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(Medicina Basada en la Evidencia)

Murcia , 31 Mayo 2022

Dr. Óliver Marín-Peña

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Hospital Virgen de la Torre

Presenter Disclosure Information

Oliver Marin-Peña

Consultant : DePuy-J&J, MBA, Heraeus, 3M, Cardinal Health.

Editorial Board: Journal of Hip Preservation Surgery (JHPS) , SICOT Journal (SICOT-J).

Journal Reviewer: RECOT, Hip International, JHPS, SICOT-J, AJSM.

No conflicts of interest in the following presentation

Introduction

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Introducción

Could be useful an **increased ROM** of the hip?.

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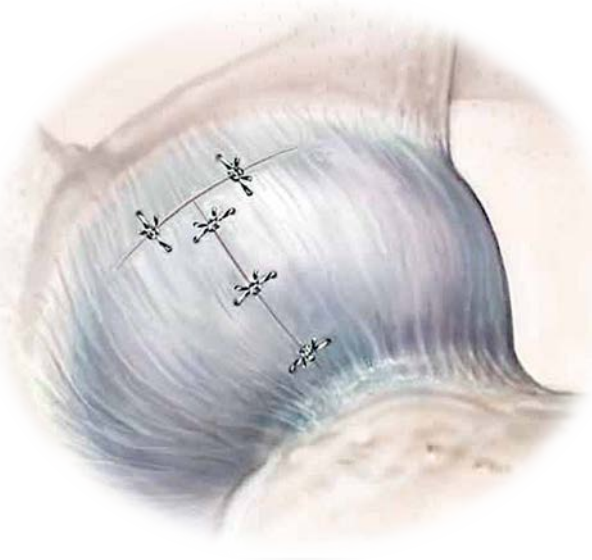
Introducción

Hip Dislocation after Hip Arthroscopy (**4 cases**)

- Ranawat et al. 2009 (Female 52 yo. **Hyperlaxity**. FAI… arthroscopic **capsular plication)**
- Matsuda et al : 2009 (Female 52 yo. **Hyperlaxity**. Posterior wall insufficiency..... Mini -anterior **capsular plication**)



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Introducción

Hip Dislocation after Hip Arthroscopy (4 cases)

- Souza et al (2010) (Excessive acetabular **rim resection**…**THA**)
- Benali et al (2009)(Dysplasia.Labral resection+ Excessive **rim resection** …**THA**)

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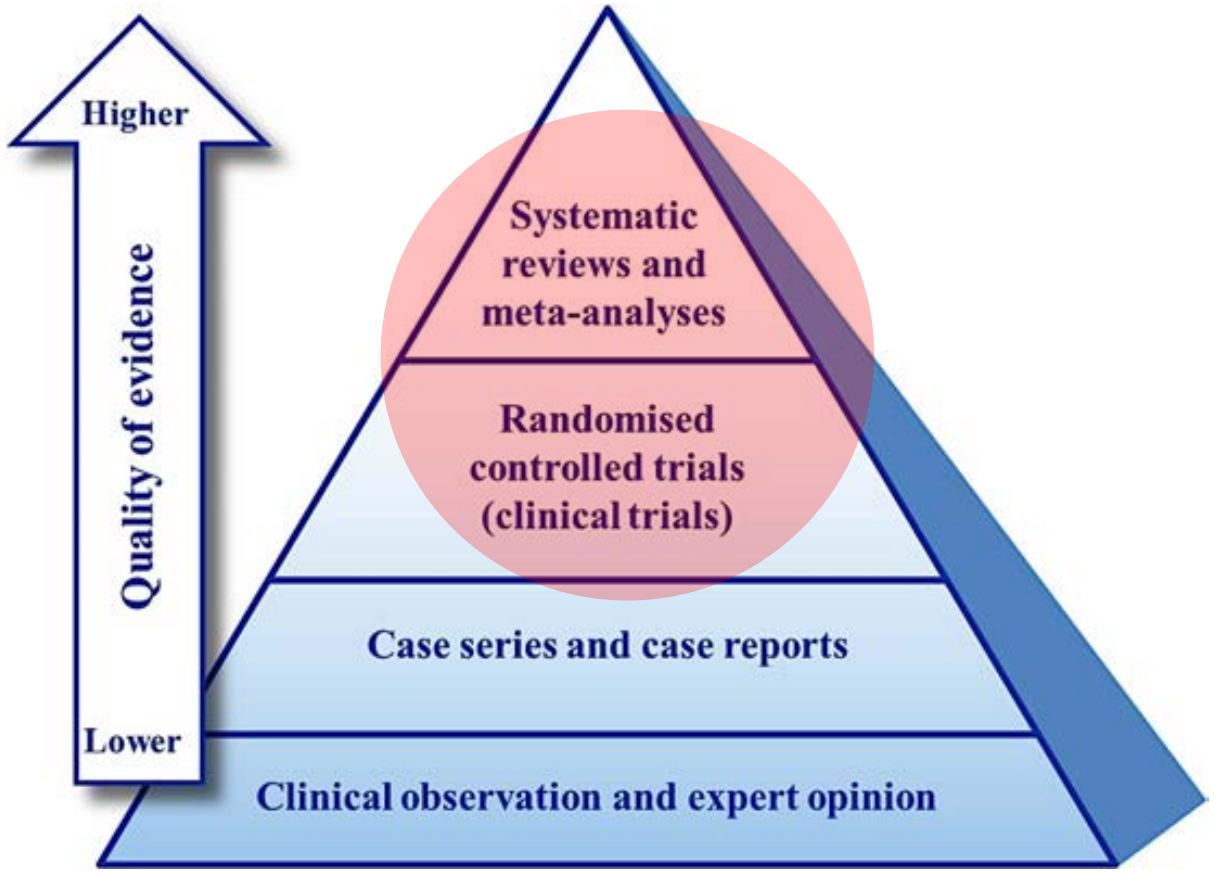
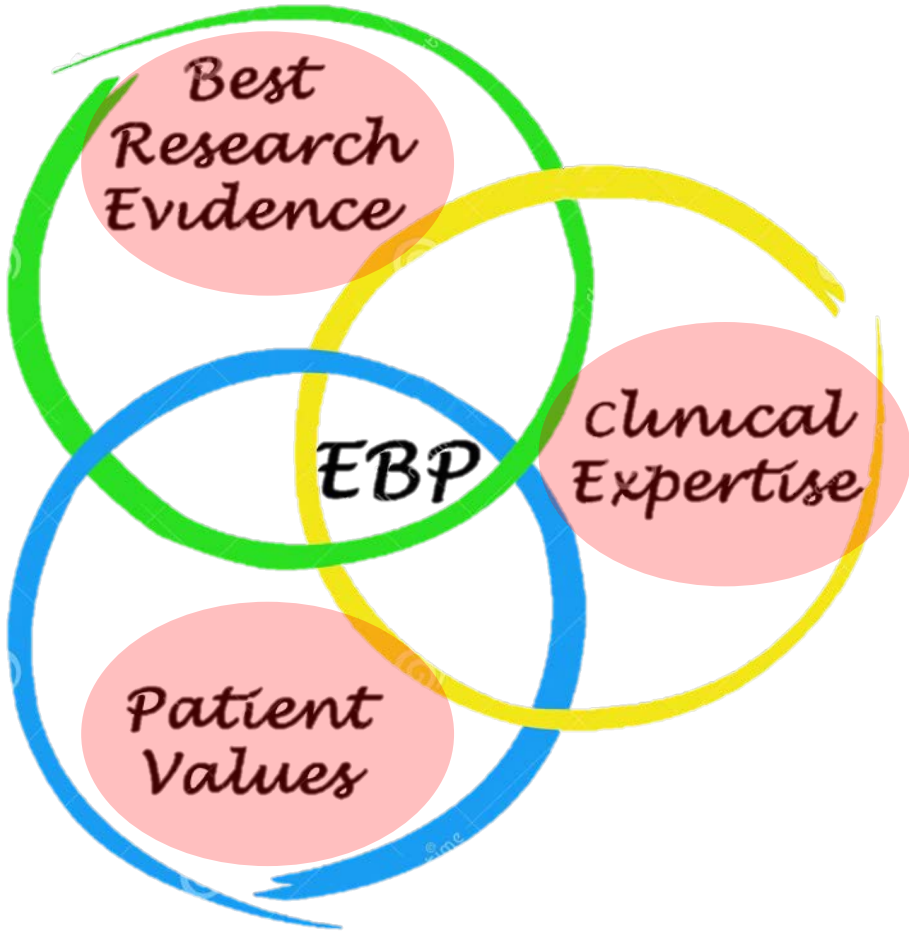
Introducción

Evidence Based Medicine & Practice based Medicine





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Capsule is NOT the main hip joint stabilizer

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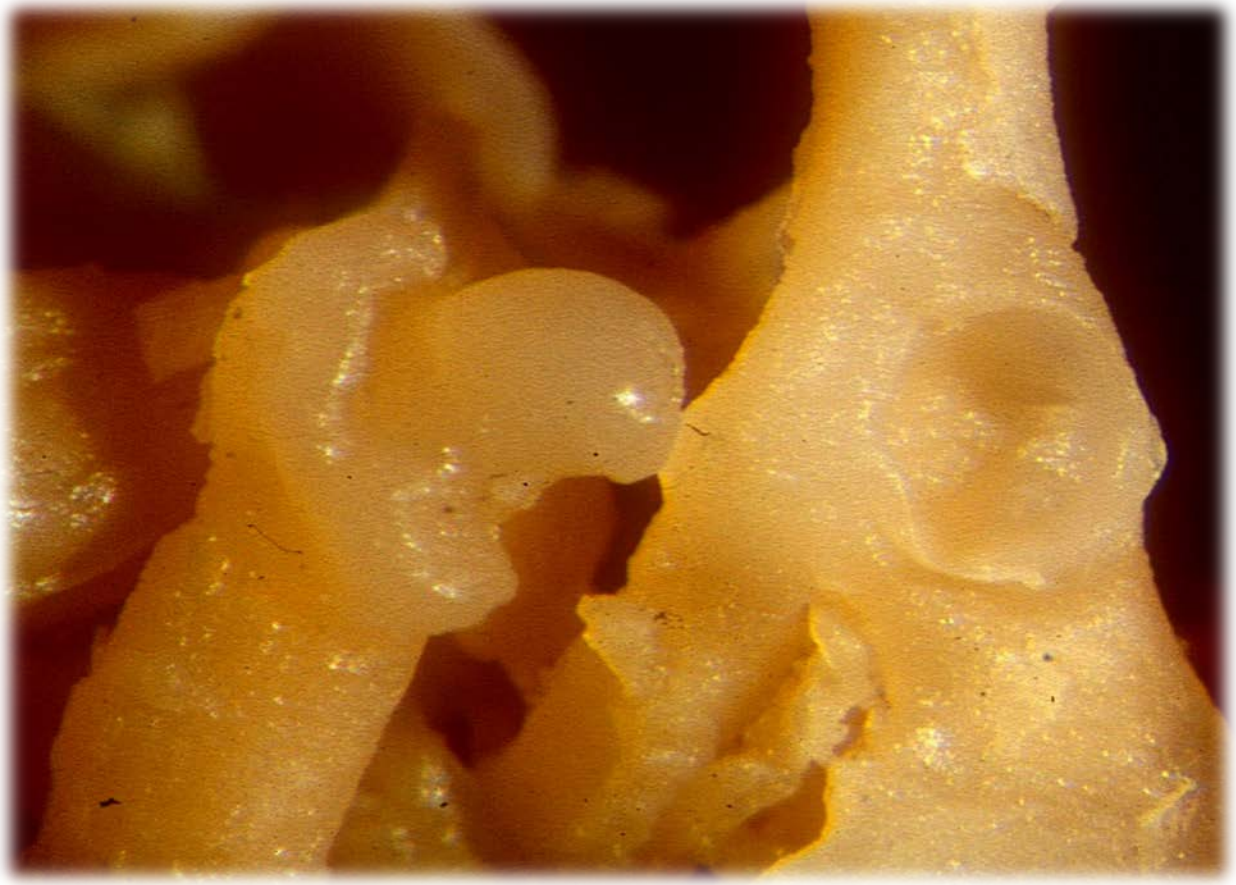
Capsule is **NOT main supportive structure** in hip joint anatomy



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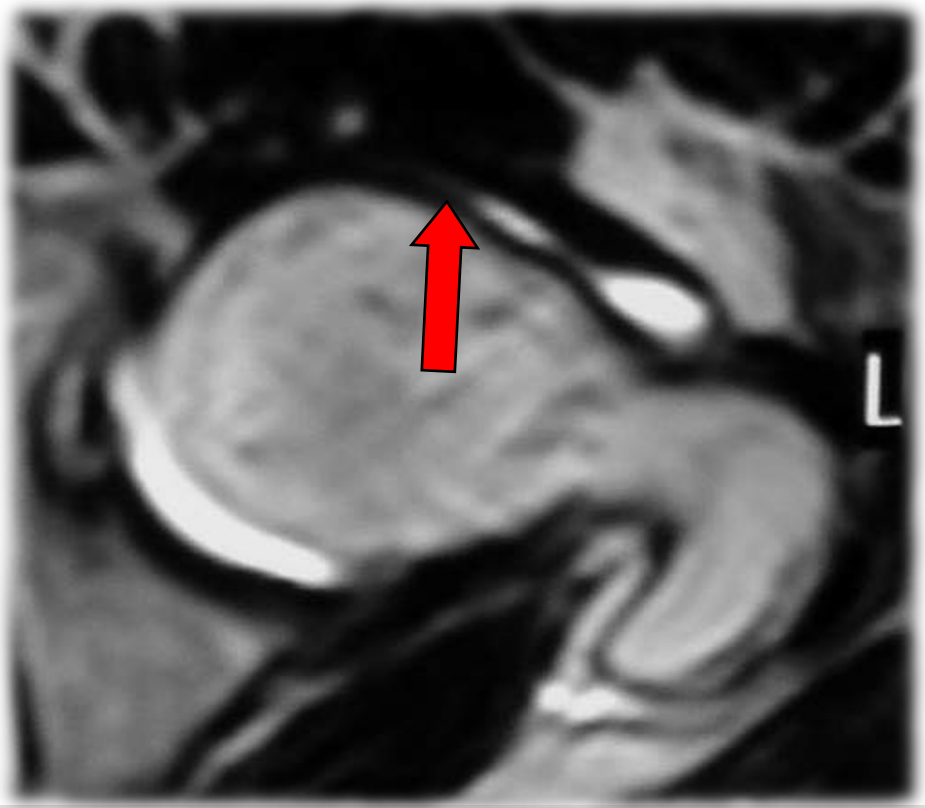
Hip instability

- More than 4-5 mm rim resection …. **Avoid rim resection**



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Clin Orthop Relat Res (2011) 469:1071–1074
DOI 10.1007/s11999-010-1581-4

SYMPOSIUM: CONTROVERSIES IN ORTHOPAEDICS

Can the Change in Center-edge Angle During Pincer Trimming Be Reliably Predicted?

Alexis C. Colvin MD, Steven M. Koehler BA, Justin Bird MD

Published online: 28 September 2010

Abstract

Background Femoroacetabular impingement is recognized as a cause of hip pain in young adults and as a precursor to osteoarthritis although many questions persist regarding its management. One in particular is when to resect a pincer lesion and how much to resect. Instability can result from overresection and persistent impingement can result from underresection.

Questions/purposes We therefore determined the correlation between the change in center-edge (CE) angle and the amount of acetabular rim resection.

Methods We performed open acetabular rim trimming on 10 cadaveric hips. Radiographs were performed before and after rim resection every millimeter from 1 to 5 mm and we determined the CE angle. We performed linear regression to establish any correlation of the CE angle with the amount of resection.

Results The CE angle could be predicted by $-1.3X + 1.5$ ($R^2 = 0.99$), in which X = the amount of resection for 1 to 3 mm of resection. The average CE angle before resection was 35° ± 8.8° (range, 19°–58°).

Conclusions The CE angle changes in a predictable way with acetabular rim trimming with larger amounts of resection resulting in greater changes in the CE angle.

Clinical Relevance The ability to accurately plan the amount of acetabular rim resection in hip arthroscopy by knowing the exact change in CE angle with amount of rim removal may help prevent overresection or underresection in pincer trimming.

Each author certifies that he or she has no commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.
Each author certifies that his or her institution approved or waived approval for the human protocol for this investigation and that all investigations were conducted in conformity with ethical principles of research.

A. C. Colvin (✉), S. M. Koehler, J. Bird
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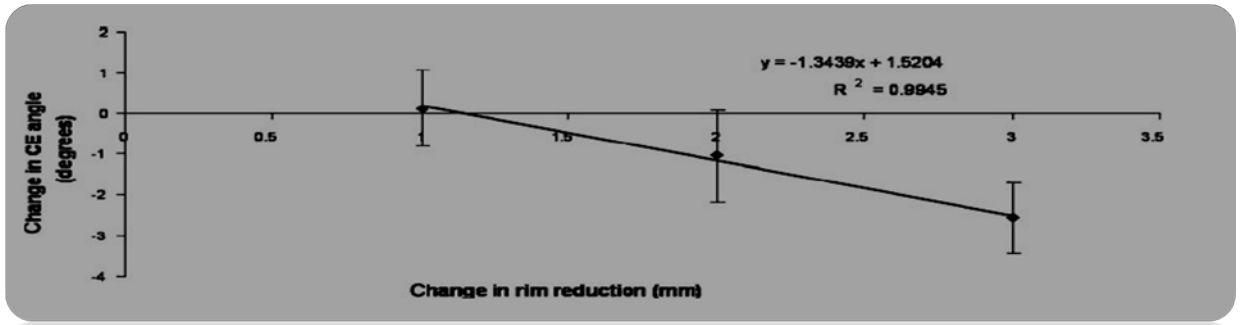
Introduction

Femoroacetabular impingement (FAI) is recognized as a cause of hip pain in young adults and as a precursor to osteoarthritis [2, 14, 26]. Impingement is the result of abnormal contact between the proximal part of the femur and the acetabular rim during motion. Two mechanisms of FAI have been described, pincer and cam [2, 7, 18]. Impingement resulting from an aspherical femoral head is termed "cam impingement," whereas impingement resulting from excess acetabular coverage is the result of "pincer impingement" [2].

Pincer deformity arises from general or local overcoverage of the femoral head by the acetabulum [18]. Local anterior overcoverage and/or posterior undercoverage of the femoral head can be secondary to a retroverted acetabulum [31]. Pain secondary to a retroverted acetabulum is often associated with repeated pinching as the femoral neck hits the retroverted acetabulum. These bony abnormalities may be treated with a periacetabular osteotomy with a improvement in ROM and Merle d'Aubigné score [32]. Global overcoverage can result from coxa profunda, which limits the ROM of the hip in all directions, causing a circumferential pattern of damage [20]. A persistent unfused os acetabuli can lead to FAI, but can also be seen as a

Wiberg angle **above 25º**

- Formula CE angle : -1,3X+1,5
- **More than 3-4 mm** resection could **create hip instability**



Colvin A.C. Can the Change in Center-edge Angle During Pincer Trimming Be Reliably Predicted? . CORR (2011) 469:1071–1074

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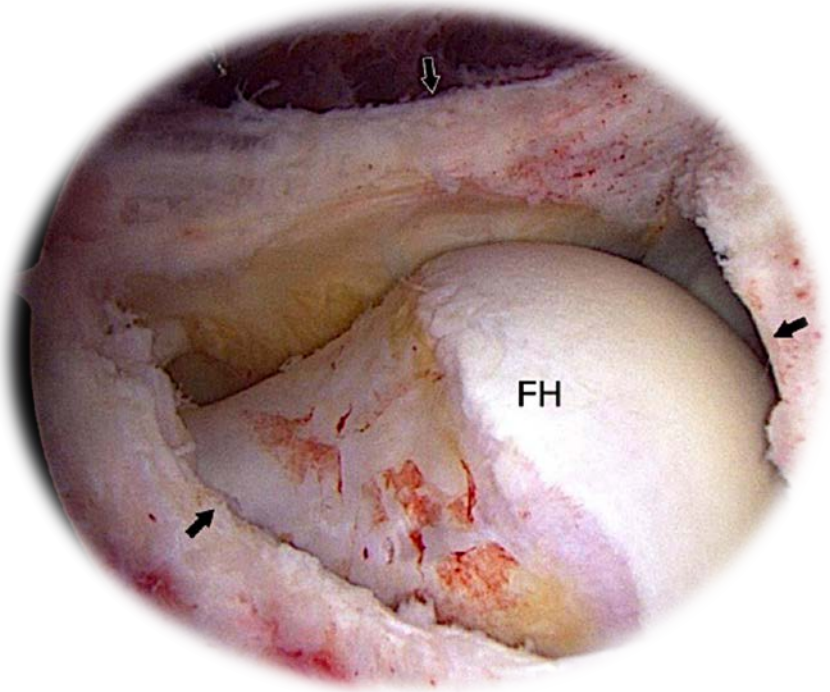
Hip instability

- More than 4-5 mm rim resection …. **Avoid rim resection**
- Labral resection….**Labral repair/reconstruction**



Byrd J. (2020). Hip Capsular Reconstruction Made Easy: The Timing and the Technique. *Arthroscopy techniques*, *10*(1), e73–e78.

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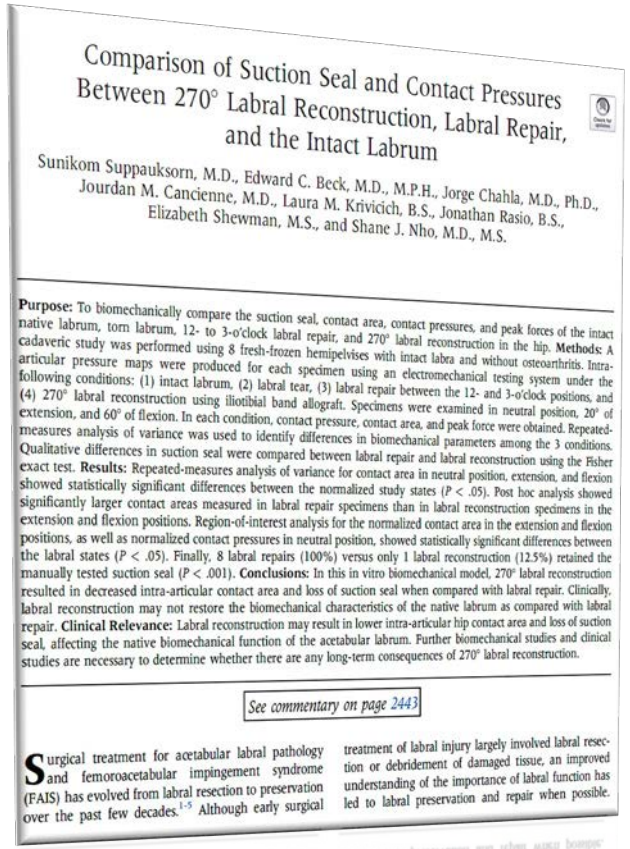
Labral tear decrease seal and **contact area 10-12%...** ….improve with labral repair



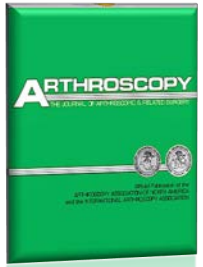
Comparison of Suction Seal and Contact Pressures Between 270° Labral Reconstruction, Labral Repair, and the Intact Labrum

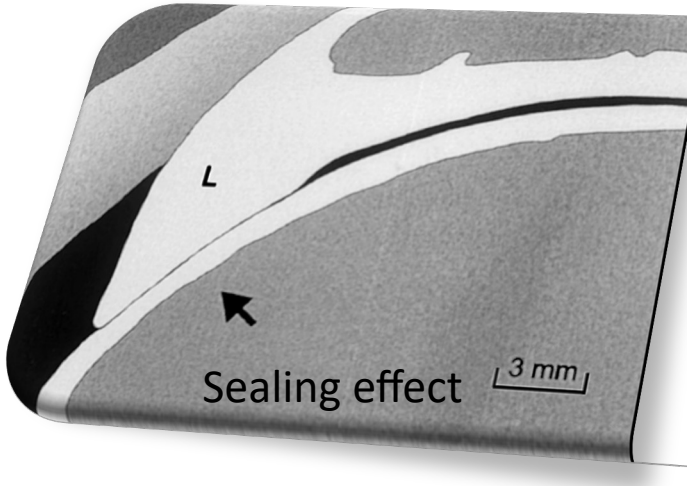
Sunikom Suppauksorn, M.D., Edward C. Beck, M.D., M.P.H., Jorge Chahla, M.D., Ph.D., Jourdan M. Cancienne, M.D., Laura M. Krivicich, B.S., Jonathan Rasio, B.S., Elizabeth Shewman, M.S., and Shane J. Nho, M.D., M.S.

Purpose: To biomechanically compare the suction seal, contact area, contact pressures, and peak forces of the intact native labrum, torn labrum, 12- to 3-o'clock labral repair, and 270° labral reconstruction in the hip. **Methods:** A cadaveric study was performed using 8 fresh-frozen hemipelvises with intact labra and without osteoarthritis. Intra-articular pressure maps were produced for each specimen using an electromechanical testing system under the following conditions: (1) intact labrum, (2) labral tear, (3) labral repair between the 12- and 3-o'clock positions, and (4) 270° labral reconstruction using iliotibial band allograft. Specimens were examined in neutral position, 20° of extension, and 60° of flexion. In each condition, contact pressure, contact area, and peak force were obtained. Repeated-measures analysis of variance was used to identify differences in biomechanical parameters among the 3 conditions. Qualitative differences in suction seal were compared between labral repair and labral reconstruction using the Fisher exact test. **Results:** Repeated-measures analysis of variance for contact area in neutral position, extension, and flexion showed statistically significant differences between the normalized study states ($P < .05$). Post hoc analysis showed significantly larger contact areas measured in labral repair specimens than in labral reconstruction specimens in the extension and flexion positions. Region-of-interest analysis for the normalized contact area in the extension and flexion positions, as well as normalized contact pressures in neutral position, showed statistically significant differences between the labral states ($P < .05$). Finally, 8 labral repairs (100%) versus only 1 labral reconstruction (12.5%) retained the manually tested suction seal ($P < .001$). **Conclusions:** In this in vitro biomechanical model, 270° labral reconstruction resulted in decreased intra-articular contact area and loss of suction seal when compared with labral repair. Clinically, labral reconstruction may not restore the biomechanical characteristics of the native labrum as compared with labral repair. **Clinical Relevance:** Labral reconstruction may result in lower intra-articular hip contact area and loss of suction seal, affecting the native biomechanical function of the acetabular labrum. Further biomechanical studies and clinical studies are necessary to determine whether there are any long-term consequences of 270° labral reconstruction.

See commentary on page 2443

Surgical treatment for acetabular labral pathology and femoroacetabular impingement syndrome (FAIS) has evolved from labral resection to preservation over the past few decades.[1-5] Although early surgical treatment of labral injury largely involved labral resection or debridement of damaged tissue, an improved understanding of the importance of labral function has led to labral preservation and repair when possible.





Suppauksorn S et al. Comparison of Suction Seal and Contact Pressures Between 270° Labral Reconstruction, Labral Repair, and the Intact Labrum. Arthroscopy. 2020;36(9):2433-2442.

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Is a effective closure?

- 28 patients (29 hips) **MRI to detect capsular defect**
- 2 capsular defects in the capsular repair group and 7 capsular defects in the unrepaired capsulotomy group (P = 0.13). **No statistical difference**
- Odds ratio (OR) for capsular defect
  - ✓ increasing lateral center-edge (CE) increase capsular defect
  - ✓ labral repair decrease capsular defect
- **No significant difference in capsular defects** between capsular **repair or unrepaired** capsulotomy.

Bech NH, van Dijk LA, de Waard S, Vuurberg G, Sierevelt IN, Kerkhoffs GM, Haverkamp D. Integrity of the hip capsule measured with magnetic resonance imaging after capsular repair or unrepaired capsulotomy in hip arthroscopy. World J Orthop. 2022 Apr 18;13(4):400-407.

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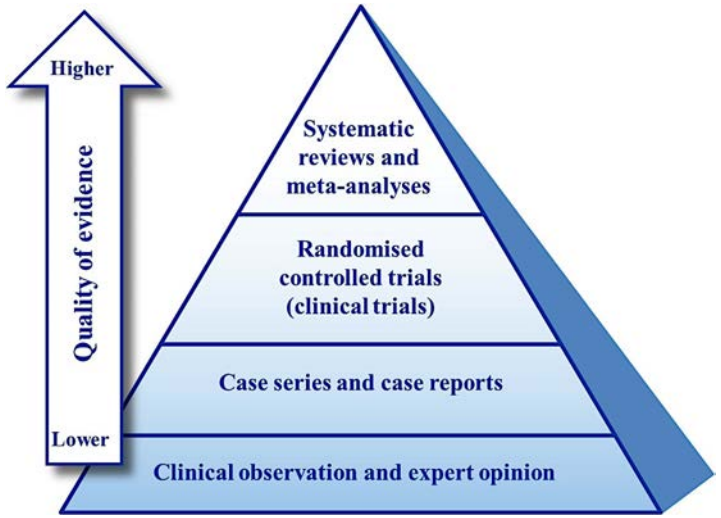
Capsule Management: Evidence Based Medicine



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Manejo capsular: Medicina Basada en la Evidencia

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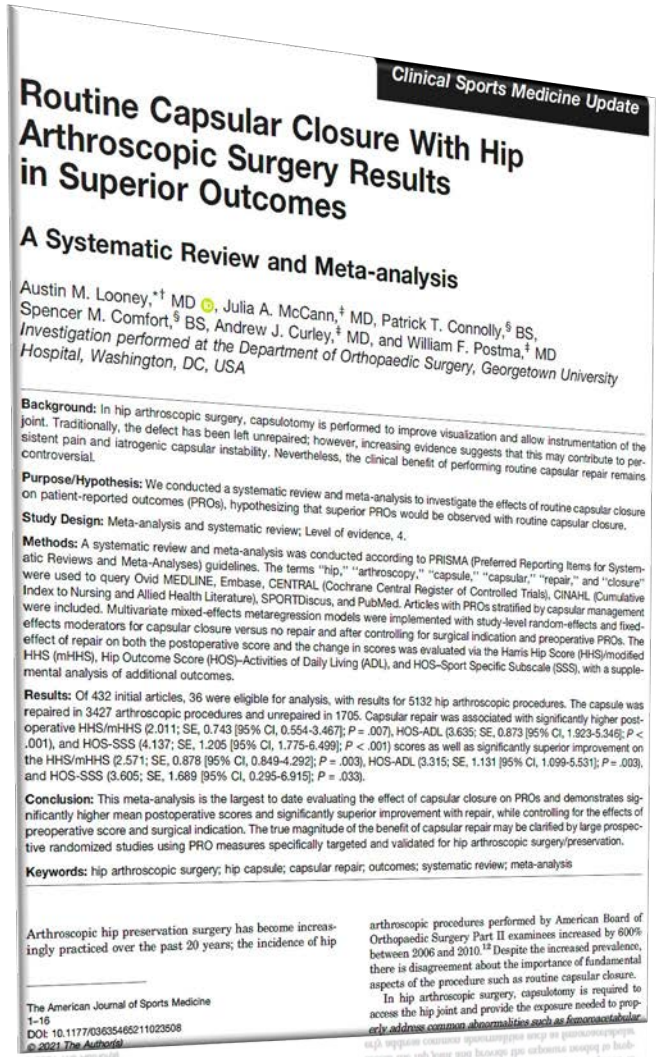


Clinical Sports Medicine Update

Routine Capsular Closure With Hip Arthroscopic Surgery Results in Superior Outcomes

A Systematic Review and Meta-analysis

Austin M. Looney,*† MD, Julia A. McCann,‡ MD, Patrick T. Connolly,§ BS, Spencer M. Comfort,§ BS, Andrew J. Curley,‡ MD, and William F. Postma,‡ MD
Investigation performed at the Department of Orthopaedic Surgery, Georgetown University Hospital, Washington, DC, USA

Background: In hip arthroscopic surgery, capsulotomy is performed to improve visualization and allow instrumentation of the joint. Traditionally, the defect has been left unrepaired; however, increasing evidence suggests that this may contribute to persistent pain and iatrogenic capsular instability. Nevertheless, the clinical benefit of performing routine capsular repair remains controversial.

Purpose/Hypothesis: We conducted a systematic review and meta-analysis to investigate the effects of routine capsular closure on patient-reported outcomes (PROs), hypothesizing that superior PROs would be observed with routine capsular closure.

Study Design: Meta-analysis and systematic review; Level of evidence, 4.

Methods: A systematic review and meta-analysis was conducted according to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The terms "hip," "arthroscopy," "capsule," "capsular," "repair," and "closure" were used to query Ovid MEDLINE, Embase, CENTRAL (Cochrane Central Register of Controlled Trials), CINAHL (Cumulative Index to Nursing and Allied Health Literature), SPORTDiscus, and PubMed. Articles with PROs stratified by capsular management were included. Multivariate mixed-effects metaregression models were implemented with study-level random-effects and fixed-effects moderators for capsular closure versus no repair and after controlling for surgical indication and preoperative PROs. The effect of repair on both the postoperative score and the change in scores was evaluated via the Harris Hip Score (HHS)/modified HHS (mHHS), Hip Outcome Score (HOS)–Activities of Daily Living (ADL), and HOS–Sport Specific Subscale (SSS), with a supplemental analysis of additional outcomes.

Results: Of 432 initial articles, 36 were eligible for analysis, with results for 5132 hip arthroscopic procedures. The capsule was repaired in 3427 arthroscopic procedures and unrepaired in 1705. Capsular repair was associated with significantly higher postoperative HHS/mHHS (2.011; SE, 0.743 [95% CI, 0.554-3.467]; $P = .007$), HOS-ADL (3.635; SE, 0.873 [95% CI, 1.923-5.346]; $P < .001$), and HOS-SSS (4.137; SE, 1.205 [95% CI, 1.775-6.499]; $P < .001$) scores as well as significantly superior improvement on the HHS/mHHS (2.571; SE, 0.878 [95% CI, 0.849-4.292]; $P = .003$), HOS-ADL (3.315; SE, 1.131 [95% CI, 1.099-5.531]; $P = .003$), and HOS-SSS (3.605; SE, 1.689 [95% CI, 0.295-6.915]; $P = .033$).

Conclusion: This meta-analysis is the largest to date evaluating the effect of capsular closure on PROs and demonstrates significantly higher mean postoperative scores and significantly superior improvement with repair, while controlling for the effects of preoperative score and surgical indication. The true magnitude of the benefit of capsular repair may be clarified by large prospective randomized studies using PRO measures specifically targeted and validated for hip arthroscopic surgery/preservation.

Keywords: hip arthroscopic surgery; hip capsule; capsular repair; outcomes; systematic review; meta-analysis

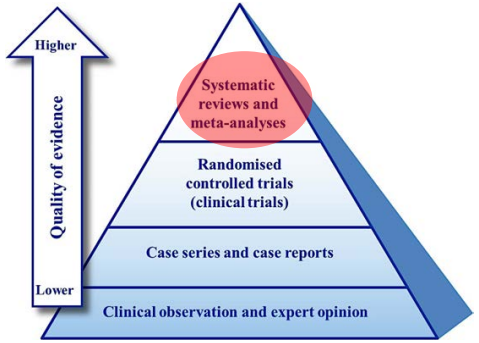
Arthroscopic hip preservation surgery has become increasingly practiced over the past 20 years; the incidence of hip arthroscopic procedures performed by American Board of Orthopaedic Surgery Part II examinees increased by 600% between 2006 and 2010.[12] Despite the increased prevalence, there is disagreement about the importance of fundamental aspects of the procedure such as routine capsular closure.

In hip arthroscopic surgery, capsulotomy is required to access the hip joint and provide the exposure needed to properly address common abnormalities such as femoroacetabular

The American Journal of Sports Medicine
1–16
DOI: 10.1177/0363546521123508

Capsule repair & PROMS: **Meta-analysis 2021**

- 5132 hip arthroscopic procedures.
- **Capsule was repaired** in 3427 and unrepaired in 1705.
- Capsular repair was associated with significantly **higher postoperative** & superior improvement in **HHS/mHHS, HOS-ADL and HOS-SSS**



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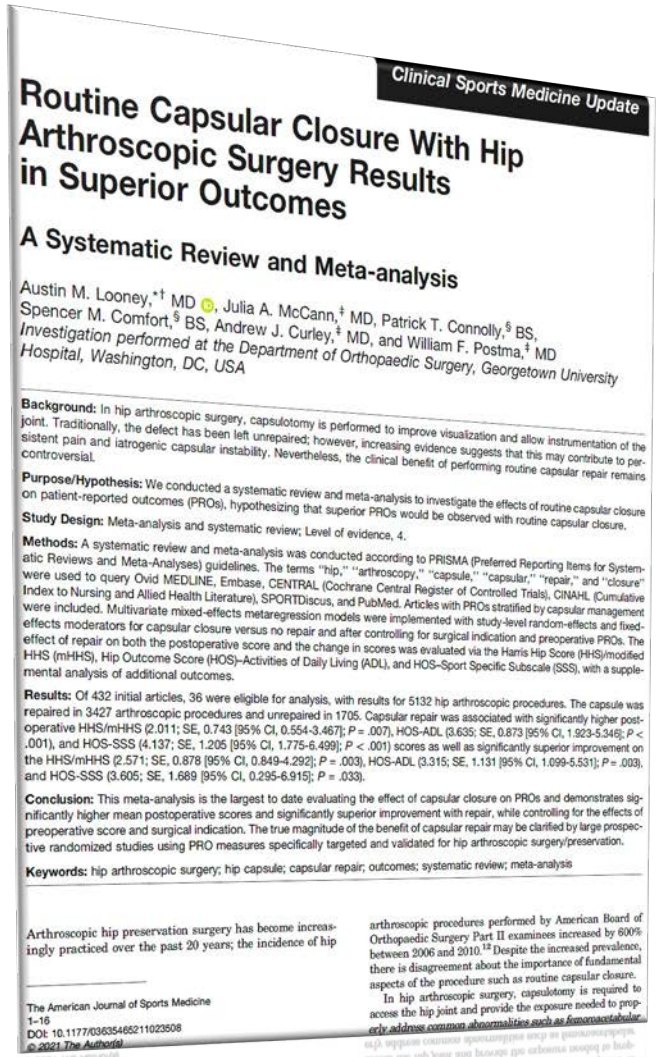

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The American Journal of Sports Medicine
1–16
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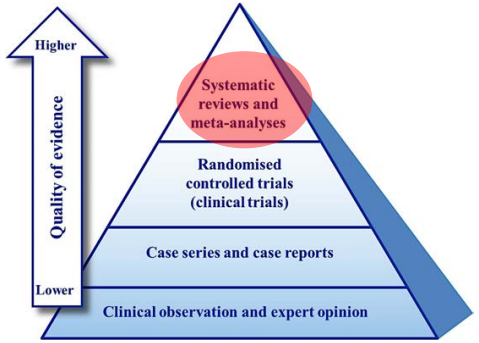
Capsule repair & PROMS: **Meta-analysis**

- HHS/mHHS: Repaired 24,59 Unrepaired 22,02
- HOS-ADL: Repaired 21,11 Unrepaired 17,80
- HOS-SSS: Repaired 32,17 Unrepaired 28,57

"**effects of repair** that we observed **did not exceed** the threshold **minimal clinically important difference** values **(MCID)"**

A real clinical difference for the patient?



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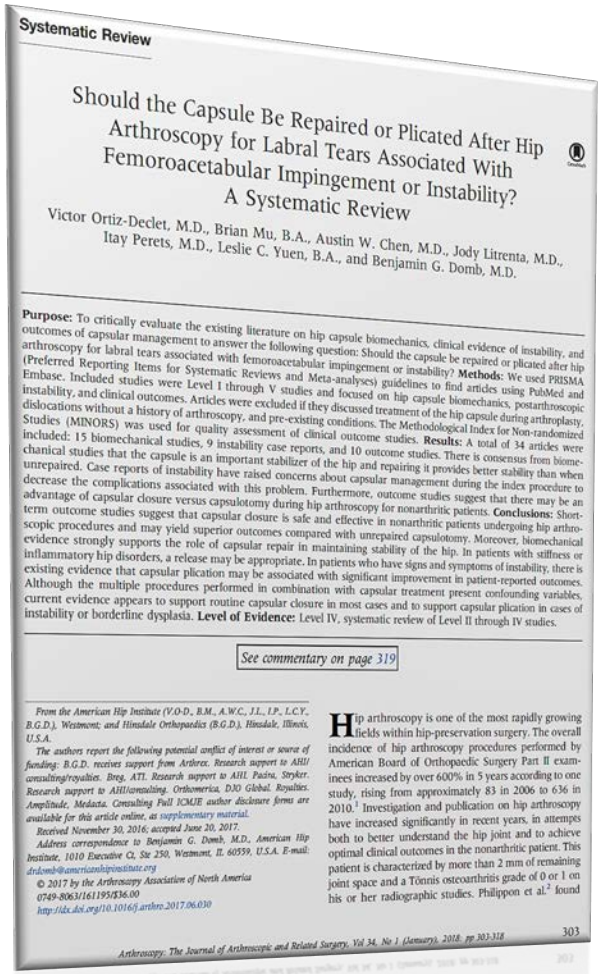

Systematic Review

Should the Capsule Be Repaired or Plicated After Hip Arthroscopy for Labral Tears Associated With Femoroacetabular Impingement or Instability? A Systematic Review

Victor Ortiz-Declet, M.D., Brian Mu, B.A., Austin W. Chen, M.D., Jody Litrenta, M.D., Itay Perets, M.D., Leslie C. Yuen, B.A., and Benjamin G. Domb, M.D.

Purpose: To critically evaluate the existing literature on hip capsule biomechanics, clinical evidence of instability, and outcomes of capsular management to answer the following question: Should the capsule be repaired or plicated after hip arthroscopy for labral tears associated with femoroacetabular impingement or instability? **Methods:** We used PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) guidelines to find articles using PubMed and Embase. Included studies were Level I through V studies and focused on hip capsule biomechanics, postarthroscopic instability, and clinical outcomes. Articles were excluded if they discussed treatment of the hip capsule during arthroplasty, dislocations without a history of arthroscopy, and pre-existing conditions. The Methodological Index for Non-randomized Studies (MINORS) was used for quality assessment of clinical outcome studies. **Results:** A total of 34 articles were included: 15 biomechanical studies, 9 instability case reports, and 10 outcome studies. There is consensus from biomechanical studies that the capsule is an important stabilizer of the hip and repairing it provides better stability than when unrepaired. Case reports of instability have raised concerns about capsular management during the index procedure to decrease the complications associated with this problem. Furthermore, outcome studies suggest that there may be an advantage of capsular closure versus capsulotomy during hip arthroscopy for nonarthritic patients. **Conclusions:** Short-term outcome studies suggest that capsular closure is safe and effective in nonarthritic patients undergoing hip arthroscopic procedures and may yield superior outcomes compared with unrepaired capsulotomy. Moreover, biomechanical evidence strongly supports the role of capsular repair in maintaining stability of the hip. In patients with stiffness or inflammatory hip disorders, a release may be appropriate. In patients who have signs and symptoms of instability, there is existing evidence that capsular plication may be associated with significant improvement in patient-reported outcomes. Although the multiple procedures performed in combination with capsular treatment present confounding variables, current evidence appears to support routine capsular closure in most cases and to support capsular plication in cases of instability or borderline dysplasia. **Level of Evidence:** Level IV, systematic review of Level II through IV studies.

See commentary on page 319

From the American Hip Institute (V.O-D., B.M., A.W.C., J.L., I.P., L.C.Y., B.G.D.), Westmont; and Hinsdale Orthopaedics (B.G.D.), Hinsdale, Illinois, U.S.A.

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Hip arthroscopy is one of the most rapidly growing fields within hip-preservation surgery. The overall incidence of hip arthroscopy procedures performed by American Board of Orthopaedic Surgery Part II examinees increased by over 600% in 5 years according to one study, rising from approximately 83 in 2006 to 636 in 2010.[1] Investigation and publication on hip arthroscopy have increased significantly in recent years, in attempts both to better understand the hip joint and to achieve optimal clinical outcomes in the nonarthritic patient. This patient is characterized by more than 2 mm of remaining joint space and a Tönnis osteoarthritis grade of 0 or 1 on his or her radiographic studies. Philippon et al.[2] found

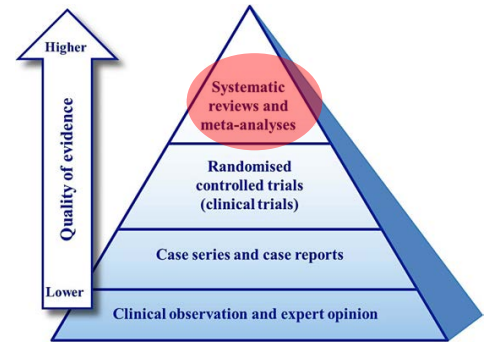
303

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 34, No 1 (January), 2018: pp 303-318

Systematic review 2018

- Not homogeneous studies
- Included: **dysplasia , hyperlaxity**, biomechanics & FAI

"…appears to support routine capsular closure in most cases and to **support capsular plication in cases of instability or borderline dysplasia**."



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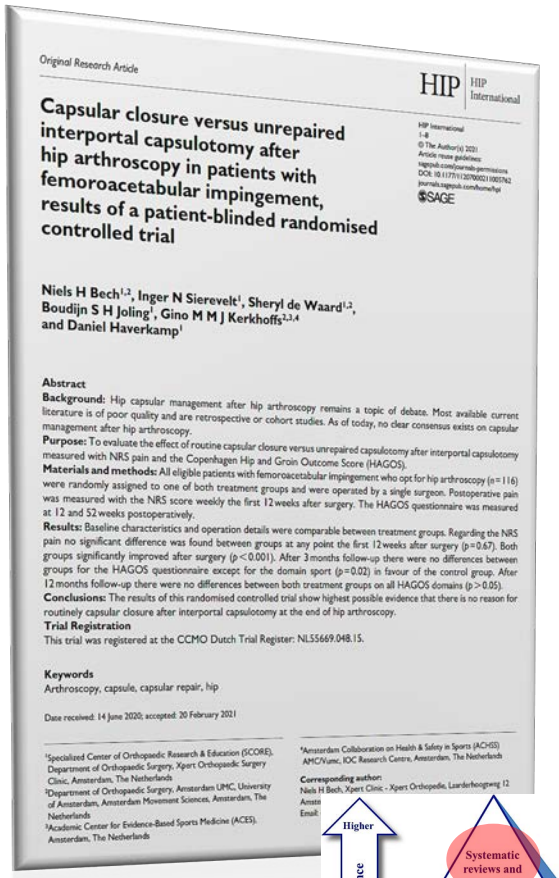

Original Research Article

HIP International

Capsular closure versus unrepaired interportal capsulotomy after hip arthroscopy in patients with femoroacetabular impingement, results of a patient-blinded randomised controlled trial

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Niels H Bech[1,2], Inger N Sierevelt[1], Sheryl de Waard[1,2], Boudijn S H Joling[1], Gino M M J Kerkhoffs[2,3,4] and Daniel Haverkamp[1]

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Materials and methods: All eligible patients with femoroacetabular impingement who opt for hip arthroscopy (n = 116) were randomly assigned to one of both treatment groups and were operated by a single surgeon. Postoperative pain was measured with the NRS score weekly the first 12 weeks after surgery. The HAGOS questionnaire was measured at 12 and 52 weeks postoperatively.

Results: Baseline characteristics and operation details were comparable between treatment groups. Regarding the NRS pain no significant difference was found between groups at any point the first 12 weeks after surgery ($p = 0.67$). Both groups significantly improved after surgery ($p < 0.001$). After 3 months follow-up there were no differences between groups for the HAGOS questionnaire except for the domain sport ($p = 0.02$) in favour of the control group. After 12 months follow-up there were no differences between both treatment groups on all HAGOS domains ($p > 0.05$).

Conclusions: The results of this randomised controlled trial show highest possible evidence that there is no reason for routinely capsular closure after interportal capsulotomy at the end of hip arthroscopy.

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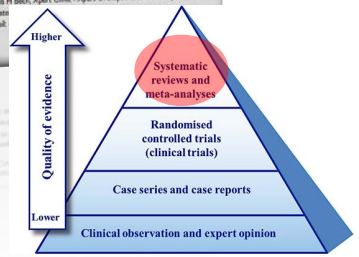

Prospective **Randomize clinical trial** 116 FAI patients

- **Interportal capsulotomy** repaired vs unrepaired
- NRS pain score & HAGOS score

Table 1. Baseline characteristics.

	Open ($n = 58$)	Closed ($n = 58$)	p-Value
Gender, *n* (%)			
Male (%)	23 (40)	19 (33)	0.44
Female (%)	35 (60)	39 (67)	
Age, mean (SD) - years	35.5 (10.4)	33.5 (8.5)	0.25
BMI, mean (SD) - kg/m^2	23.1 (2.7)	24.2 (2.9)	0.05
Yes (%)	3 (5)	6 (10)	0.49
No (%)	55 (95)	52 (90)	
NRS pain, mean (SD)	4.1 (2.8)	4.4 (2.3)	0.44
HAGOS, mean (SD)			
Symptoms	47.6 (18.5)	47.6 (19.5)	0.99
Pain	50.2 (19.4)	49.1 (19.3)	0.76
ADL	54.1 (25.5)	52.7 (25.6)	0.77
Sport	39.0 (23.2)	37.2 (20.9)	0.68
QoL	33.1 (14.8)	27.9 (14.0)	0.06
CE angle, mean (SD)	34.6 (8.7)	36.0 (8.6)	0.39

SD: standard deviation; BMI: body mass index; HAGOS: Copenhagen Hip and Groin Outcome Score; CE: centre-edge.

Table 3. The effect of closure on change from baseline (CFB) at 3 and 12 months, and proportion of patients reaching minimal important change (MIC) on the HAGOS.

	Crude analysis			Adjusted		MIC (%)		
	Open mean (SD)	Closed mean (SD)	p-Value	β-coefficient (95%CI)	p-Value	Open (%)	Closed (%)	p-Value
NRS pain, CFB								
3 months	−2.7 (3.0)	−3.2 (2.1)	0.30	−0.13 (−0.73 to 0.47)	0.67	77	90	0.07
12 months	−2.3 (3.0)	−2.7 (2.5)	0.53	−0.14 (−0.98 to 0.70)	0.75	68	82	0.09
HAGOS, CFB								
Symptoms								
3 months	21.0 (18.1)	16.5 (20.0)	0.24	−4.1 (−10.2 to 2.1)	0.19	74	65	0.38
12 months	21.3 (20.4)	21.2 (24.1)	0.99	−0.1 (−8.8 to 8.6)	0.98	73	68	0,64
Pain								
3 months	26.7 (18.1)	24.8 (19.0)	0.62	−3.3 (−9.4 to 2.8)	0.28	84	81	0.70
12 months	30.8 (20.2)	30.4 (23.2)	0.94	−0.3 (−8.6 to 7.9)	0.94	84	84	1.00
ADL								
3 months	24.5 (24.8)	21.0 (23.9)	0.48	−3.8 (−11.0 to 3.4)	0.30	63	60	0.71
12 months	30.0 (25.8)	32.4 (26.6)	0.67	3.1 (−6.20 to 12.4)	0.50	75	71	0.63
Sport								
3 months	25.9 (25.9)	16.8 (28.1)	0.10	−11.3 (−20.8 to 1.8)	0.02	68	54	0.15
12 months	36.4 (26.6)	32.2 (25.1)	0.48	−3.6 (−13.8 to 6.6)	0.49	77	75	0.80
QoL								
3 months	20.6 (18.4)	19.3 (20.8)	0.74	−4.8 (−12.2 to 2.5)	0.20	66	57	0.34
12 months	30.6 (22.5)	34.3 (23.6)	0.45	3.6 (−6.1 to 13.2)	0.46	85	82	0.78

HAGOS: Copenhagen hip and groin outcome score.

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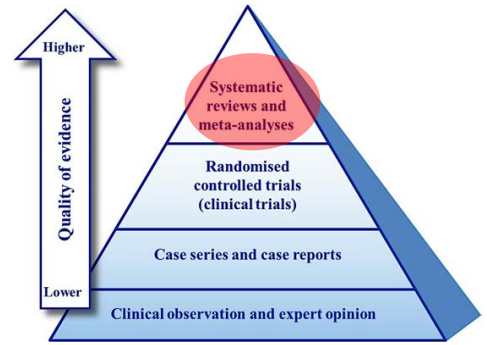
Randomised controlled trial

- **No significant difference** between capsular closure or unrepaired interportal capsulotomy with regard to postoperative pain and patient reported outcome up to **12 months** postoperatively.
- **No reason for routinely capsular closure** at the end of hip arthroscopy



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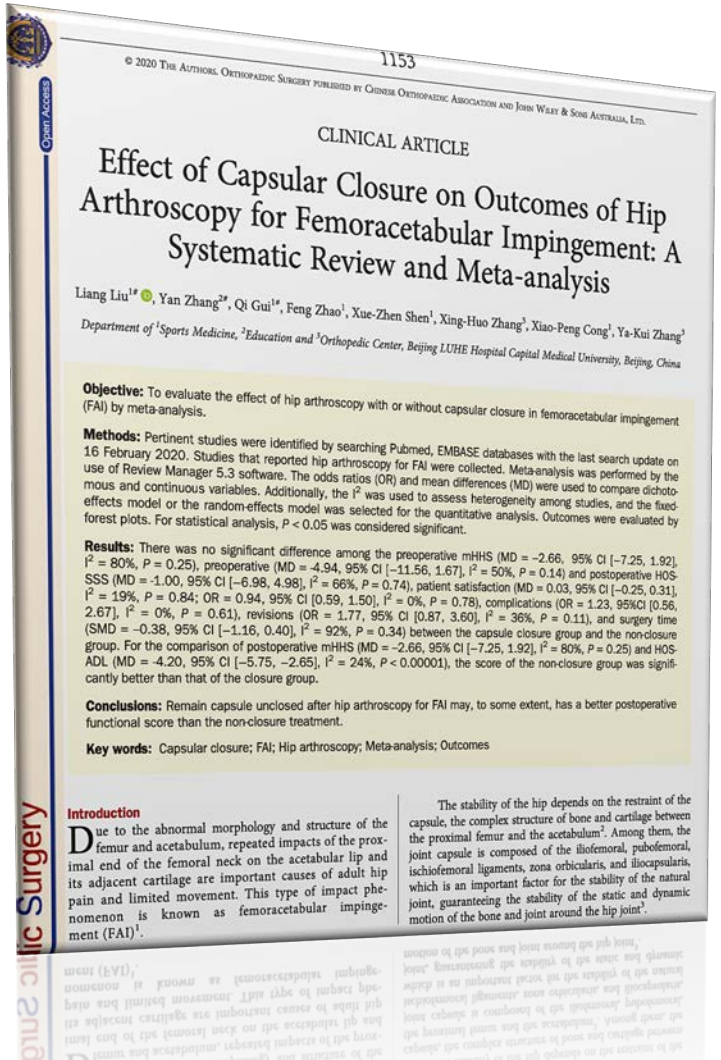

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CLINICAL ARTICLE

Effect of Capsular Closure on Outcomes of Hip Arthroscopy for Femoracetabular Impingement: A Systematic Review and Meta-analysis

Liang Liu[1#], Yan Zhang[2#], Qi Gui[1#], Feng Zhao[1], Xue-Zhen Shen[1], Xing-Huo Zhang[3], Xiao-Peng Cong[1], Ya-Kui Zhang[3]

Department of [1]Sports Medicine, [2]Education and [3]Orthopedic Center, Beijing LUHE Hospital Capital Medical University, Beijing, China

Objective: To evaluate the effect of hip arthroscopy with or without capsular closure in femoracetabular impingement (FAI) by meta-analysis.

Methods: Pertinent studies were identified by searching Pubmed, EMBASE databases with the last search update on 16 February 2020. Studies that reported hip arthroscopy for FAI were collected. Meta-analysis was performed by the use of Review Manager 5.3 software. The odds ratios (OR) and mean differences (MD) were used to compare dichotomous and continuous variables. Additionally, the I^2 was used to assess heterogeneity among studies, and the fixed-effects model or the random-effects model was selected for the quantitative analysis. Outcomes were evaluated by forest plots. For statistical analysis, $P < 0.05$ was considered significant.

Results: There was no significant difference among the preoperative mHHS (MD = −2.66, 95% CI [−7.25, 1.92], I^2 = 80%, P = 0.25), preoperative (MD = -4.94, 95% CI [−11.56, 1.67], I^2 = 50%, P = 0.14) and postoperative HOS-SSS (MD = -1.00, 95% CI [−6.98, 4.98], I^2 = 66%, P = 0.74), patient satisfaction (MD = 0.03, 95% CI [−0.25, 0.31], I^2 = 19%, P = 0.84; OR = 0.94, 95% CI [0.59, 1.50], I^2 = 0%, P = 0.78), complications (OR = 1.23, 95%CI [0.56, 2.67], I^2 = 0%, P = 0.61), revisions (OR = 1.77, 95% CI [0.87, 3.60], I^2 = 36%, P = 0.11), and surgery time (SMD = −0.38, 95% CI [−1.16, 0.40], I^2 = 92%, P = 0.34) between the capsule closure group and the non-closure group. For the comparison of postoperative mHHS (MD = −2.66, 95% CI [−7.25, 1.92], I^2 = 80%, P = 0.25) and HOS-ADL (MD = -4.20, 95% CI [−5.75, −2.65], I^2 = 24%, $P < 0.00001$), the score of the non-closure group was significantly better than that of the closure group.

Conclusions: Remain capsule unclosed after hip arthroscopy for FAI may, to some extent, has a better postoperative functional score than the non-closure treatment.

Key words: Capsular closure; FAI; Hip arthroscopy; Meta-analysis; Outcomes

Introduction

Due to the abnormal morphology and structure of the femur and acetabulum, repeated impacts of the proximal end of the femoral neck on the acetabular lip and its adjacent cartilage are important causes of adult hip pain and limited movement. This type of impact phenomenon is known as femoracetabular impingement (FAI)[1].

The stability of the hip depends on the restraint of the capsule, the complex structure of bone and cartilage between the proximal femur and the acetabulum[2]. Among them, the joint capsule is composed of the iliofemoral, pubofemoral, ischiofemoral ligaments, zona orbicularis, and iliocapsularis, which is an important factor for the stability of the natural joint, guaranteeing the stability of the static and dynamic motion of the bone and joint around the hip joint[3].

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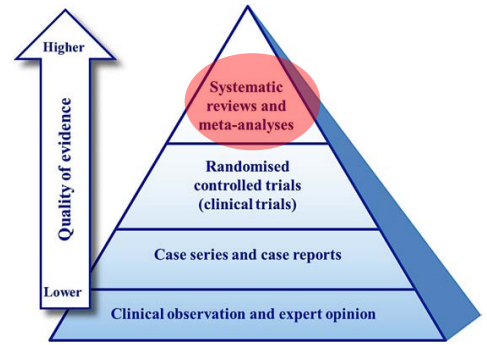
Meta-analysis 2020

- 4 non-RCT and 3 RCT
- 923 FAI patients after hip arthroscopy
  - ✓505 patients without capsular closure
  - ✓418 patients capsular closure
- mHHS, HOS-ADL,HOS-SSS



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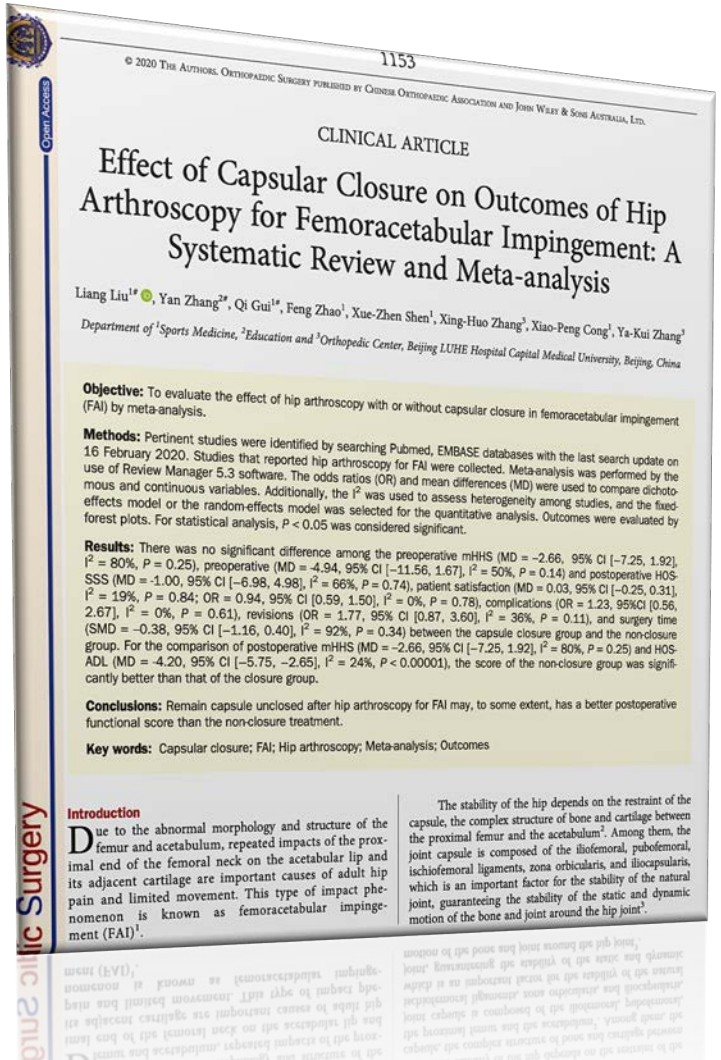

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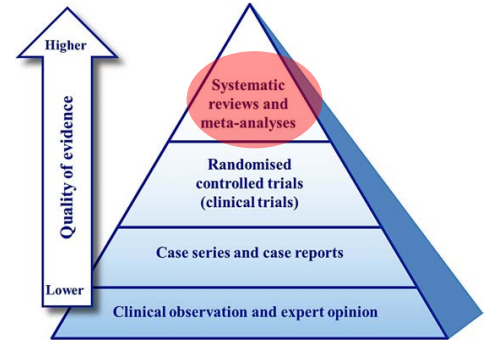
Meta-analysis 2020

- **No significant statistical difference** in the **mHHS, HOS-SSS,** patient satisfaction, complications, revision rates, and surgery time
- The present meta-analysis suggests that keeping the **capsule unclosed** after hip arthroscopy may result in a **better postoperative functional score** than closing the capsule.



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Review Article

How capsular management strategies impact outcomes: A systematic review and meta-analysis of comparative studies

Alexander J. Acuña, Linsen T. Samuel, Alexander Roth, Ahmed K. Emara, Atul F. Kamath*

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Keywords:
Hip arthroscopy
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Plication
Patient reported outcomes (PROs)
Capsular management

ABSTRACT

Purpose: To objectively evaluate the effect different management strategies have on the following post-surgical outcomes.

Methods: The PubMed, Embase and Cochrane Library databases were reviewed for articles published between January 1st, 2000 to September 18, 2019 that reported on studies comparing techniques for handling the capsule during hip arthroscopy. After applying the inclusion and exclusion criteria, our final analysis included 10 studies. In total, these articles included 1556 hips. The following capsular management strategies were implemented: complete repair (n = 444; 28.53%), partial repair (n = 32; 2.06%), plication (n = 223; 14.33%) and release/no-repair (n = 857; 55.08%). A meta-analysis was performed on outcomes presented in three or more studies using sufficient pooled statistical analysis data.

Results: Our meta-analysis demonstrated an improvement in the HOS-SS with capsular repair without being statistically significant (95%CI [-6.71, 8.21], p = 0.06). However, a significant improvement in the mHHS was detected with capsular repair (95%CI [-1.37, 9.39], p = 0.03). Of the Four studies evaluating HOS-ADL, two reported improved outcomes with capsular repair (p < 0.05 for both) while the other two reported no significant difference. While mixed results were demonstrated for reoperation rates, no difference was found across capsular management strategies regarding radiological outcomes, NAHS (all p-values > 0.05) pain (p > 0.05), flexion (p > 0.05), and patient satisfaction (p > 0.05).

Conclusion: Capsular repair has the potential to improve patient reported outcomes after hip arthroscopy. While there was no consensus in literature, studies consistently reported similar or superior outcomes in the capsular repair cohorts compared to capsular release. Further randomized controlled studies need to be conducted for better evaluation of outcomes.

1. Introduction

Non-arthritic hip pathologies, such as femoroacetabular impingement (FAI) and labral tears, are frequently managed through hip arthroscopy. Partly due to the development of less invasive surgical techniques, procedural volume for hip arthroscopies has surged over the past decade.[1,2] However, while these hip procedures have generally yielded high rates of success,[3] there has recently been an increased incidence of reported iatrogenic instability events reported in the literature. Specifically, these include rapidly progressive osteoarthritis, as well as joint subluxation or dislocation, following hip arthroscopy.[4–8] Thus, in order to maintain positive outcomes, there has been a growing interest in ways to prevent these complications following hip arthroscopy. Capsular management strategies have been extensively explored in this domain[9–14].

The hip capsule is comprised of the iliofemoral, ischiofemoral, and pubofemoral ligaments which form a capsuloligamentous envelope that encloses the hip joint.[14,15] Frequently, the capsule is incised in order to obtain atraumatic entry into the joint and to allow for adequate maneuverability of surgical instruments.[16–18] Due to the technically demanding nature of capsular repair,[19] the capsule is traditionally left open, or released.[20] However, given that the capsule has been shown to contribute significantly to joint stability,[11,13,21] it has been suggested that capsular closure may restore native biomechanical properties following arthroscopic procedures.[18,22] Options for closure include complete repair, partial repair, and plication, the tightening of the hip capsule that results from thermal capsular shrinkage. Despite the possible benefits that result from closure, there is lack of consensus among surgeons regarding which strategy should be implemented.

As hip arthroscopy procedures continue to rise, identifying factors

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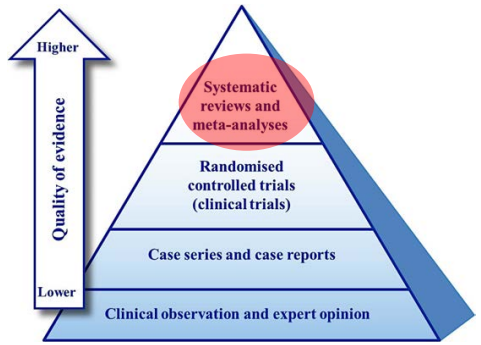
Meta-analysis 2020

- 10 studies, included **1556 hips**
- both interventions demonstrated **similar results** in terms of patient satisfaction, pain, range of motion and radiographic outcomes.
- It is notable that **none of the studies** included in this review demonstrated **superior results with capsular release** in any of the reported outcomes



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Manejo capsular: Medicina Basada en la Evidencia

Capsular Repair May Improve Outcomes in Patients Undergoing Hip Arthroscopy for Femoroacetabular Impingement: A Systematic Review of Comparative Outcome Studies

Jade S. Owens, B.S., Andrew E. Jimenez, M.D., Jacob Shapira, M.D., Benjamin R. Saks, M.D., Rachel M. Glein, B.S., David R. Maldonado, M.D., Hari K. Ankem, M.D., Payam W. Sabetian, M.D., Ajay C. Lall, M.D., M.S., and Benjamin G. Domb, M.D.

Purpose: To review the existing literature in order to determine the effect of hip capsule repair on outcomes after hip arthroscopy for femoroacetabular impingement syndrome. **Methods:** This study used Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines to find articles by using PubMed and Embase. Included studies were Level I through III studies that focused on patient outcomes as a function of hip capsular treatments: capsulotomy repair, partial repair, plication, and unrepaired capsulotomies. The Methodological Index for Non-randomized Studies was used for quality assessment of clinical outcome studies. After applying inclusion and exclusion criteria, a total of 16 comparative outcome studies evaluating 2,996 hips were included; they evaluated the following capsular management techniques: complete repair (n = 1,112, 37.1%), partial repair (n = 32, 1.1%), plication (n = 223, 7.4%), and unrepaired capsulotomy (n = 1629, 54.4%). **Results:** Of the 16 studies, 13 included patient-reported outcome scores (PROs), 3 included imaging outcomes data, and 2 reported on reoperation. Of the studies, 10 directly compared patient-reported outcomes between a capsular repair group and an unrepaired group. Of the 10 studies that directly compared PROs between a group with unrepaired capsulotomy and a group with capsular repair, 8 studies demonstrated statistically significantly better PROs in the repaired group compared to the unrepaired group, and 2 studies found no difference between the groups. Reoperation rates demonstrated mixed results between groups, and no difference was found in regard to imaging outcomes.

From the American Hip Institute Research Foundation, Chicago, Illinois, U.S.A (J.S.O., A.E.J.,J.S., B.R.S., R.M.G., D.R.M., H.K.A., P.W.S., A.C.L., B.G.D.), AMITA Health St. Alexius Medical Center, Hoffman Estates, Chicago, Illinois, U.S.A. (A.C.L., B.G.D.), Cedars-Sinai Kerlan-Jobe Institute, Los Angeles, California, U.S.A. (A.C.L., B.G.D.)

The authors report that they have no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as supplementary material.

Dr. Domb reports grants and other from American Orthopedic Foundation, during the conduct of the study; personal fees from Amplitude, grants, personal fees and non-financial support from Arthrex, personal fees and non-financial support from DJO Global, grants, personal fees and non-financial support from Medacta, grants, personal fees, non-financial support and other from Stryker, grants from Breg, personal fees from Orthomerica, grants and non-financial support from Medwest Associates, grants from ATI Physical Therapy, personal fees and non-financial support from St. Alexius Medical Center, grants from Ossur, non-financial support from Zimmer Biomet, outside the submitted work; In addition, Dr. Domb has a patent 8920497-Method and instrumentation for acetabular labrum reconstruction with royalties paid to Arthrex, a patent 8708941-Adjustable multi-component hip orthosis with royalties paid to Orthomerica and DJO Global, and a patent 9737292-Knotless suture anchors and methods of tissue repair with royalties paid to Arthrex and Dr. Domb is a board member of American Hip Institute Research Foundation, AANA Learning Center Committee, the Journal of Hip Preservation Surgery, the Journal of Arthroscopy; has had ownership interests in the American Hip Institute, Hinsdale Orthopedic Associates, Hinsdale Orthopedic Imaging, SCD#3, North Shore Surgical Suites, and Monster Specialty Surgery Center. Dr. Lall reports grants, personal fees and non-financial support from Arthrex, non-financial support from Ivivi, non-financial support from Medwest, non-financial support from Smith & Nephew, grants and non-financial support from Stryker, non-financial support from Vericel, non-financial support from Zimmer Biomet, personal fees from Graymont Medical, outside the submitted work; and Dr. Lall is the Co-Medical Director of Hip Preservation at St. Alexius Medical Center, the Clinical Instructor at the University of Illinois College of Medicine, and member of the AANA Learning Center Committee. Dr. Maldonado reports non-financial support from Arthrex, non-financial support from Stryker, non-financial support from Smith & Nephew, non-financial support from Ossur, outside the submitted work; and Dr. Maldonado is an editorial board member of the Journal of Arthroscopy. Dr. Saks reports grants from Arthrex, personal fees from DJO Global, outside the submitted work. Dr. Shapira reports non-financial support from Arthrex, non-financial support from Stryker, non-financial support from Smith & Nephew, non-financial support from Ossur, outside the submitted work.

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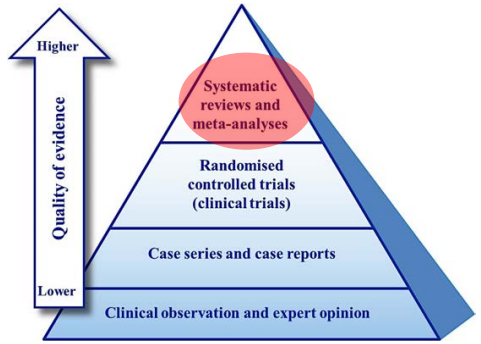
Systematic review 2021

- **16 studies,** PROMs & imaging
- capsular repair group and an unrepaired group.
- **8 studies** demonstrated statistically significantly **better PROMs in the repaired group**
- **2 studies** found **no difference** between the groups.
- **Reoperation rates** demonstrated **mixed results**
- **No** difference in regard to **imaging**



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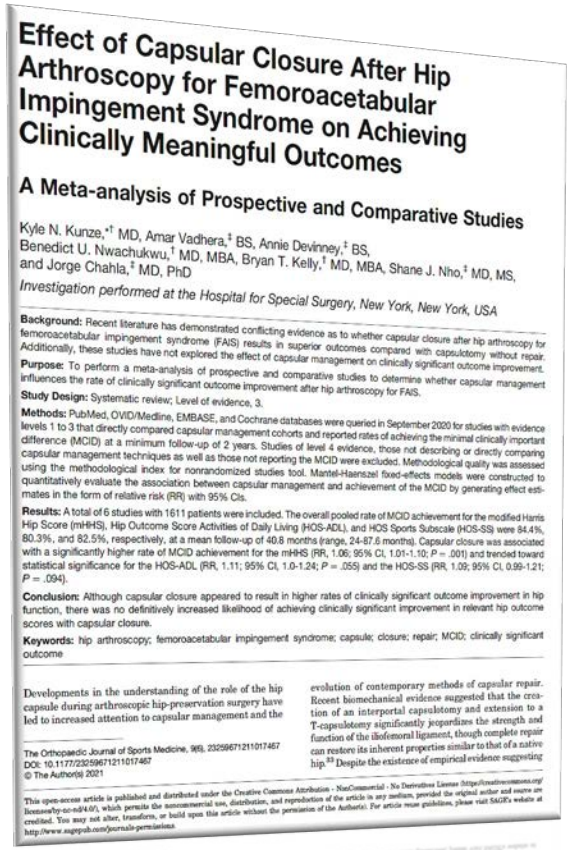

Effect of Capsular Closure After Hip Arthroscopy for Femoroacetabular Impingement Syndrome on Achieving Clinically Meaningful Outcomes

A Meta-analysis of Prospective and Comparative Studies

Kyle N. Kunze,*† MD, Amar Vadhera,‡ BS, Annie Devinney,‡ BS, Benedict U. Nwachukwu,† MD, MBA, Bryan T. Kelly,† MD, MBA, Shane J. Nho,‡ MD, MS, and Jorge Chahla,‡ MD, PhD

Investigation performed at the Hospital for Special Surgery, New York, New York, USA

Background: Recent literature has demonstrated conflicting evidence as to whether capsular closure after hip arthroscopy for femoroacetabular impingement syndrome (FAIS) results in superior outcomes compared with capsulotomy without repair. Additionally, these studies have not explored the effect of capsular management on clinically significant outcome improvement.

Purpose: To perform a meta-analysis of prospective and comparative studies to determine whether capsular management influences the rate of clinically significant outcome improvement after hip arthroscopy for FAIS.

Study Design: Systematic review; Level of evidence, 3.

Methods: PubMed, OVID/Medline, EMBASE, and Cochrane databases were queried in September 2020 for studies with evidence levels 1 to 3 that directly compared capsular management cohorts and reported rates of achieving the minimal clinically important difference (MCID) at a minimum follow-up of 2 years. Studies of level 4 evidence, those not describing or directly comparing capsular management techniques as well as those not reporting the MCID were excluded. Methodological quality was assessed using the methodological index for nonrandomized studies tool. Mantel-Haenszel fixed-effects models were constructed to quantitatively evaluate the association between capsular management and achievement of the MCID by generating effect estimates in the form of relative risk (RR) with 95% CIs.

Results: A total of 6 studies with 1611 patients were included. The overall pooled rate of MCID achievement for the modified Harris Hip Score (mHHS), Hip Outcome Score Activities of Daily Living (HOS-ADL), and HOS Sports Subscale (HOS-SS) were 84.4%, 80.3%, and 82.5%, respectively, at a mean follow-up of 40.8 months (range, 24-87.6 months). Capsular closure was associated with a significantly higher rate of MCID achievement for the mHHS (RR, 1.06; 95% CI, 1.01-1.10; $P = .001$) and trended toward statistical significance for the HOS-ADL (RR, 1.11; 95% CI, 1.0-1.24; $P = .055$) and the HOS-SS (RR, 1.09; 95% CI, 0.99-1.21; $P = .094$).

Conclusion: Although capsular closure appeared to result in higher rates of clinically significant outcome improvement in hip function, there was no definitively increased likelihood of achieving clinically significant improvement in relevant hip outcome scores with capsular closure.

Keywords: hip arthroscopy; femoroacetabular impingement syndrome; capsule; closure; repair; MCID; clinically significant outcome

Developments in the understanding of the role of the hip capsule during arthroscopic hip-preservation surgery have led to increased attention to capsular management and the evolution of contemporary methods of capsular repair. Recent biomechanical evidence suggested that the creation of an interportal capsulotomy and extension to a T-capsulotomy significantly jeopardizes the strength and function of the iliofemoral ligament, though complete repair can restore its inherent properties similar to that of a native hip.[3] Despite the existence of empirical evidence suggesting

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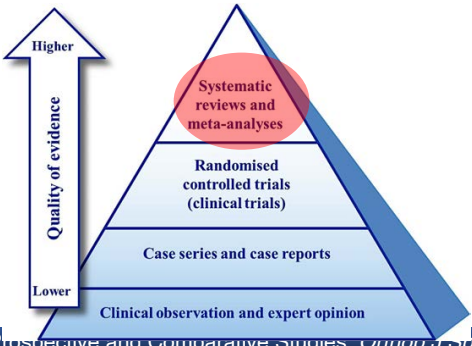
Meta-analysis 2021

- A total of 6 studies with **1611 patients**
- Mean follow-up of **>3 years**
- **Capsular closure trended toward** statistical significance HOS-ADL and the HOS-SS
- capsular closure **"appeared to"** result in higher rates of clinically significant outcome but **no definitively** of achieving **clinically significant improvement**



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“Save the hip capsule”

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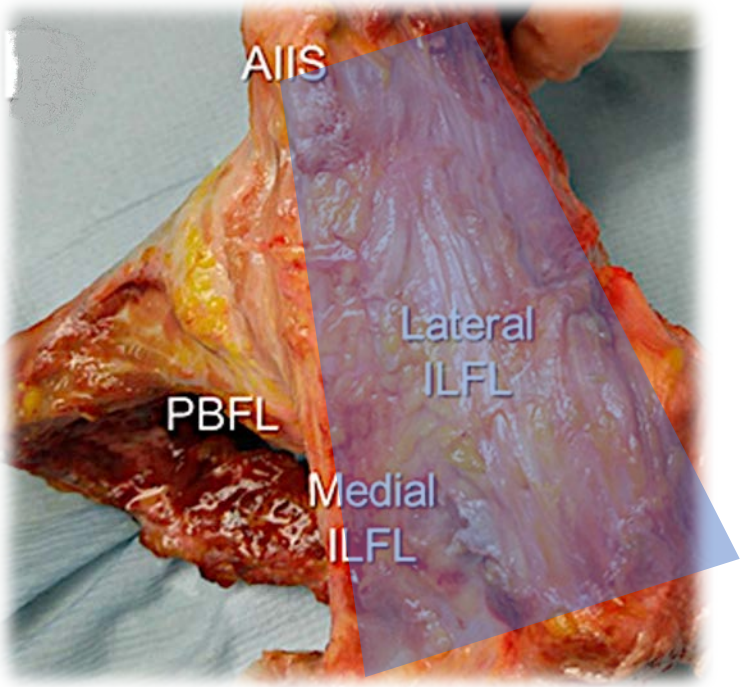
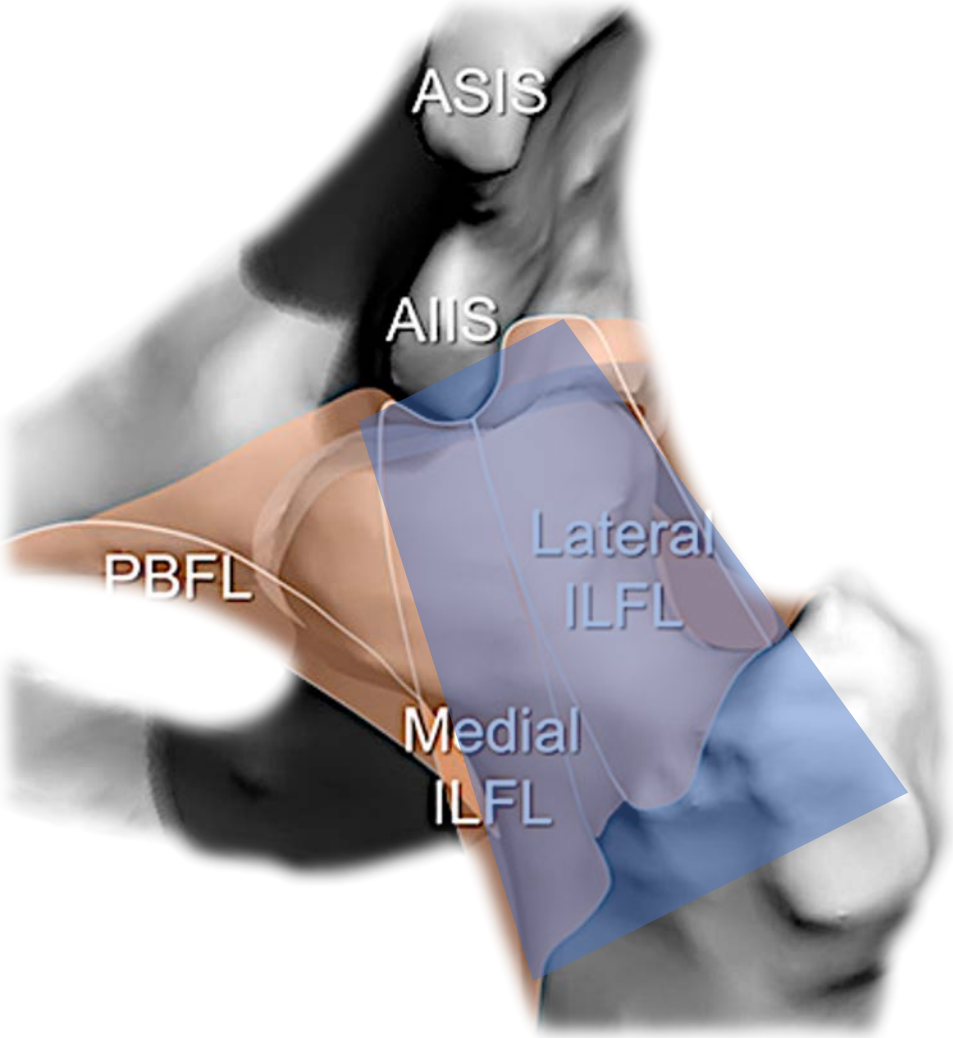
Instability related to capsular opening

- **Capsular preservation**?





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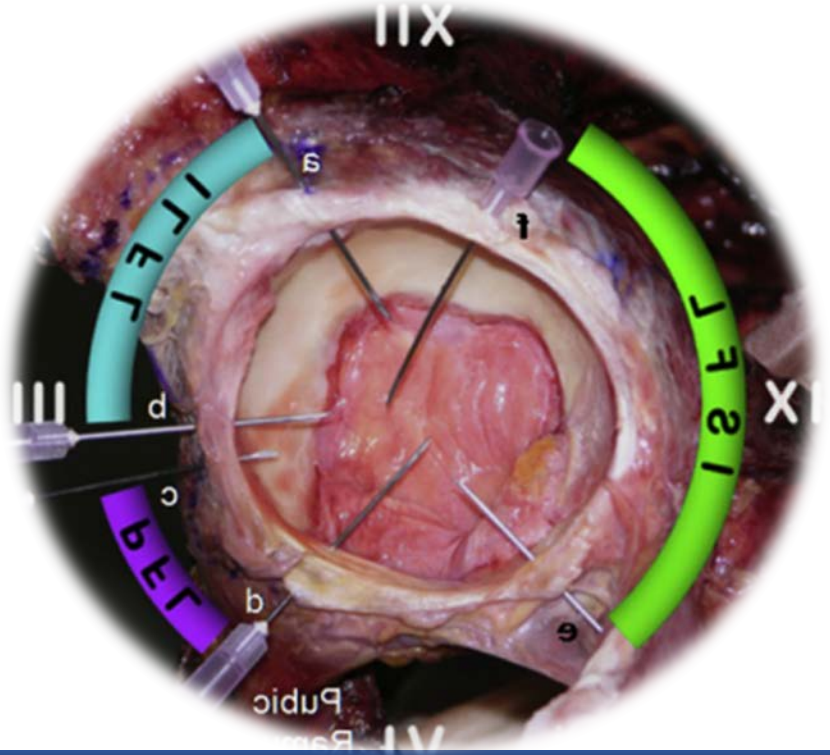
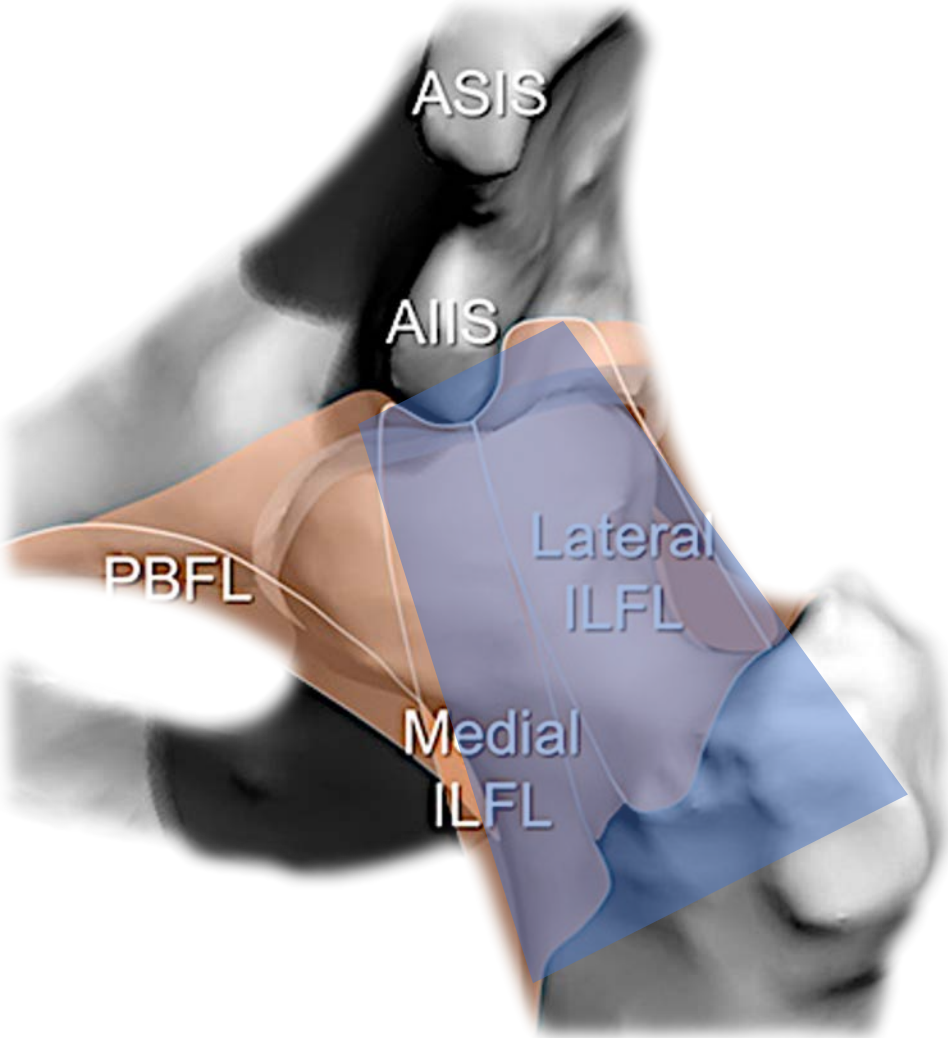
Instability related to capsular opening

- **Capsular preservation**?





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Instability related to capsular opening

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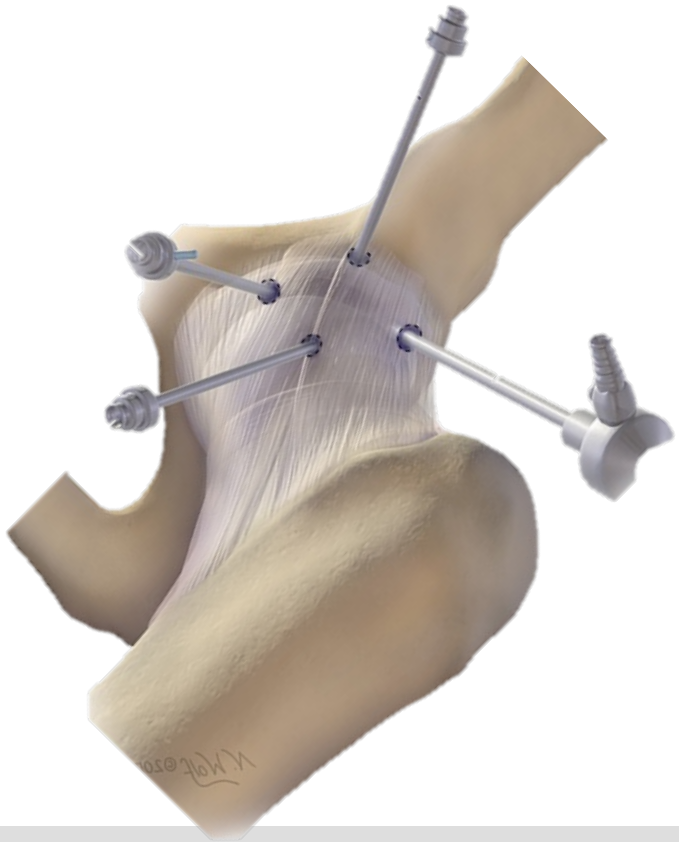

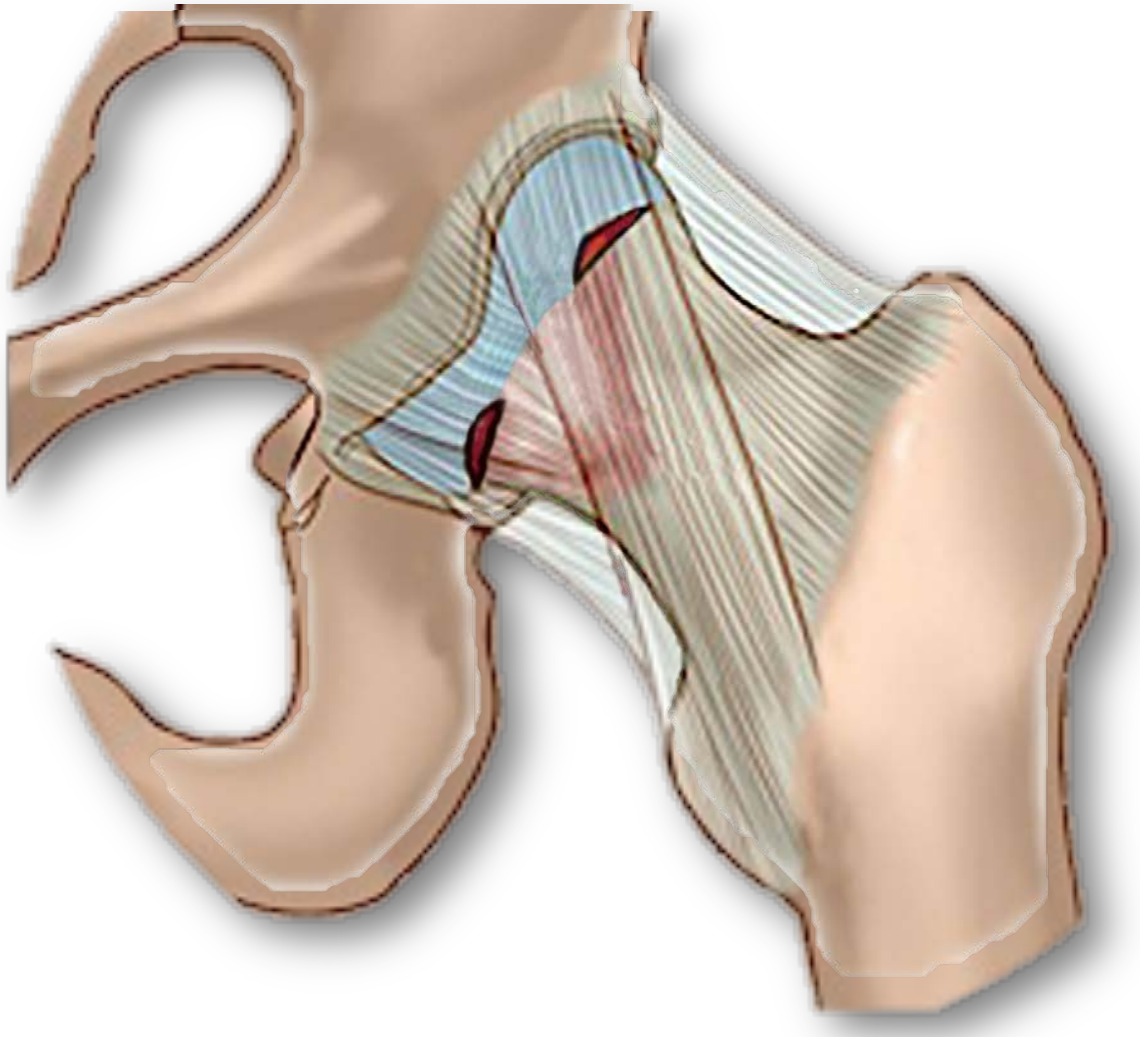

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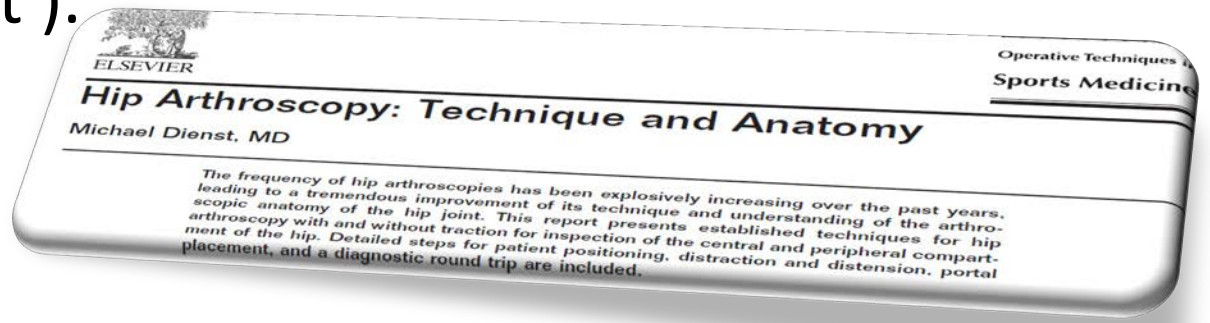
Peripheral compartment first (M. Dienst).

- ✓ Proximal MAP (PMAP)
- ✓ Anterior Portal (AP)

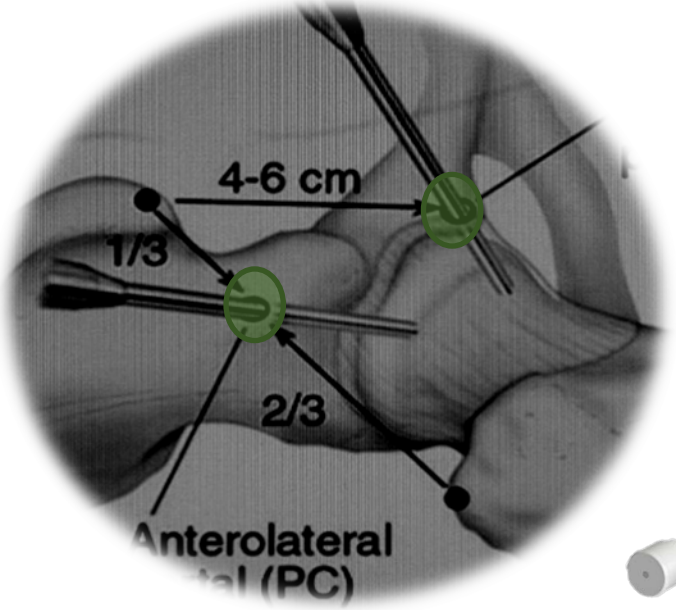

ELSEVIER

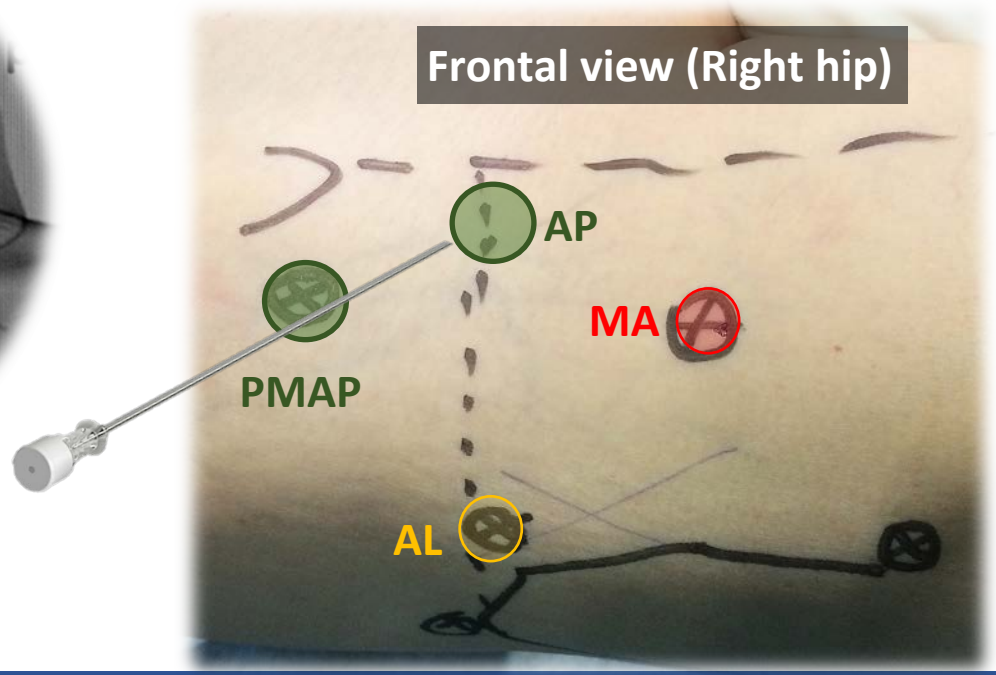
Operative Techniques in Sports Medicine

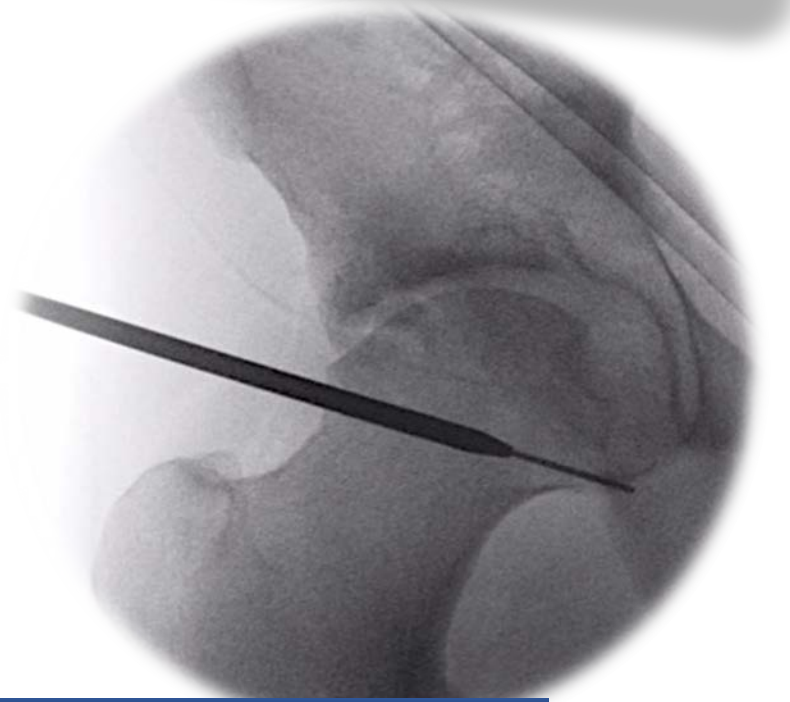
Hip Arthroscopy: Technique and Anatomy

Michael Dienst, MD

The frequency of hip arthroscopies has been explosively increasing over the past years, leading to a tremendous improvement of its technique and understanding of the arthroscopic anatomy of the hip joint. This report presents established techniques for hip arthroscopy with and without traction for inspection of the central and peripheral compartment of the hip. Detailed steps for patient positioning, distraction and distension, portal placement, and a diagnostic round trip are included.







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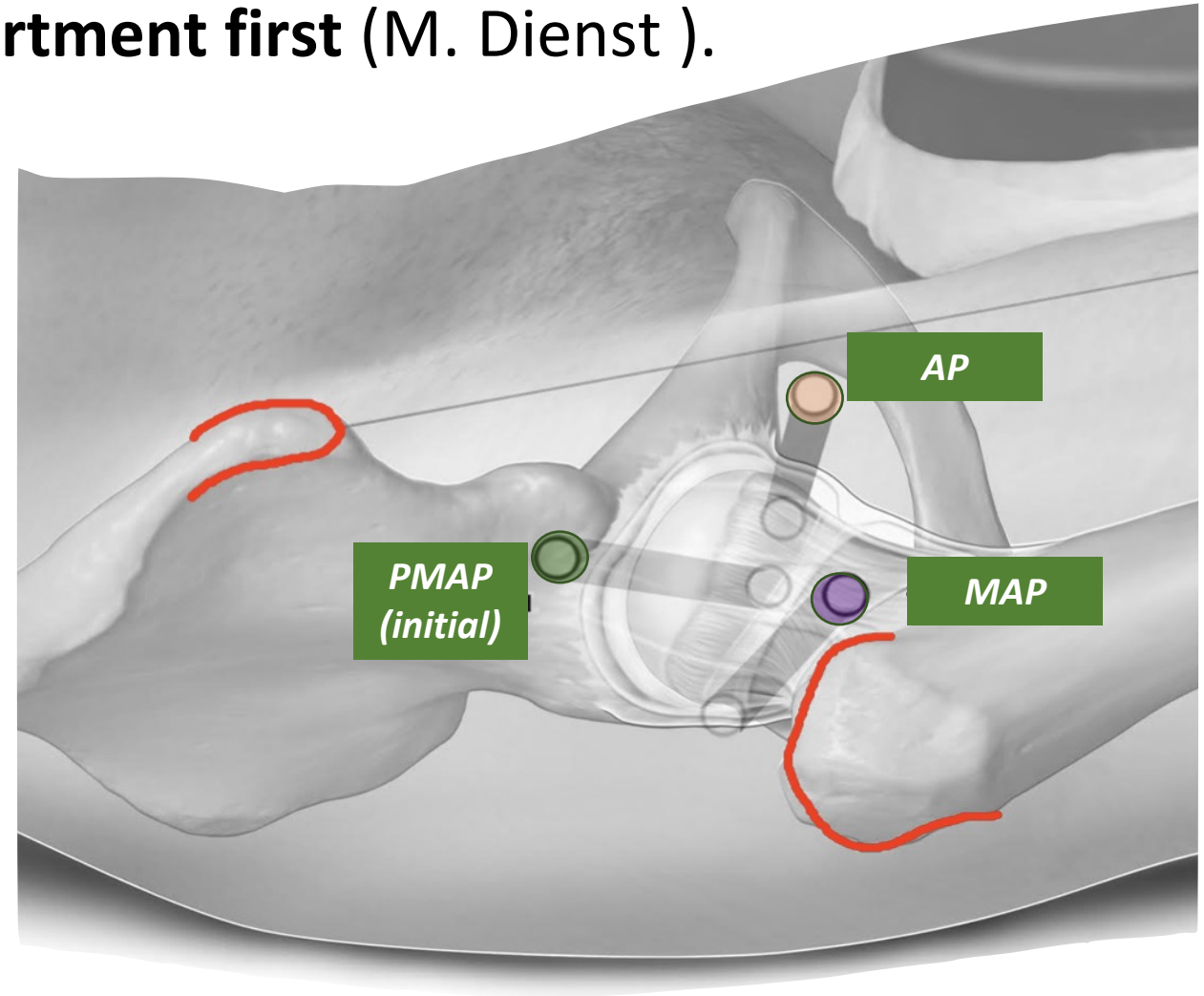
Peripheral compartment first (M. Dienst).



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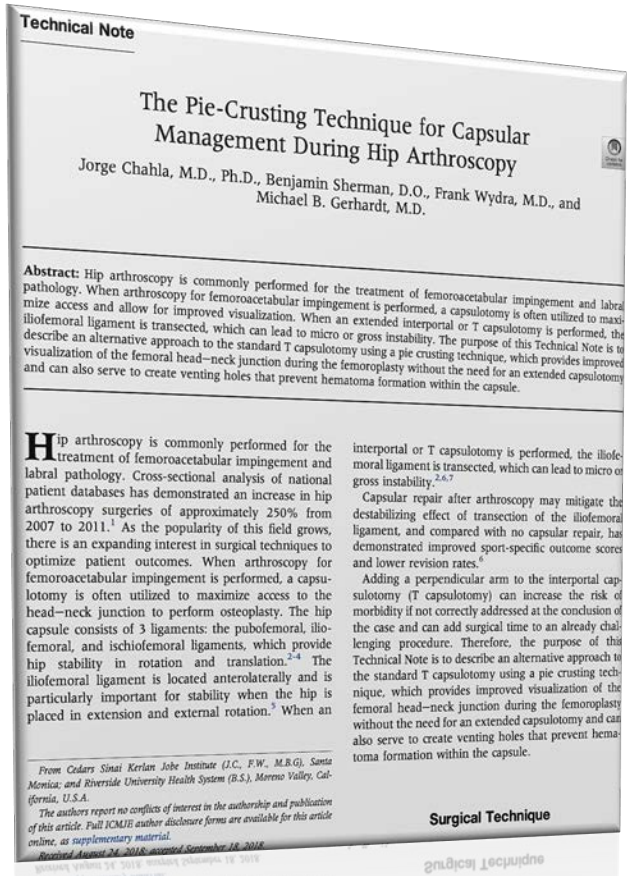
Instability related to capsular opening

- **Capsular preservation**?



Technical Note

The Pie-Crusting Technique for Capsular Management During Hip Arthroscopy

Jorge Chahla, M.D., Ph.D., Benjamin Sherman, D.O., Frank Wydra, M.D., and Michael B. Gerhardt, M.D.

Abstract: Hip arthroscopy is commonly performed for the treatment of femoroacetabular impingement and labral pathology. When arthroscopy for femoroacetabular impingement is performed, a capsulotomy is often utilized to maximize access and allow for improved visualization. When an extended interportal or T capsulotomy is performed, the iliofemoral ligament is transected, which can lead to micro or gross instability. The purpose of this Technical Note is to describe an alternative approach to the standard T capsulotomy using a pie crusting technique, which provides improved visualization of the femoral head–neck junction during the femoroplasty without the need for an extended capsulotomy and can also serve to create venting holes that prevent hematoma formation within the capsule.

Hip arthroscopy is commonly performed for the treatment of femoroacetabular impingement and labral pathology. Cross-sectional analysis of national patient databases has demonstrated an increase in hip arthroscopy surgeries of approximately 250% from 2007 to 2011.[1] As the popularity of this field grows, there is an expanding interest in surgical techniques to optimize patient outcomes. When arthroscopy for femoroacetabular impingement is performed, a capsulotomy is often utilized to maximize access to the head–neck junction to perform osteoplasty. The hip capsule consists of 3 ligaments: the pubofemoral, iliofemoral, and ischiofemoral ligaments, which provide hip stability in rotation and translation.[2-4] The iliofemoral ligament is located anterolaterally and is particularly important for stability when the hip is placed in extension and external rotation.[5] When an interportal or T capsulotomy is performed, the iliofemoral ligament is transected, which can lead to micro or gross instability.[2,6,7]

Capsular repair after arthroscopy may mitigate the destabilizing effect of transection of the iliofemoral ligament, and compared with no capsular repair, has demonstrated improved sport-specific outcome scores and lower revision rates.[6]

Adding a perpendicular arm to the interportal capsulotomy (T capsulotomy) can increase the risk of morbidity if not correctly addressed at the conclusion of the case and can add surgical time to an already challenging procedure. Therefore, the purpose of this Technical Note is to describe an alternative approach to the standard T capsulotomy using a pie crusting technique, which provides improved visualization of the femoral head–neck junction during the femoroplasty without the need for an extended capsulotomy and can also serve to create venting holes that prevent hematoma formation within the capsule.

From Cedars Sinai Kerlan Jobe Institute (J.C., F.W., M.B.G), Santa Monica; and Riverside University Health System (B.S.), Moreno Valley, California, U.S.A.

The authors report no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as supplementary material.

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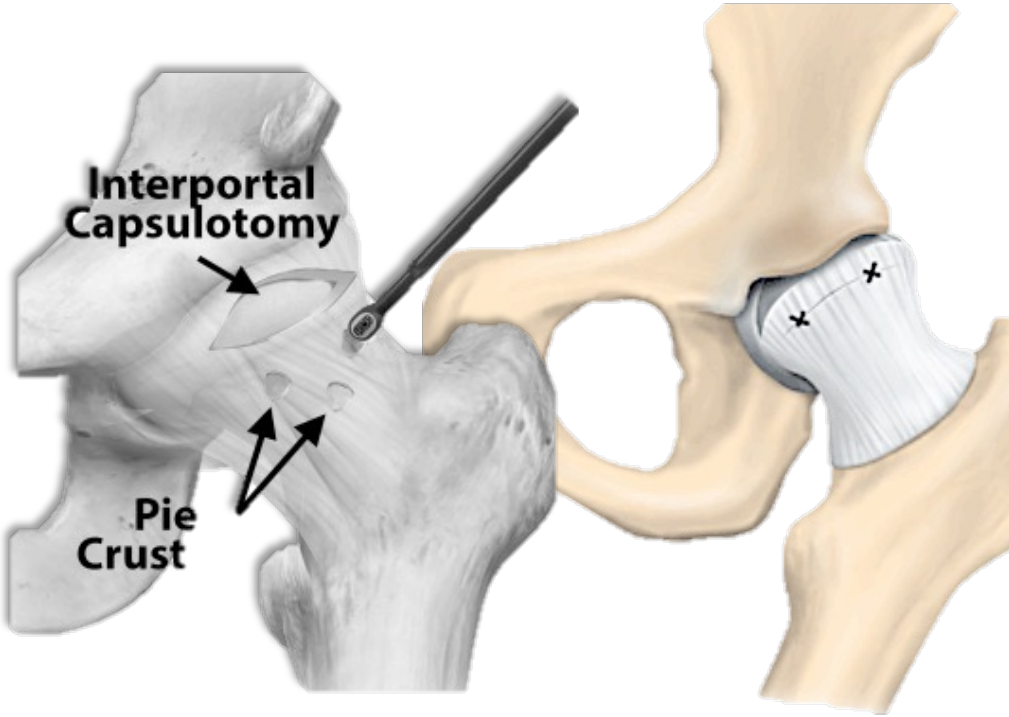
Surgical Technique



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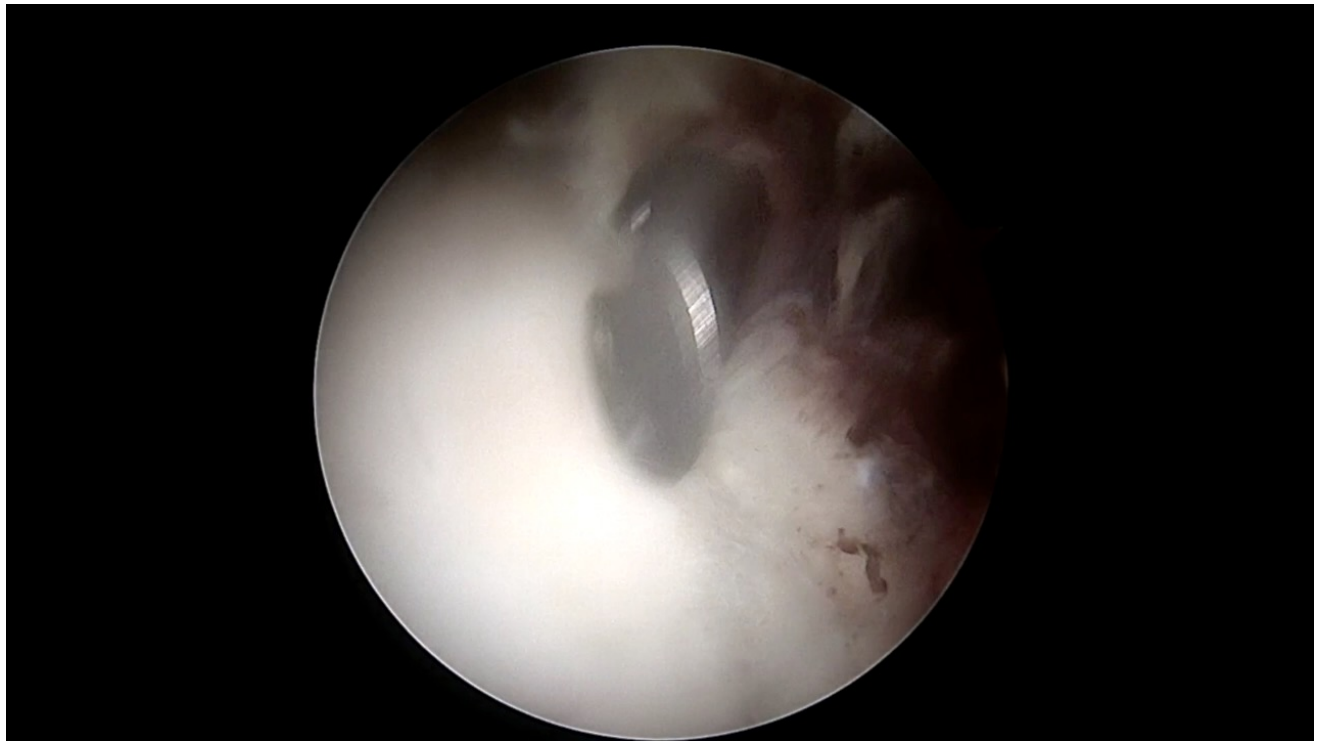
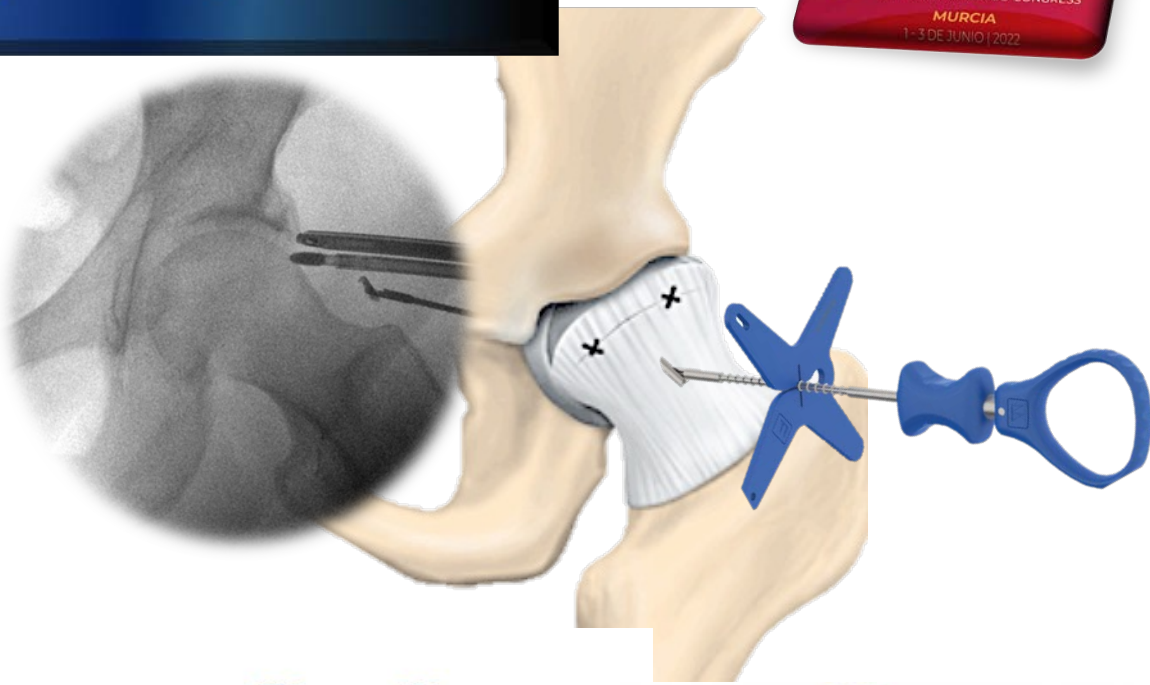
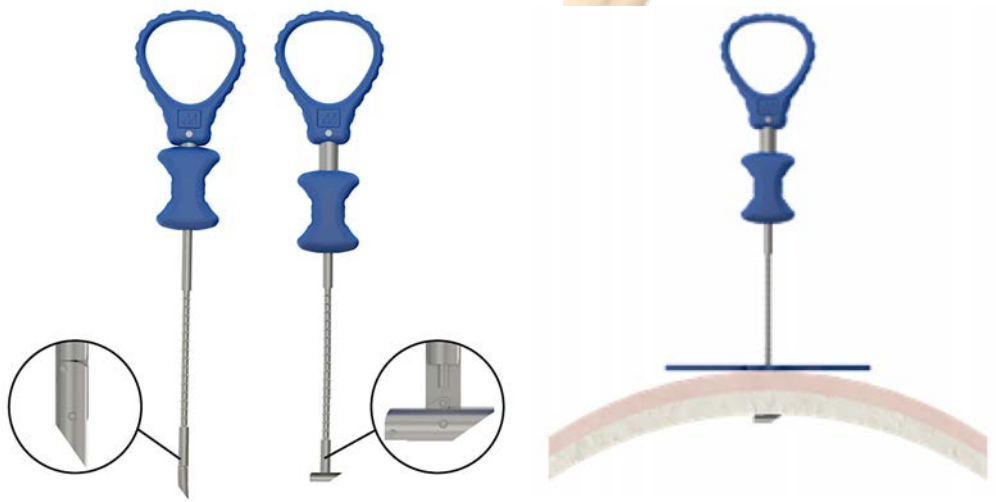
Salvar la cápsula de la cadera

➢Capsular preservation?







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Take Home Messages

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- Evidence based….. Close the capsule is not mandatory
- Based on personal experience…. Preserve the capsule as much as possible

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Thank you for your Attention

Gracias por su Atención