Arthroplasty Today 1 (2015) 73–75

Contents lists available at ScienceDirect

Arthroplasty Today

journal homepage: http://www.arthroplastytoday.org/

Office tip

Trochanteric impingement: is it a source of pain after THR?

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ARTICLE INFO

Article history:
Received 28 January 2015
Received in revised form
11 May 2015
Accepted 13 May 2015
Available online 4 September 2015

Keywords:
Total hip arthroplasty
Total hip replacement
Hip pain
Trochanteric impingement
Femoral offset
Trochanteric bursitis

ABSTRACT

While uncommon, trochanteric-pelvic impingement may lead to significant lateral hip pain. We defined "impingement distance" as the radiographic distance from the medial aspect of the greater trochanter and the corresponding lateral edge of the acetabular bone or component and compared this to the contralateral normal hip. We present two painful total hip replacement (THR) cases, each featuring a patient with severe lateral hip pain when walking and sitting. Both patients had diminished femoral offset and trochanteric-pelvic clearance, compared to the contralateral normal hip. The impingement distance was increased an average of 10 mm with the exchange to a longer femoral head. Both patients had immediate and complete pain relief with operative treatment to increase the impingement distance.

Introduction

Total hip replacement (THR) is one of the most popular orthopedic procedures performed in the United States today, and its utilization is predicted to rise over the next decade. While most patients are extremely satisfied with the pain relief THR achieves, a small percentage of patients experience persistent pain. In an otherwise clinically and radiographically stable implant, lateral hip pain is thought to be caused by trochanteric bursitis or the result of referred pain of spinal origin.

We have dealt with several patients who had residual lateral hip pain due to what we believe was trochanteric-pelvic impingement. These patients shared many common findings. Their pain was severe, in fact, incapacitating. The pain was described as "deep" and accompanied by a "catching sensation." The pain was always lateral and described as involving the trochanteric region, not localized to an exact point. All patients had spine MRI scanning and consultation with a spine expert to rule out referred pain.

The gait of each patient was markedly antalgic. Passive hip range of motion in flexion was not painful, though forced abduction past 20° reproduced the patient's pain. Lateral pain was also present with flexion and external rotation of the hip joint. Muscle strength testing was not noticeably different as compared to the contralateral side.

Radiographic examination revealed stable implants. Of note, however, the medial aspect of the greater trochanter was closer to the acetabular structures present on the contralateral non-operative hip. Shortening of the hip was also present. Metal suppression MRI scan was negative for trochanteric bursitis, fluid collection or abductor muscle tear. A diagnostic injection (lidocaine, marcaine, depomedral 10 cc cocktail) was given at the proximal tip of the greater trochanter and deep to the gluteus medius insertion, as this was thought to be the site of impingement.

We hypothesized that symptoms were caused by trochanteric-pelvic impingement. We present a radiographic technique to measure relative impingement.

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We defined "impingement distance" as the radiographic distance from the medial aspect of the greater trochanter and the corresponding lateral edge of the acetabular bone or component and compare this to the contralateral normal hip (Figs. 1 and 2).

One or more of the authors of this paper have disclosed potential or pertinent conflicts of interest, which may include receipt of payment, either direct or indirect, institutional support, or association with an entity in the biomedical field which may be perceived to have potential conflict of interest with this work. For full disclosure statements refer to http://dx.doi.org/10.1016/j.artd.2015.05.004.

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http://dx.doi.org/10.1016/j.artd.2015.05.004

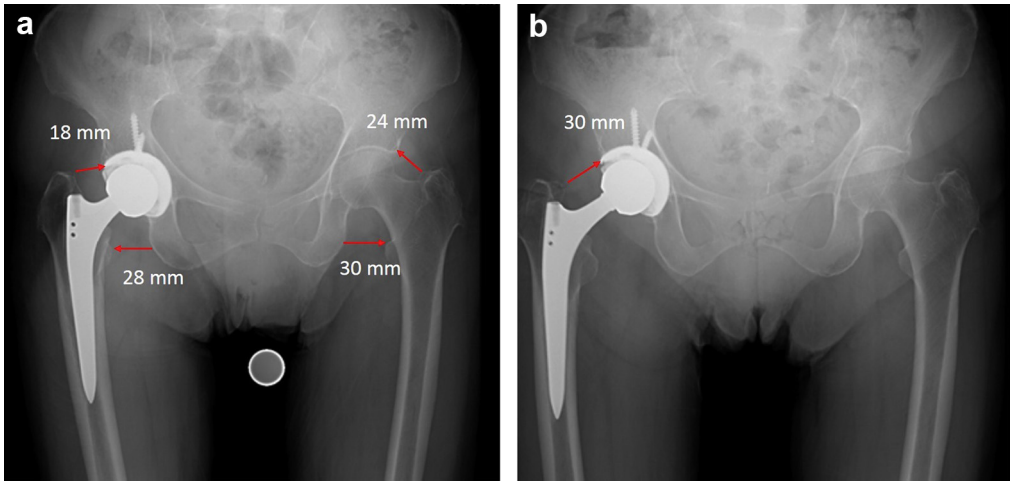

Figure 1. AP pelvis radiographs of an 82-year-old female with trochanteric impingement. (**a**) The right hip shows a diminished impingement distance of 18 mm compared to 24 mm on the contralateral hip. The offset of the right hip (28mm) is slightly less than the left (30 mm). (**b**) Postoperative findings demonstrate an increased impingement distance of 30 mm accomplished by exchange to a +12 head from a +0 head.

Case examples

The first patient is an 82-year-old female with a three-year history of right hip pain, which began approximately six months following right total hip replacement (THR). Radiographs revealed stable, well-fixed components with relatively equal leg lengths and a slightly decreased femoral offset of 2 mm on the operative hip. There was an impingement distance of 18 mm compared to 24 mm of the contralateral hip (Fig. 1a).

The patient underwent revision surgery to exchange the femoral head from the original 36 mm + 0 head to a 36 mm + 12 mm head (Fig. 1b). At her first postoperative visit the patient's pain was completely resolved and her gait was substantially improved. Nine months later, the patient remained pain free. Radiographically, the trochanteric-pelvic impingement distance increased from 18 mm to 30 mm with a corresponding increase of 5 mm in leg length (1 mm shorter pre-op to 4 mm longer post-op).

The second patient is a 57-year-old, very active female who underwent revision right total hip replacement for a recalled modular femoral component approximately 17 months prior to the diagnosis of trochanteric impingement. Because of persistent lateral hip pain she underwent removal of a trochanteric plate and cerclage wires approximately one year after her initial revision. All laboratory studies and imaging, including metal ion levels, inflammatory markers, and MARS MRI, revealed no abnormalities. Her radiographs revealed radiographically stable components, with restoration of femoral offset (13 mm right, 12 mm left), shortening of 8 mm and a decreased trochanteric-pelvic impingement distance of 10 mm compared to 42 mm on the contralateral hip (Fig. 2a). Of note the trochanteric-pelvic distance was particularly diminished, because the tip of the trochanter has healed to the more medial position due to the previous trochanteric osteotomy and the presence of a large dual mobility acetabular component, which was prominent laterally. Because of persistent severe pain, revision surgery was performed to exchange the dual mobility inner head from 28 mm − 6 mm to a 28 mm + 6 mm head (Fig. 2b). At her first postoperative follow-up, her pain had completely resolved, and six months later the patient remained pain free. Radiographically, the trochanteric-pelvic impingement distance increased from 10 mm to 21 mm and the leg length increased 8 mm (8 mm short pre-op to equal length post-op).

Discussion

Very little information currently exists regarding trochanteric-pelvic impingement following THR. Typically impingement is considered a problem leading to THR instability [1–5]. While these two cases do not prove that trochanteric-pelvic impingement was the cause of pain in these patients, the rapid and complete alleviation of symptoms is highly suggestive of our diagnosis. As part of the revision surgery, these patients also had concomitant limb lengthening at the hip joint. Another possible cause of our patient's

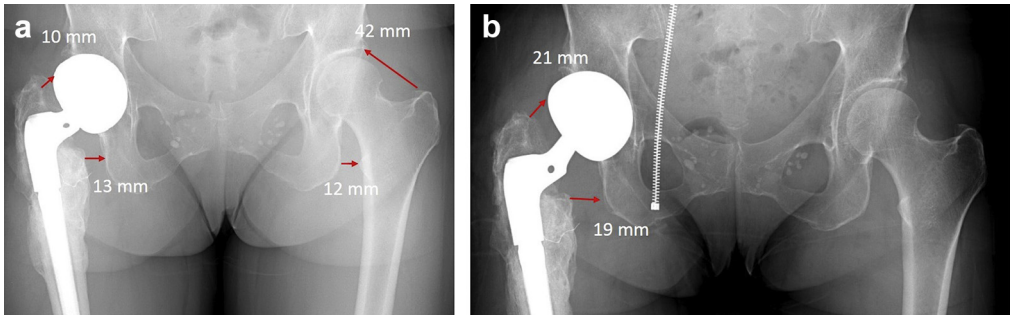

Figure 2. AP pelvis radiographs of a 57-year-old female with trochanteric impingement. (**a**) The right hip shows a greatly diminished impingement distance of 10 mm compared to 42 mm on the contralateral side. The offset is within 1 mm (13 mm right hip versus 12 mm left hip). (**b**) Postoperative findings demonstrate an increased right impingement distance of 22 mm accomplished by exchange to a +6mm head from a −6mm head.

pain is abductor muscle weakness and the resulting overworking of these muscles during gait [6]. We do not believe that this lengthening alone can account for the dramatic pain relief seen in these patients.

These findings corroborate the reports of trochanteric impingement seen in non-arthroplasty patients experiencing pain and disability [7]. Trochanteric impingement due to Legg–Calve–Perthes Disease (LCPD), Slipped Capital Femoral Epiphysis (SCFE) or post-septic arthritis was studied and treated successfully with relative femoral neck lengthening. Their results showed reduced pain, improved function and improved radiographic parameters of the proximal femur after adequately addressing the impingement [7]. Certainly, many patients have similar measurements and do not have symptoms consistent with trochanteric-pelvic impingement. Correlation with clinical symptoms, imaging studies and physical exam is important. We do not know the absolute decrease in the impingement distance that may cause symptoms. We have presented only two cases from a high volume clinical practice, which demonstrates that this, in our opinion, is an unusual source of pain. A MARS MRI to assess for abductor muscle tear is recommended to rule out this problem before re-operating. Neither of these cases had an abductor muscle tear.

The measurements of femoral offset and impingement distance are related; however, the impingement distance differs somewhat from hip joint offset. Offset is generally the horizontal distance measure from the femur to a point on the pelvis such as the center of the hip or the lateral ischium. The impingement distance measures a distance from the most medial aspect of the greater trochanter to the most lateral aspect of the acetabular bone or acetabular component. So any abnormality of the greater trochanter (remodeling, angulation from previous osteotomy, medial migration) will decrease the impingement distance but not change the offset. These abnormalities are more likely after revision surgery as compared to primary total hip replacement. On the acetabular side, any lateral prominence of the cup (lateralized position, oversized component) will also decrease the impingement distance. The measurements presented here are within accepted clinical error in radiographic measurements. Oblique x-rays certainly can affect the measurement of impingement distance and offset so every attempt should be made to obtain true anterior-posterior radiographs.

Prevention of this problem may be improved with intra-operative radiographs. Intra-operative radiographs are generally used to evaluate acetabular position, component sizing and hip joint offset. However, they can also be helpful to evaluate the impingement distance. We do not feel that a particular surgical approach would affect this phenomenon, unless the greater trochanter was osteotomized. One patient had an initial posterior approach and the other had an initial anterolateral approach.

While we elected surgically to increase offset, and the impingement distance, a prior report of two cases treated with trochanteric “osteoplasty” (removal of medial trochanteric bone) demonstrated improvement in pain and gait [8]. This supports the diagnosis in the two cases presented here. Trochanteric osteoplasty does not lengthen the leg or change the offset, but can eliminate the impingement. It may also theoretically weaken or fracture the trochanter or lead to non-union if the trochanter is advanced. Prosthetic neck lengthening is straight-forward, mechanically stable, and provides increased limb length as desired. Both of these cases benefited from increased offset and impingement distance, so lengthening using a long femoral head was appropriate. We caution against over lengthening or increasing offset beyond anatomic limits as this can cause pain due to IT band impingement or even mechanical failure at the head/neck junction [9].

Summary

Though uncommon, we believe that trochanteric-pelvic impingement can lead to significant lateral hip pain. We have proposed a radiographic measure to assess potential impingement. More common causes of lateral hip pain (trochanteric bursitis, spinal pain) should be first considered, but clinical symptoms and radiographic signs can suggest impingement as the source of pain. The pain and gait alteration tends to be much more severe than bursitis, and radiographs when compared to the contralateral side demonstrate a decreased impingement distance. In these two cases, the trochanteric-pelvic impingement distances were increased by 11–12 mm with alleviation of the patient's symptoms.

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