

An Updated Characterization of Capsule Closure in Hip Arthroscopy: A Systematic Review

John Jason Heifner, Leah Marie Keller, Gagan Grewal, Ty Davis¹, Jan Pieter Hommen

¹Larkin Community Hospital

INTRODUCTION:

Articular access to the hip is provided by a capsulotomy which invades the iliofemoral ligament, the principle static restraint to extension and external rotation. The most common is the interportal (IP) capsulotomy which connects the anterolateral and anterior or mid anterior portals. The T-type capsulotomy is a longitudinal distal extension made perpendicular to the interportal capsulotomy. Historically, surgeons were hesitant to close the capsule, due to concern for reduced excursion. Recently, capsule closure has been performed more frequently in part due to awareness of the clinical detriment of hip microinstability. Thus, capsular management has emerged as a critical component of hip arthroscopy.

Although capsule closure has been increasingly investigated, there is an incomplete understanding of the characteristics of the repair. It is reasonable if not imperative to critically evaluate the characteristics of a variable that some have deemed integral to achieving a satisfactory outcome. The current literature is void of aggregate reporting of the characteristics of capsule closure.

Our primary objective was to review the recent literature to provide an updated characterization of capsule closure in hip arthroscopy. Secondly we aimed to determine if the characteristics of closure impacted clinical outcomes.

METHODS:

In keeping with the Preferred Reporting in Systematic Reviews and Meta Analyses (PRISMA) guidelines, a literature review was performed using the PubMed and Google Scholar databases. The Population, Intervention, Comparison and Outcome (PICO) characteristics for eligibility were the following: patients over 18 years of age who underwent primary hip arthroscopy with reporting of patient-reported outcome measures or revision/failure.

RESULTS:

A total of 23 studies met the inclusion criteria and were selected for analysis. At a mean follow up of 37.5 months, there was significant postoperative improvement in Nonarthritic Hip Score (NAHS), the Hip Outcome Score Sport-Specific Subscale (HOS-SSS), the Modified Harris Hip Score (mHHS), a visual analog scale (VAS) for pain, and the shortened International Hip Outcome Tool (iHOT-12). Revision surgery occurred in 5.9% of cases and failure occurred in 8.8% of cases.

The T-type capsulotomy was utilized in 43% of the included studies. This is indicative of a trend in increasing utilization of the T-type compared to the review by Ekhtiari et al. in 2017 which reported a 30% utilization.

Across all included studies, the most common suture number for closure of the vertical limb was three sutures and for closure of the transverse limb, two sutures. The interportal capsulotomy was commonly closed with two to three sutures. A simple side-to-side repair was the most commonly reported construct. We postulate that skill level may be a limiting factor in implementing more detailed suture configurations. Only two studies reported the use of single sutures to close the capsule. Nonabsorbable suture was utilized more often than absorbable suture for capsule closure. This finding may be indicative of concern for a disparity between the time to capsule healing and the time to substantial loss of tensile strength of the suture.

DISCUSSION AND CONCLUSION:

The literature displays consistent efficacy for arthroscopic treatment of intra-articular hip pathologies. With the increasing prevalence of hip arthroscopy, procedure variables such as the capsulotomy and capsule closure have become increasingly reported and further evaluated. As described by Weber et al., closure of the capsule may be intuitive as it restores the disrupted anatomy. However, our results demonstrate that the characteristics of capsule closure are infrequently and incompletely reported.

There is a growing body of investigations into the efficacy of routine capsule closure following hip arthroscopy. However, it is conspicuous that the characteristics of capsule closure are infrequently and inconsistently reported. Compared to earlier reports, there appears to be a trend toward increased utilization of T-type capsulotomy. Capsule closure is commonly performed with #2 high strength nonabsorbable suture, with three sutures used in the vertical limb and two to three in the transverse limb.

Study	N*	Portals*	Capsulotomy*	# of suture*	Absorbability
Frank, 2014	64	AL/Ant/DALA	T-type	2-4 (vertical), 2 (transverse)	NR
Larson, 2015	231	NR	IP	3-5	NR
Levy, 2016	51	AL/MA/DALA	T-type	3 (vertical), 2- 3 (transverse)	NR
Nawabi, 2016	177	AL/MA/DALA	T-type	5-6	Nonabsorbable
Weber, 2016	39	AL/mMA/DALA	T-type	3 (vertical), 2 (transverse)	NR
Chandrasekaran, 2017	55	AL/Ant/DALA	IP	4-6	Absorbable
Cvetanovich, 2017	414	AL/MA/DALA	T-type	3 (vertical), 2- 3 (transverse)	Absorbable
Hatakeyama, 2017	45	AL/MA	IP	2-3	NR
Srickland, 2018	15	AL/MA	IP	2-3	Absorbable
Atzmon, 2019	64	AL/MA	IP	2	Absorbable
Chahla, 2019	634	AL/mMA	T-type	2-4 (vertical)	NR
Stone, 2019	125	AL/mMA/DALA	T-type	3 (vertical), 2 (transverse)	NR
Beck, 2020	264	AL/MA/Ant	T-type	2-4 (vertical)	NR
Filan, 2020	966	AL/mMA	T-type	1-4	Nonabsorbable
Mas Martinez, 2020	60	AL/MA/DALA	T-type	2-3 (vertical), 2 (transverse)	NR
McGovern, 2020	68	AL/MA	IP	1-2	Absorbable

Bech, 2021	29	NR	IP	2-3	NR
Beck, 2021	100	AL/MA	T-type	2-3 (vertical), 2-3 (transverse)	Nonabsorbable
Yin, 2021	56	NR	IP/T-type	2-3	NR
Beals, 2022	38	AL/MA	IP	3	Absorbable
Cong, 2022	22	AL/MA/DALA	Ext longitudinal	2-3	Nonabsorbable
Jimenez, 2022	84	AL/mMA/DALA	IP	4-6	Absorbable
Gao, 2022	194	AL/MA	IP	2-3	Nonabsorbable

*N - sample size, AL - anterolateral, MA - mid anterior, mMA - modified mid anterior, DALA - distal anterolateral accessory, IP - interportal, ext longitudinal - extended longitudinal, # suture - the number of suture reported for capsule closure, NR - not reported