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POSTERIOR APPROACH TO THE HIP JOINT IN PROSTHETIC REPLACEMENT

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The majority of the classical surgical approaches to the hip joint have some or all of the following disadvantages when used for the purpose of replacement of the femoral head.

1. Bleeding and shock during operation.
2. Inadequate exposure of the acetabulum.
3. The danger of postoperative dislocation because of division of the anterior structures during operation.
4. Interference with the abductor mechanism causing abductor inadequacy, with a positive Trendelenberg sign and a limp.

Anterior Approaches

Smith-Petersen's[1,2] anterior approach is well known and widely used for many purposes. In the surgery of prosthetic replacement it suffers from all the deficiencies mentioned above.

The Heuter method is advised by Judet *et al.*[3,4] On their own admission, visualization of the acetabulum is difficult and very strong retraction is required. Any surgeon who has attempted it will agree. Postoperatively, the danger of anterior dislocation exists and precautions are necessary to control external rotation of the leg.

Luck[5] has described a transverse anterior approach which suffers from much the same disabilities.

Other anterior routes have been described in the past by Barker, Lucke, Hoffa-Lorenz, Albee, and Nelaton, but these are now of historical interest only.

Lateral Approaches

A true lateral approach to the hip joint depends on division and reflection upwards of the greater trochanter with its attached muscles. Good exposure is obtained, but the interference with the abductor mechanism leads to poor results if a prosthesis is used, because it is most difficult to obtain satisfactory union of the bony fragments without lengthening and muscular weakness. Such approaches have been described by Oliver, Murphy, and Robert Jones in the past, and more recently by Jergesen and Abbot.[6]

Postero-lateral Approaches

Approach to the hip joint from behind was not much used in the English-speaking world until Gibson's[7] restatement of the Kocher[8] procedure, with slight modifications. It came at a time when the attention of orthopaedic surgeons was focussed on the works of the Judet brothers and offered an easy, bloodless route to the hip. However, it retained the disadvantages of postoperative dislocation and abductor insufficiency. McFarland and Osborne[9] recognized this latter disability and attempted to overcome it by detaching the gluteus medius subperiostially in continuity with the anterior part of vastus lateralis, but the gluteus minimus was still divided. In practice it was often unsatisfactory because the continuity between the two muscles was too tenuous, and re-attachment difficult. In any event, the anterior structures having been divided, postoperative dislocation could still occur.

Marcy and Fletcher[10] described a modification of the postero-lateral approach to the hip for the insertion of a femoral-head prosthesis. Their operation was a great advance, since they retained the abductors intact and dislocated the femoral head backwards after division of the small rotator muscles. They avoided all the disadvantages enumerated above.

Posterior Approaches

The Langenbeck[11] incision was designed for posterior drainage of the hip joint, as was that of Ober.[12] While satisfactory for their purpose, they do not allow any working space in the hip joint.

Osborne[13] studied the known approaches and, as a result of cadaver experiments, suggested a true posterior approach 'for "infected" cases of any type requiring a direct attack on the joint or head and neck of the femur with subsequent drainage'.

The approach to be described was developed in order to avoid the inherent disadvantages of other methods, and to give an exposure that would allow various procedures to be performed. It has been used on a great number of occasions since 1954, in order that different operations might be carried out in and around the hip joint. The majority of these operations have been for prosthetic replacement. Credit must be given to the previous work of Osborne[13] and Marcy and Fletcher[10] which pointed the way. Moore[14] has recently described his 'southern exposure' which is essentially the same and maintains all the benefits of this approach.

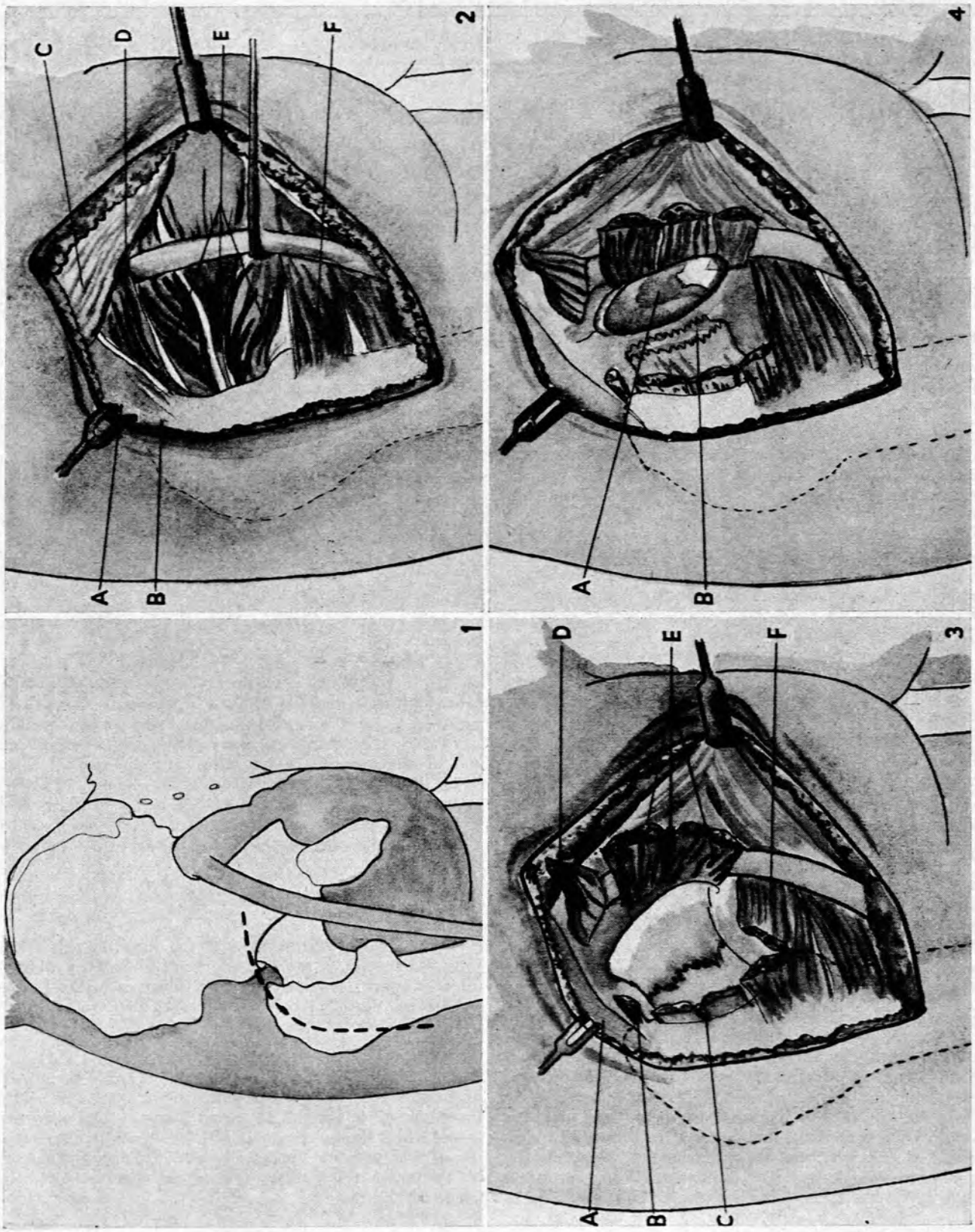
TECHNIQUE OF OPERATION

Position

The patient lies fully prone with the operation side at the edge of the table. A sandbag is inserted under each anterior superior spine to allow free abdominal excursion during respiration. Draping is carried out in such a way that the limb is freely mobile.

Incision

The only bony landmark required is the tip of the greater trochanter. The incision is commenced about 4 inches medial to this point and about 1½ inches above it, and is carried laterally and downwards in a curve to a point just below the tip of the trochanter and then longitudinally down the back of the lateral aspect of the thigh in the line of the femoral shaft, for 4 inches (Fig. 1).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Development

Skin and subcutaneous fat are divided to expose the gluteus maximus and the fascia lata (ilio-tibial band). The fascia lata is incised longitudinally in the extent of the vertical component of the skin incision. The index finger is then inserted deep to the gluteus maximus at the upper end, and the tendinous structures divided medially with scissors until the fleshy fibres are reached. From this point, further medial separation of the muscle mass is achieved digitally. If this is confined to the extent of the skin incision, there is no bleeding and no danger to the nerve supply. Brash[15] has shown that the neurovascular hilum of the lower part of the gluteus maximus is confined to the medial half of the muscle.

The muscle and attached fascia lata are then reflected downwards and medially and the sciatic nerve is identified at the medial end of the operation field (Fig. 2).

The deep muscles in immediate posterior relationship to the hip joint are exposed after a thin layer of fat covering them has been separated with scissors and reflected downwards. They are identified from above downwards as gluteus medius, piriformis, obturator internis with the gemelli and quadratus femoris. The superior edge of piriformis is defined by blunt dissection and the tendons of insertion of this muscle and the obturator internis and the gemelli are divided, leaving short stumps for re-attachment, and the muscles reflected medially (Fig. 3). A small twig from the ascending branch of the medial femoral circumflex artery is encountered here. It is not always necessary to divide piriformis.

More anteriorly, the obturator externis is treated in a like manner. Subsequent manoeuvres are usually facilitated by division of the upper half of the insertion of the quadratus femoris.

The capsule of the hip joint is opened along the line of its attachment to the margin of the acetabulum. The joint is easily dislocated by flexing the knee and internally rotating the femur; a skid or a Martin's gouge may be of assistance. If the operation is being performed for a fresh subcapital fracture or an avascular necrosis, the head is removed with a gouge or a cork-screw after the femur has been rotated internally.

The next stage demands close attention because visualization of the femoral neck is not as good from behind as it is from the front. With the femur in maximum internal rotation, a broad osteotome is driven through the base of the neck at an angle designed to receive the flange of the prosthesis. These angles are different for the Thompson and the Moore prostheses. The osteotome is slanted forwards in order to remove a little more bone anteriorly so as to allow about 10° of anteversion of the head when the prosthesis is fully seated. It has been thought that too much anteversion of the prosthesis may be a cause of pain. Pollard[16] reports a suggestion from the Columbia-Presbyterian Medical Centre in New York, that if the prosthesis is inserted so as to lie in the neutral position or even in a little retroversion, the patient may be more comfortable when walking is commenced. Care must be taken to remove sufficient of the neck, otherwise the limb is relatively longer and reduction very difficult.

If acetabuloplasty is necessary, this is performed before the prosthesis is inserted.

The dislocation is easily reduced by flexion of the hip over the edge of the table, and direct pressure forwards on the head of the prosthesis. The leg is then extended to lie next to its fellow, but with some external rotation, and the wound closed in layers. The short rotator muscles are sutured to the tendinous stumps with a double loop of silk, and the quadratus femoris attached to periosteum. The fascia lata is repaired with interrupted chromic catgut and the gluteal fascia approximated, but the stitches are not inserted through the muscle belly. The skin is then closed. No drainage is necessary.

Postoperative Care

The patient is returned to bed without any retentive apparatus. There is no shock during surgery and very little complaint of pain afterwards. Active straight leg-raising exercises are commenced on the third day and the patient may be allowed out of bed to sit in a chair. For demonstration purposes, patients have been allowed to walk with assistance on the day following the operation, but the usual practice is to commence four-point crutch walking at about the seventh postoperative day. Recovery of gait is rapid, and little if any residual limp is apparent.

RESULTS

The cases analysed below were all treated in the Department of Orthopaedic Surgery at Addington Hospital. The operations were performed by visiting staff as well as registrars and house surgeons with varying levels of experience.

This series concerns 61 patients in whom a vitallium hip prosthesis was introduced *via* a true posterior approach to the hip joint. The Thompson prosthesis was used 59 times and the Moore prosthesis only twice.

The average age of these patients was 75·4 years, the oldest being 90 and the youngest 39 years. There were 7 males and 54 females. The indications for surgery were, primary operation for subcapital or transcervical fractures of the femoral neck and secondary operation following failed pinning or avascular necrosis, and osteoarthritis. The breakdown of cases is shown in Table I.

TABLE I. BREAKDOWN OF CASES

Indication for surgery	*No. of cases*	*Average postoperative hospital days*
Primary	43	27
Secondary	15	25
Osteoarthritis	3	48

There were 10 deaths in the series, i.e. 16·4%, of which 4 may have been directly due to the operation; 2 cases de-

Fig. 1. The bony landmarks and the relationship of the sciatic nerve. The skin incision is shown. *Fig.* 2. The relation of the muscles to the back of the hip joint; the sciatic nerve is retracted medially. A=Gluteus medius, B=tip of trochanter, C=gluteus maximus — reflected, D=piriformis, E=obturator internis and the gemelli, F=quadratus femoris. *Fig.* 3. The muscles have been divided near their insertions and reflected medially. After opening the capsule an excellent view of the neck of the femur is obtained. A=Gluteus medius — intact, B=piriformis tendon, C=insertions of obturator internis and gemelli, D=piriformis — reflected, E=obturator internis and gemelli — reflected, F=quadratus femoris — partly divided. *Fig.* 4. After removal of the head of the femur the whole acetabulum is clearly visualized. A=Acetabulum, B=stump of neck.

veloped sepsis and 2 died within 24 hours of operation. In the remainder the outcome was probably influenced by age or previous pathology. The causes of death are shown in Table II.

TABLE II. CAUSES OF DEATH

Age	*Indication*	*Cause of death*	*Survival (days)*
58	Failed pin	Old hemiplegic—sepsis	44
84	Failed pin	Cerebrovascular	1
84	Fracture	Cerebrovascular	15
74	Fracture	Cardiovascular	33
74	Fracture	Cardiovascular	42
81	Fracture	Cardiovascular	25
64	Failed pin	Cardiovascular	6
84	Fracture	Diabetic. Cerebrovascular	31
87	Fracture	Decubitus ulcers—sepsis	30
70	Fracture	Cerebrovascular	1

The average postoperative stay in hospital was 27 days, but, after excluding 15 patients who remained in hospital for longer than 30 days because of complications, the average stay of the remaining 46 uncomplicated cases was 21 days. The reasons for prolonged stay in these 15 cases, who averaged 47 days in hospital, is shown in Table III.

TABLE III. REASONS FOR PROLONGED STAY IN HOSPITAL

Complication	*Duration (days)*
Sinus formation	58
Sinus formation	49
Sepsis	44
Senility	31
Uraemia	66
Cardiac condition	33
Senility	51
Split femur	69
Cardiac condition	42
Diabetes	70
Diabetes	31
Spondylarthrosis	43
Social problem (disposal)	44
Psychiatric condition	32
Sinus formation	38
Total 15 cases	701 days
Average	47 days

The follow-up on cases was from 1 month to 3 years. All patients continued to report improvement for 6 months, but a certain number did not report back since they were holiday visitors to the city. I was struck by the remarkably good range of movements and absence of pain in the hip joint in the vast majority of cases. It was exceptional not to find a 90° range of hip flexion with 20° - 30° of abduction and 10° of adduction. Any residual restriction was usually of internal rotation, but very often this matched the range in the other hip. Only in 2 cases was it recorded that a positive Trendelenberg sign was present, indicative of abductor insufficiency, and in both cases it was after secondary surgery. At the time of their last visits, 14 patients used walking sticks for security, but all could get about without them in their homes. Only 1 patient, who had had an operation for osteoarthritis, complained of disabling pain in the hip.

COMMENT

This is a most versatile approach to the hip joint and, besides prosthetic replacement and vitallium-cup arthroplasty, it has been used for internal fixation of the acetabular fragment after fracture-dislocation of the joint. This approach is also used for Brittain's ischio-femoral arthrodesis under direct vision, but in this case the only deep muscle reflected (to allow identification of the lesser trochanter) is the quadratus femoris. The line of osteotomy is then established and carried medially to the ischium, which can be palpated. The sciatic nerve is available for reference, although screened in a position of safety by the retracted quadratus femoris. This approach is also of value in open reduction and fixation of a slipped epiphysis since the exposure should not jeopardize the circulation of the head to the same extent as the usual anterior approach. The horizontal limb of the incision can be used for drainage of the hip joint, as indicated originally by Osborne.[13] Excellent exposure of the ischium is also possible if this is required.

SUMMARY

A true posterior approach to the hip joint is described. It is accompanied by little bleeding and no shock, and avoids the disadvantages of abductor insufficiency and postoperative dislocation of the hip. The approach can be used for many procedures in and about the hip joint.

I am grateful to my wife, Dr. Sylvia Kisner, for the illustrations. The anatomical studies on which this approach is based were carried out while I was a part-time lecturer in anatomy at the Medical School, University of Natal.

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