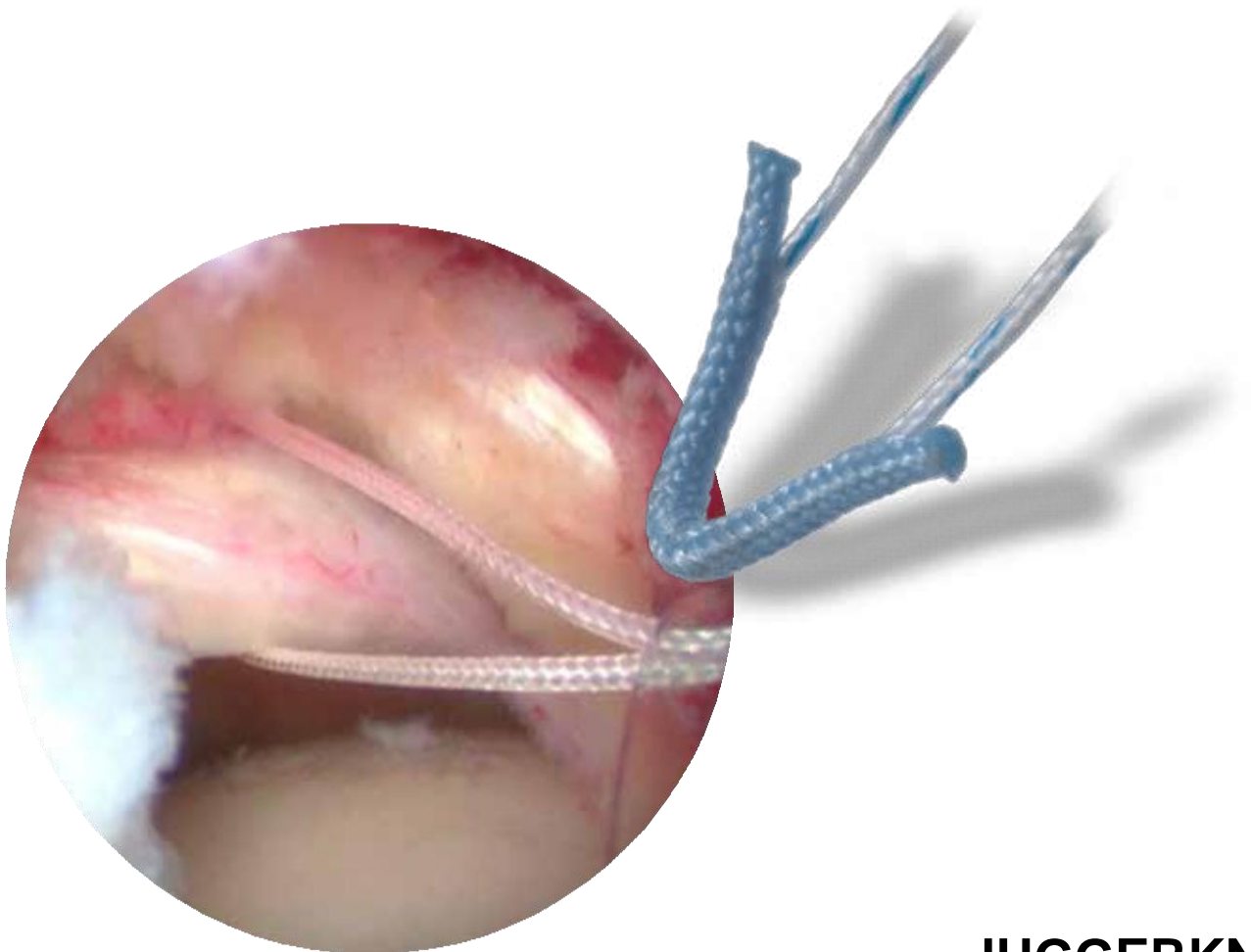


# JuggerKnot™

SOFT ANCHOR



## **JUGGERKNOT**

### Inside-Out Hip Arthroscopy Technique

SURGICAL TECHNIQUE  
described by Dr. Eric Margalet

**BOMET**®  
SPORTS MEDICINE

# JuggerKnot Hip Arthroscopy

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## Introduction

Hip arthroscopy has experienced enormous advances in the last few years.

This technique is revolutionary but technically much simpler, with a short learning curve that allows us to easily access the coxofemoral joint. Another advantage is the use of non-specific instruments that makes the development even more simplified, with an improvement in the arthroscopic manipulations together with a considerable decrease in time required for surgery, such as the time under traction which, in turn, means the complications associated with this joint decrease considerably. (Figure 1a and 1b).

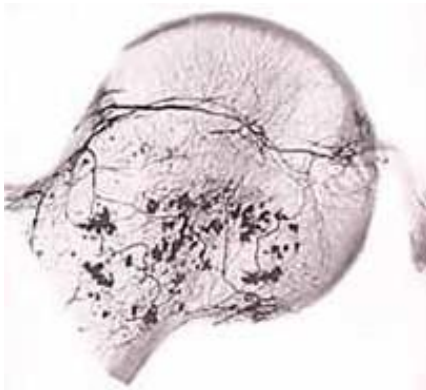


Figure 1a



Figure 1b

## Indications

The capacity to access the hip allows us to expand the indications which were previously only reserved for those patients with a preserved intra-articular space, while avoiding complications.

The most frequent indications for hip arthroscopy are:

- Femoroacetabular impingement (cam-pincer-mixed)
- Coxa saltans interna (tendinopathy of the psoas)
- Coxa saltans externa (tendinopathy of the iliotibial band)
- Chondral lesions
- Lesions of the round ligament
- Instability
- Lesions of the acetabular labrum
- Free bodies
- Pathology of the peripheral and central compartment: synovitis, chondrocalcinosis
- Coxarthrosis treatment
- Synovial plica and orbicular ligament lesions
- Arthroscopic revision of a painful hip

# JuggerKnot Hip Arthroscopy

## *Preoperative Planning*

We position the patient in the supine position, although it is also possible to use the lateral position. This requires the use of an orthopedic traction table and the extremities are positioned in complete knee and hip extension, with neutral rotation of the foot. Traction is not applied. General anesthesia is recommended with placement of a wide roller or perineal post.

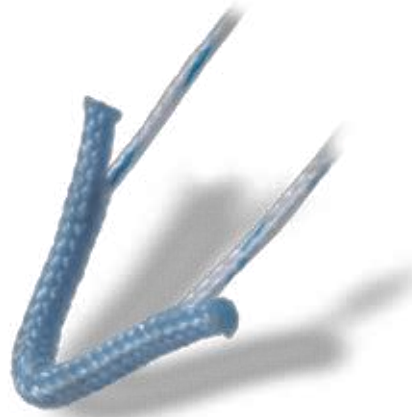
The arthroscopy tower is situated opposite the surgeon at the height of the opposite side of the hip that is to be operated. The assistant is positioned to the right in the case of right hips and the instrument nurse is on the left, or vice versa in the case of left hips (Figure 2).



*Figure 2*

## *The Implant*

In cases in which we have to make a labral reinsertion, we will use the **JuggerKnot Soft Anchor** implant. The fundamental advantage of this implant is that it is a 100% suture implant and is only 1.4 mm. The implant includes a four-toothed guide for its correct positioning, as well as a fine drill bit of 1.4 mm (Figure 3a and 3b).



*Figure 3a*



*Figure 3b*

The use of this small-sized implant allows greater bone preservation (60% compared with a 3mm anchor) and gives us the possibility of increasing the contact surface, if that were to prove necessary, through the positioning of a greater number of implants in a small space, which would be much more complicated with other implants.

## Surgical Technique

### 1. Anatomical References

We draw the Anterior Superior Iliac Spine (ASIS) and the patella, as well as the trochanter major, as reference bones of interest.

We trace a line which joins the ASIS with the center of the patella in such a way that the longitudinal line that is traced marks the border or limit at the medial level where we cannot perform any surgical act (puncture, portals...).

The trochanter major (TM): Bone reference in the case where a classic portal is required (for accessory trochanter) (Figure 4).

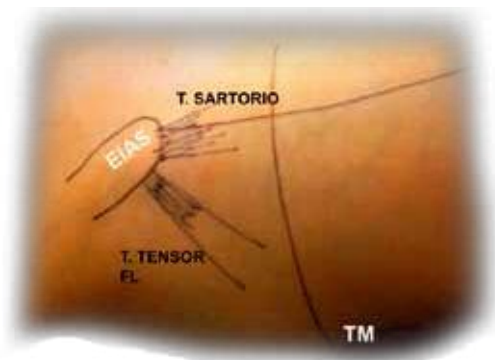


Figure 4

### 2. Vision Portals

Above the line that parts the ASIS (Figure 5a) toward the patella, at three-four fingerbreadths and one finger lateral to the line previously described, we make an incision at the level of the skin, which is oriented vertically (vision portal), situated in the anatomical region of the inverted V (superficial muscular plane defined by the insertion at the ASIS level of the tendons: sartorius and tensor fascia lata, and in the deeper plane by the tendons of the rectus femoris and the gluteus medius) (Figure 5b).

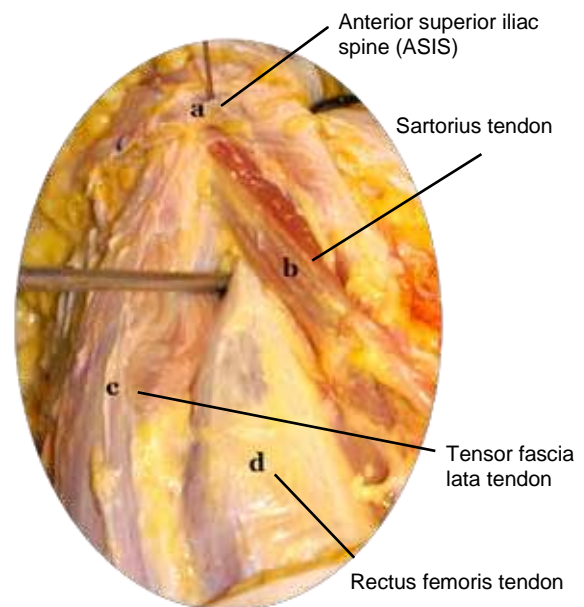


Figure 5a

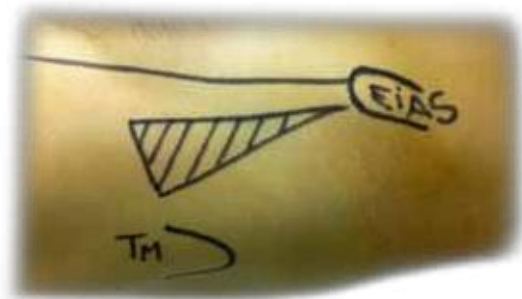


Figure 5b

# JuggerKnot Hip Arthroscopy

## Surgical Technique

### 3. Work Portal

Two fingerbreadths in the proximal direction from the vision portal and above the same line, the work portal is made inside the anatomical window described by the inverted V (Figure 5c).

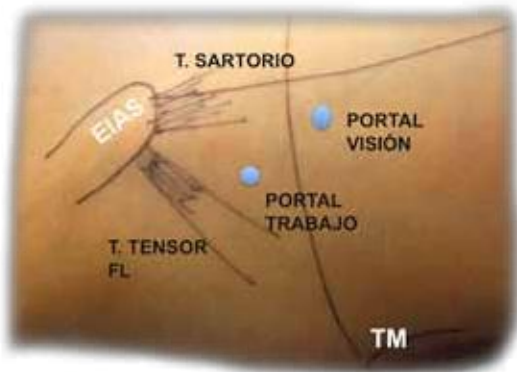


Figure 5c  
[Vision Portal, Work Portal, Sartorius Tendon, Tensor Fascia Lata Tendon]

### 4. Approach

Once we make the cutaneous incision for the vision portal, we will insert the arthroscope with the blunt obturator, following a cranial to caudal direction of 45°, slightly distal to proximal, with the intention of palpating the femoral neck through the anatomical window. This palpation is quite reliable due to its proximity. Once we palpate the femoral neck, we perform the maneuver known as the "windshield wiper movement", with the intention of locating the lateral and medial borders of the femoral neck in order to obtain the dimensions of the neck thickness proprioceptively, demarcating the axis of the neck and creating a precapsular space (Figure 6a, 6b, 6c and 6d).



Figure 6a

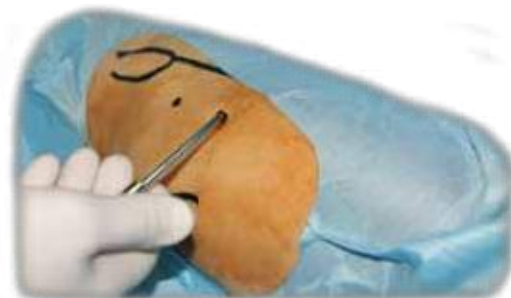


Figure 6b

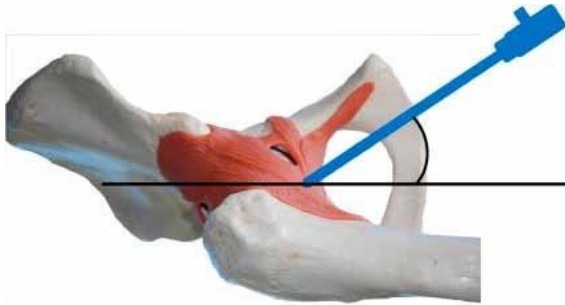


Figure 6c

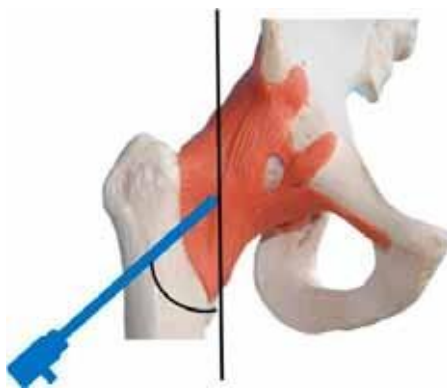


Figure 6d

Once the center of the femoral neck axis has been located, we will insert a Wissinger (Switching stick) through the work portal. Through the maneuver called "knitting" (Figure 7a and 7b), we will lightly touch the two distal ends of the arthroscope to the Wissinger.



Figure 7a

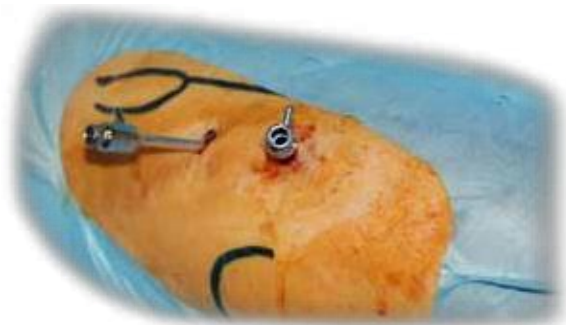


Figure 7b

Use of the image intensifier is optional (Figure 8).



Figure 8

# JuggerKnot Hip Arthroscopy

## *Surgical Technique (cont.)*

### **5. Arthroscopic Visualization and Cannula Positioning**

Once these maneuvers are conducted, we will insert the 30° optic. A pressure of no greater than 50 mmHg is recommended.

The 30° optic should be directed toward the side in which the Wissinger is inserted to obtain optimal visualization (Figure 9).



*Figure 9*

At this point we pass the optic through the hard surface that we palpate over the femoral neck. This maneuver is conducted as many times as required until we obtain a white image which indicates the presence of capsular tissue.

We arthroscopically locate the Wissinger through which we can obtain a work a cannula of 7mm in diameter and 70/80 mm in length (Figure 10a, 10b and 10c).



*Figure 10a*



*Figure 10b*



*Figure 10c*



## 6. Capsulotomy

Once the work cannula is situated, we will identify the direction of the anterior iliofemoral ligament fibers with the arthroscopic capsule image (main stabilizer of the joint capsule).

We will insert a vaporizer with a 90° end through the work cannula, with which we will make a small oval window, eliminating the muscular fibers that would make correct capsular visualization difficult.

Subsequently, we insert a 50° end vaporizer with which we will proceed to the capsulotomy following the direction of the anterior iliofemoral ligament fibers and beginning the capsulotomy from distal to the neck towards proximal (toward the head of the femur).

We will not progress in the capsulotomy until we locate ourselves exactly, to avoid iatrogenesis (Figure 11a, 11b and 11c).

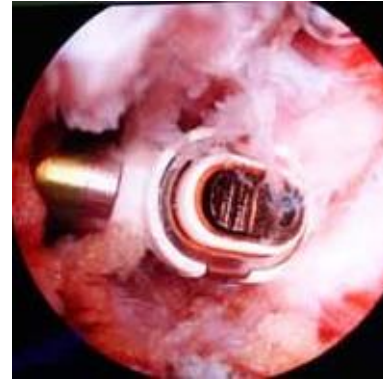


Figure 11a

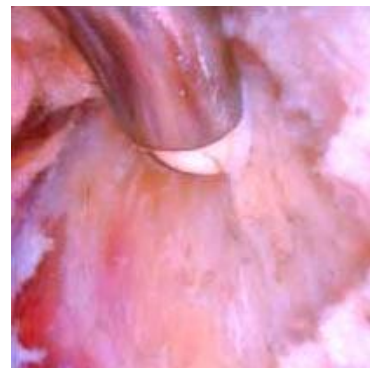


Figure 11b



Figure 11c

# JuggerKnot Hip Arthroscopy

## *Surgical Technique (cont.)*

### **7. Identification of the Acetabular Labrum**

The patient's supine position with their hip extended enables us to have the joint cartilage be the first structure that we find below the capsule.

We begin the capsulotomy in the proximal direction with the intention of locating the acetabular labrum (Figure 12).



*Figure 12*

One detail to keep in mind is the presence and arthroscopic visualization of the hypertrophied synovitis that is evident in almost all cases of arthritis (a result of the inflammation that these patients present) which notifies us of the close proximity (some few millimeters) of the acetabular labrum.

Therefore, delicate handling of the tissues is required, making use of the dissector to raise the remainder of the capsular tissue and confirm the near proximity of the labrum.

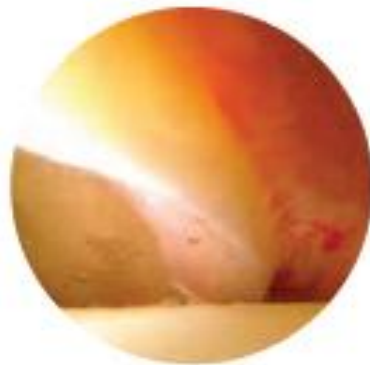
At this point the use of synoviotomy is recommended, given that it is most respectful of the labral tissues and thereby we avoid damaging it (Figure 13).



*Figure 13*

Once we see the joint cartilage of the femoral head and the labrum and we are able to palpate it, touch the labrum or view its coloration, this indicates the status of the acetabular labrum, for which reason it will be necessary to conduct a more extensive T-capsulotomy for labral repair. The capsulotomy should be conducted prior to the application of traction.

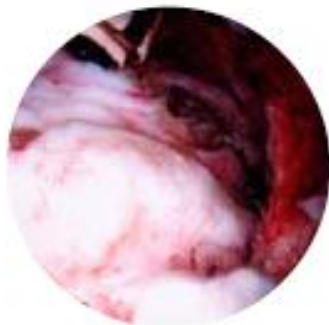
Once this maneuver is conducted, we will proceed to the traction of the extremity, visualizing the decoaptation of the hip and adjusting to the distance necessary to insert an optic (only 4 mm are required, with which we avoid unnecessary traction) (Figure 14).



*Figure 14*

With the hip decoaptated, we will conduct the "guided tour" maneuver that consists of inserting the 70° optic through the work cannula, while we control with the 30° optic through the vision portal, as the 70° is inserted without damage to the chondral or labral structures, to the zone of the central compartment. Once we have this image, we will conduct a change of the camera and light source to 70° optic in order to obtain intra-articular images.

With this goal, we will take a tour through the intra-articular zone, inspecting the acetabular joint cartilage status, presence of the teres ligament, visualization of the transverse acetabular and the condrolabral union, which is frequently affected in CAM type lesions (Figure 15).



*Figure 15*

## **8. Labral Reinsertion**

We maintain the traction, proceeding to the detachment of the labrum with the assistance of the dissector or scalpel along the entire extension of the damaged labrum (Figure 16).



*Figure 16*

The labral reinsertion should be conducted without a transfixing point to the labrum, as we will have a greater possibility of damaging it. Therefore, the ideal fixation is through "embrace" of the labrum. It is a simple and very seldom iatrogenic movement.

A delicate point is the choice of portal at the time of reinsertion, as we should have the necessary angle of attack for its correct positioning and, therefore, we can change the vision portal for the work portal and vice versa.

# JuggerKnot Hip Arthroscopy

## Surgical Technique (cont.)

### 8. Labral Reinsertion (cont.)

In Pincer type lesions, or in those that present with tear/labral detachment (CAM type lesions), the reinsertion of the labrum will be required. We will prepare the reinsertion through an extensive exposure of the labrum while we avoid damaging it. We can use the work portal to insert the **JuggerKnot kit**, consisting of a four-toothed guide, a drill bit of 1.4 mm and an obturator.

We must insert the guide in a direction sufficiently tangential to the acetabulum in order to avoid intra-articular implantation (Figure 17a).

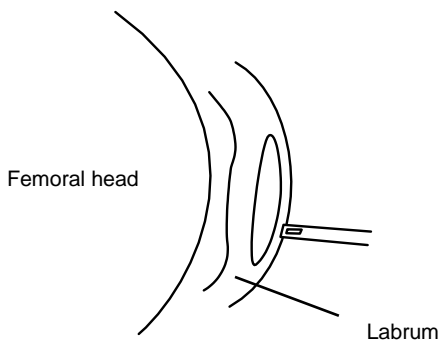


Figure 17a

We will drill with the 1.4 mm drill bit until the laser mark (if we situate the motor on the edge of the laser mark, we will drill until the motor causes us to bump into the guide) and we will proceed until we impact the **JuggerKnot**. It is important that the implant is impacted in a paused, but continuous, manner without the guide moving from its initial position (Figure 17b, 17c, 17d, 17e).

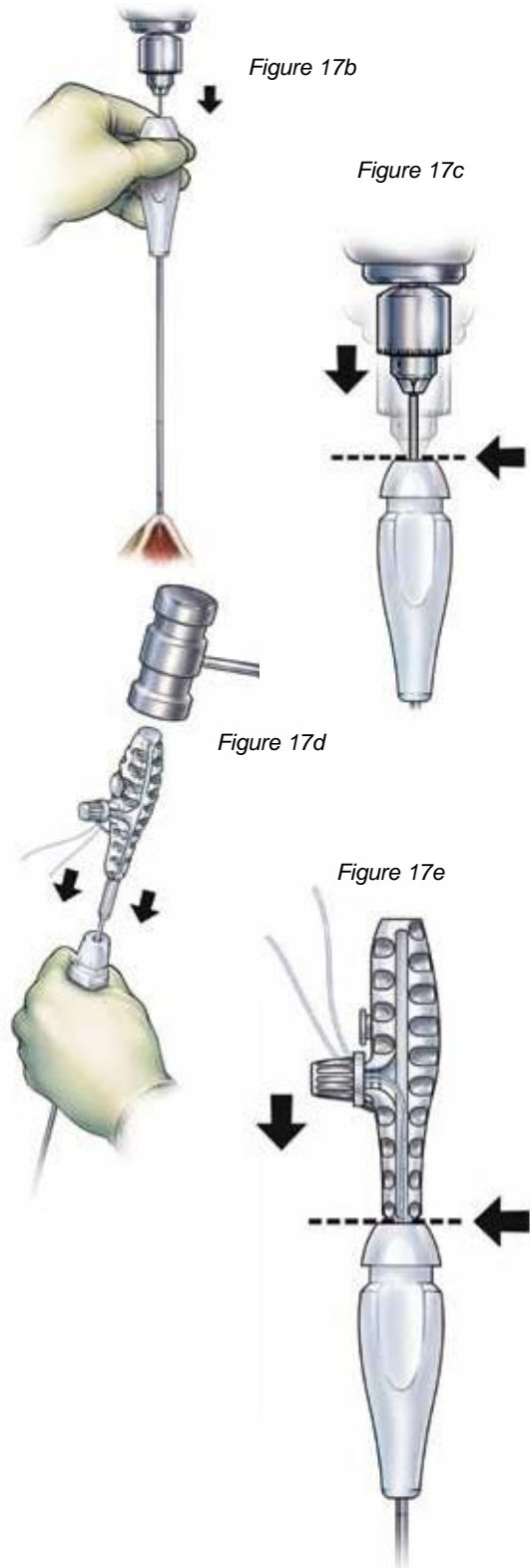


Figure 17b

Figure 17c

Figure 17d

Figure 17e

Once the guide is removed, we release the sutures, (Figure 18a) and we will apply traction from the JuggerKnot with the two threads, with the end result of making the implant expand inside the brocade hole. Upon expansion, the implant will remain blocked. (Figure 18b, 18c, 18d).

We will note a sensation of movement, which will be noted thereafter as we apply traction.

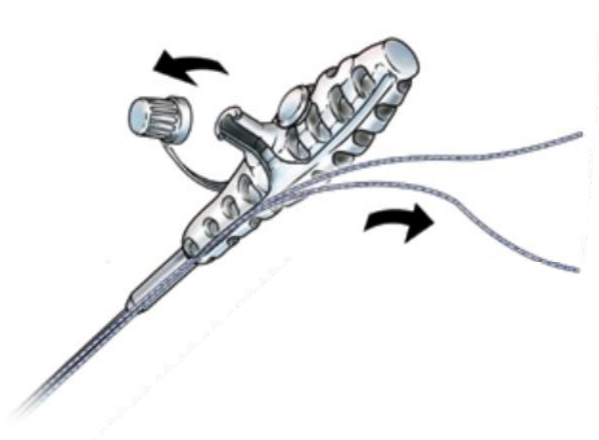


Figure 18a

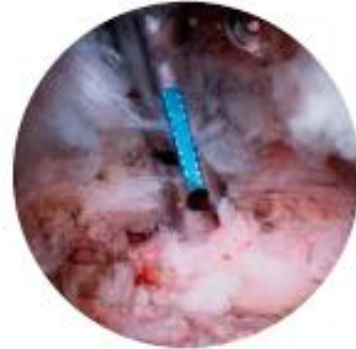


Figure 18b

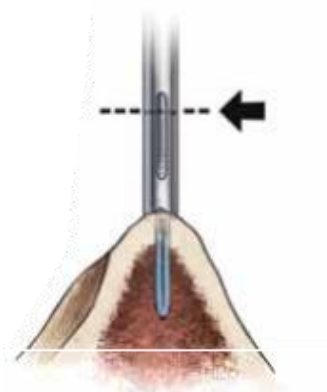


Figure 18c

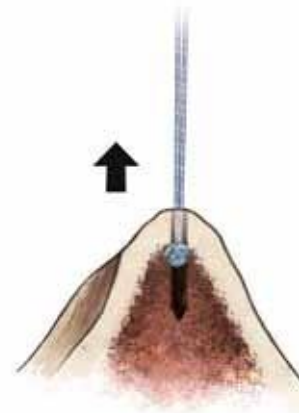


Figure 18d

# JuggerKnot Hip Arthroscopy

## *Surgical Technique (cont.)*

### **8. Labral Reinsertion (cont.)**

We will test that the thread runs and we will conduct the suture either through a transfixing point or through a knot embracing the labrum (Figure 18e and 18f).



*Figure 18e*



*Figure 18f*

We will manipulate the sutures carefully with needle drivers and, finally, we will proceed to knot, strongly tightening the suture (Figure 18g and 18h).



*Figure 18g*



*Figure 18h*

### *Postoperative*

It is also possible to use the vision portal if we require a different angulation for locating the lesion.

2 or 3 implants are required per reinsertion.

The security that this anchor provides us in the hip is fundamental, given that it avoids the impact manipulations of threading dies which require time and effort.

The 1.4 mm drill bit diameter makes the loss of bone stock insignificant and, in the case of having to place another implant, it allows us to securely approach the one already implanted.

Having solved the problem of the labrum, we proceed with the removal of the traction, which is shown through arthroscopic visualization as it traverses the femoral joint head at the time of traction removal.

The average time under traction in this technique will vary between 5 and 30-40 minutes in our series.

The use of a 2.5% Bupivacaine infiltration without adrenaline is recommended along with a Trigon Depot which, on one hand, will provide hours of comfort and local anesthesia to the patient and, on the other hand, will avoid the formation of calcified lesions.

Initiation of early mobility of the hip is basic, beginning with passive movements 4 - 5 hours after surgery, allowing support with two canes and limiting flexion to less than 90° during the first 3 weeks.

It is important to initiate activity in heated water of a swimming pool in order to mobilize the hip, as well as on an exercise bike (as long as the patient tolerates these activities).

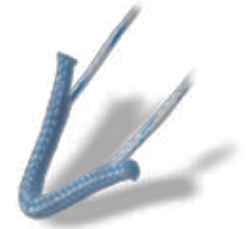
Conduct of these activities is recommended within 72 hours following surgery. In this way, we will avoid the formation of fibrosis/postsurgical adhesions.

# JuggerKnot Hip Arthroscopy

## Equipment

### JuggerKnot Implants

Reference	Description
912000	<b>JuggerKnot</b> anchor 1.4 mm (2 units)+ disposable kit
912030	<b>JuggerKnot</b> anchor 1.4 mm
912010	<b>JuggerKnot</b> anchor 1.4 mm, 10 units
912040	<b>JuggerKnot</b> disposable kit



### AquaLoc Cannulas:

Reference	Description
900362	<b>AquaLoc</b> disposable cannula 5 x 75 mm f
900360	<b>AquaLoc</b> disposable cannula 7 x 75 mm f
900363	<b>AquaLoc</b> disposable cannula 8.5 X 75 mm f
900366	<b>AquaLoc</b> disposable cannula 5 x 85 mm f
900364	<b>AquaLoc</b> disposable cannula 7 x 85 mm f
900367	<b>AquaLoc</b> disposable cannula 8.5 X 85 mm f
900360H	<b>AquaLoc</b> disposable cannula 7 x 75 mm rigid
900362H	<b>AquaLoc</b> disposable cannula 5 x 75 mm rigid
900363H	<b>AquaLoc</b> disposable cannula 8.5 x 75 mm rigid
900364H	<b>AquaLoc</b> disposable cannula 7 x 85 mm rigid
900366H	<b>AquaLoc</b> disposable cannula 5 x 85 mm rigid
900367H	<b>AquaLoc</b> disposable cannula 8.5 X 85 mm rigid





Biomet Sports Medicine 56 East Bell Drive P.O. Box 587 Warsaw, Indiana 46581 USA	01-50-1218  Date: 03/2011	<ol style="list-style-type: none"> <li>5. Attention should be paid to ensure adequate fixation of the soft tissue at the time of surgery. If a correct fixation is not obtained, or the position or location of the device is incorrect, it can produce subsequent undesirable results.</li> <li>6. Use of appropriate immobilization and postoperative treatment is indicated as part of the treatment until the healing process is complete.</li> <li>7. Do not modify the implants.</li> <li>8. Correct implant handling is extremely important. Do not crush or allow the sutures to become entangled when using surgical instruments such as forceps or needle drivers.</li> <li>9. Do not use excessive force when inserting the device. The application of excessive force can damage the device or negatively affect its performance.</li> <li>10. An excess of activity or trauma can cause the device to break or fail. In case of failure, an additional surgical intervention would be required, or removal of the device.</li> <li>11. DO NOT USE the devices if they are not in a completely sterile condition.</li> <li>12. DO NOT USE devices that have been opened or that are found damaged. Only use devices from unopened and undamaged packages.</li> <li>13. Ensure that there is contact between the tissue and the bone when you use the device.</li> <li>14. Instruct the patient adequately. Postoperative care is of utmost importance. The ability and willingness of the patient to follow the indicated instructions is one of the most important aspects for the successful treatment of a fracture.           <ul style="list-style-type: none"> <li>• Patients who are senile or who suffer from mental illnesses, as well as persons who abuse alcohol or drugs, face a greater risk of device or procedure failure. These patients may ignore instructions and the imposed activity restrictions.</li> <li>• The patient must be instructed in the use of external supports (orthopedic devices, immobilization devices, crutches, etc.) that are designed to immobilize the treated location and to limit load-bearing or resistance.</li> <li>• The patient must know that the device does not replace normal healthy bone and that the implant can break or be damaged by stress, activity, applied loads or weight-bearing.</li> <li>• The patient must be advised that there are surgical risks and that adverse effects may occur from the surgical intervention; the patient must also be advised that failure to complete the postoperative care instructions can cause the implant and treatment to fail.</li> <li>• In the same way, the patient must be informed of the need to regularly attend postoperative consultations during the time the implant remains in the body.</li> <li>• Patients must be advised that if they conduct physical activities that cause force on the operated area, it can produce damage in or around the implant, which can cause failure of the device and/or treatment.</li> </ul> </li> <li>15. Failure to comply with the postoperative instructions can cause failure of the device and, as a consequence, may require another intervention and extraction of the device.</li> <li>16. Do not reuse the implants. Although an implant may appear intact, prior force can cause imperfections that may reduce its serviceable life. Never place an implant into a patient that has been used in another patient, even if it had only been momentarily.</li> </ol>
<b>JuggerKnot™ Soft Tissue Anchors</b>		<p><b>PRECAUTIONS</b></p> <p>There are instruments to assist in the precise implantation of internal fixation devices. Fractures or intraoperative breakage of instruments have been reported. Surgical instruments are subject to wear with normal use. Instruments that have been subjected to prolonged use or to excessive force are prone to fractures. Surgical instruments should only be used in the specific manner for which they were designed. Biomet Sports Medicine recommends that all instruments are subjected to regular review to detect wear and deformation.</p>
<b>INSTRUCTIONS FOR THE SURGEON</b>		<p><b>POSSIBLE ADVERSE EFFECTS</b></p> <ol style="list-style-type: none"> <li>1. Non-union or delayed union, which can produce implant fracture.</li> <li>2. Implant deformation or rupture.</li> <li>3. Loosening or displacement of the implant.</li> <li>4. Allergic reaction to a foreign body.</li> <li>5. Pain, discomfort or abnormal sensation due to the presence of the device.</li> <li>6. Neurological lesions due to surgical trauma.</li> <li>7. Necrosis of the bone or tissue.</li> <li>8. Inadequate healing.</li> <li>9. Intraoperative or postoperative bone fracture and/or postoperative pain.</li> </ol>
<b>DESCRIPTION</b>		<p><b>IMPLANTS: MAGNETIC NUCLEAR RESONANCE INFORMATION</b></p> <p>The specific components of the JuggerKnot™ soft tissue anchors are fabricated from Ultra High Molecular Weight Polyethylene (UHMWPE), polypropylene, nylon and polyester. These materials are neither conductive nor magnetic. Therefore, in accordance with the definition indicated in ASTM F-2503-08, the standard practice for secure marking of medical devices and other elements in the use of magnetic resonance; they are elements that do not present known risks in the use of magnetic resonance.</p>
<p>The JuggerKnot™ soft tissue anchors are composed of a case without core structures or suture material. The anchors are designed for use in soft tissue fixation to bone when they are displaced.</p>		<p><b>STERILITY</b></p> <p>The Biomet Sports Medicine internal fixation implants are sterilized by exposure to Ethylene Oxide gas (ETO). For single use only. Do not resterilize this product. Do not use after the expiry date.</p>
<p><b>MATERIALS</b></p> <p>Suture Ultra high molecular weight polyethylene (UHMWPE)/polypropylene, UHMWPE/polyester, UHMWPE/nylon or polyester</p> <p>Base UHMWPE/polypropylene or polyester</p>		<p><b>Caution:</b> Current health laws restrict the sale, distribution or use of this device to either by or under the orders of a physician.</p>
<p><b>INDICATIONS FOR USE</b></p> <p>The JuggerKnot™ soft tissue anchors are designed for the fixation of soft tissue to bone according to the following indications:</p>		<p>Comments on use of this device can be sent to the attention of: Regulatory Affairs, Biomet, Inc., P.O. Box 587, Warsaw IN 46581 USA, Fax: 574-372-3968.</p> <p>All registered trademarks mentioned are the property of Biomet, Inc. or its subsidiaries unless otherwise indicated.</p> <p>Authorized representative: Biomet U.K., Ltd. Waterton Industrial Estate Bridgend, South Wales CF31 3XA, U. K.</p>
<p><b>Shoulder</b></p> <p>Repair of Bankart lesion          Repair of SLAP lesion          Acromioclavicular recuperation          Capsular displacement/capsulolabral reconstruction          Deltoid repair          Rotator cuff tear recuperation          Biceps tenodesis</p>		
<p><b>Foot and Ankle</b></p> <p>Medial/lateral repair and reconstruction          Repair of the central and posterior parts of the foot          Hallux valgus reconstruction          Repair or reconstruction of the metatarsal ligament/tendon          Achilles tendon repair</p>		<p>Factors to be considered at the time of selecting patients include: 1) need of fixation of soft tissue to bone, 2) capability and intention of the patient to follow the guidelines of postoperative care until the healing process is complete and 3) a good nutritional status of the patient.</p>
<p><b>Elbow</b></p> <p>Cubital or radial collateral ligament reconstruction          Lateral epicondylitis repair          Biceps tendon reinsertion</p>		<ol style="list-style-type: none"> <li>1. The correct selection of implant is extremely important. The probability of success in the fixation of soft tissue to bone increases if the appropriate type of implant is selected. While the risks decrease with appropriate selection of implant, neither the device nor the grafts have been designed to support the force of carrying full body weight, nor load-bearing, nor excess activity.</li> </ol>
<p><b>Knee</b></p> <p>Extracapsular repair: MCL (medial collateral ligament), LCL (lateral collateral ligament) and posterior oblique ligament          Iliotibial band tenodesis          Patellar tendon repair          VMO (vastus medialis obliquus) advancement          Closure of the Joint capsule</p>		<ol style="list-style-type: none"> <li>2. An incorrect selection, situation, location and fixation of the device can cause device or procedure failure. The surgeon should know the device, its method of application and the surgical procedure before conducting the surgical intervention. The most appropriate type of internal fixation device should also be selected for each treatment.</li> <li>3. The implants can loosen or become damaged and the graft can fail if it is subjected to progressive loading in combination with a lack of union, or delayed union. If there is a delay in the healing process, or if it does not occur, the implant or the procedure can fail. The loads produced by the weight of the arm and by the levels of activity can determine the longevity of the implant.</li> <li>4. An inadequate fixation at the time of surgical intervention can increase the risk of loosening or displacement of the device, or the tissue that it supports. It is important that there is sufficient quantity and quality of bone for an adequate fixation in order for a successful intervention. The bone quality should be evaluated at the time of surgery. Adequate fixation can be more difficult if the bone is not healthy. Patients with low quality bone, as in the case of osteoporosis, have a greater risk of the device loosening and failure of the intervention.</li> </ol>
<p><b>Hand and Wrist</b></p> <p>Repair of the collateral ligament          Reconstruction of the scapholunate ligament          Tendinous phalangeal transfers          Reconstruction of the volar plate</p>		<p>The contents of this publication are subject entirely to the LEGAL NOTICE and the LIABILITY DISCLAIMER shown on the first page of this publication.</p>
<p><b>Hip</b></p> <p>Acetabular labral repair</p>		<p>15</p>
<p><b>CONTRAINDICATIONS</b></p>		
<ol style="list-style-type: none"> <li>1. Infection.</li> <li>2. Patient conditions which include limitations in blood supply and insufficient quantity or quality of bone or soft tissue.</li> <li>3. Patients with mental or neurological illnesses who do not wish to, or cannot, follow postoperative rehabilitation instructions.</li> <li>4. Sensitivity to foreign bodies. If adverse reaction or sensitivity to the materials is suspected, relevant tests should be conducted prior to implantation of the device.</li> </ol>		
<p><b>WARNINGS</b></p>		

# JuggerKnot Hip Arthroscopy

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