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A Prospective Study Comparing a New Method of Tissue-Preserving Total
Hip Arthroplasty to Conventional Total Hip Arthroplasty: Assessment of
Recovery and Complications

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Introduction. Each surgical exposure chosen for performing total hip arthroplasty has advantages and disadvantages. The posterior exposure has an increased risk of post-operative dislocation. The direct lateral exposure results in an increased risk of delayed or incomplete abductor recovery. The transtrochanteric exposure risks trochanteric nonunion. The anterior exposure increases the risk of abductor injury and lateral femoral cutaneous nerve injury and presents difficulties in instrumenting the femur. More recently, smaller incision or minimally-invasive exposures have been advocated. One study has shown that use of the mini-posterior exposure increases the risk of several perioperative complications. Several studies have also documented the increase in perioperative complications associated with 2-incision exposures including lateral femoral cutaneous nerve palsy, femoral nerve palsy, component malposition, and intraoperative femur fracture.

A new method of tissue-preserving total hip arthroplasty using a superior capsulotomy was developed with the goal of accelerating recovery while simultaneously maintaining or even reducing the already low perioperative complication rate associated with conventional total hip arthroplasty techniques. The current study prospectively compares the results of a sequential series of THA performed using the tissue-preserving, superior capsulotomy exposure (study group) to a sequential series of conventional THA using a modified direct lateral exposure (control group).

Methods:

Operative Techniques and Post-operative Rehabilitation:

Control Group: Modified Direct Lateral Exposure. The direct lateral exposure was performed in the lateral position. The anterior 1/3rd of the medius, entire minimus, and anterior 1/2 of the hip joint capsule were reflected anteriorly with a thin bony wafer of the anterior part of the greater trochanter. Following implantation, the superior capsule was closed and the abductors were repaired with simple and horizontal mattress transosseous sutures. Post-operatively, patients were allowed unrestricted range of motion, but were asked to continue 50% weight-bearing with two crutches for 6 weeks.

Study Group: Tissue-Preserving Superior Capsulotomy Exposure. With the patient in a lateral position, a 6 to 8 cm incision was placed proximal to the greater trochanter. After spreading the gluteus maximus, the medius and minimus were reflected anteriorly and the piriformis was incised and reflected posteriorly. The posterior capsule and short external rotators were left intact. Through an incision in the superior capsule, the femur was reamed and broached, the neck was transected with the broach in place, and the femoral head was excised using a shanz screw and a slap-hammer. The socket was then reamed and the acetabular component implanted with angled instruments. After implantation of the components, the superior capsule was closed. Post-operatively, the patients were allowed unrestricted motion and progression of weight bearing.

Materials. 107 consecutive total hip arthroplasties performed using a tissue preserving technique through a superior capsulotomy (study group) were compared to 131 consecutive total hip arthroplasties performed using a modified direct lateral exposure (control group). All procedures were performed by the same surgeon at the same hospital using the same implants. In order to have a control group of similar complexity to the study group, 14 of the 131 consecutive control cases were excluded as they were deemed too complex to have been performed using the tissue preserving technique. This left 107 total hip arthroplasties in each group. Reasons for exclusion due to complexity were deformity and hardware in the femur and/or pelvis (6), protrusio (3), post-traumatic deformity (2) deformity due to dwarfism (1), deformity due to Paget's disease (1), and deformity of both the femur and pelvis due to DDH (1).

Study Group Demographics. There were 59 men and 48 women. The mean age at surgery was 56 years with a standard deviation of 12.0 years. Five patients had a history of prior surgery. One had a prior pelvic osteotomy, two had a prior femoral osteotomy, one had a prior ORIF of the femur, and one had a core decompression.

Control Group Demographics. There were 55 women and 52 men. The mean age at surgery was 53 years with a standard deviation of 14.8 years. 4 patients had prior surgery. Two had a prior arthrotomy and trochanteric osteotomy, one had a prior femoral osteotomy, and one had a prior pelvic osteotomy.

Results. Neither group had a patient sustain a hip dislocation despite allowing unrestricted range of motion postoperatively. Neither group had an intraoperative femur fracture. Both groups had one intraoperative greater trochanteric fracture treated at the time of surgery. Cup position was similar in both groups with the direct lateral group having a mean abduction angle of 40.5 +/- 4.0 degrees and the superior capsulotomy group having an mean abduction angle of 43.3 +/- 3.6 degrees. 76 of 107 control procedures were performed with computer-assisted navigation of cup insertion. 96 of 107 study procedures were performed with computer-assisted navigation of cup position. There were 4 implant-related reoperations in the control group including one I&D for acute infection, one traumatic post-operative greater trochanteric fracture requiring ORIF, and two cases of early post-operative abductor injury requiring repair. There was one implant-related reoperation in the tissue-preserving, superior capsulotomy group. This patient had unrecognized displacement of the acetabular component during surgery requiring acute correction. Assessment of post-operative function by Merle D'Aubigne scoring demonstrated a statistically significantly accelerated return to normal unaided gait at 1st follow-up in the study group as compared to the control group.

Discussion.

Perioperative complications can occur with any surgical exposure for total hip arthroplasty but have been shown to be more frequent with some minimally invasive methods. If minimally invasive techniques accelerate recovery in a majority of patients but also result in an increased rate of complications and reoperation, the practice of those minimally invasive techniques may not be justified. The tissue-preserving technique described here was specifically

designed to allow rapid transition to a conventional exposure if necessary and designed to allow direct visualization and protection of the abductor muscles while preserving the short rotators and posterior capsule. The hip is not dislocated during surgery since this act of displacement requires destabilization of the joint by release or disruption of the surrounding tissues. While more technically demanding, the technique can be performed in the same or less time than the conventional direct lateral exposure. The finding of only one reoperation in this group combined with an absence of dislocations and intraoperative femur fractures is encouraging. As compared to a conventional direct lateral exposure, the technique clearly accelerates recovery and shows promise in decreasing, rather than increasing the incidence of peri-operative complications.

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