Most orthopaedic surgeons base their decision to treat subcapital fractures of the hip on a set of guidelines. Garden in 1971 provided a simple system of grades to guide surgeons. The system is based on displacement of the fracture fragments and relies on the survival of live osteocytes in a compromised, if not totally disrupted, vascular bed. The most displaced fracture—Garden type IV—has no intact nutrient or neck vessels. Only the vessel of the ligamentum teres may survive. Two additional conditions affect the vitality of the displaced femoral head: patient age and the time lapse since fracture. While intra-osseous vessels may not be affected by age, extra-osseous vessels are. Osteocytes do not survive long in the complete absence of a blood supply. Although a few dying osteocytes have been observed within intact femoral head trabeculae for up to 3 weeks after a sub-capital fracture, they appear to be fatally harmed after 12 hours of ischaemia.

After subcapital fracture, there are no completely reliable techniques to determine whether the femoral head is alive or dead. Even intravital tetracycline labelling and technetium-methylene phosphonate radionuclide imaging, is not completely ‘fool-proof’. Therefore many surgeons do not attempt to treat this fracture by reduction and pinning, and, in particular, the acetabular labrum. The labrum increases the dimensions of the acetabular space and reduces the likelihood of postoperative dislocation. In patients who are likely to be sitting in bed or in a wheelchair, an anterior approach will reduce the risk of hip dislocation. The converse is true following a posterior approach.

The patient’s level of activity must also be considered. It influences the choice of arthroplasty. Few people at high risk for subcapital hip fracture are tennis players, but if an individual is very active, a total hip arthroplasty (THA) is better able to withstand hard work and heavy-duty sports, such as skiing, than other treatment options.

Blood transfusion increases the risk of wound infection and should be avoided if at all possible. Among patients who have had surgery for intracapsular fractures of the hip, the overall risk of wound infection is about 4.5%. It is about 7.0% in those who are transfused in contrast with only 3.71% in the non-transfused. Hence a ‘less-blood-losing’ operation would seem particularly advantageous in this type of surgery, although it is best to avoid blood transfusions in any type of surgery.

The above-listed caveats influence the decision on the best choice of femoral head replacement.

Hemiarthroplasty
Austin Moore developed a stainless steel monopolar arthroplasty in 1942 and in 1952 Thompson introduced a similar implant made of cobalt chrome alloy. The cemented or uncemented Thompson prosthesis is still in common use. Of 154 patients followed up for 10 years after hemiarthroplasty, only 46% became...
community ambulators, and 10% remained at home. Their Harris Hip Score did not exceed 69 although the failure rate was only 7.7% at 10 years. Younger patients (aged under 70 years) had a higher revision rate. Failure of a hemiarthroplasty may be the result of pain arising from the metal-to-bone contact within the joint or from femoral stem loosening. Conversion of a failed monopolar to a THA substantially lessens the pain and improves the function. In a meta-analysis of 106 published reports, hemiarthroplasty required revision after 2 years in 6 to 18% of patients.

**Bipolar hemiarthroplasty**

Bipolar hemiarthroplasty may act in more or less the same way as the monopolar procedure, if the bulk of the movement takes place within the acetabulum. In one study, the outcomes in 67 (87%) out of 77 of such patients were rated good or excellent at an average of 5 years after their operation. In contrast, another study recorded that 48 (49%) of 98 of bipolar hip replacements complained of pain at an average of 42 months postsurgery, and 60% had problems with walking. Acetabular wear was seen in 32% although it did not necessarily correlate with the clinical data. Only 31% showed movement within the prosthesis itself.

A ceramic ball inside the bipolar implant may function better than a metal one. No advantage was found between a bipolar and monopolar prosthesis in a group of patients at the end of the postoperative first year. Similarly, no difference of significance has been found in outcome between monopolar and bipolar arthroplasties.

**Total hip arthroplasty**

The decision to use a THA for the treatment of subcapital fracture rests heavily on the age and functional capacity of the patient prior to the fracture. However, the concern over failure rates of monopolar or bipolar arthroplasties and considering the comorbidities prevailing in these older patients, a once only operation should be the goal. Costs of care also need to be addressed, the duration of the operation and the increased possibility of blood transfusion with THA must be weighed.

A simple, inexpensive set of implants, cemented because of the wide endosteal femoral canal, has its advantages. Fit and active patients may require more expensive implants that endure longer even with active, heavy use. Comparison of 32 THA and 42 hemiarthroplasty patients 4 years post surgery showed that none of the former required revision, whereas 38% of the latter were revised to THAs. The THA patients had a Harris Hip Score of 86, but only 12% of surviving hemiarthroplasties achieved such a high score. Two (6%) of the THAs dislocated. 76% of the THA patients could walk a mile, but only 27% of the surviving hemiarthroplasties could do so. A prospective randomised trial compared the mortality, morbidity, and functional results of internal fixation, hemiarthroplasty, or THA in 270 patients >65 years. The 13-year results showed no difference in mortality, but those having internal fixation or hemiarthroplasty did not do well. Their revision rate was 33% and 24%, respectively, whereas only 6.5% of the THA patients needed revision. The Harris Hip Score for internal fixation was 62, for hemiarthroplasty, 55 and for THA, 80. THA provides the least pain and the greatest mobility in both the short and long term.

The prevailing numbers of hip fractures at present and the numbers expected in the future make the costs of care a serious challenge for health administrators. Efforts at minimising the prevalence of hip fractures may succeed, but they will not be eliminated. Surgeons must choose the optimal procedure for each patient in his or her community, bearing in mind costs, rapidity of recovery, quality of life, and the endurance of the implant. There is little to choose between the costs of monopolar, bipolar, and THA, after taking account of outcome variables including postoperative complications, length and cost of hospitalisation, functional recovery and quality of life. The mean hospitalisation costs for patients who had bipolar arthroplasty was 30% more than for having a monopolar procedure. However, better long-term results with THA make it more effective than internal fixation, monopolar, or bipolar arthroplasties and even in economic terms, it appears to be the best option.

In summary, monopolar and bipolar arthroplasties are less enduring than THA, and are not suitable for younger, more active patients. Bipolar arthroplasty may favour early mobilisation but may develop some of the negative characteristics of monopolar implants whenever motion is not principally at the internal joint. Should there be a dislocation, monopolar implants are more amenable to closed reduction than when they are bipolar. THA provides early mobilisation, no increased morbidity at the time of surgery, and more reliable long-term pain relief. The increased rate of early dislocation may be a reflection of the surgeon’s skill rather than any inherent failure of THA design. THA may be the only option if there is pre-existing arthritis in the hip, significant osteoporosis, or Paget’s disease of the pelvis. Monopolar arthroplasty
can be recommended for patients whose ambulation is likely to be very limited or if they have debilitating illness. For all others, THA seems to be the best option.

REFERENCES