

NEW HIPs FOR OLD

Total Prosthetic Replacement of the Hip

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The idea of replacing a joint damaged by injury or disease is a fairly obvious one.

"New Joints for Old" is probably of very ancient appeal and was certainly thought of in the last century. However, until the correct materials became available and the correct indications followed, the idea of total hip replacement did not materialise to any great extent.

In this era of "high-octane" discussion of cardiac, kidney, liver and other organ transplantations, we regret to state that Orthopaedic Surgeons are not yet capable of transplanting an entire healthy hip joint. As a palliative procedure, however, the total replacement of a hip joint by metallic or plastic prosthesis has been rewarding.

Total prosthetic replacement of the hip joint means the insertion of an artificial hip joint into the human body, the acetabulum being replaced by a cup, and the head of the femur by a ball. Various combinations of materials have been used. In some instances, the acetabulum or cup has been made entirely of plastic and in others of metal, and in others a combination of both.

The ball or head of the femur has been made of metal in most instances, although plastic has been tried without constant success. The size of the cup and head also varies.

The surgical treatment of chronic arthritis and certain other hip joint conditions has always been a compromise between the relief of symptoms and the preservation of function that is still present in the joint.

OSTEOTOMY

If a good range of movement is still present in the hip, the operation of osteotomy fulfils these criteria. It is especially useful in the very early stages of arthritis of the hip, and some authorities insist that it should be confined to this type of case.

ARTHRODESIS

Arthrodesis completely relieves pain, but results in complete loss of movement if it is performed successfully. It is not indicated in older persons with arthritis of the lumbar spine because of the extra strain placed on the spinal joints when hip joint movement is abolished.

ARTHROPLASTY

When the head of the femur is replaced by a metal ball such as Austin-Moore or Thompson prosthesis, only one side of the joint is treated. It is becoming increasingly evident that this unilateral treatment of the arthritic joint is not durable or lasting, even though the acetabulum in some cases is more or less normal and not as markedly involved in the arthritic process as the head of the femur. A perfectly congruous co-adaptation of a metal head with a bony acetabulum is difficult to obtain, and relief of pain and retention of mobility is often only temporary.

The Smith-Petersen interposition cup or mould arthroplasty was and still is an attempt to tackle both sides of the diseased hip joint in order to preserve mobility and abolish pain.

Meticulous selection of candidates for this procedure is essential because not every elderly patient will be found capable of tolerating the prolonged period of intensive rehabilitation required after this procedure. It is, however, useful in the younger arthritic hip sufferer and its particular merit is that if this operation fails then other procedures can still be undertaken.

EXCISION OPERATIONS

Excision operations consisting of total excision of the head and neck of the femur have been done frequently in the past, but these are gradually falling into disfavour and except in rare circumstances, are being completely superseded by the total hip prosthetic replacement.

TOTAL HIP REPLACEMENT

The development of complete hip replacement has been stimulated in recent years by the following surgeons—in England—Charnley, McKee, Farrar, Ring and Scales. In America, McBride and Urist have developed this and in Switzerland, Müller is performing a similar type of procedure.

John Charnley at the Centre for Hip Surgery in Wroughton near Manchester in 1960, described the use of methylmethacrylate or acrylic plastic cement to anchor a metal femoral head into the medullary cavity of the upper femoral shaft. Later he developed an acetabular cup made of high-density Polyethylene which he fixed into the previously roughened acetabular floor with the same plastic cement. Into this acetabular prosthesis, he locked a 32 mm. diameter metal head prosthesis which was cemented into the upper femoral shaft. This so-called Low Friction Arthroplasty of the hip joint has now been performed by him in approximately 2,000 hip joints and such is the humility and sincerity of this surgeon that he is awaiting his 10-year follow-up period before publishing his results. He still wants to dissipate the doubts harboured by him about the biological reaction of tissues to abraded particles of plastic after a 10-year period of wear.

McKee and Farrar of Norwich, England, have used various ball and socket types of metal artificial hip joints.



Fig. 1. Charnley's Type of Plastic Acetabulum and Metal Head.

The appliances used at present consist of a modified metal Thompson's femoral prosthesis fixed into the upper femoral shaft with acrylic cement and this is lapped into a congruous acetabular cup which anchored into the roughened and pitted acetabular floor with a similar plastic cement. They use four types and sizes of prosthesis and cups. The head of the femur and cups are made of Cobalt Chrome Alloy because they have found that stainless steel is not sufficiently inert, and Titanium tends to seize up and bond after a period of use.

Another surgeon, by the name of Ring, uses a screw-in metal cup for the acetabular portion, and a lapped Austin-Moore femoral head which is not anchored into the femur with cement. This operation requires special instruments for insertion such as a guide wire with introducers and cannulated drills and conical acetabular cutter and drivers.

In Switzerland, Müller uses a metal to metal artificial hip joint. The acetabular cup has three high-density Polyethylene plugs, situated in the floor of the acetabular prosthesis:

- (a) To allow fluid to pass in and out of the adjacent metal bearing surfaces and thus assisting in lubrication.
- (b) To provide an exit for any metal particles produced by the wear of the prosthesis.

Scales in England and McBride and Urist of America have also devised certain artificial hip joints.



Fig. 2. McKee-Farrar Metal Acetabulum and Metal Head.



Fig. 3. McKee-Farrar Total Hip Prosthesis cemented into bone.

McKee-Farrar Procedure

At present in South Africa we are using the McKee Farrar procedure which consists of an acetabular metal cup and a Thompson's metal femoral head prosthesis. This is inserted and locked into the bone by means of the acrylic cement. This acrylic cement does not bond to bone but "keys" into the rough surfaces of the bone. After the operation, the legs are tied together until the patient recovers from the anaesthetic to prevent dislocation. Active exercises are commenced on the first post-operative day. It is advisable not to encourage hip flexion at the commencement in case the prosthesis has not been placed at the correct angle of inclination. Excessive flexion may cause the new hip to dislocate. The patients are not given crutches but are encouraged to use two sticks. Only those who have had to use crutches prior to the operation are prescribed crutches for a short period. On the tenth day the sutures are removed and the patient is encouraged to climb stairs. On the 14th to the 21st day the patient is discharged from hospital and is advised to use two sticks for 6 weeks. At the end of this period, the patient can graduate to using one stick for the next 3 months. The patient should be warned against falling and should restrain his activities and be told that he is "wearing-in" a new joint the same as if "running-in" a new car. This is a salvage procedure and the patient should be warned that it is not the same as a normal hip.

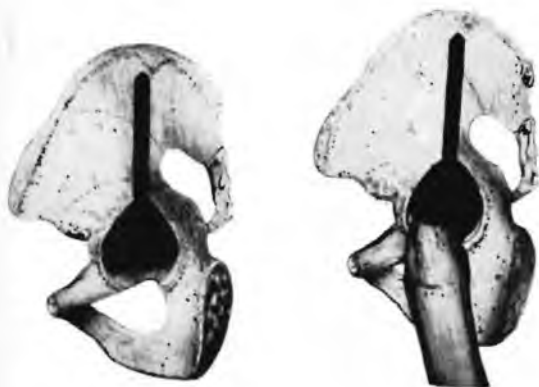


Fig. 4. Ring's Screw-in Hip Prosthesis.

Complications:

1. *Dislocation*: If the acetabular cup has not been implanted at the correct angle, and if flexion of the hip is encouraged too early in the post-operative period, the metal head is liable to dislocate. Careful handling of the patient before he recovers from the anaesthetic is mandatory.
2. *Sepsis*: This is unusual and should be prevented by every means possible. In fact, Mr. Charnley of Manchester has devised a special glass-cage operating theatre with a slight positive pressure to evacuate all air breathed by the surgeon, sister and assistants.
3. *Sciatica*: Fragments of acrylic cement if left lying in the posterior region of the operation site may irritate the sciatic nerve. The wound should be thoroughly inspected and irrigated prior to closure.
4. *Penetration of the Femoral Cortex*: If the femoral prosthesis is not driven into the femur correctly, the stem of this prosthesis may penetrate the femoral cortex. It is important that the surgeon should make

sure that this complication does not arise before he closes the wound.

5. *Loosening of the Cup or Femoral Prosthesis*: This may become loose in the acrylic cement after several months. The patient will then complain of pain on movements especially when getting up from a chair or when commencing to walk. This may require exploration and revision of the operation.

Indications:

1. In unilateral hip conditions when the patient is over 65 years of age or when the patient has retired from work because of age or disability.
2. This operation replaces the need for excision of the head and neck of the femur in conditions where this procedure was indicated in the past.
3. It can be used for failed arthrodesis cases.
4. It can be used for patients who have had previous osteotomies or failed union of fractures of the neck of the femur and particularly in avascular necrosis of the head of the femur.
5. It can be used in ankylosing spondylitis to give the patient a slightly mobile hip joint.
6. It can also be used in patients suffering from failure of Austin-Moore or Smith Petersen Cup prosthesis.
7. It can also be used in patients who have had a congenital dislocation of the hip for many years and are now suffering from a painful osteo-arthritis.
8. Protrusio Acetabuli is another indication.
9. Rheumatoid Arthritis is also a very important indication for this type of prosthetic replacement of the hip joint.

CONCLUSIONS

At the present stage of development of this operation, we must still regard this as a salvage procedure and not as a primary method of treatment. We must adopt a policy of caution and calculation rather than one of intense commitment to this operative procedure. There must be meticulous selection of patients and there must be a full understanding of the details of technique with a full knowledge of the pitfalls and complications likely to arise. If these precautions are faithfully observed and if enthusiasm for this procedure is sensibly restrained, we may be at the dawn of a new era in hip surgery.