Effect of Immediate Full Weight Bearing on Abductor Repair and Clinical Function After THA Through a Modified Hardinge Approach

THOMAS L. BERNASEK, MD; NAGA KIRAN THATIMATLA, MD; MELISSA LEVERING, BS; GEORGE J. HAIJUKWEYCH, MD

Abstract

This study evaluated the effect of immediate full weight bearing on abductor repair and clinical function after total hip arthroplasty (THA) using a direct lateral (modified Hardinge) approach. The surgical approach detached a bone flake with the abductors, providing a radiographic marker for abductor displacement and healing. Patients in whom weight bearing was restricted for 6 weeks (partial-weight bearing group) were compared with patients who were immediately weight bearing (full-weight bearing group). A total of 307 patients (309 hips) were followed for a mean of 14 months (range, 12-36 months). The partial-weight bearing group (163 patients) underwent 6 weeks of partial weight bearing, and the full-weight bearing group (146 patients) underwent immediate full weight bearing. The abductor repair was assessed radiographically via the bone flake harvested with abductor muscles. Nonunion of the abductor bone was observed in 12 (7%) patients in the partial-weight bearing group and 9 (6%) patients in the full-weight bearing group ($P=0.55$). Patients in the full-weight bearing group had significantly earlier discharge from hospital than the partial-weight bearing group (2.6 vs 3.5 months, respectively; $P=0.0021$). Patients in the full-weight bearing group had a higher mean Engh score (6.58) radiographically than did patients in the partial-weight bearing group (4.92) ($P=0.0005$). No difference was observed in Harris Hip Score, limp, thigh pain, high-grade heterotopic bone, trochanteric bursitis, or stem subsidence between groups. Restricting weight bearing postoperatively to protect the Hardinge abductor repair appears unnecessary, and recovery of activity is improved with immediate weight bearing.

The authors are from the Division of Adult Reconstruction (TLB, NKT), Florida Orthopaedic Institute; the Foundation for Orthopaedic Research and Education (ML), Tampa; and Orlando Regional Medical Center (GJH), Orlando, Florida.

The authors have no relevant financial relationships to disclose.

Correspondence should be addressed to: Thomas L. Bernasek, MD, Division of Adult Reconstruction, Florida Orthopaedic Institute, 13020 Telecom Plkwy N, Tampa, FL 33637 (mlevering@foreonline.org).

doi: 10.3928/01477447-20130222-12
Displacement of the abductor repair after a direct lateral approach to the hip can result in a persistent limp, hip instability, and chronic trochanteric pain. To protect the repair, the authors routinely restricted weight bearing during the first 6 weeks of rehabilitation. With the contemporary emphasis on rapid rehabilitation, they altered their postoperative program to allow immediate full weight bearing. A direct lateral approach takes a thin trochanteric flake in continuity with the detached abductor tendons, resulting in a radiographic marker for abductor detachment and a means to assess the influence of early weight bearing on abductor healing. They were also able to determine the effect of detachment on clinical outcome, including limp and trochanteric pain. The purpose of this study was to assess the effect of early weight bearing on healing of abductor repair using the direct lateral (Hardinge) approach and to correlate weight bearing with the early clinical outcome.  

**Materials and Methods**

Institutional review board approval was obtained for this retrospective analysis. Between April 2003 and May 2005, a total of 329 patients underwent primary total hip arthroplasty by a single surgeon (T.L.B.) at the authors’ institution. Twenty-two patients were lost to follow-up, leaving 307 patients (309 hips) in the study group. Mean clinical follow up was 14 months (range, 12-36 months).

All patients were treated with THA performed through a direct lateral (Hardinge) approach that was modified by taking a thin trochanteric bony flake in continuity with the mobilized anterior two-thirds of the gluteus minimus tendon and the entire gluteus medius tendon. This facilitated the bone-to-bone repair with braided non-absorbable sutures. All acetabular components were uncemented (Pinnacle System; DePuy, Warsaw, Indiana). All stems were Summit tapered titanium, proximally porous-coated, collarless stems (DePuy) prepared with a conical reamer and broach technique.

Patients were categorized into the partial-weight bearing group (n=163) or the full-weight bearing group (n=146) based on postoperative weight-bearing restrictions. Demographic data reflected no differences between the 2 groups (Table). All patients received the same protocol-based home health physical therapy and nursing care with regular written reports to the surgeon. Partial weight-bearing patients were allowed 20 lb weight bearing using 2-arm support (a walker at all times) for 6 weeks. Active abduction and flexion more than 90° was not permitted. After 6 weeks, patients were weaned to weight bearing as tolerated, initially with a cane. Cane use was discontinued when patients were able to walk with minimal or no limp. Full weight-bearing patients were instructed to walk initially with weight bearing to tolerance with 2-arm support and to progress to a cane for balance as soon as they felt comfortable. They were allowed to discontinue gait aids at their own pace. Active abduction was not permitted for 6 weeks.

Both cohorts were closely monitored by the home health physical therapists who provided written progress evaluations at each follow-up visit. Progressive range of motion, ankle pumps, and quadriceps and gluteus maximus isometric exercises were allowed for both cohorts. Standard patient clinic follow-up visits occurred at 2 and 6 weeks, 3 and 6 months, and until discharged at the surgeon’s discretion to annual follow-up when the patient achieved independent ambulation without cane. Clinical and radiographic data were collected at each follow-up. All patients received routine antibiotics and warfarin for deep venous thrombosis prophylaxis. Patients were discharged from the hospital when medically stable and ambulatory.

Clinical and radiographic data were collected at regular postoperative intervals. Harris Hip Scores were obtained. Specific queries were performed regarding thigh pain, trochanteric pain, and Trendelenburg limp. Immediate postoperative and final follow-up radiographs were examined for evidence of bony flake migration, stem subsidence, component fixation, and radiolucencies using Engh’s radiographic criteria. Component subsidence was assessed by MedView imaging software (MedImage, Ann Arbor, Michigan) by measuring the distance from the center of the femoral head to the tip of the greater trochanter. The measurement difference between the immediate postoperative and final follow-up radiographs represented the measured subsidence. Radiographic assessment of abductor bone flake healing was performed. Abductors were considered healed when no space was evident between the bone flake and the greater trochanter (Figure 1). Fibrous union was reported if lucency was noted between the bone flake and the greater trochanter but the bone flake was stable and moved with the trochanter on anteroposterior and lateral radiographs (Figure 2). Nonunion was considered when

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Partial-weight Bearing Group</th>
<th>Full-weight Bearing Group</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex, No. of M/F</td>
<td>67/96</td>
<td>77/69</td>
<td>.79</td>
</tr>
<tr>
<td>Mean age (range), y</td>
<td>63 (33-87)</td>
<td>64 (29-86)</td>
<td>.73</td>
</tr>
<tr>
<td>Mean BMI (range), kg/m²</td>
<td>29 (18-44)</td>
<td>28 (17-42)</td>
<td>.99</td>
</tr>
</tbody>
</table>

Abbreviation: BMI, body mass index.
the bone flake was dissociated and did not move with the greater trochanter on anteroposterior and lateral radiographs (Figure 3). Bony flake union status was statistically analyzed and correlated with the presence of clinical limp or trochanteric pain.

MedCalc statistical software version 11.5 (MedCalc, Ostend, Belgium) was used for statistical analysis, with significance set at a P value less than .05. Measurement of the prosthetic femoral head (known diameter) was used to adjust for magnification when measuring sequential radiographs.

RESULTS

Bony flake detachment (indicative of abductor repair detachment) was not affected by weight bearing and occurred in 12 (7%) of 163 hips in the partial-weight bearing group and 9 (6%) of 146 hips in the full-weight bearing group (P=.55). Flake detachment was associated with an 8-fold increase in slight to moderate limp (odds ratio calculation). Time from hospital discharge to annual examinations was significantly shorter in the full-weight bearing group (mean, 2.6 months) compared with the partial-weight bearing group (mean, 3.5 months) (P=.0021). Mean Engh’s radiographic scores were higher in the full-weight bearing group (6.58) than in the partial-weight bearing group (4.92) (P=.0005). More radiolucent lines were present on the bone-metal interface in the partial-weight bearing group (51.5%) than in the full-weight bearing group (31.6%); however, this did not reach significance (P=.21).

No significant difference existed between the groups in high-grade heterotopic bone (8.0% vs 8.2%, respectively; P=.94) or trochanteric bursitis (3.7% vs 3.4%, respectively; P=.90). Similarly, no significant difference existed between the groups in thigh pain (P=.15), limp (P=.07), Harris Hip Score (P=.74), or depth of femoral subsidence (P=.22). Overall, measurable femoral component subsidence (greater than 2 mm) was noted in 40 (25%) patients in the partial-weight bearing group and 55 (38%) patients in the full-weight bearing group (P=.22). Subsidence was not associated with clinical reports of limp or thigh pain, and all stems that subsided had stable interfaces at last follow-up.

No revisions were required for any reason in either group. No dislocations or infections occurred, and all components (acetabular and femoral) were considered radiographically osteointegrated at last follow-up. No difference existed in medi-
 discuss the clinical implications, which was the purpose of this study.

The strengths of this study include the large, consecutive series treated by a single surgeon and the fact that variables such as patient age, sex, body mass index, preoperative diagnosis, and bone quality (by Dorr’s classification) were statistically evenly matched between the groups. This was not surprising because the authors simply changed their protocol for all patients in their practice and then retrospectively reviewed the results, essentially eliminating selection bias. Although smaller comparative studies exist, including prospective and computer-matched methodologies, previous studies are too small and underpowered to draw definitive conclusions. Although the current study has the limitations of a retrospective review, the practically identical patient populations allowed the authors to draw reasonably sound conclusions about the effect of early weight bearing on the abductor mechanism and subsequent clinical implications, which was the purpose of this study.

A study by Rao et al. compared the results of 28 uncemented THAs in 14 patients who had bilateral simultaneous uncemented THA with those of a full weight-bearing postoperative protocol with 28 computer-matched controls who underwent unilateral uncemented THA and were kept partially weight bearing for 6 weeks. A modified Hardinge, or trans-trochanteric, approach was used in all patients. The authors found no difference in the clinical results, which were excellent, although the patients who were full weight bearing had significantly more radiographic subsidence of the femoral component at 6 weeks and 2 years postoperatively.9

Kishida et al. conducted a prospective study comparing 19 hips that underwent immediate weight bearing rehabilitation with 18 hips that underwent delayed (6 weeks) weight bearing. They used a spongy metal Lubeck (S&G Implants, Lubeck, Germany) hip prosthesis made of a cobalt-chrome-molybdenum alloy. The results of the study revealed that full weight bearing immediately after uncemented THA shortened the rehabilitation process and hospital stay without radiographic migration of the components or clinical complications.14

Woolson and Adler retrospectively compared 25 hips that underwent early weight bearing with 25 hips that underwent delayed (6 weeks) weight bearing. A posterolateral approach was used in all patients. They used an extensively porous-coated, uncemented, collared femoral prosthesis and emphasized achieving a good fit of the stem into the medullary canal for obtaining excellent clinical and radiographic results irrespective of time of weight bearing.15

To the current authors’ knowledge, this is the first study to document the incidence of abductor repair dehiscence (as evidenced by bony flake migration) and to correlate dehiscence with weight bearing and clinical limp. Overall, dehiscence occurred in 6.7% of cases. Immediate full weight bearing had no effect on the abductor mechanism healing (ie, no increased rate of limp or bony flake dehiscence). Therefore, restriction of weight bearing to protect the abductor repair appears unnecessary. However, if flake dehiscence occurred, a patient having a limp was 8 times more common than healed or fibrous abductor union.

The authors used an uncemented, proximally porous-coated, tapered, collarless titanium stem. Interestingly, subsidence had no detrimental clinical effects. In fact, mean Engh’s radiographic scores were higher for the full weight-bearing group, perhaps due to the compression associated with full weight bearing and its theoretically beneficial effects on bone remodeling. It can be postulated that early weight bearing is not deleterious but rather beneficial for tapered stem performance, but longer follow-up is necessary to substantiate these speculations.

The authors encountered no additional complications by implementing the immediate weight-bearing protocol. Trochanteric bursitis, anterior thigh pain, and heterotopic ossification were comparable in both groups. The added advantage of the immediate weight-bearing protocol was a significant decrease in time from clinical discharge to annual examinations.

In the authors’ experience, the ability of patients to mobilize comfortably and with confidence influences their readiness for discharge. They suspect that patients who were told that it was safe to bear full weight regained confidence sooner than those told that they needed to protect the hip for 6 weeks. Muscle atrophy may have been minimized as well.

**Conclusion**

Immediate weight bearing allowed a statistically significant reduction in the time to clinical discharge with no increase in clinical complications or abductor mechanism problems. Although radiographic subsidence (with a mean depth of 3 mm) was common with early full weight bearing, such subsidence was not associated with any deleterious clinical effects. Longer follow-up is necessary to determine whether any long-term differences between the groups will become
evident. Restricting weight bearing postoperatively due to concerns regarding abductor flap healing, problematic stem subsidence, or failure of osteointegration appears unnecessary.

REFERENCES