Total Hip Arthroplasty: Comparison of Two-Incision and Standard Techniques at an AOA-Accredited Community Hospital

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Context: The two-incision approach to total hip arthroplasty (THA) has received increasing attention in recent years. However, the benefits of this procedure have been debated.

Objectives: To evaluate the two-incision THA technique compared to the standard anterolateral THA approach in a community hospital setting.

Methods: A retrospective review of records from patients who had THA at Memorial Hospital of York in Pennsylvania. Outcomes for patients who received the two-incision THA technique were compared to those who had a standard anterolateral THA approach. Perioperative parameters included operation duration and complication rates. Early function was evaluated by hospital length of stay and whether patients were discharged home or to a rehabilitation center.

Results: Twenty-eight patients had 30 THAs with a two-incision technique, and 30 patients had a standard anterolateral THA. Demographic parameters were similar among both groups. The two-incision THA group had a longer mean operation time by 34 minutes but shorter hospital stay by 0.8 days. Patients in the two-incision THA group were discharged to home 87% of the time compared to 43% in the anterolateral group. In addition, 4 patients (13%) in the two-incision group had an orthopedic complication compared to no complications in the anterolateral group.

Conclusion: There were longer operative times, shorter hospital stays, and higher complication rates among patients who received the two-incision THA. Patients who receive the two-incision THA should be selected carefully and advised about the potential for increased complications.

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Methods
We retrospectively reviewed the records of patients who received a two-incision THA operation between January 2004 and February 2006 at Memorial Hospital of York in Pennsylvania. All THA procedures were performed by a general orthopedic surgeon (M.F.M.), who has performed an average of 25 standard THA procedures per year since 2002.

To compare outcomes, we also retrospectively reviewed records of patients who received a standard anterolateral THA approach by the same surgeon during the same period. The institutional review board at Memorial Hospital of York approved the present study.

Surgical Approaches
The two-incision approach conformed to the process described by Berger and Duwelius. First, an anterior incision and dissection through the interval between the rectus femoris and tensor fascia lata muscle was used to expose and implant the acetabular component. Another incision, proximal and slightly posterior to the greater trochanter, was made in the buttock using the interval between the hip abductors and external rotators to allow for implantation of the femoral component. Intra-operative fluoroscopy was used as needed to aid in placement of both components.

For the anterolateral group, the Harding approach was used. An incision was centered over the greater trochanter. Deep dissection was applied through the tensor fascia lata muscle and by reflecting the anterior one-third of the gluteus medius and minimus muscles to expose the hip capsule, which was incised and repaired upon closure. The abductor sleeve was then repaired with the use of drill holes through the greater trochanter.

The two-incision technique was used for more standard, straight-forward patients with a body mass index less than 35 and substantial leg length discrepancy (<2 cm).

All patients received an uncemented acetabular component (Triology; Zimmer Inc, Warsaw, Indiana). Patients received either a proximally porous-coated taper stem (wedge-fit, medial/lateral M/L Taper; Zimmer Inc) or a fully porous-coated stem (Versys; Zimmer Inc).

Recovery
Postoperatively, patients received 24 hours of prophylactic antibiotics. Warfarin sodium therapy was prescribed for 4 weeks to prevent deep venous thrombosis. On the first postoperative day, patients were allowed to stand, and physical therapy—including strengthening exercises and full weight-bearing, as tolerated—was initiated. Physical therapy occurred twice daily while the patient was in the hospital.

Patients were discharged to home when pain was adequately controlled with oral medications, vital signs were stable, and hematocrit level was greater than 21. Patients were discharged to a rehabilitation center when it was believed that they needed a subacute level of rehabilitation as assessed by physical therapist evaluations. On dismissal from the hospital, patients were encouraged to continue hip-strengthening exercises three times per week for life.

Data Analysis
Descriptive analysis was performed using data on a Microsoft Office Excel spreadsheet (Microsoft Corporation, Redmond, Washington) to qualitatively compare the groups with regard to blood loss, operative time, complications, and time to discharge.

Results
A total of 28 patients received 30 two-incision THA procedures (ie, 2 patients received hip replacements in both hips). The standard anterolateral THA group comprised 30 patients, each of whom had the procedure once, totaling 30 anterolateral THA operations. Each group was similar according to several demographic parameters (Table 1), though patients who received the two-incision THA had a lower body mass index.

In the two-incision group, 22 proximally porous-coated taper stems and 8 fully porous-coated stems were used. Likewise, the anterolateral group had proximally porous-coated taper stems in 22 hips, with 8 hips receiving a fully porous-coated stem.

Patients in the two-incision group had a longer overall mean time of operation (166 min; range, 107-236 min) compared to the anterolateral approach (132 min; range, 108-197 min) (Table 2). In the two-incision group, 7 operations lasted longer than 3 hours. Mean intraoperative estimated blood loss for the two-incision approach was 713 mL compared to 512 mL for the anterolateral approach. Blood transfusions were
required in 8 patients (29%) in the two-incision group and in 9 (30%) of those in the anterolateral group.

The length of stay was shorter for patients who underwent the two-incision THA than for those who had the anterolateral approach. Mean length of stay for the two-incision group was 2.2 days (range, 1-10 days) compared to 3 days (range, 2-4 days) for the anterolateral approach. Twelve patients (40%) who underwent the two-incision THA were discharged to home on postoperative day 1. In total, 25 patients (89%) who underwent the two-incision approach were discharged to home, while 13 (43%) who had the anterolateral approach were discharged to home.

The complication rate was higher in the two-incision cohort. Orthopedic complications occurred after 4 (13%) of the 30 THAs performed using the two-incision technique compared to no complications in the anterolateral group. These complications included reoperation in 2 patients who had calcar fractures. In 1 recovering patient, a dislocation and calcar fracture were recognized on a postoperative radiographic scan. The patient was returned to the operating room and had a revision to a distally fully porous-coated stem with a cerclage wire placed around the proximal femur. Another patient complained of persistent groin pain, and 2 weeks postoperation, a calcar fracture was found on a postoperative radiographic scan. The patient was returned to the operating room where revision to a distally fully porous-coated stem and placement of a cerclage wire around the proximal femur through an anterolateral approach was performed. Both of the patients who sustained calcar fractures recovered fully and went on to full weight-bearing without further incident.

Two patients in the two-incision group developed femoral nerve palsies that resolved completely within 12 months. In addition, one patient in the two-incision group had a nonorthopedic complication (pulmonary embolism), which was successfully managed with anticoagulation therapy.

Comment
As mentioned earlier, patients and surgeons have expressed considerable interest in minimally invasive THA approaches. In addition to the two-incision technique described in the present study, standard anterolateral and posterior approaches have been applied through smaller incisions with purportedly less damage to muscles and tendons.11,12 However, such approaches are not without risk.

The technical difficulty associated with the two-incision technique has been reflected in increased operative times, both in the present study and in previously published studies.6,8,13 For example, the increased operative time we noted has been seen by the developers of the two-incision technique as many of their cases initially exceeded 2 hours.14

As reported by the four surgeon developers of the two-incision technique,14 in 375 operations, 2.1% of patients had minor complications and 1.3% had major complications. These complication rates are low compared to the 14% complication rate noted by Pagnano et al,8 who also reported a 5% reoperation rate.

As described in the present study, 2 patients (6.8%) in the two-incision group required reoperation because of calcar fractures. We attribute the calcar fractures to the use of a proximal wedge fit stem. Neither fracture was identified in the operating room—one was recognized in the recovery room and the other at 2 weeks postoperation. We believe that these fractures might have occurred with a standard open procedure if the same stem was used. The femoral nerve palsies, which occurred in 2 patients (6.8%), may have been avoided by different placement of acetabular retractors, as it is critically important to place the anterior retractor underneath the rectus femoris muscle.

With use of a rapid rehabilitation protocol among young patients with the procedure occurring as the first of the day, Berger7 reported sending 97 of 100 patients home the day of the operation. By comparison, patients in the present study who received the two-incision THA were discharged home from the hospital at an average of 2.2 days, with 40% of them going home on postoperative day 1 and 86% of them discharged to home.

It is important to note that we applied the two-incision technique to an unselected consecutive patient population in a community setting and performed these operations in a 125-bed hospital without the major benefits of a dedicated total-joint replacement center. Unique challenges to performing the two-incision THA in a small community hospital include working with different operating room staff on a weekly basis, fewer resources for purchasing newer and more expensive equipment, and less overall surgical volume specific to one single hospital.

### Table 2

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Two-Incision Group, mean (range)</th>
<th>Anterolateral Group, mean (range)</th>
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<tbody>
<tr>
<td>Operative Time, min</td>
<td>166 (107-236)</td>
<td>132 (108-197)</td>
</tr>
<tr>
<td>Estimated Blood Loss, mL</td>
<td>713 (100-3000)</td>
<td>512 (200-1800)</td>
</tr>
<tr>
<td>Orthopedic Complications, No. (%)</td>
<td>4 (13)</td>
<td>0</td>
</tr>
<tr>
<td>Hospital Stay, days</td>
<td>2.2 (1-10)</td>
<td>3 (2-4)</td>
</tr>
<tr>
<td>Discharge Home, No. (%)</td>
<td>25 (89)</td>
<td>13 (43)</td>
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</tbody>
</table>

* Data presented as mean (range) unless otherwise noted.
† In the two-incision THA group, 28 patients received a total of 30 THAs.
‡ Re-operation for calcar fractures was needed in 2 patients, one of whom had a dislocation. Two patients had femoral nerve palsies that resolved completely in 12 months. In addition, 1 patient had a nonfatal pulmonary embolism.
operation. Physicians performing these operations in high-volume at centers dedicated to total-joint replacement likely do not encounter these situations.

We found the two-incision THA procedure to be more difficult than the anterolateral technique. With application of this technique, considerable patience is required for learning by the surgeon. As noted by Bal et al., complication rates and reoperations are likely to decrease with surgeon experience. In addition, not all patients are suitable candidates for this type of minimally invasive procedure. The ideal patient for the two-incision approach is a thin and young patient with low risks for peri- and postoperative complications. However, these qualities may not reflect the general population in a community setting.

Limitations
One limitation of the present study was that patients were not randomly assigned to the type of THA approach they received. The retrospective study design and patient selection for the two-incision approach may have led to a bias in the results, though most of the differences between the two groups were not substantial (Table 1). In addition, because the operations occurred in a general orthopedic practice that serves a small community, there were a limited number of patients. Another major limitation of this study was that in performing the two-incision THA approach, we were early in the learning curve compared to the standard anterolateral approach. As described in other studies, the technical difficulties associated with the two-incision procedure are high, but operation time and complications may decrease with surgeon experience.

Conclusion
The two-incision THA can be performed in the community setting. However, surgeons and patients should expect longer operative times and initial increased risk of complications in addition to the reported benefits of two-incision THA. We believe that with increasing experience, time of surgery and complication rates will dramatically decrease.

Although we continue to use the two-incision approach in carefully selected patients who request the procedure, we caution them about the increased risk of complications. Otherwise, we use the standard approach.

References