

Limitations of Postless Hip Arthroscopy for a Patient with Coxa Profunda

A Case Report

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Abstract

Case: A 27-year-old man with coxa profunda and a right acetabular labral tear presented for surgical re-evaluation after a postless arthroscopic labral repair was attempted at an outside institution and aborted because of inadequate distraction during portal placement. Arthroscopic labral repair with a perineal post was subsequently performed without complications.

Conclusion: Indications and limitations of postless hip distraction are seldom discussed in the literature. This report examines possible limitations of postless hip distraction for a patient with coxa profunda. Careful radiographic evaluation of hip anatomy may be essential for patients with deep hip sockets to determine the best-suited distraction technique.

In recent decades, hip arthroscopy has emerged to the forefront of minimally invasive surgical treatments for patients with femoroacetabular impingement and resultant labrum and cartilage pathology. The hip is a highly constrained joint, and arthroscopy often requires significant traction force—62 to 125 lbs—to safely distract the joint and introduce instruments^{1,2}. Most often, the patient is positioned supine or lateral with the perineum against a stationary post for countertraction. However, excessive or prolonged force against the perineum has been associated with soft-tissue injuries and neuropraxia of the ischial, femoral, and pudendal nerves²⁻⁵.

Postless distraction techniques have emerged to prevent these complications by using gravity or friction for countertraction as opposed to a perineal post^{2,4,5}. In the Trendelenburg technique, a patient is laid supine on a fracture table inclined 5° to 15° to elevate the feet above the head. Trendelenburg leverages gravity for countertraction, and a foam pad can be inserted beneath the body to increase friction and reduce slippage^{2,4,5}. In an alternative method, the patient is laid supine or lateral without Trendelenburg, and the torso is tightly secured between a deflated bean bag and the fracture table, using friction for countertraction⁶.

However, indications and limitations for postless distraction are seldom discussed. Patients with coxa profunda, in which the acetabular fossa is medial to the ilioischial line on a standard anteroposterior radiograph, routinely require more

traction force than patients without this finding and consequently are more prone to traction-related complications^{1,7}. However, the degree to which postless distraction can provide visualization into deeper hips is unknown. This is the case of a patient with coxa profunda who required additional surgery because arthroscopic labral repair was attempted and aborted during portal placement likely in part because of limitations of postless distraction.

The patient was informed that data concerning the case would be submitted for publication, and he provided consent.

Case Report

A 27-year-old man presented with bilateral femoroacetabular impingement secondary to coxa profunda. The patient had a history of pudendal nerve neuropraxia after a left arthroscopic labral repair and consequently sought out a high-volume, fellowship-trained hip arthroscopist specializing in postless distraction technique to avoid similar complications for a right labral repair. Of note, the 2 procedures were performed at separate, outside institutions and by 2 different expert hip arthroscopists.

The postless operation failed despite several attempts to establish portals, including an outside-in approach with minimal interportal capsulotomy. As described in the operative note, “intra-articular fluid distension and postless distraction did not provide adequate distraction to establish working portals,

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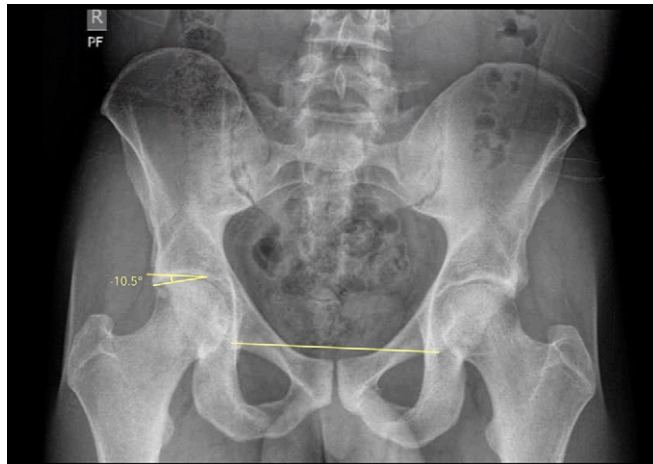


Fig. 1-A

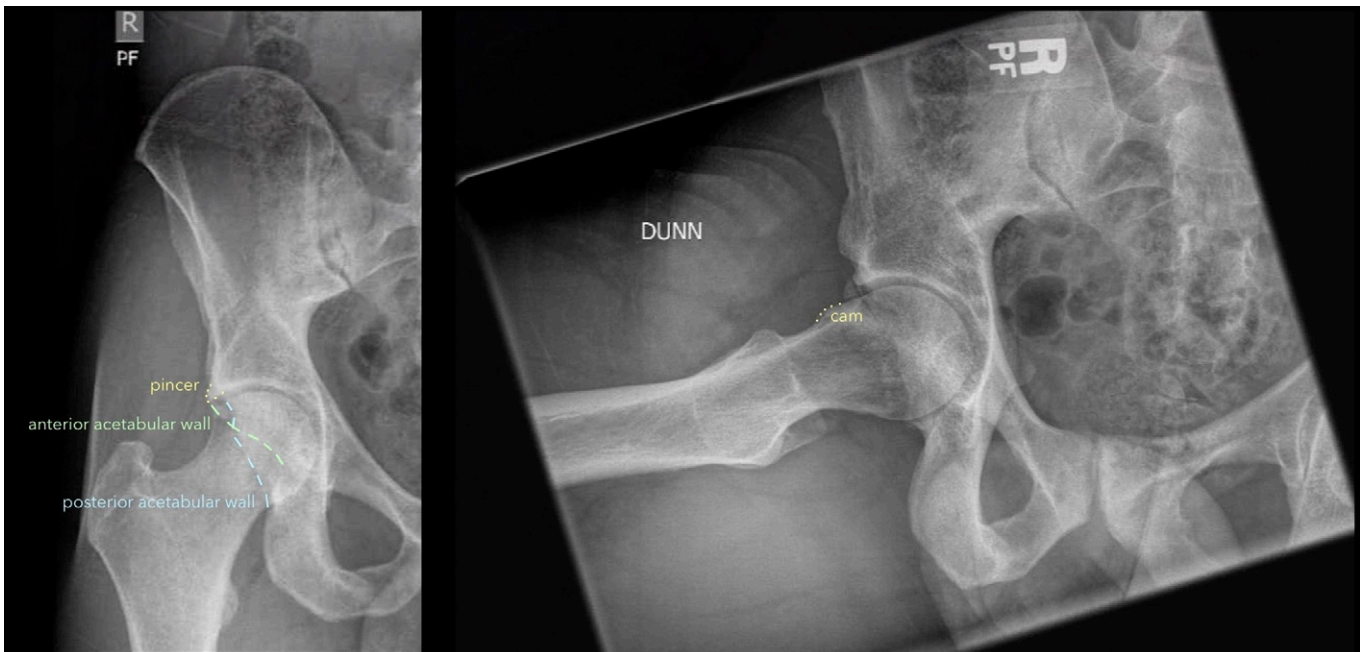


Fig. 1-B

Fig. 1-A Radiographic films revealed significant coxa profunda with a downward sloping sourcil (Tönnis angle [10.5°] $< 0^\circ$). **Fig. 1-B** In the anteroposterior and Dunn lateral views, cam and pincer lesions are present.

so the operation was aborted.” After this event, the patient presented to the senior author’s clinic for surgical re-evaluation.

The patient had progressive, right-sided groin pain that intensified with activity. He reported pain during the flexion, adduction and internal rotation (FADIR) test; flexion, abduction and external rotation (FABER) test; and log roll and squat tests and demonstrated loss of internal rotation with 30° of obligatory external rotation with hip flexion. On the International Hip Outcome Tool-33 (iHOT-33) and modified Harris Hip Score (mHHS) assessments, he scored 53 and 82.5, respectively. Anteroposterior and lateral radiographs (Fig. 1-A and 1-B) revealed significant coxa profunda, os acetabuli, and a right cam lesion. The patient failed conservative treatment and was consented for surgery.

The patient was administered general anesthesia and prepped on a hip positioning table (Smith & Nephew, Hanover, Massachusetts) with a gel-padded perineal post. Feet and ankles were padded and secured into foam distraction boots. Significant traction—approximately 25 turns—was necessary to achieve the vacuum sign. Using a 17-gauge needle, the joint was insufflated with fluid to relax the capsule and further distract the joint⁸. Under fluoroscopic guidance, the anterolateral portal was established. The anterior, midanterior, and Dienst portals were made under direct visualization using a 4.5 mm obturator and cannula.

The arthroscope was then directed into the capsular recess of the peripheral compartment and changed to a 5.0 mm cannula for improved flow. Minimal traction was maintained

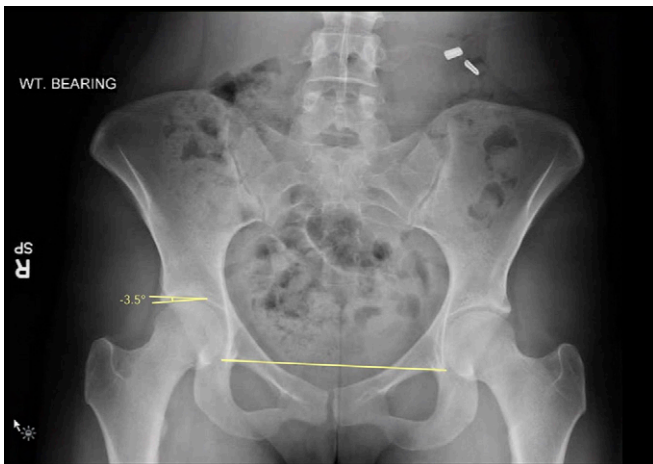


Fig. 2
An example of coxa profunda with a mild sloping sourcil (Tönnis angle [3.5] < 0).

while acetabular osteoplasty was performed with a 4.0 mm round abradar on high speed reverse. Labral repair with capsular autograft was performed according to the senior author's technical note⁹. Using minimal traction and working through a midanterior portal, 2.3 mm biocomposite anchors were placed into the newly recessed acetabular rim. Normal traction was applied while loop sutures were passed through the chondrolabral junction and tensioned and tied-down on the capsular recess side. Then traction was completely released.

The patient's hip was flexed to 45°, and a separate 5.5 mm obturator and cannula were introduced in the peripheral compartment. Femoral neck osteoplasty was performed using a 5.5 mm round abradar to remove the cam lesion and recontour the head-neck junction, restoring offset. Portals were closed with simple sutures. No incident or complication occurred, and total traction time was minimized to 61 minutes, owing to the intermittent use of traction¹⁰. At 6 months postsurgery, the patient continued to report no complications and demonstrated improvements on iHOT-33 and mHHS assessments, scoring 75 and 95.7, respectively.

Discussion

To our knowledge, this is the first documentation of a hip undistractable by a postless method, but subsequently distractible with the use of a perineal post.

Historically, arthroscopists have used perineal posts for hip distraction. Over the years, improvements to patient positioning and padding of the post have lowered complication rates¹. Notwithstanding, patients continue to experience post-related complications, including our patient who had neuropraxia from a previous contralateral hip arthroscopy. A perineal post concentrates traction counterforce against the patient's groin and has been associated with pressure-related soft-tissue injuries and compression-related nerve injuries of the ischial, femoral, and pudendal nerves^{1-6,11-13}. In comprehensive systematic reviews, data aggregated from thousands of hip arthroscopy cases identified soft-tissue injuries in 0.16% to

0.22% of cases and postoperative neuropraxia in 1.4% to 1.8% of cases¹¹⁻¹³.

Lall et al. performed a series of hip arthroscopies with perineal post technique and found that Trendelenburg substantially lessened perineal pressure against the post—5°, 10°, and 15° of Trendelenburg diminished perineal pressure by 16%, 28%, and 46%, respectively⁵. In postless systems, the patient is positioned in Trendelenburg or tightly secured between a deflated bean bag and the fracture table; gravity or friction provides resistance to traction instead of a stationary post so that forces are no longer localized at the groin^{2,4-6}. Accordingly, lower complication rates are reported by early studies on postless distraction, with the highest rate of nerve injury reported at 0.5% and no reported instance of soft-tissue complications^{2,3,13}. However, as demonstrated by the present case, postless distraction may not be suitable for all patients, and its limitations should be further studied.

Across the literature, indications and limitations of postless technique are seldom discussed. The utility of postless distraction for patients who require greater traction force, such as patients with coxa profunda or other challenging bone anatomy, is unknown^{2,3,7,13}. For this reason, Mei-Dan et al.'s observation that less than 1% of hips are undistractable using postless technique is difficult to generalize to patients with deep hips². In the Trendelenburg position, a 1 lb increase in patient's weight correlates to a 0.29 lb increase in traction force²; thus, the efficacy of a postless system depends on the patient's weight. In evaluating postless systems, Kollmorgen et al. indicated weight as a disadvantage for patients under 120 lbs⁴, suggesting that weight may limit the traction force attainable. Because patients with coxa profunda are likely to require more traction force during hip arthroscopy⁷, additional studies are necessary to quantify the force required and provide guidance for the use of postless distraction on patients with deep hips.

In addition, there are some variations in coxa profunda morphology. Because the Tönnis angle is often zero or negative



Fig. 3
An example of coxa profunda with a sourcil that extends to the femoral head-neck junction. Degenerative changes and os acetabuli are present. Arthroscopic surgery was not advised.

in coxa profunda cases, the acetabular rim can obstruct instrument introduction into the joint⁷. A hip with coxa profunda and a mild sloping sourcil (Fig. 2) may require high traction force but is generally treatable arthroscopically. However, a hip with coxa profunda and a negative sloping sourcil (Fig. 1-A) can be challenging to treat arthroscopically, especially with a postless system. Significant overcoverage can be difficult to overcome and may require smaller instruments, such as a 2.3 mm arthroscope, to access the central compartment. Finally, a hip with coxa profunda and a sourcil that extends to the femoral head-neck junction (Fig. 3) is likely untreatable arthroscopically, even with a perineal post. By recognizing these differences, surgeons are better able to counsel patients on the best-suited distraction technique.

Furthermore, the significant traction force necessary to arthroscopically treat patients with coxa profunda also predisposes them to a higher risk of traction-related injuries^{1,7}. Telleria et al. reported that each 1 lb increase in traction force increased the likelihood of a nerve event by 4%¹. Of note, certain techniques can be practiced irrespective of distraction method to reduce traction force and time and lessen the risk of

postoperative complications, including Trendelenburg positioning, intermittent traction, and intra-articular fluid distention^{5,8,10}. Because traction-related injuries remain an important clinical problem, careful evaluation of hip anatomy may be essential to determine the distraction technique best-suited for each patient⁷. ■

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References

1. Telleria JJ, Safran MR, Gardi JN, Harris AH, Glick JM. Risk of sciatic nerve traction injury during hip arthroscopy—is it the amount or duration? *J Bone Joint Surg.* 2012; 94(22):2025-32.
2. Mei-Dan O, Kraeutler MJ, Garabekyan T, Goodrich JA, Young DA. Hip distraction without a perineal post: a prospective study of 1000 hip arthroscopy cases. *Am J Sports Med.* 2018;46(3):632-41.
3. Welton KL, Garabekyan T, Kraeutler MJ, Vogel-Abernathie LA, Raible D, Goodrich JA, Mei-Dan O. Effects of hip arthroscopy without a perineal post on venous blood flow, muscle damage, peripheral nerve conduction, and perineal injury: a prospective study. *Am J Sports Med.* 2019;47(8):1931-8.
4. Kollmorgen RC, Ellis T, Lewis BD, Harris JD. Achieving post-free distraction in hip arthroscopy with a pink pad patient positioning device using standard hip distraction tables. *Arthrosc Tech.* 2019;8(4):e363-e368.
5. Lall AC, Saadat AA, Battaglia MR, Maldonado DR, Perets I, Domb BG. Perineal pressure during hip arthroscopy is reduced by use of trendelenburg: a prospective study with randomized order of positioning. *Clin Orthop Relat Res.* 2019;477(8):1851-7.
6. Merrell G, Medvecky M, Daigneault J, Jokl P. Hip arthroscopy without a perineal post: a safer technique for hip distraction. *Arthrosc J Arthrosc Relat Surg.* 2007; 23(1):107.e1-107.e3.
7. Flecher X, Wettstein M, May O. Limitations of arthroscopy for managing coxa profunda. *Orthop Traumatol Surg Res.* 2019;105(8):S267-S274.
8. Alpaugh K, Shin SR, Martin SD. Intra-articular fluid distension for initial portal placement during hip arthroscopy: the “femoral head drop” technique. *Arthrosc Tech.* 2015;4(1):e23-e27.
9. Nwachukwu BU, Alpaugh K, McCormick F, Martin SD. All-arthroscopic reconstruction of the acetabular labrum by capsular augmentation. *Arthrosc Tech.* 2015;4(2):e127-31.
10. Skelley NW, Conaway WK, Martin SD. “In-round” labral repair after acetabular recession using intermittent traction. *Arthrosc Tech.* 2017;6(5):e1807-13.
11. Harris JD, McCormick FM, Abrams GD, Gupta AK, Ellis TJ, Bach BR Jr, Bush-Joseph CA, Nho SJ. Complications and reoperations during and after hip arthroscopy: a systematic review of 92 studies and more than 6,000 patients. *Arthrosc J Arthrosc Relat Surg.* 2013;29(3):589-95.
12. Gupta A, Redmond JM, Hammarstedt JE, Schwindel L, Domb BG. Safety measures in hip arthroscopy and their efficacy in minimizing complications: a systematic review of the evidence. *Arthrosc J Arthrosc Relat Surg.* 2014;30(10):1342-8.
13. Habib A, Haldane CE, Ekhtiari S, de Sa D, Simunovic N, Belzile EL, Ayeni OR. Pudendal nerve injury is a relatively common but transient complication of hip arthroscopy. *Knee Surge Sport Traumatol Arthrosc.* 2018;26(3):969-75.