To know whether minimally invasive hip surgery will eventually replace standard hip-replacement surgery one would need a crystal ball, but certainly it is a winning idea. Everybody, especially patients, would like surgery to be less painful, have smaller incisions and recover faster from the procedure. This is what minimally invasive hip replacement promises and if it can deliver what it promises it would certainly be a winner.

I consider myself a relatively young orthopedic surgeon, but if I chronicle my age against the changes in surgery that have occurred since I started in medicine I would have to consider myself old. Who would have thought at the time of my training that arthroscopic meniscectomy, arthroscopic anterior cruciate ligament reconstruction, arthroscopic shoulder stabilization, and other endoscopic procedures such as cholecystectomy and appendicectomy would have ever been possible? These procedures have become the accepted standard and have resulted in less patient morbidity and faster recovery. Would any of us now consider having an open meniscectomy? I’m sure the answer is no, but I can remember when arthroscopic surgery was ridiculed as a triumph of technology over good sense just as minimally hip surgery is being ridiculed now. To me it sounds like the same tune just to a different drum.

Even two years ago the concept of minimally invasive hip replacement seemed ridiculous. In fact, I resented the concept as hip replacement remained one of the few bastions of anatomical dissection that is such a delight to most surgeons. Even now, mere discussion of the technique with colleagues seems to arouse the emotion of anger. Standard total hip replacement is one of the great surgical successes of the past one hundred years and who would have thought that something as successful as hip replacement could ever have been challenged as the standard procedure. Most of us would wonder how could we make a procedure that appears to be such a perfect technique even better. It is, however, the testing of such boundaries that leads to improvement and if people did not push the boundaries, we would still be riding horses and traveling in carts.

I first became aware of the technique of minimally invasive hip surgery when I read about it in an orthopedic publication, but I quickly and in an off-handed manner disregarded what I read. It was not until one of my research fellows asked about a research project for his upcoming research year that my interest in the procedure was aroused. At that time the consequences of wear debris and minimally invasive total hip replacements were the controversial topics in joint-replacement surgery and on this basis we decided to research the possibility of minimally invasive total hip arthroplasty.

Dr. Gary Heynan from Auckland in New Zealand was at that time performing the two-incision technique and had accumulated extensive experience using this technique. We traveled to New Zealand to observe the procedure. I was surprised by the remarkably simple concept and astonished to see the rapidity of patient recovery with some patients actually being discharged from hospital the day of surgery. On return to Australia, an ideal patient was chosen and with some trepidation we went ahead with the procedure, using the two-incision technique that we had witnessed in New Zealand. The surgery went surprisingly well with little struggle and the patient has done well. The second case also went smoothly, but with the third and fourth cases we struck difficulty due to poor placement of the proximal incision that resulted in poor alignment of the femoral reamer leading to femoral shaft perforation. As a result of the perforation, the wound required extension to...
allow better exposure of the proximal femur and insertion of a prosthesis that bypassed the femoral perforation. Luckily, the patients’ post-operative recovery was uneventful and subsequently they have done well, but this experience gave me severe reservations about the safety of the two-incision technique. I recall also, as I extended the wound for better exposure, my alarm at the amount of damage to the abductors which had been sustained during the preparation of the femur. I could envisage that if this procedure became widely used in the general orthopedic community, we would see a sharp rise in the number of surgical complications. The experience led me to explore other minimally invasive techniques.

One particular orthopedic company in Australia has heavily promoted the use of a two-incision technique and has run cadaver workshops and organized surgeon visits on the technique. Australian orthopedic surgeons initially showed a lot of interest, but it comes as no surprise to me that many surgeons who tried the technique enthusiastically after attending these workshops have subsequently abandoned the procedure and reverted to standard approaches or other minimally invasive techniques.

To those who wish to attempt this technique I would recommend the following. The procedure can be confronting and it is easy to get into difficulties during the surgery so it requires a sense of adventure and a desire to get out of one’s comfort zone.

It is essential to attend cases with an experienced surgeon and trial the technique if possible in a cadaver laboratory before proceeding to live cases. Be aware that the learning curve for this procedure is extremely steep. As the procedure is much easier in thin patients I would strongly recommend for the first few cases to select only thin patients.

As the procedure requires the use of image intensification, I have employed the use of a Jackson spinal table. This allows easy access for the image-intensification machine and provides a relatively unobstructed view of the procedure.

The procedure takes longer than with standard techniques so it is important to warn your anesthetist and choose a patient anesthetist.

Special instruments have been designed to perform the procedure and it is essential that you obtain and become familiar with these new instruments. Most companies provide specially designed retractors and these are essential for improved exposure. As the incision is small, it is difficult to illuminate the depths of the wound with a standard operating theatre light and specially designed low-profile light sources are required. As the incision is small and mobilization of the proximal femur difficult through the small incisions modified acetabular reamers are required to minimize damage to the hip muscles. A specially designed acetabular component inserter is also required to allow proper orientation of the acetabular component. As the preparation of the femur is performed through the abductor muscles, special femoral reamers and broaches are required to minimize damage to the abductor muscles during this preparation. As the buttock and the iliac crest make access to the proximal femur, difficult broach handles with a reversed angle are required to avoid these obstacles. With this technique it is difficult to insert all types of prosthesis, so some surgeons may require a change in type of prosthesis that they use. If this were the case, I would strongly recommend that you become familiar with the prosthesis using a standard open procedure before attempting the two-incision technique. At this stage, I do not think that it would be possible to use a cemented femoral component with the two-incision technique. It is almost inevitable that you will strike difficulties at some time using the procedure. If this occurs, a more extensive exposure will become necessary. As the patient is supine, extension of the exposure has to be done through an anterolateral approach. If you are not familiar with this approach, it should be practiced preferably with a cadaver before proceeding with a trial of the technique.

In summary the two-incision technique is possible and can go smoothly with a good result in some cases but I have the following concerns. The procedure is technically challenging and small mistakes can have serious consequences. The lack of exposure and the lack of surgical “feel” increase the risk of component mal-positioning. Mal-positioning increases the risk of dislocation and component loosening. As visualization and surgical feel are compromised, the possibility of incorrect sizing of the components is increased. Insertion of a component that is too small increases the chance of component loosening while insertion a component that is too large increases the risk of femoral shaft fracture. The lack of adequate exposure can cause unnecessary muscle damage and there may be an increased incidence of nerve damage as a result of this.
Even if studies in the future find that the two-incision technique results in shorter hospital stays and faster rehabilitation, I am not convinced that the risks involved with the surgery make the benefits worthwhile.

The fears that I have with the two-incision technique lead me then to explore the mini-posterior approach. As I have always used a modified Hardinge approach for my standard hip replacement changing to a mini-posterior had the two difficulties for me of becoming familiar with the posterior approach and also using a small incision. At first I found it cumbersome and uncomfortable but with perseverance and some work in a cadaver laboratory combined with the development of a purpose designed instrument set the operation has become comfortable and now my standard procedure for uncomplicated total hip replacement even in the more obese patient. For those familiar with the posterior approach and having the retractor instrument set available, I think they will quickly learn the technique and become comfortable with it without much difficulty. I have found certain tricks that have helped to make the procedure less difficult.

Firstly, in positioning the patient in the lateral decubitus position place the contralateral lower limb with the hip extended and the knee flexed. This differs from the standard practice where the contralateral lower limb is normally flexed at the hip and the knee. Having the hip extended allows the upper hip to be more adducted and allows for better exposure of the proximal femur for preparation of the femoral canal and insertion of the femoral component.

Take time to remove the fat and bursal tissue just posterior to the greater trochanter as later in the procedure this will help to identify important landmarks.

Once the hip has been dislocated, remove any remaining capsule and stumps of the external rotator tendons from the area behind the greater trochanter. This gives an excellent view of the femoral neck so that femoral neck resection angle and length can be better estimated.

I use a spiked curved retractor that I place just anterior and superior to the acetabulum and hammer this into the ilium. This allows excellent retraction of the proximal femur to allow exposure of the acetabulum. A second curved spike retractor is then placed behind the acetabulum at the junction of the ischium and the ilium and this retracts the neurovascular bundle the capsule and the external rotators posteriorly and completes the exposure of the acetabulum.

To expose the proximal femur I use a curved spiked retractor over the greater trochanter underneath the tendons of the gluteus medius and the gluteus minimus and a special curved retractor that is placed under the capsule. With these two retractors, excellent exposure of the proximal femur can be achieved and standard femoral preparation then proceeds.

Using this technique, I have found that the mini-posterior approach provides excellent visualization of the acetabulum and the femur. It allows accurate sizing of the femoral and acetabular components and accurate component positioning. Trialing of the components is no more difficult compared to when using a standard posterior approach and I am able to assess stability leg length and offset much more adequately than I can with a two-incision technique. The neurovascular bundle is identified and can be protected adequately. A more accurate assessment of leg length is possible minimizing the possibility of a leg length discrepancy. The approach allows for use of standard components without the necessity to change component types. It allows for either press fit or cement technique. If difficulties are encountered, the surgical approach is easily extended.

I have been using the mini-posterior approach as my standard technique for the last twelve months. The differences in patient outcomes are difficult to quantitate objectively but it is certainly my impression that patients have less pain, mobilise quicker and are happier compared to patients having the standard approach. Patients that have had their other hips replaced not using the mini-incision technique almost universally comment on the relative ease of the second procedure. My physiotherapist who has been working with me for almost thirteen years, has commented without prompting that the patients have less pain and are easy to rehabilitate. Surgeons may not be keen on the technique but the patients are and word travels quickly in the osteoarthritic community. Patients are now beginning to ask about the surgical technique and are starting to demand a less invasive approach. With the increased demand by patients and the encouraging experience that I have had as well as the apparent lack of increased complications I am certain that mini incision hip surgery like other minimally invasive techniques will become the expected norm.

At almost all of the meetings I attend presentations conclude that there is no difference in results at one year comparing patients who have had minimally invasive surgery to those who have had standard hip surgery.
Chapter 24: Is Minimally Invasive Hip Replacement a Winning Concept?

This finding is used to conclude that minimally invasive surgery is not good. To me the result is positive for minimally invasive surgery; after all, minimally invasive surgery promises only improvements in the post-operation period hopefully without jeopardizing longer-term results. There is no reason why minimally invasive surgery should improve the results at one year. The results at one year comparing open and arthroscopic ACL reconstruction would show little difference, but who would recommend open reconstruction?

I feel that we have become a little complacent towards hip arthroplasty. One of the other good aspects of this debate has been the reassessment of the procedure that has occurred. New instruments such as retractors, broach handles, component inserters and better light sources for confined spaces have all been positive spin offs of the new procedure. Also, dramatic changes in treatment protocols have occurred. These include better pain-control protocols, faster rehabilitation with earlier weight-bearing and better patient education to facilitate early discharge.

I am confident, however, that surgeons who do not learn and start using minimally invasive techniques will be left behind as surgeons who embrace the procedure will be sought by patients. I am sure, improvements will happen, instruments will improve and prosthetic design may even change to suit the technique, new muscle-sparing approaches will be introduced and the prospect of help from computer-assisted navigation instruments is exciting.

Minimally invasive hip replacement is a winning concept and in fact it has already scored many points. It has stimulated new instrument designs, the development of more rapid rehabilitation programs and the development of better pain-control protocols. It has made us realize that our previous incisions were longer than necessary.

I’m afraid that surgeons who continue to practice hip replacement using standard exposures will be left behind by patients just as those who failed to take up other minimally invasive techniques such as arthroscopic knee surgery were left behind.

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