

# Single Table Concomitant Post-Less Hip Arthroscopy Combined with Periacetabular Osteotomy for Hip Dysplasia



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**Abstract:** It has been well established that both arthroscopic and open hip preservation techniques can result in improved patient outcomes and interrupt the natural history of hip disease. Traditionally, hip arthroscopy has been used to address central and peripheral compartment disease consisting of labral tears, impingement morphology and cartilage pathology. The periacetabular osteotomy has been the most used treatment for hip instability caused by inadequate acetabular coverage of the femoral head or dysplasia. With failures of periacetabular osteotomy linked to postoperative impingement and the high incidence of intra-articular pathology in the dysplastic hip, there has been a great interest in combining hip arthroscopy with the periacetabular osteotomy. Here, we describe a technique for a single table, single drape, postless combined hip arthroscopy, and periacetabular osteotomy.

Often thought of as separate, open and arthroscopic hip preservation has the unified goal of extending the life of the natural hip. Over the past 30 years, hip preservation has moved from the fringe of orthopaedics and has become much more mainstream with increased awareness of hip pathology and the development of advanced procedures to treat patients with hip disease. First described in 1988, the Bernese periacetabular osteotomy (PAO) has become the mainstay treatment for an undercovered or dysplastic hip.<sup>1</sup> The treatment of intra-articular hip pathology has evolved from open techniques, such as the surgical hip dislocation, to arthroscopic techniques to repair the damaged labrum and treat cam and pincer morphology, which has gained in popularity in the past decade. Much more recently, these procedures have been combined to

address both acetabular undercoverage and the coincident intra-articular pathology that is commonplace in dysplastic hips.<sup>2,3</sup> However, as previously described, these require the transfer of the patient to a separate table, redraping of the patient and use of a traction post during arthroscopy that can result in traction neuropathies, perineal skin complications, and prolonged anesthetic time. In this Technical Note, we describe the technique for combined hip arthroscopy and periacetabular osteotomy using a single table with post-free hip distraction.

## Description of Technique

### Positioning

The patient is given an epidural before the start of the procedure. The patient is positioned on a Hana table (Mizuho OSI, Union City, CA) with a specialty Pink Hip Kit (Xodus Medical, New Kensington, PA) (Fig 1 A and 1B), which is dense foam that is highly conforming to the patient's skin and allows hip distraction without traction against a post. When positioning on the pad, there is minimal to no linen sheets or other material between the patient's skin and the material of the pad. This facilitates stabilizing the trunk to allow for traction. The table can also be placed into 10 to 15° of Trendelenburg to assist with distraction, especially if the patient is slender. Most patients are positioned such that their perineal area is approximately 4 to 6 cm from the hole for the post to avoid metal artifact from the spars on the table (Fig 1C). The patients' feet are padded and

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The authors report the following potential conflicts of interest or sources of funding: B.L. reports personal fees from Xodus Medical, outside the submitted work. Full ICMJE author disclosure forms are available for this article online, as [supplementary material](#).

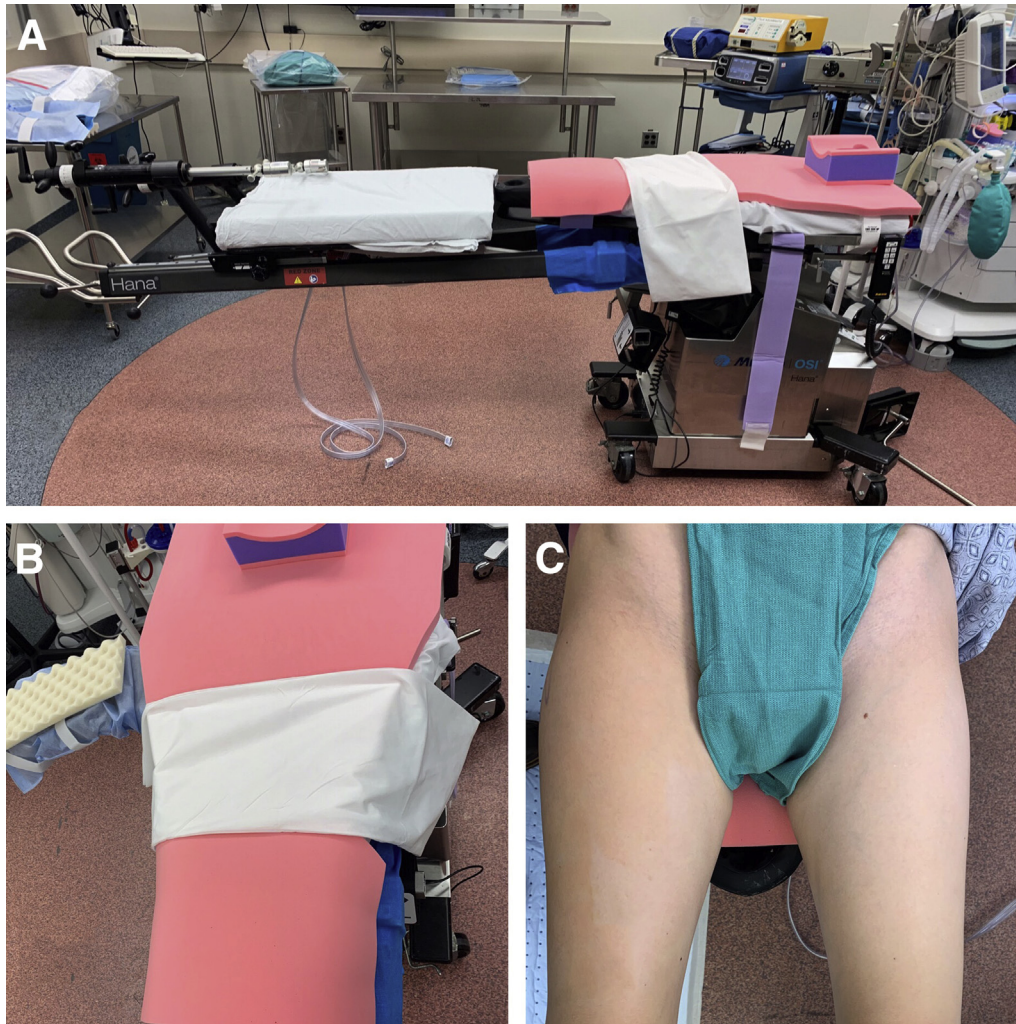
Received June 4, 2019; accepted August 16, 2019.

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2212-6287/19732

<https://doi.org/10.1016/j.eats.2019.08.015>



**Fig 1.** View of standard Hana table setup with Pink Hip Kit and patient draw sheet folded in half from the (A) side and (B) above. (C) View from above of the ideal patient placement with perineum approximately 4 to 6 cm from the post positioning hole.

placed into the boots for the Hana table and secured in place. The legs are then positioned in a neutral position to slight abduction and neutral to slight flexion. Gross traction is applied in a 3-step sequence (operative extremity, nonoperative extremity, then operative extremity once more). We then use a single prep and drape for both portions of the procedure (Video 1).

### Arthroscopy-Central

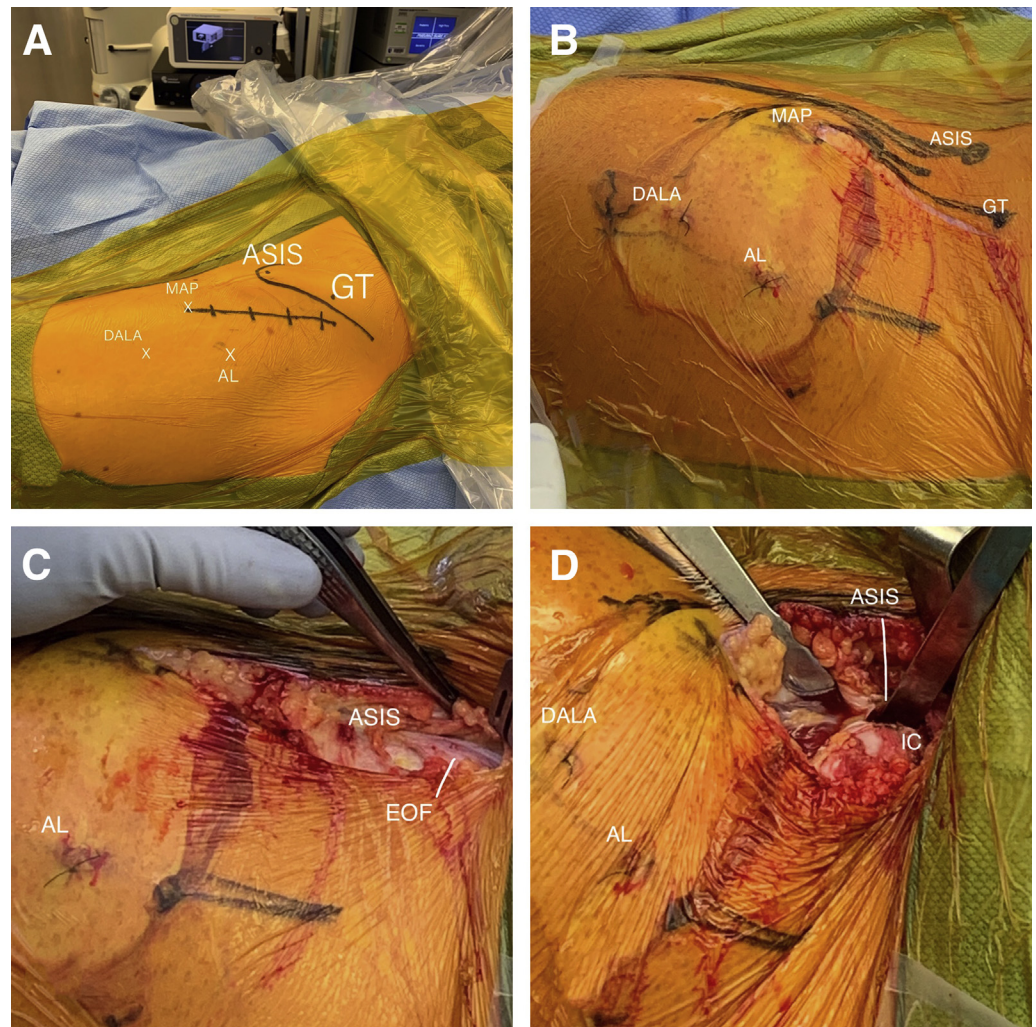
Two to 3 turns of fine traction are often enough to distract the dysplastic hip. While under traction, internal and external rotation of the hip can often help break any residual suction seal of the hip. An additional technique is to vent the hip joint with a spinal needle and 20 to 30 mL of air through a syringe. Once adequate distraction is obtained, standard anterolateral (AL) and mid-anterior (MA) portals are used with some mild variations. Without a post, the pelvis tilts forward as the lumbar lordosis increases; therefore, the AL portal should be placed with care because the anterior coverage may increase and the operative position of the

needle may vary slightly from a traditional hip arthroscopy setup.

The MA portal is also made further medially, nearly in line with the anterior superior iliac spine (ASIS). This is to coincide with the planned PAO incision (Fig 2A). Additionally, the more medial MA portal allows improved access to the ligamentum teres. Of note, the dysplastic labrum can be either normal, hypoplastic, or, often, hyperplastic. In the hyperplastic labrum, the capsulotomy may need to be made as near to the labrum as possible because the distance to the acetabular rim may be greater and make rim preparation and labral repair more difficult.

An interportal capsulotomy is made using a Samarai blade (Stryker, Kalamazoo, MI). Using a radiofrequency wand, the capsulotomy is completed and/or extended as needed. Using a previously described technique,<sup>4</sup> capsular traction sutures are placed using an injector (Stryker) (Video 1). Typically, we use 3 sutures through the MA portal and 2 sutures through the AL portal. The traction sutures allow access under a patulous capsule,

**Fig 2.** (A) Patient is supine with the left hip sterilely prepped and draped and inferior margin of iliac crest outlined. The ASIS and GT are marked as well. The incision of the periacetabular osteotomy is made from the GT and is connected to the MAP. (B) Incision for the PAO is made from the GT to the MAP. (C) Exposure of the EOF is important before masking. (D) Fleck osteotomy of the ASIS off of the IC using a one-half-inch straight osteotome. (AL, anterolateral portal; ASIS, anterosuperior iliac spine; DALA, distal anterolateral accessory portal; EOF, external abdominal oblique muscle and fascia; GT, gluteal tubercle; IC, iliac crest; MAP, mid-anterior portal; PAO, periacetabular osteotomy.)



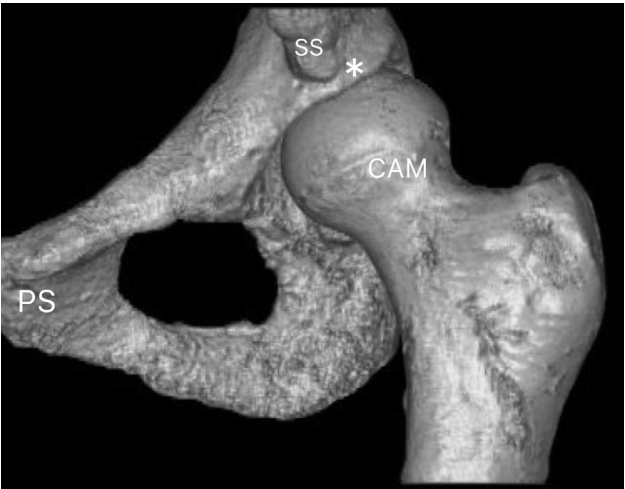
help delineate the capsulolabral junction, and help to preserve the capsule during acetabular rim reshaping and labral repair to facilitate capsular repair. They also help maintain tension on the capsule at the end of the procedure for arthroscopic closure of the capsule.

A diagnostic arthroscopy is performed to evaluate the acetabular and femoral head cartilage, the full labrum, and ligamentum teres. The radiofrequency wand is then used to reflect the labrum from the acetabular rim to prepare for rim resection and preparation for labral refixation ([Video 1](#)). We use 3-dimensional imaging to help guide our rim resection (if needed for focal prominence) ([Fig 3](#)) and do not make special consideration for the dysplastic patient if we are concurrently performing a PAO because any deficiency will be corrected during the open portion. This is done using a standard arthroscopic burr. Sub-spine resection will also be done arthroscopically, if indicated based on preoperative imaging, rather than during the open portion. A standard distal anterolateral accessory (DALA) portal is then made. A labral

repair is performed per each surgeon's preferred technique with knotless anchors. We believe that using an anchor, which independently allows tensioning of the base and periphery, is key to avoiding eversion of the hyperplastic labrum. Once the labrum is repaired, the ligamentum teres is debrided if torn ([Video 1](#)). Traction is at this point let off and the hip flexed to 30 to 40° in preparation for the peripheral compartment. Importantly, the straps of the boots must be slightly loosened to prevent excessive compression of the foot during arthroscopy of the peripheral compartment and PAO ([Table 1](#)).

### Arthroscopy: Peripheral

Concomitant cam deformity often exists in patients undergoing PAO and in the vast majority of cases, we will address the cam deformity arthroscopically. Capsular traction sutures are again used to better visualize the cam deformity and allow ease of instrumentation and provide tension for passage of suture during capsular closure. Typically, 1 suture is placed



**Fig 3.** Magnetic resonance imaging based 3-dimensional rendering of a left hip joint viewed anteriorly is used for preoperative planning. This demonstrates typical findings of focal femoroacetabular impingement found in the dysplastic hip with a minimal cam and pincer (\*), which are labeled. (PS, pubic symphysis; SS, subspine.)

into the most lateral edge of the femoral side of the capsule. At this point, a T-capsulotomy is made by 1 surgeon with 2 additional sutures placed, 1 each into the lateral and medial limbs of the femoral sided

capsule. If continuing with cam resection without making a T-capsulotomy, traction sutures are placed at the medial and lateral corners of the femoral-sided capsule with an additional traction suture midway between the 2 previously placed sutures.

A standard cam resection is then carried out based on preoperative 3-dimensional imaging (Fig 3) and confirmed with the use of intraoperative fluoroscopy. Once the cam resection is complete, the hip is brought down into 10 to 15° of flexion for arthroscopic capsular closure with 4 nonabsorbable sutures in figure 8 fashion using a slingshot (Stryker) (Video 1). Alternatively, the capsule is left open and is closed following the PAO using the injector (Stryker). The arthroscope is removed, all arthroscopy equipment is removed from the field, and the case is prepared for conversion to the open portion. While the assistant is setting the field up for the open procedure, the AL and DALA portals can be closed. Typically, this transition takes 3 to 5 minutes as the instruments are already on the back table and the patient is already positioned and draped for the PAO portion.

**Periacetabular Osteotomy: Dissection**

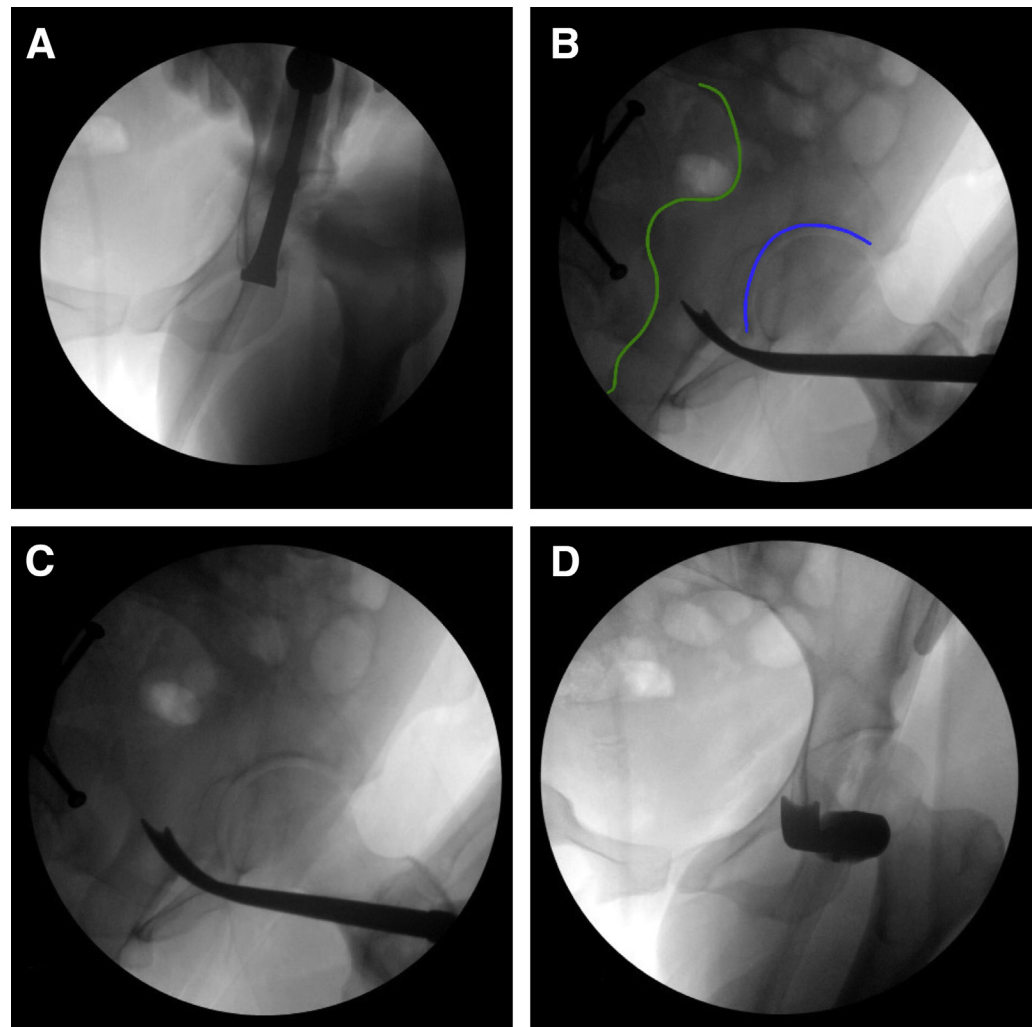
A standard setup for the PAO with a hip preservation set (DePuy Synthes, West Chester, PA). Cell saver

**Table 1.** Technical Pearls and Benefits

Technical Pearls	Benefits
<ul style="list-style-type: none"><li>• The draw or transfer sheet can be removed from under the patient to increase the contact between the patient and the pad</li><li>• Removal of the holder for the leg extension for the table prior to start of the procedure can make positioning of the fluoroscopy imager easier</li><li>• A C-arm drape can be placed first over the operative leg and Hana table leg holder to allow surgeon intraoperative control of traction and rotation</li><li>• It is important to complete the capsulotomy full-thickness to allow passage of instruments, complete joint access, and adequate fluid extravasation from the hip to prevent excessive soft tissue swelling</li><li>• Capsular traction sutures can be placed using a large diameter plastic cannula, using a sled or going directly through the portals sites if there is a good soft-tissue track</li><li>• Although the dysplastic labrum may not be torn, many times, hyperplastic labra will be unstable or “floppy” and would require anchor stabilization</li><li>• Because the patient will continue to be in the traction boots during the PAO procedure, it is important to gently unclick to the straps on both the operative and nonoperative boots to relieve slight pressure on the foot</li><li>• If the table was placed in Trendelenburg to assist with distraction, level the bed before the periacetabular osteotomy for easier x-ray viewing</li><li>• The Hana table is narrow distally and the patient can begin to lean away; an additional arm board or padded leg board can be placed on the contralateral side of the table attached to the spar to prevent leaning</li><li>• If the metal portion of the spars are obstructing the view during the PAO portion the fluoroscopy unit can be pulled towards the contralateral side slightly; or the patient can be gently pushed toward the contralateral side until the view is clear</li></ul>	<ul style="list-style-type: none"><li>• Use of single table and single sterile prep and drape allows for operative room efficiency</li><li>• Reduced anesthetic and total surgical time resulting from lack of need for transfer to additional bed and second sterile prep and drape</li><li>• Concomitant hip arthroscopy with use of epinephrine in arthroscopy fluid can increase visualization during the open PAO portion by reducing blood loss</li><li>• Arthroscopy directly before PAO can provide some amount of hydro-dissection of soft tissues, allowing for more efficient open dissection during the PAO</li><li>• Arthroscopy without the use of a perineal post can potentially avoid or reduce iatrogenic injury to the perineum via tension or crush injury to the genital soft tissues and/or nerves</li><li>• Short learning curve for transition from hip arthroscopy with a post to without a post</li></ul>

PAO, periacetabular osteotomy.

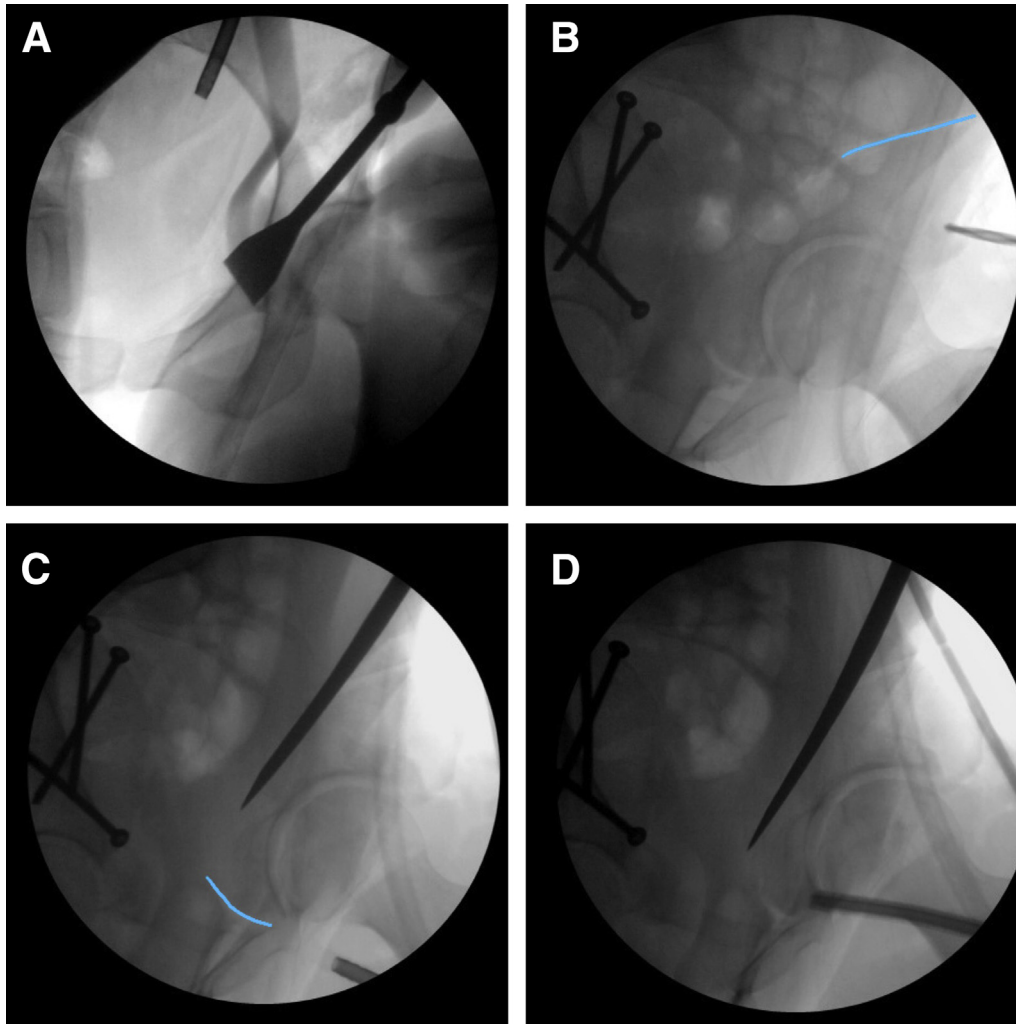
**Fig 4.** Intraoperative fluoroscopic images of a left hip periacetabular osteotomy. (A) Anteroposterior view demonstrating the narrow curved osteotome against the medial aspect of the anterior ischium prior to osteotomy. (B) Iliac oblique view with the acetabulum outlined in blue and posterior column including ischial spine outlined in green showing the (C) appropriate depth of the curved osteotome of the incomplete ischial osteotomy. (D) Anteroposterior view showing the curved osteotome's ideal position behind the acetabulum.



(Haemonetics, Braintree, MA) is used for all PAO procedures, even though blood loss is typically less than the threshold for autotransfusion. If there are no contraindications, a weight-based dose of tranexamic acid is given to the patient before PAO incision and a second dose is given at wound closure. The positioning spar of the Hana table can assist in leg positioning throughout the PAO portion by holding the hip in approximately 30° of flexion. The leg can be flexed before incision or during the deep dissection, and there are no changes to our PAO technique resulting from the concomitant arthroscopy other than capsular management.

Our standard incision starts just below the iliac crest at the gluteal tubercle and extends obliquely to connect with the MA portal (Fig 2B). Dissection is first carried out at the proximal portion of the incision to expose the external oblique muscle attachments (Fig 2C) near the ASIS. The external oblique fascia is then elevated from the iliac crest using Bovie cautery from slightly distal to the gluteal tubercle to a point approximately 2 cm from the ASIS. Attention is then turned to the distal

dissection where the fascia overlying the tensor fascia lata (TFL) muscle is exposed. The area where the DALA portal came through the TFL may be noted here. The TFL fascia is incised typically laterally, in the middle of the muscle belly, and is carried distally toward the end of the incision, in line with the TFL muscle fibers using curve Metzenbaum scissors. This is additionally carried proximally toward the ASIS and should end near the attachment of the sartorius fascia. A sharp Hohman is placed in the interval between the anteromedial TFL fascia and the TFL proximal attachment. The Hohman tip ends up in a position on the pelvis between the ASIS and the anterior inferior iliac spine. A fleck osteotomy of the ASIS is carried out with a one-half-inch curved or straight osteotome to protect the lateral femoral cutaneous nerve (Fig 2D). A Cobb elevator is used to reflect the periosteum and psoas muscle off the inner iliac crest. A radiolucent, reversed curved blunt Hohman (Eva) is then placed over the pelvic brim onto the quadrilateral surface. The proximal rectus femoris tendon is identified and careful dissection is carried out



**Fig 5.** Fluoroscopic images of the left hip. (A) Wide straight osteotome in correct position on the anteroposterior view overlying the acetabular teardrop. (B) Iliac oblique view with the iliac osteotomy made using the oscillating saw outlined in blue. (C) Iliac oblique view of the straight osteotome coming behind the acetabulum and (D) connecting with the previous incomplete ischial osteotomy, which is outlined in blue.

anterior and medial to this to expose the iliocapsularis muscle on the capsule. The iliocapsularis muscle is then reflected off the capsule from lateral to medial using a Bovie and a large curved Mayo scissor, which will develop an interval to the psoas bursa.

At this point, the curved handle of a Hibb's retractor is placed under the psoas tendon to elevate it off of the superior pubic ramus. Using a long-tipped Bovie cautery, the pelvic brim periosteum is scored lateral to the Eva retractor. The superior pubic ramus is also scored using a Bovie from proximal to distal (cephalad to caudal) medial to the pubic tubercle. Using a straight Cobb elevator, the periosteum is elevated from the pelvic brim down the quadrilateral surface and then using the 30° Cobb elevator from the hip preservation set (DePuy Synthes), the periosteum is then elevated from the posteroinferior margin of the superior pubic ramus to protect the obturator neurovascular bundle. Finally the 30° Cobb elevator is placed along the superior margin of the superior pubic ramus, medial to the pubic tubercle and is directed toward the

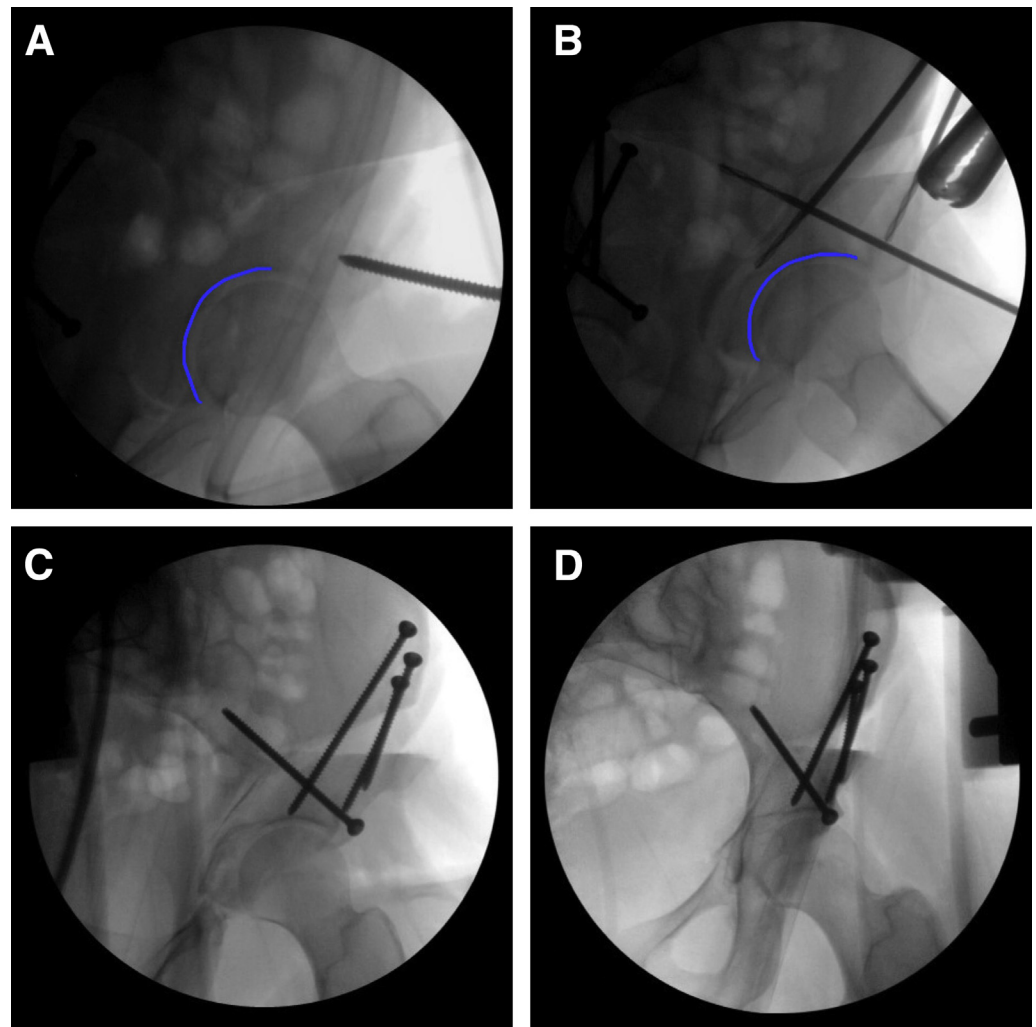
contralateral knee. The periosteum is elevated in this area (generally under where the psoas would cross the ramus) being careful to avoid the hip joint, especially if the capsule was left open. Once the periosteum is broken through a gentle pop and release is felt. The elevator can be used to palpate the anterior ischium and position can be confirmed with fluoroscopy.

#### **Periacetabular Osteotomy: Cuts**

There are 4 to 5 osteotomies or "cuts" that make up the PAO: (1) incomplete osteotomy through the anterior ischium inferior to the joint; (2) osteotomy through the superior pubic ramus, medial to the joint; (3) iliac osteotomy up to the pelvic brim; and (4) osteotomy down the quadrilateral surface to connect with the first incomplete ischial osteotomy. A fifth osteotomy connecting the first and fourth osteotomies is sometimes needed to completely free up the acetabular fragment.

The first osteotomy is made by removing the 30° Cobb elevator and carefully placing a narrow curved

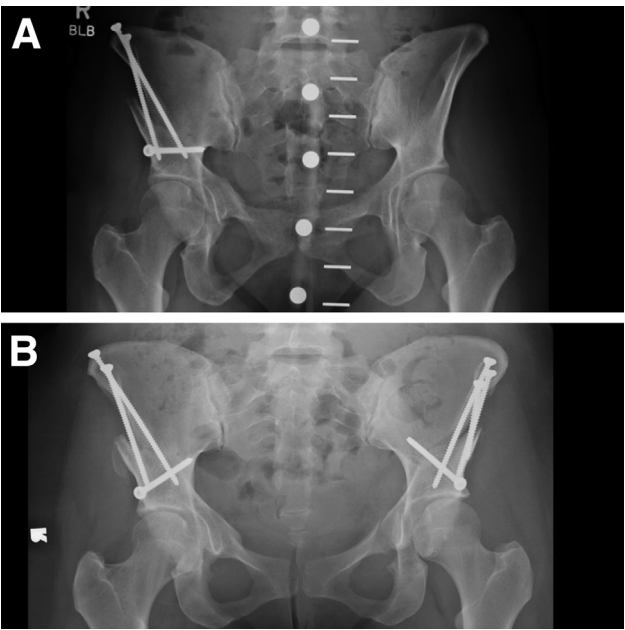
**Fig 6.** Left hip fluoroscopic iliac oblique views of the acetabular fragment (A) before correction with the acetabulum outlined in blue and (B) postcorrection with provisional fixation using 3.2-mm drill bits. (C) Iliac oblique and (D) anteroposterior fluoroscopic views showing final position of acetabular fragment following periacetabular osteotomy with 4.5-mm screws in place.



osteotome from the hip preservation set (DePuy Synthes) along the developed soft-tissue track. Its position is confirmed with an anteroposterior (AP) fluoroscopic view. It is important that the first pass with the osteotome is along the medial quadrilateral surface (Fig 4A). The osteotome is directed toward the iliac spine and is stopped at a position just past the midpoint of the posterior column using an iliac oblique fluoroscopy image (Fig 4 B and C). Once the medial portion of this osteotomy is felt to be satisfactory, the steps are repeated for the middle portion and lateral portion of the ischial osteotomy. On the AP fluoroscopic view, the osteotome should appear to travel behind the hip joint (Fig 4D). Of note, as the osteotomy is moved from medial to lateral, the depth of the osteotome will not be appreciated on the iliac oblique fluoroscopic view. Additionally, great care must be taken when making the lateral-sided osteotomy as this portion carries the highest risk of sciatic nerve injury.

An Eva retractor is placed under the superior pubic ramus to protect the obturator neurovascular bundle. The second osteotomy will use a wide straight osteotome from the hip preservation set (DePuy Synthes). The osteotome is placed at the level of the teardrop and is directed 45° from the anterolateral to posteromedial direction (Fig 5A). This is placed carefully just medial to the pubic tubercle on the superior pubic ramus. Additionally, the handle of the osteotome is rotated so that the distal tip of the osteotome is directed 45° laterally. This will assist with elevating the fragment past the intact portion of the ramus.

The third osteotomy involves using an oscillating saw to make a cut at or near the ASIS to a point 1 to 2 cm from the pelvic brim (Fig 5B). The level of osteotomy is determined using AP and iliac oblique fluoroscopic views to allow for enough acetabular bone for fixation and appropriate trajectory of the quadrilateral osteotomy to meet the first ischial osteotomy. Once the level of osteotomy is determined, a small amount of the



**Fig 7.** Anteroposterior views of the pelvis showing the left hip (A) preoperatively and (B) postoperatively. Increased lateral coverage of the femoral head and decreased inclination of the acetabular sourceil are noted.

abductors is elevated from the external iliac crest. A blunt Hohman retractor is placed between the abductor muscles and outer ilium to protect the abductor muscles from the saw blade.

The fourth osteotomy will connect the iliac osteotomy to the ischial osteotomy via an osteotomy down

the posterior column, through the quadrilateral surface (Fig 5 C and D). An Eva retractor is placed along the pelvic brim and a straight narrow osteotome is used from the hip preservation set (DePuy Synthes). It is placed at the distal extent of the iliac osteotomy along the pelvic brim. An iliac oblique fluoroscopic image is used to confirm correct rotation of the osteotome tip and trajectory. The bone of the pelvic brim is dense and hard and may require heavy blows from the mallet. Additionally, the osteotome will need to be held firmly to avoid slippage and maintain rotation and trajectory. Once the osteotome is taken to a position behind the acetabulum, it can be exchanged for a wide osteotome from the hip preservation set (DePuy Synthes). It is important to reach into the pelvis and palpate at the quadrilateral surface because the tip of the osteotome must be felt to avoid over-penetration of the lateral cortex. This, with additional hip abduction, can help avoid iatrogenic injury to the sciatic nerve.

A 3.5-mm drill bit is used to place a hole just above the anterior inferior iliac spine, near the rectus femoris tendon origin. A 5-mm Schanz pin is placed in this hole with a T-handle chuck and driven into place with position noted on an iliac oblique view (Fig 6A). Using the T-handle chuck and either the opposite hand or a pair of Farabeuf retractors, the fragment is mobilized and rotated into its new position. The fragment should address lateral and anterior or posterior under-coverage, based on preoperative imaging. Anterior coverage is assessed with an iliac oblique view and

**Table 2.** Technical Pitfalls, Disadvantages, and Risks

Pitfalls	Disadvantages	Risks
<ul style="list-style-type: none"><li>• Patient’s perineum must be placed near the distal portion of the pad, approximately 4 to 6 cm from the hole for the post; too distal and they may tilt toward the contralateral side; too proximal and the spars will obstruct the fluoroscopy view during the PAO</li><li>• Alcohol will degrade the pad and therefore care must be taken during skin prep to not get alcohol on the pad</li><li>• Boots must be secured within the holder on the spar or the patient is at risk for having their extremity fall out of the holder</li><li>• Boots must be “unclicked” or gently loosened once central compartment work is complete or patient could suffer undue prolonged compression of the foot soft-tissue structures</li></ul>	<ul style="list-style-type: none"><li>• Hip arthroscopy and PAO are very different skill sets with steep learning curves</li><li>• Would often require 2 surgeons unless a single surgeon is skilled in both arthroscopy and PAO</li><li>• Leg can be “floppy” or unstable without the use of the perineal post and require someone to hold the knee to keep the hip from over-externally rotating during the peripheral compartment arthroscopy and PAO</li><li>• It remains to be seen what the impact of additional arthroscopic treatment is of central and peripheral compartment hip disease on mid- and long-term outcomes of PAO</li></ul>	<ul style="list-style-type: none"><li>• Use of a pad could potentially result in the epidural backing out and care must be taken during gross traction and large patient shifts; anesthesia should also be aware and safely secure the epidural</li><li>• Patient falling or severely tilting on narrow bed</li><li>• Lack of experience with new technique, table or equipment can lead to potential incorrect use by operative staff</li><li>• Unknown potential complications of new technique</li></ul>

PAO, periacetabular osteotomy.

lateral coverage as well as acetabular version is assessed using the AP view. Once correction is felt to be adequate, 3.2-mm drill bits are generally used to place 2 to 3 4.5-mm screws from the intact iliac crest into the acetabular fragment (Fig 6B-D). The Schanz pin can be removed and additional 4.5-mm screw can be placed after drilling from the acetabular fragment into the intact ilium with a 3.2-mm drill. Final AP, iliac, and obturator oblique images are obtained to confirm adequate correction and proper screw placement (Fig 7 A and B). After completion of the PAO, if the capsule had not been closed, it is closed at this time in 10 to 15° of flexion with 3 to 4 nonabsorbable sutures using the injector (Stryker).

The wound is irrigated and the fleck osteotomy is reduced back to the ilium via a 2.0-mm drill hole through the remaining ASIS and nonabsorbable suture. The TFL fascia is closed along with reapproximating the external oblique fascia to the iliac crest. The subcutaneous tissue and skin are then closed. The remaining arthroscopy portals are additionally closed and a dressing is applied.

## Discussion

A high incidence intra-articular pathology in patients with hip dysplasia when identified by open or arthroscopic means has been reported.<sup>5</sup> The vast majority of our patients also satisfy the Warwick criteria for acceptability for hip arthroscopy from their imaging, physical examination, and history.<sup>6</sup> Because of these factors, we have been performing concomitant arthroscopy on nearly every PAO at our institution since 2013 and have been performing the current postless technique since March 2018. Our technique of combined hip arthroscopy and PAO has evolved over the years to what is described in this Technical Note with the use of 1 table and without a perineal post. The senior surgeon has performed more than 500 PAO procedures and has found that concomitant arthroscopy does not increase the operative time of the PAO and, if anything, has made the exposure easier with less bleeding and better-defined tissue planes because of hydro-dissection from the arthroscopy fluid. The ease of exposure along with other technical pearls and benefits are outlined in Table 1.

The long-term outcomes of PAO have been well described over the past 2 decades, with one-third of the original Bernese cohort having been preserved at 30 years.<sup>7</sup> A known cause of failure of the PAO is not addressing femoroacetabular impingement or creating impingement with the PAO correction.<sup>8</sup> However, it remains to be seen if addressing central and peripheral compartment pathology at the time of PAO can affect short- and long-term outcomes. Reports thus far have been sparse and inconsistent with selection bias of treating intra-articular pathology to those with signs

and symptoms of impingement or MRI findings of labral pathology. We firmly believe that with the high association of intra-articular pathology and cam morphology<sup>9</sup> in patients with dysplasia that an arthroscopic evaluation and treatment of the central and peripheral compartments of the hip is warranted in all hips before PAO.

We have found a very high prevalence of intra-articular pathology with nearly all hips presenting for PAO requiring a labral repair and more than one-half with some degree of chondromalacia of the acetabulum. The use of a single table and draping has allowed us to complete an efficient combined hip arthroscopy and PAO (Table 1). At our institution, both the arthroscopy and PAO are performed by a single surgeon. Neither of these procedures alone should be taken on by the inexperienced surgeon because both the PAO and arthroscopic hip surgery have a steep learning curve.<sup>10,11</sup> Any new technique involving the combination of multiple complex, difficult procedures and new equipment can carry potential disadvantages and risks (Table 2). When performed by an experienced surgeon, however, the addition of arthroscopy before PAO can be done safely and does not increase the complication rate.<sup>12</sup>

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