



Monograph: New or current surgical techniques

Surgical technique of hip arthroscopy without perineal post

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ABSTRACT

The present study describes the surgical technique of hip arthroscopy without the use of a perineal post. Hip arthroscopy has gained popularity in recent years as a treatment for different disorders, though it is not without complications. Some of these are related to the surgical technique used, such as transient neuropraxia or other more serious complications such as hematomas and genital injuries, associated with the use of a perineal post. The technique is performed under general anesthesia with continuous muscle relaxation, and the patient must be positioned in the supine position on a non-slip pad. Dislocation of the hip is achieved by axial traction, in the Trendelenburg position. In our experience, the technique has been effective, reducing the number of postoperative complications associated with the use of a central post. This technique is safe and easily reproducible, and is economically feasible, requiring only a non-slip pad.

The technique provides tips and tricks obtained after more than a thousand operations performed by the senior surgeon, including specific recommendations on patient positioning, the preparation of portals, joint capsule management, and capsule closure.

Key words: Hip arthroscopy. Perineal post. Capsulotomy. Capsule closure.

ABSTRACT

Técnica quirúrgica de artroscopia de cadera sin pivote perineal

El objetivo de este trabajo es describir la técnica de artroscopia de cadera sin uso de poste perineal. La artroscopia de cadera ha ganado popularidad en los últimos años como tratamiento para diversas patologías, aunque su realización no está exenta de complicaciones, algunas de ellas asociadas a la técnica quirúrgica utilizada, como es la neuroapraxia transitoria u otras más graves como hematomas y lesiones genitales, asociadas al uso de poste perineal. La técnica se realiza bajo anestesia general con relajación muscular continua, siendo imprescindible posicionar al paciente en decúbito supino sobre una almohadilla antideslizante. La luxación de la cadera se consigue mediante tracción axial, en posición de Trendelenburg. En nuestra experiencia, la técnica ha sido eficaz, reduciendo el número de complicaciones postoperatorias asociadas al uso de pivote central. Esta técnica es segura y fácilmente reproducible, además es económicamente viable, al solo precisar de una almohadilla antideslizante para su realización.

En esta técnica se proporcionan consejos y trucos obtenidos después de más de mil casos realizados por el cirujano senior, incluyendo recomendaciones específicas sobre la colocación del paciente, la realización de los portales, el manejo de la cápsula articular y el cierre capsular.

Palabras clave: Artroscopia de cadera. Poste perineal. Capsulotomía. Cierre capsular.



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Introduction

Hip arthroscopy has gained popularity in recent years^(1,2), establishing itself as an effective tool for the treatment of various hip disorders, and the number of indications is increasing rapidly. Despite the numerous techniques described for implementing hip arthroscopy, there is still no consensus on the most appropriate procedure for obtaining the best results.

Hip arthroscopy is not without risks, with reported complication rates ranging from 0.5-59%⁽³⁻⁵⁾. An association has been observed between use of the perineal post and the occurrence of transient neuropraxia^(6,7), as well as soft tissue injuries, and scrotal and vulvar tears^(7,8). Perineal and inguinal dysesthesia rates of up to 41-59% have been reported when using a perineal post^(9,10). These complications are typically transient and resolve within days, weeks or months⁽¹¹⁾, although permanent lesions have also been reported⁽⁵⁾. A systematic review by Habib *et al.*⁽⁷⁾ reported an incidence of pudendal nerve injury of 1.8%.

To avoid these potential complications, hip dislocation techniques without the use of a post have gained popularity in recent years⁽¹²⁻¹⁴⁾. The incorporation of new techniques represents a challenge for the surgeon, and is not without difficulties. In this article, we present a precise description of the technique we have been using in our center, with the basic set-up done in a way to make it easily reproducible in order to ensure satisfactory results.

Surgical technique

To perform this technique, collaboration with the anesthesia team is necessary to secure good relaxation of the patient, which will be crucial to achieve hip joint diastasis without the use of a perineal post generating resistance to axial traction of the limb. In our center, the anesthesia team uses a continuous intravenous infusion of rocuronium adjusted to the patient's weight: rocuronium bromide (Esmeron®) 0.5 mg/kg/h. We make sure that we have all the necessary equipment to perform the hip distraction surgical technique without the use of a perineal post. The list of required equipment is detailed in **Table 1**.

Table 1. Equipment required for hip arthroscopy without a perineal post.

Conventional traction table
Anti-slip pad
Fluoroscopy
Access needles and nitinol
Hip arthroscopy instruments according to surgeon's preference

Operating room layout

In order to create a stable and comfortable surgical environment for the operation, we adopt a systematic room layout. This will allow us to have a sterile area where surgical techniques can be performed as comfortably as possible. Our proposed surgical layout is shown in **Figure 1**.

The patient is placed in supine decubitus on the traction table. The entire surgical team is positioned on the side where the operation is to be performed. This will provide a closed sterile area to work in (**Figure 2**).

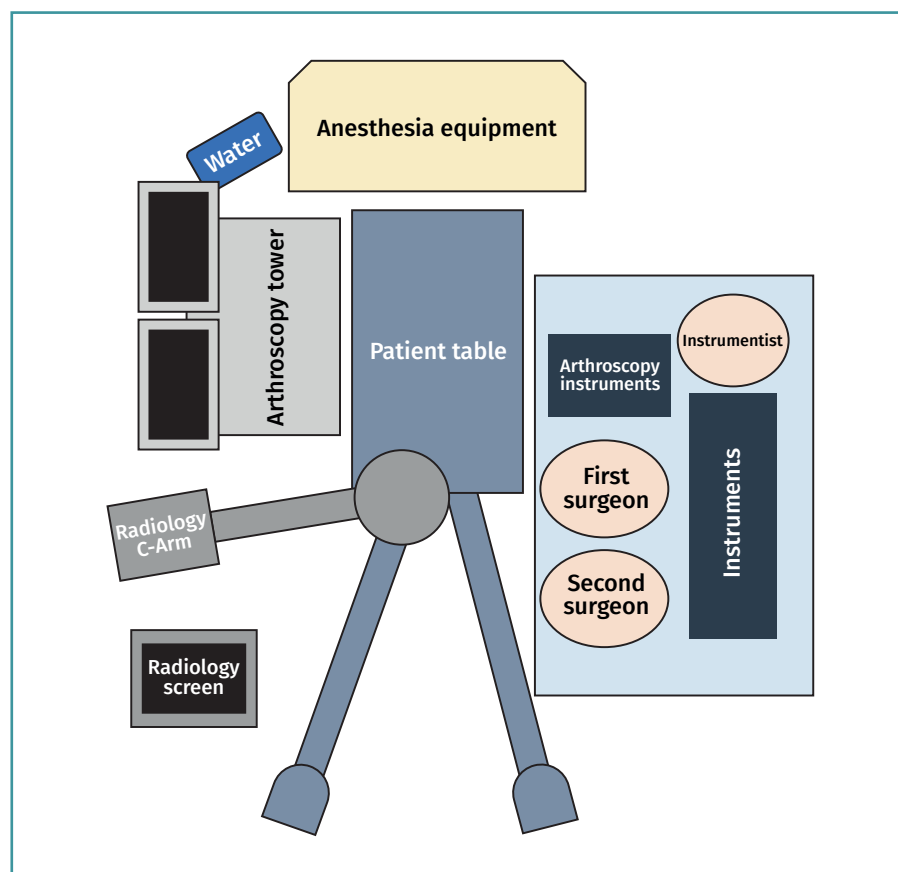


Figure 1. Schematic representation of the operating room layout for left hip arthroscopy.



Figure 2. View of the intraoperative surgical layout.

On the opposite side, from cranial to caudad, we place the support of the fluids that provide the necessary flow to perform hip arthroscopy. Next, we position the suction pump and the arthroscopy tower with the equipment screens directly in front of the surgeon for comfortable

and close viewing. Then, the image intensifier arm is positioned, entering from the opposite side and which will be free to move according to the needs of the surgery. In addition, the radioscropy screen should be placed close to the patient's feet so that the surgical team has a direct, unobstructed field of view (Figure 3).

Positioning of the patient

Once the patient is intubated and relaxed, we proceed to position him/her. The patient should lie supine on a non-slip pad correctly placed on the operating table (Figure 4). In our center we use an anti-slip pad (CarePad®) made of high-density viscoelastic material to ensure even distribution of the patient pressure. It is essential to avoid surgical pyjamas and sheets, to ensure full contact between the pad and the skin of the gluteal and lumbar region in order to generate sufficient resistance to allow the patient to adhere to the surgical table. For reference, the patient's position is similar to that obtained with the use of a post.

Once the patient is in a satisfactory position, we place both legs in the traction system available in our operating room, checking that both heels are correctly positioned. We use self-adhesive elastic bandaging to reinforce the traction system. For the upper extremities, we cross the patient's arm on the surgical side over the chest, using a suitably padded support to avoid any compression. The contralateral arm is placed in an arm support, facilitating access to the different lines needed for drug administration of the patient during the operation. We recommend the use of a transparent drape so that signs of abdominal extravasation can be monitored at all times (Figure 5 and Table 2).

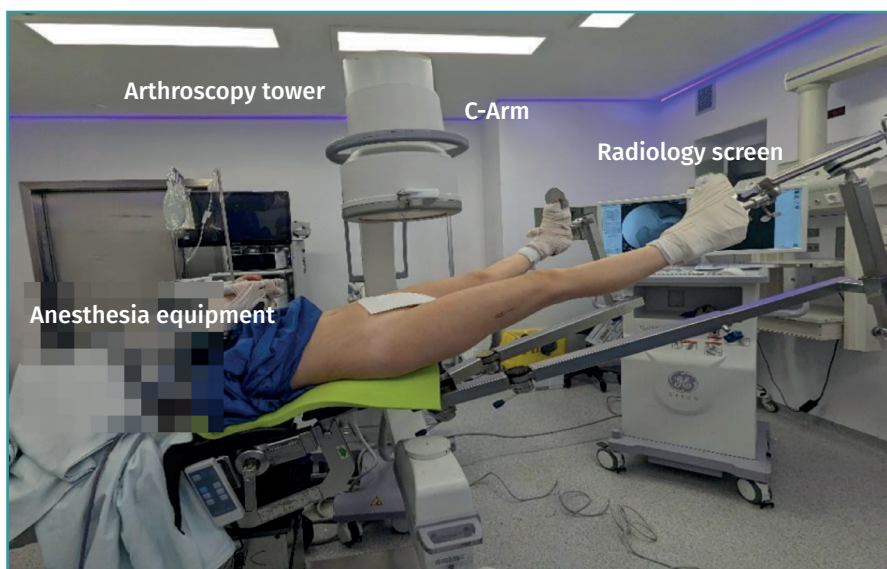


Figure 3. View of the operating room layout for left hip arthroscopy.

Hip distraction

We perform hip distraction under radiological control to ensure easy entry of the different arthroscopic portals at the start of surgery. We ensure that the image is correctly centered over the hip joint. It is essential to place the patient in 10-15° Trendelenburg to provide a gravity force vector together with the anti-slip pad, sufficient for hip dislocation (Figure 4). It is important to consider the weight of the patient. The heavier the patient, the less Trendelenburg will be required, while very light-weight patients may re-

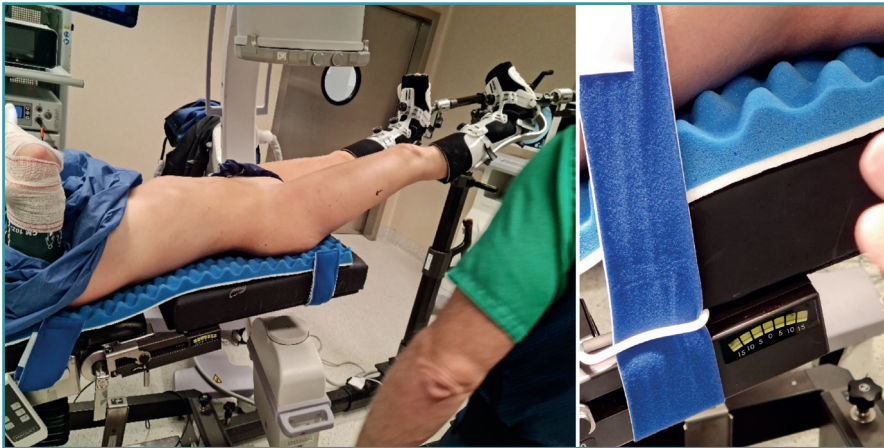


Figure 4. Final positioning of the patient prior to joint distraction. We ensure correct contact with the anti-slip pad. The patient is placed in 10-15° Trendelenburg.

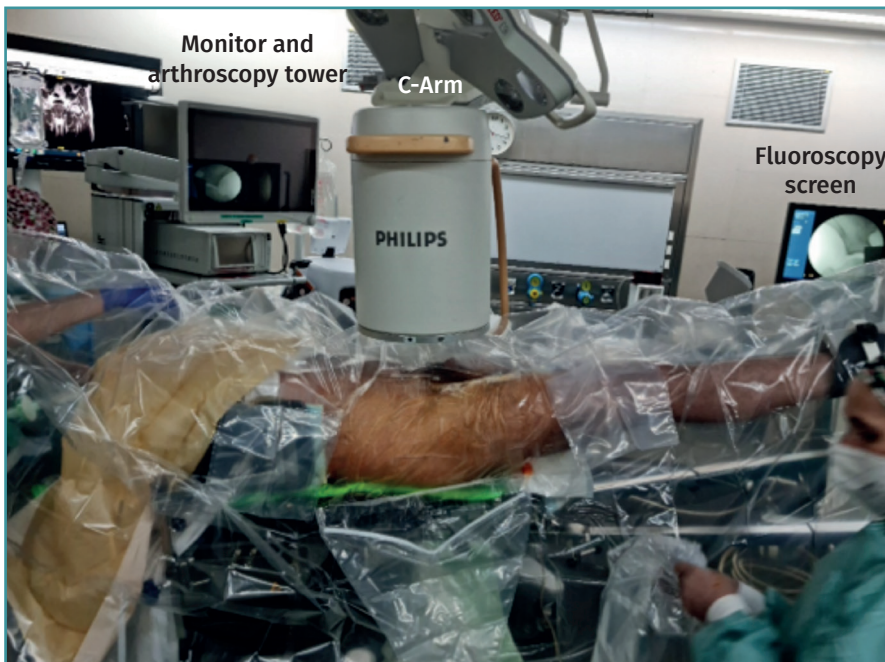


Figure 5. Final positioning of the patient prior to the start of surgery. We use a transparent drape that will allow adequate monitoring of the patient and facilitate the identification of any extravasation.

quire more Trendelenburg to counteract axial traction. The contralateral leg is abducted approximately 10-20° and positioned with minimal traction to balance the traction force on the leg to be operated upon.

Initially, traction is applied with the limb in maximum abduction, and subsequently it is brought into neutral abduction. This maneuver often secures sufficient distraction. If not, axial traction is added with the operating table tractor system. Traction is performed in internal rotation

to counteract femoral anteversion and to be able to work in a horizontal plane. Fluoroscopic control must ensure distraction that allows us to create the arthroscopic portals safely. Occasionally, we may hear a clicking sound when distraction of the hip joint is achieved, indicating that the natural seal has been lost, in the case of a competent acetabular labrum. Once sealing is lost, the Trendelenburg position can usually be decreased to maintain joint distraction. If sufficient distraction is not achieved on the first attempt, we ensure that the patient is properly relaxed and repeat the maneuver, temporarily increasing the Trendelenburg degrees to 20-30° if necessary (Figure 6).

Another technique we can use to facilitate distraction is disruption of the joint seal by insufflating air (30 ml) into the joint with an 18 gauge needle under radiological control, after initial traction. This will create a positive pressure within the joint capsule, eliminating the native negative pressure, and thus facilitating further distraction of the joint. The insufflation of air into the joint will allow us to check that we are inside the joint by delimiting a radiolucent area corresponding to the joint capsule (Table 3).

Arthroscopic portals

For hip arthroscopy, we use the *inside-out* technique, with minor modifications. We systematically use the anterolateral (AL) and modified mid-anterior portals (mMAP) and, if necessary, a third portal is established: the distal anterolateral accessory portal (DALA).

We start the surgery by identifying the different anatomical points that will guide us during creation of the arthroscopic portals. First, we locate the anterosuperior iliac spine (ASIS) and the patella, drawing a line connecting these two points that will serve as our surgical boundary. It is essential to avoid exceeding this limit medially in or-

Table 2. Tips for optimal patient positioning

Tips and tricks
Ensure full contact of the heel with the traction boot
Ensure correct contact of the anti-slip pad with the patient's body
Reinforce leg restraint of the traction system
Avoid positioning the patient on the lower edge of the bed in order to avoid compromising patient safety during distraction
Use transparent draping for correct patient monitoring

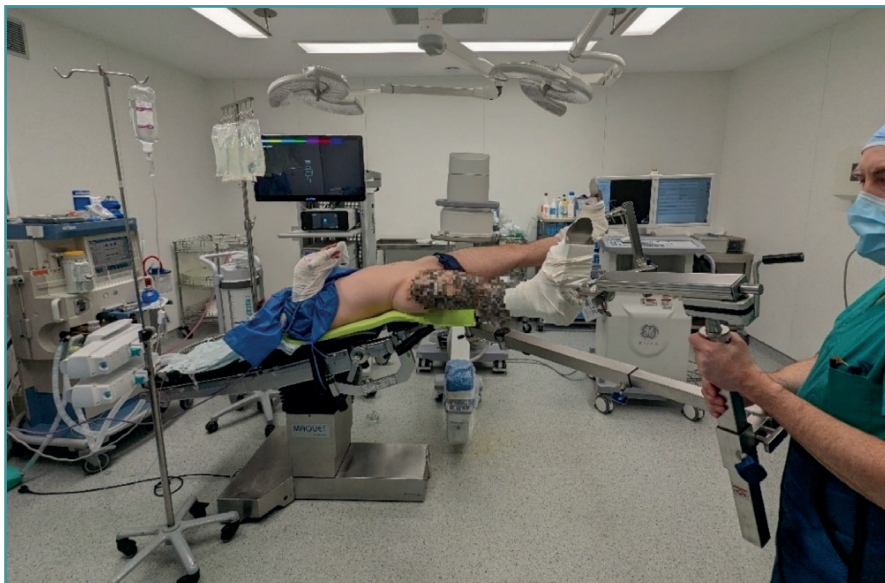


Figure 6. Proposed technique to achieve dislocation of the coxofemoral joint in complex cases. The Trendelenburg angle is temporarily increased to 30°, maximum abduction is performed, and the leg is placed in slight hip flexion, thus obtaining traction with a greater force vector.

Table 3. Tips for successful coxofemoral distraction

Tips and tricks
Correct placement of the anti-slip pad
Ensure complete muscle relaxation of the patient with the anesthesia equipment
Temporarily increase the Trendelenburg angle in the case of dislocation difficulty
Disruption of the joint seal through air insufflation

der to avoid damaging the adjacent vascular structures. Next, we identify the greater trochanter (GT) and mark the AL portal at its anterosuperior margin. It is advisable for this portal to be located as close as possible to the trochanter in order to facilitate access to the joint. The mMAP is then marked approximately 7 cm or 4 fingers from the

AL portal in an anterior and medial direction and at 45° in a craniocaudal direction. Finally, we place the DALA portal at an equidistant distance between the AL portal and the mMAP, forming an equilateral triangle (Figure 7).

We perform the AL arthroscopic portal under fluoroscopic control to confirm positioning of the guide needle. The guide is inserted with the bevel facing towards the femoral head in order to avoid damaging the cartilage of the latter. We visualize the location of the coxofemoral joint seeking to triangulate the entry point so that we access from the most lateral part of the acetabulum. To do

this, we can imagine a line half-way between the pubis and the ASIS. As a general rule, the guide needle is oriented about 20° in the cephalic direction. If we have adequately corrected the patient's femoral anteversion with internal rotation of the leg, as explained above, we should be able to enter with a direction parallel to the ground. By palpation, we detect the initial resistance of the fascia lata and, secondly, the resistance of the joint capsule, identifying the entry in the joint. We check the intra-articular location through palpation with nitinol wire (with blunt ends), touching with the acetabular fundus and via radioscopic control. We insufflate 30 ml of air to help us identify the rim of the acetabular labrum and physiological communication with the psoas - this being important to prevent possible

abdominal fluid extravasation (Figure 8). To minimize the risk of trans-labral penetration, it is advisable to consider removing the guide needle after air insufflation and re-enter while taking care to avoid the footprint of the acetabular labrum (Table 4).

The mMAP is performed under direct visualization of the arthroscopic triangle formed by the acetabular labrum, the femoral head, and the limit of view of the arthroscope, in the anterior region of the joint. Finally, if necessary, we establish the DALA portal likewise under direct visualization.

Capsulotomy

To ensure optimal visualization and in order to work comfortably, we perform the interportal capsulotomy. Only this measure will guarantee comfortable, safe and com-

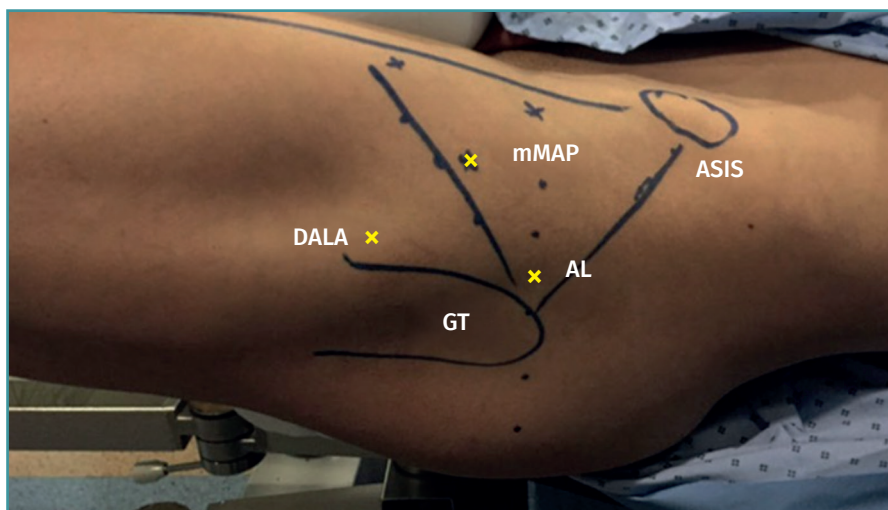


Figure 7. View of a left hip with drawing of the different anatomical references. AL: anterolateral portal; mMAP: modified mid-anterior portal; DALA: distal anterolateral portal; GT: greater trochanter; ASIS: anterosuperior iliac spine.

plete access to the entire anterior and lateral acetabular region for the proper assessment and treatment of possible lesions. After performing the mMAP, we switch the viewing camera to the mMAP so that we can visually check the exact location of our AL portal and, if it seems correct, we start the interportal capsulotomy. If a trans-labral portal has been made, we correct it and evaluate whether the lesion produced needs to be repaired (this is usually not the case, since the orifice measures 5 mm). Once the interportal capsulotomy has been started, we again switch the arthroscope to the AL portal to complete the capsulotomy from mMAP. To

approach the peripheral compartment, after the removal of traction and placement of the limb at 40° of hip flexion, we expand the capsulotomy by making a "T" shaped incision, where the interportal capsulotomy will be the top part of the "T". For this purpose, it is useful to place traction stitches in the capsule, thus allowing the capsulotomy to be performed evenly and safely.

To improve visibility during surgery, it is advisable to use well-placed traction points, which will allow us to maintain constant traction in the form of a tent, thus widening our field of view⁽¹⁵⁾. This is achieved by placing a suture through the

Table 4. Tips for performing the arthroscopic portals

Tips and tricks

Bevel towards the femoral head to avoid damaging the femoral cartilage

Insufflation of air to check correct entry

Use traction points to improve the field of view

It is advisable to repeat a second entry of the guide needle, more distal to the initial access, once correct location within the joint has been confirmed, in order to avoid trans-labral entry

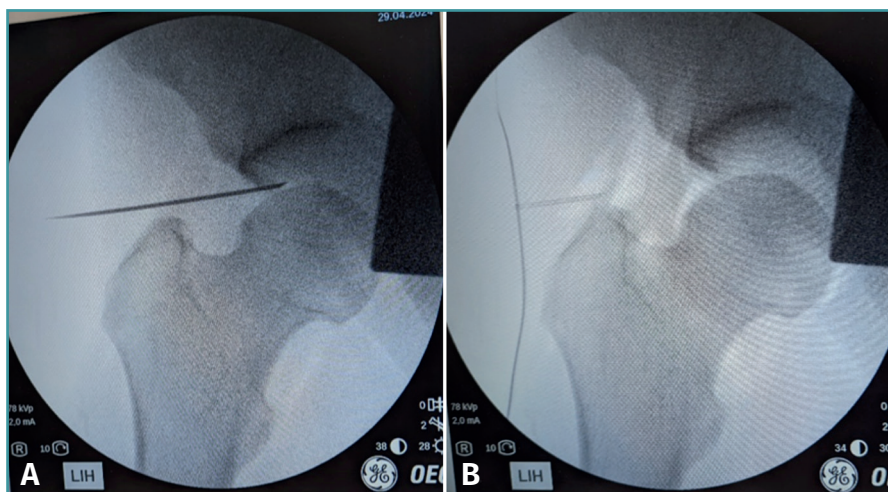


Figure 8. A: insertion of the guide needle from the anterolateral portal, ensuring that the bevel is oriented towards the femoral head; B: delineation of the radiolucent capsular contour by insufflating air into the joint to check that we are inside it.

capsular ridge in the desired position, pulling from outside and applying mosquito grasping forceps over the skin to maintain the traction obtained.

Capsule closure

Once the surgery has been performed, capsule closure is carried out. To do this, we start the closure with stitches from distal to proximal of the vertical arm of the "T", followed by one or two stitches of the interportal capsulotomy, being careful not to include the reflex portion of the rectus femoris in this repair.

Discussion

Hip arthroscopy is a complex surgical technique with a long learning curve, making it a challenge for surgeons to master the technique. In order to speed up this learning curve, we present the technique that we use in our center on a routine basis, and which represents the technical evolution that has given us the best results after more than 20 years dedicated to hip arthroscopy.

The gold standard in arthroscopic hip surgery includes a counter-traction post. However, several techniques without a post have been described^(12,13,15,16), although they are still in minority use. Fletcher *et al.*⁽¹⁷⁾ propose external fixation with threaded pins inserted into the femoral diaphysis and acetabulum. With this method, the authors reported no neurological complications in a series of 23 patients. However, the use of these pins has its own complications, including iatrogenic fractures, infections and increased postoperative pain. Mei-Dan *et al.*⁽¹⁸⁾ in turn describe the use of a post at thigh level, about 10 cm from the perineum. In over 2000 patients, the authors reported no complications related to the inguinal zone or perineum; however, they have described other possible complications such as obturator nerve neuropraxia.

The reported complication rates associated with the use of a perineal post vary widely from 0.05-59%^(4,5,19,20). Pudendal nerve palsy is the most common complication described after perineal post hip arthroscopy^(8,20,21). The most widely accepted interpretation of nerve injury as a complication of hip arthroscopy is the combination of traction and compression forces. A study in cadavers revealed a significant increase in pressure with increasing traction force in the ischial tuberosity and genital region, suggesting that pudendal nerve injury may be due to compressive rather than traction force⁽²²⁾.

In a systematic review of 92 studies with 6134 patients, Harris *et al.*⁽²¹⁾ showed the most frequent complication, along with iatrogenic chondrolabral injury, to be pudendal neuropraxia after hip arthroscopy. In this systematic review, perineal lesions were described in a total of 10 cases (0.16%). Kreautler *et al.*⁽²³⁾ have conducted a prospective comparative study of systems with an inguinal post *versus* systems without a post. The authors found a significantly lower risk of inguinal dysesthesias secondary to pudendal neuropraxia in the group without a post (0 versus 30%; $p < 0.0001$). They also reported a decreased risk of peroneal nerve neuropraxia in the group without a post (12 versus 32%; $p = 0.04$).

Different techniques have been described for distraction of the hip joint without the use of an inguinal post. Mei-Dan *et al.*⁽¹⁸⁾, in a prospective cohort study of 1000 hip arthroscopies, described a technique that combines the Trendelenburg position with the use of a specific traction system to achieve hip distraction without the use of a perineal post. The technique we present focuses on elim-

inating the use of the perineal post to obtain hip joint distraction by simply using an additional anti-slip pad⁽¹³⁾, which hardly increases the costs of surgery.

In our experience, we have seen that patients with a low body mass index may present greater difficulties during surgical preparation. In these cases, the patient's weight may not be sufficient to ensure adequate friction with the anti-slip pad, thus potentially making dislocation of the hip joint more difficult. We recommend initially increasing the degree of Trendelenburg to about 30° to improve the gravitational force exerted on the pad and thus facilitate joint dislocation (Figure 6)⁽²⁴⁾. In addition, patients with pincer-type morphology or with some degree of coxarthrosis may pose additional challenges at the time of joint dislocation. In such cases, it is often wiser to access the peripheral compartment in the first instance or adopt an outside-in approach. However, in our experience, this is much more traumatic to the joint and may cause us to reconsider the benefits of the preservation surgery we are about to perform.

Among the possible limitations of hip distraction techniques without the use of a perineal post, mention must be made of the need for the Trendelenburg position. Theoretically, a Trendelenburg position maintained throughout an operation could alter venous flow of the operated limb. In a prospective study involving a cohort of 35 patients, Welton *et al.*⁽²⁴⁾ observed no significant reduction in venous flow in the common femoral or popliteal veins. Another possible complication of hip arthroscopy is fluid extravasation. However, the literature has not reported an association between this complication and use of the technique without a perineal post⁽²⁵⁾.

When performing the arthroscopic portals, we must ensure that adequate distraction of the joint has been achieved. The identification of the different anatomical points will help us to secure optimal access points. Poor positioning of the arthroscopic portals can affect the rest of the surgery. We therefore must take the time necessary to obtain adequate access to allow proper visualization and maneuverability during the operation. Each surgeon has his or her own preferences or a variation of portals to suit personal comfort, but the AL portal, described by Burman in 1931, remains the initial portal in most cases for accessing the central compartment of the hip⁽²⁶⁾.

Capsulotomy is essential to ensure adequate maneuverability during surgery. However, capsulotomy is controversial due to possible iatrogenic damage to the joint capsule, especially to the iliofemoral ligament⁽²⁷⁾. A sufficiently wide capsulotomy must be performed to avoid damaging it during our surgical technique and to ensure proper repair of the capsule at the end of the procedure. We seek to restore the previous anatomy of the hip joint through precise capsule closure. As Bakshi *et al.* point out⁽²⁸⁾, sacrifice of the stabilizing ligaments of the hip joint could lead to hip instability with anterior hip displacement. De-

spite the controversies, recent research shows superior results in terms of patient reported outcomes (PROs) with capsule closure^(19,29,30).

Conclusions

Hip arthroscopy without the use of a perineal post is an effective, reproducible and safe technique that significantly reduces the incidence of complications related to the use of a post.



Video 1. Patient positioning for hip arthroscopy without a perineal post.

Supplementary material

The video accompanying this article can be seen at **(Video 1)**:

<https://fondoscience.s3.eu-west-1.amazonaws.com/fs-reaca-videos/reaca.fs2406014-artroscopia-cadera-sin-pivote-perineal.mp4>

Ethical responsibilities

Conflicts of interest. The authors state that they have no conflicts of interest.

Financial support. This study has received no financial support.

Protection of people and animals. The authors declare that this research has not involved human or animal experimentation.

Data confidentiality. The authors declare that the protocols of their centre referred to the publication of patient information have been followed, and that all the patients included in the study have received sufficient information and have given written informed consent to participation in the study.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

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