EDITORIALS AND ANNOTATIONS

COMPLICATIONS OF ARTHROPLASTY OF THE HIP

There is no doubt that the work of Charnley, McKee and Ring has conferred a great blessing on mankind. No orthopaedic surgeon who has had the experience of this type of arthroplasty of the hip would willingly give it up and return to the older methods of treatment. This feeling has prejudiced surgeons in favour of arthroplasty and has encouraged them to minimise the complications that may occur. It is only now that an adequate number of operations have been carried out that the complications are becoming apparent. Attention is drawn to two aspects of these in the current Journal.

Technical complications are peculiar to each method of arthroplasty and to the surgeon performing the operations. Capability and experience reduce them to a minimum and it is not proposed to discuss these. Mechanical failure is the result of faulty design, and corrections in design have contributed to the steady progress towards an efficient arthroplasty.

In the paper by Anderson, Freeman and Swanson loosening of the cup component is critically examined. Loosening of the femoral component has been previously analysed by Charnley and Kettlewell (1965: J.B.J.S., 47-B, 56). Apart from infection, the three possible elements contributing to loosening of the acetabular part of the prosthesis are defective fixation, bone resorption and a defective prosthesis. Anderson and his colleagues reduce the factors responsible for loosening of the prosthesis to one—thermal bone necrosis at the time of the setting of the cement. There are two interesting conclusions. They suggest that drilling of the floor of the acetabulum need not be as thorough and extensive as was thought to obtain an adequate grip of the cement. They also mention the possibility of fatigue fracture of bone in the presence of a metal or polythene prosthesis. Both these observations tie up with the conclusions of the second paper.

Miller has found that fracture of the pelvis in the region of the acetabular floor may occur after both the McKee and the Ring arthroplasty. The fact that it occurs after the Ring arthroplasty, in which cement has not been used, absolves this from responsibility, but compels one to examine critically the elements common to both operations: these are reaming of the acetabulum and the insertion of a metal component. The known causes of fracture are trauma and infection, but fractures occur spontaneously without significant trauma and without the appropriate pain. The suspicion that these may be fatigue fractures is therefore aroused. The stresses on the acetabular segment of the pelvic ring are still ill understood. It is clear that if the acetabulum is reamed too deeply, serious weakening of the pelvis will occur, and further weakening is produced by drilling of the acetabular floor for the fixation of the acetabular component. On top of this, bone necrosis may be produced by the rise in temperature of the cement as it sets. It is important to notice that so far no fracture of a similar nature has been reported after the use of the Charnley prosthesis or other polythene acetabular cups. While it remains likely that such fractures will at some time be reported, it is probable that their frequency in the Charnley type of arthroplasty is considerably less than with metal prostheses, or they would have been found already. It may well be that the elastic qualities of the polythene insert in some way distribute the stresses more evenly on the acetabular floor and so reduce the risk of fatigue fracture.

Post-operative dislocation remains a risk in all methods. Clearly the relationship of the cup to the metal head is of great importance. A disturbance of the normal relationship may follow attempts at arthroplasty after fracture of the pelvis and in the revision of a

McMurray osteotomy. Another important factor is the insertion of a prosthesis which reduces the length of the femoral neck and so slackens off the pelvi-femoral muscles. Instability from this cause can be controlled by skeletal traction post-operatively. In the rare case of recurrent subluxation, reduction and a period in a plaster hip spica will result in sufficient fibrosis around the hip joint to stabilise it.

Para-articular ossification may develop from three months to three years after operation. Careful technique and removal of all bone dust is mandatory, but in spite of this the complication occurs occasionally, for reasons that are not yet clear. The only known predisposing cause is muscular paralysis in the vicinity of the joint. Fortunately the condition is usually only intermittently painful, and, although movements at the hip are restricted, further operation is seldom required and is generally unwise, as it is likely to be followed by increased para-articular ossification.

There is no doubt that late infection of a seemingly successful arthroplasty occurs, sometimes many years after the operation. One can presume that this is due to a latent infection introduced at the time of operation, although commonsense would seem to deny this probability. Charnley, who has reduced his post-operative infection to 0.5 per cent, believes that late infection is associated with operative infection; as his figures of immediate post-operative infection have fallen, so has the incidence of late infection. This deduction may, however, be erroneous. The avoidance of immediate post-operative infection is a matter of technique and good working conditions. A reduction in the time of operation and of haematoma formation will both clearly influence the risk. Whether the use of a prophylactic antibiotic is justified is a matter for personal choice. It would at least appear that it can do no harm. The article by Wilson, Amstutz, Czerniecki, Salvati and Mendes (1972: *J.B.J.S.*, **54-A**, 207) seems to support this. They give a disturbingly high post-operative infection rate of 11 per cent for an early series of cases, and as a result of this patients were given Oxacillin before operation and for four days afterwards. This eliminated infection in the next 100 cases observed for a total of sixteen months.

An even more alarming incidence of complications is reported by Patterson and Brown (1972: *J.B.J.S.*, **54-A**, 257), amounting to 31.25 per cent and classified as mechanical, biological and technical. The infection rate was 8.15 per cent both early and late.

When deep infection occurs the problem of management is difficult. While it is usually easy to remove the loosened prosthesis from the acetabulum, a pale, superficially dead surface of bone is often presented, and this may go on to minor sequestration. The removal of cement from the upper end of the femur may require fairly extensive resection of bone. Although in many cases a reasonably satisfactory false joint is formed, in some cases infection persists and causes intermittent discharge from the wound.

The chief lesson that one can learn from the two papers presented in this issue is that it is important to avoid excessive acetabular reaming and to reduce the amount of drilling in the acetabulum to stabilise the prosthesis. Smaller holes, if filled with cement, will be as effective as larger ones in preventing torsional strains. A reduction in body weight is clearly of importance, and it is not unreasonable to refuse operation to the over-weight patient until some reduction has been achieved.

The story of the complications of hip arthroplasty is just beginning. It is to be hoped that it will be short and conclusive, and that when the book is finally written, there will be nothing in it which will inhibit the freedom of choice of the orthopaedic surgeon for the arthroplasty that he prefers.

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