mind when patients present with intractable superficial inflammation in that situation.

The development of pilonidal suppuration in two different sites in the same patient suggests that anatomical abnormalities in the sacro-coccygeal region may not be the sole cause of the suppuration which occurs in that area. This patient, whether from a peculiarity of hair growth or of sweat-gland formation, or from some hormonal or metabolic disturbance which has not been revealed (and it is curious that most sufferers from sacro-coccygeal suppuration are male), has been liable to a down-growth of hair not only in the sacro-coccygeal region, where a congenital sinus may have encouraged it, but in the axilla, where there are no congenital sinuses larger than the apocrine glands. Hodges's original title of "pilonidal sinus"

would still seem to be more desirable, even in the sacro-coccygeal region, than any anatomical or other titles that have subsequently been conferred upon this pathological picture.

Wide excision and plastic repair would seem to be the only suitable treatment for axillary suppuration of this character.

I am grateful to Dr. C. V. Harrison for his pathological reports, and to Mr. J. N. Barron for the details of the operation which he performed and for the plastic care which he gave this patient. I am also indebted to Mr. M. R. Ewing for drawing my attention to the excellence and comprehensiveness of R. M. Hodges's original paper.

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ACRYLIC REPLACEMENT AFTER SEGMENTAL RESECTION OF BONE

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The accepted treatment of bone tumours, even those of moderate malignancy, is, whenever possible, amputation of the affected part. This report of three patients is concerned with the preservation of limbs disabled from disease by resection of the tumour-bearing segment and the subsequent restitution of the defect by the use of an internal prosthesis made of acrylic resin and steel.

Case 1. Osteoclastoma

A woman aged 20 sustained a pathological fracture of the right femoral neck on November 7, 1949 (Fig. 1). Curettage, packing the cavity with iliac-bone chips, and immobilization in plaster spica for 10 weeks produced no

FIG. 1.—Case 1. Radiolucent lesion in femoral neck with pathological fracture. FIG. 2.—Case 1. Twenty-two months after insertion the prosthesis has worked loose in femur. FIG. 3.—Case 2. Lytic lesion in trochanteric region.

success. Histology of curetted fragments confirmed osteoclastoma. On February 5, 1950, the femoral head, neck, trochanters, and 1 in. (2.5 cm.) of the shaft of the right femur were excised. On March 8 an acrylic prosthesis moulded round a steel bar of square cross-section was inserted after ramming the lower 4 in. (10 cm.) of the bar down the medullary cavity of the femoral shaft (J. M. P. C.). After eight weeks of immobilization on a Thomas splint walking was begun with the aid of crutches. On November 16 the patient returned to the work of a burler. In December, 1951, the limb was still painless and capable of full passive but not active hip movements and 50 degrees of knee flexion. The prosthesis, however, had worked loose in the femoral shaft (Fig. 2).

Case 2. Chondrosarcoma

A woman aged 31 had a fall in January, 1950, and complained of pain in the left knee and hip for the next 12 months. The radiographs showed a lytic lesion in the trochanteric region (Fig. 3) and the serum alkaline phosphatase was 94 units. On February 17, 1951, the

tumour-bearing segment, together with a sleeve of muscle, was excised (Fig. 4). Leg length was maintained by skeletal traction through a tibial pin. On March 31 a prosthesis was inserted (Fig. 5) and the abductor muscles were moored to holes in the prosthesis (A. C. B.). After immobilization in a Thomas splint for six weeks non-weight-bearing active movements were started. On July

FIG. 4.—Case 2. The excised tumour-bearing segment, with a sleeve of muscle.

11 the patient left hospital wearing a weight-relieving calliper. The hip movements were painless and the serum alkaline phosphatase had fallen to 8.7 units. A radiograph taken on November 16 showed new bone formation around the prosthesis (Fig. 6). Passive hip movements are full: active movements, including abduction, are about half the normal range (Fig. 7). Knee flexion is 70 degrees. The patient is doing ordinary household duties and has no pain.

FIG. 5.—Case 2. The prosthesis. The male and female templates on the left were used to shape the bone to fit into a recess in the lower end of the prosthesis.

FIG. 6.—Case 2. New bone round the prosthesis 7½ months after its insertion.

FIG. 7.—Case 2. Active hip flexion of 65 degrees.

Case 3. Osteochondroma

A youth aged 16 had a painless osteochondroma removed from the upper end of his left humerus in 1948. The tumour was reported malignant by two pathologists and benign by two others. In 1951 there was a local recurrence, which was painful and rubbed against the chest wall; the serum alkaline phosphatase was 14.9 units. On March 16, 1951, the upper half of the left humerus was excised, and on June 7 was replaced by a prosthesis (Fig. 8) (A. C. B.); the rotator cuff was stitched with fascia lata to holes in the tuberosity of the prosthesis and the subscapularis was stitched to the deltoid in front of the prosthesis. The arm was immobilized in a shoulder spica for six weeks. Movements were restored by a course of active exercises. On January 1, 1952, he began work as a baker. The left shoulder movements are painless and there is active abduction to 60 degrees. His left elbow, wrist, and hand are normal.

FIG. 8.—Case 3. Prosthesis six months after insertion, with new bone round its lower end.

Discussion

Segmental resection of bone tumours has been advocated by Coley and Higinbotham (1948, 1949). The procedure is applicable only to tumours of low malignancy which have not spread beyond the cortices of the bone. It may be advisable to remove a sleeve of muscle surrounding the bone in order to prevent dissemination of the tumour cells. No more effective extirpation of the neoplasm would be achieved by disarticulation at the hip or shoulder. The removal of regional lymph nodes by hind-quarter or fore-quarter amputations is unnecessary, as bone tumours do not usually spread by lymphatics. It is submitted that for endosteal tumours of low malignancy segmental resection is the method of choice because adequate removal of the tumour is feasible and the function of the limb can be restored by the use of an internal prosthesis.

Although resection and restitution have been performed in one operation, two stages are preferable, so that delivery of the prosthesis need not delay removal of the tumour and an accurately made prosthesis can be constructed from the resected bone. After a successful operation a satisfactory early result is to be expected, but the late results have still to be considered. The prosthesis in the first patient has already worked loose, and the correct treat-

ment for this complication has yet to be decided. In the other two patients the prosthesis is apparently wedded to the bone as a result of more rigid fixation, and it may be that the marriage will be a long and happy one.

Wholly metallic (Moore and Bohlman, 1943; Loomis, 1950) and wholly plastic prostheses similar to ours (Hudack, 1951; Scales, 1951) have proved satisfactory replacements for segments of bone, but the relative merits of the two materials have yet to be evaluated. A judicious combination of the two materials is best in order to achieve the optimum of lightness and strength.

Summary

Bone resection and replacement by internal prosthesis are advocated for endosteal tumours of low malignancy.

The early results in three cases are reported.

The relative merits of amputation and resection are discussed.

The first patient's prosthesis was made by the dental school of the University of Leeds, the prostheses of the second and third patients by Messrs. Down Bros. It is a pleasure to thank Professor T. Read, of the University of Leeds, and Mr. V. Carter, of Down Bros., for the help they have given us with the designing and construction of these prostheses. We also wish to thank Mr. J. E. Andrews and Miss Frances M. Ellis for the clinical photographs.

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Medical Memoranda

Dermatitis after using "Pyrotex"

The following case is recorded because the condition is new to me and because such cases are likely to occur with increasing frequency.

CASE REPORT

An electrician consulted me because of an irritation of his left forearm. He is a healthy man of 39 with no previous history of skin complaints.

On examination a patch of dermatitis 3 by 2 in. (7.5 by 5 cm.) was seen on the front of the left wrist. This had been extremely irritable for 24 hours. We found that the only new substance handled recently was an electrical conductor known as "pyrotex." This conductor, I am informed, is becoming more frequently used, as it overcomes many of the technical difficulties met with in the more common and older electrical conductors. It consists of a copper tube tightly packed with glass fibre, with the wire running down the centre, the glass fibre being the insulating medium. It is flexible, heat-resisting, and any short-circuit would immediately go to earth through the copper tube. The patient had been using this medium for the first time 36 hours before the onset of his trouble.

On examining the lesion under a lens a minute spicule was seen protruding from one point. This was scraped off with a scalpel. A specimen of the insulating powder was now removed from the tube and examined under the microscope. It appeared in all ways to be similar to the spicule removed from the skin. A little of the powder was used for a patch test. After 36 hours there was no reaction when the adhesive plaster was removed in the morning. After a day at work, the patient came to see me again with an identical patch of dermatitis in the area used for the patch test. It appeared reasonable to presume that there was no reaction while the adhesive plaster immobilized the area, but that friction from the shirt on particles adhering to the skin

quickly brought on an intense reaction. Careful washing, a soothing ointment, and the removal of the cause resulted in the complete disappearance of the lesion within 24 hours. I believe that the aggravating cause of his first lesion was friction from the shirt cuff.

It is suggested that men working with pyrotex should do so with their sleeves rolled up to the elbow, that precautions be taken to prevent the powder from contaminating the clothes, and that special care be given to washing soon after contact.

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A Case of Meigs's Syndrome

In 1934 J. V. Meigs (quoted by Beaumont, 1950) drew attention to a striking condition in which an ovarian fibroma was associated with a pleural effusion and ascites. The pleural effusion (and ascites) cleared up and did not recur after removal of the ovarian tumour. Reviewing the subject, Beaumont states that up till 1944 only 30 cases had been recorded, 27 of these in America. In most cases the pleural effusion was on the right side.

Boyd (1950) states: "The nature of this rare condition is completely obscure, although a number of ingenious suggestions have been made in an attempt to explain how a benign ovarian tumour can cause pleural effusion." Two of the "ingenious" suggestions are: (1) That the pleural effusion is due to pressure on the azygos vein. The fact that pleural effusions are unknown in normal pregnancies, where the azygos vein is probably pressed upon to a greater extent, deprives this theory of any attractions it might have held. (2) That a persistent congenital pleuro-peritoneal channel might permit ascitic fluid to overflow into the chest, since ovarian fibromata, though benign, are known to be frequently associated with ascites. This theory is, however, not proved.

Until a satisfactory explanation is forthcoming to elucidate this mysterious association, cases of Meigs's syndrome such as the one described below will continue to be of interest.

CASE REPORT

A married woman of stout build aged 56 was admitted to hospital on April 4, 1951, complaining of lower abdominal pain of relatively sudden onset, duration 36 hours. She had vomited once, 12 hours before admission. There was no constipation or diarrhoea. She had noticed slight breathlessness on exertion in the preceding few weeks, and a slight unproductive cough was present. There had been no history of haemoptysis and no loss of weight. Fourteen years previously she had had an attack of pneumonia, and had also been operated on in 1945 for a strangulated femoral hernia. Otherwise her health had been quite good.

On examination she was of good colour and well nourished; her tongue was clean and moist. Her blood pressure was 140/80; temperature and pulse were normal. The abdomen was distended, partly by fat and partly by a rounded lower abdominal mass, reaching midway between the umbilicus and the pubis. Vaginal examination confirmed the impression of a large solid intra-abdominal tumour, arising from the pelvis. The heart sounds were normal. A small pleural effusion was detected at the base of the right pleural cavity. A blood count showed: red cells, 4,000,000; colour index, 0.9; white cells, 8,400 (neutrophils 75%; lymphocytes 22%, eosinophils 1%, basophils 1%, metamyelocytes 1%). E.S.R., 50 mm. in one hour (Wester-gren).

A diagnostic thoracentesis was performed on April 16 and 20 ml. of straw-coloured fluid was withdrawn. The pathological report was: "Cloudy yellow fluid containing a clot 1 cm. in diameter. Cells: 50% polymorphs, 50% lymphocytes. Ziehl-Neelsen's test, no acid-fast bacilli seen. Gram film, numerous pus cells. Cultures sterile." On May 4 a laparotomy was done (Mr. T. J. Cobbe) and a round pedunculated solid ovarian tumour 15 by 13 by 14 cm.