

Arthroscopic debridement of the isolated Ligamentum Teres rupture

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Abstract

Purpose Most tears of the Ligamentum Teres (LT) are diagnosed when treating other hip pathologies. The purpose of this study was to evaluate the outcome of arthroscopic surgery for a unique group of patients with symptomatic isolated Ligamentum Teres rupture of the hip.

Methods The study included 29 patients who suffered from an isolated Ligamentum Teres rupture of the hip and were treated with an arthroscopic debridement from 2003 to 2008. Patients with femoroacetabular impingement or other hip pathologies except Ligamentum Teres tear were excluded. Clinical results were measured preoperatively and postoperatively with the modified Harris Hip Score (MHHS) and Non-Arthritic Hip Score (NAHS). The mean age was 25 years (SD ± 11) with a mean follow-up time of 2.5 years (SD ± 1.5).

Results At the last follow-up, the mean MHHS improved from 70 to 86 [mean difference = 16 (95% CI 4–27)] and the mean NAHS improved from 64 to 86 [mean

difference = 22 (95% CI 10–33)]. Five patients have had a second arthroscopic debridement due to symptomatic recurrent tears.

Conclusion Arthroscopic debridement alone of the isolated Ligamentum Teres rupture has a short-term beneficial result in more than 80% of cases.

Keywords Hip-arthroscopy · Ligamentum-Teres · Rupture

Introduction

The evolution of hip arthroscopy has enabled the investigation of various hip pathologies [5, 13, 17]. One such pathology is the Ligamentum Teres (LT) rupture that is considered difficult to assess prior to surgery [20]. Therefore, the LT rupture is classified during arthroscopy and in most cases is accompanied by other lesions [10]. Nowadays nearly all LT ruptures are treated by an arthroscopic debridement, but outcome studies are scarce and mainly published as case reports [6, 15, 21, 23, 24]. On a recent comprehensive annotation, Bardakos and Villar [2] reviewed the literature regarding the LT of the adult hip and described the few articles on the results of treatment. As the clinical scores can be determined by additional pathology often found with the LT rupture (i.e. chondral lesion), it is essential to evaluate the isolated LT rupture. The purpose of this study was to evaluate the outcome of patients who suffered from an isolated LT rupture of the hip and were treated with an arthroscopic debridement. In view of the mechanical symptoms and pain which are caused by a LT rupture, the study hypothesis was that arthroscopic debridement would provide relief of pain and improved function.

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Materials and methods

This study included patients who have had arthroscopic debridement of an isolated (no other intra-articular pathology) Ligamentum Teres rupture for persistent localized groin pain. The patients' follow-up files and operation reports were retrospectively reviewed. The information that was retrieved included demographic details, clinical scores, and arthroscopic findings. From the senior surgeon hip arthroscopies database since 2002 until 2009 (2,628 procedures), there were 237 (9%) procedures that reported on a rupture of the Ligamentum Teres. After excluding additional intra-articular pathologies and records with an insufficient follow-up, there were 29 cases with a solitary LT rupture (from 2003 to 2008). The mean follow-up time was 2.5 years ($SD \pm 1.5$). There were 6 men and 23 women. The mean age was 25 years ($SD \pm 11$). Fifteen arthroscopies were performed on the right side and 14 on the left. Scores were taken preoperatively and then 6 weeks, 6 months, and annually thereafter. All patients were informed that their charts and images might be reviewed for scientific purposes and given the opportunity to forbid such use of their data. All patients included in this study consented to the use of their data. The indication for the hip arthroscopy was hip pain accompanied by mechanical symptoms not responsive to a non-operative treatment for at least 12 weeks with painful range of motion on physical examination.

Surgical technique

All arthroscopies were done by a single surgeon well experienced in that procedure. Surgeries were performed in the lateral decubitus position, utilizing general anesthesia (without muscle relaxants) and traction for the operated hip in a technique described by Mason et al. [16]. During arthroscopy, the LT was routinely inspected in internal rotation (the Ligamentum is loose) and external rotation (the Ligamentum is taut). Any LT rupture detected was classified as partial or complete according to Gray and Villar [10]. Synovitis was documented as local (when it was confined to the fovea and the ligament) or generalized. The technique of debridement is similar to the one described by Bardakos and Villar [2] using a long, thin, flexible radiofrequency ablation probe and curved-blade shaver whenever applicable. At the end of the surgical procedure, the joint was lavaged and injected with local anesthetic (Bupivacaine 100 mg in earlier cases, and currently Ropivacaine 150 mg), Morphine 5 mg and Betamethasone 11.4 mg.

Postoperatively, weight bearing as tolerated was advised on the surgically treated limb, with crutches for the first few days as required.

Patients with recurrent symptoms unresponsive to non-operative treatment have had a second hip arthroscopy. Recurrent tears were treated by re-debridement and capsular tightening. The technique of capsular tightening involved radiofrequency energy (Eflex, Smith and Nephew) applied in a grid pattern to the anterior capsule. This is the same method used previously in the shoulder. It resulted in visible capsule tightening at the time of application, but no demonstrable change in the range of movement (ROM) immediately. Over the next 4 weeks, the patient was restricted in rehabilitation and especially in any external rotation movement.

Outcome scores

Outcome was assessed preoperatively and postoperatively using the modified Harris Hip Score [11] (MHHS) and the Non-Arthritic Hip Score [7] (NAHS). The modified Harris Hip Score is a condition-specific outcome instrument that has been used widely after hip arthroscopy. The Non-Arthritic Hip Score is a validated, self-administered questionnaire designed to assess non-arthritic hip pain in patients with high activity demands and expectations.

Statistical analysis

The differences in the mean score results before and after surgeries were investigated with a two-tailed paired Student *t* test and the Pearson correlation coefficient was used for correlation analysis. *P* was considered statistically significant if it was less than 0.05.

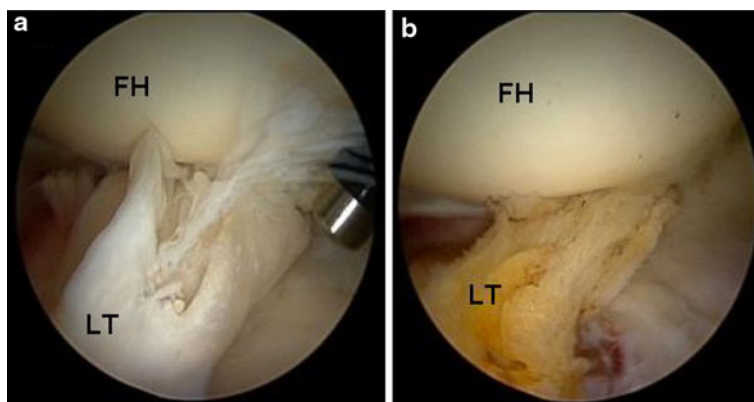
Results

All patients that made the study inclusion criteria had partial LT ruptures (Fig. 1). Eleven patients presented with no synovitis, 12 with local and 6 with generalized synovitis. No correlation was found between the presence of synovitis and scores. The mean traction time was 19 min ($SD \pm 7$). All LT tears were chronic partial thickness tears. None were degenerate, hypertrophic, or complete. Acute full thickness tears associated with dislocation were excluded as all were associated with further injuries.

Patients were evaluated pre- and postoperatively with the MHHS and NAHS scores. At 12 months follow-up, the mean MHHS improved from 70 to 86 [mean difference = 16 (95% CI 4–27), $P = 0.008$] and the mean NAHS improved from 64 to 86 [mean difference = 22 (95% CI 10–33), $P = 0.001$]. Continued improvement was observed during the first year.

From the 29 cases of arthroscopic LT rupture debridement in the study, five developed recurrent symptoms,

Fig. 1 Arthroscopic images of partial Ligamentum Teres rupture before (a) and after (b) debridement. *LT* Ligamentum Teres; *FH* femoral head



which did not settle with conservative treatment, including intra-articular steroid injection. On physical examination, they had increased external rotation of the hip joint in extension. These five patients underwent a second arthroscopy. The mean time between the primary and the second surgery was 9 months ($SD \pm 2$). On the second arthroscopy, all patients had recurrent partial tears of the LT. Recurrent tears were treated by re-debridement and capsular tightening. This resulted in a 10–15° loss of external rotation, both in extension and at 90° of flexion. This reduction in range has been maintained throughout the follow-up period.

Discussion

The most important finding of the study was that arthroscopic debridement of the Ligamentum Teres tear provides significant pain relief and improvement in function. However, there is a high risk of recurrence which might be associated with ligamentous laxity, either generalized or localized to the hip. The finding of a Ligamentum Teres rupture during a hip arthroscopy is not infrequent and was documented in 9% of the cases registered in the study database which corresponds with the incidence in previous studies [1, 6, 20]. Although the role of the Ligamentum Teres (LT) of the hip is not completely understood, there are arguments to support its biologic and mechanical importance [2]. Moreover, it was shown that the LT rupture can induce pain and mechanical symptoms such as locking and giving way [6, 20], but unfortunately these symptoms and other diagnostic tools are not specific enough to evaluate the LT integrity. Often the insult to the hip (e.g. trauma and degeneration) damages the ligament as well as other structures inside it [10, 23], and therefore, it is difficult to determine which pathology requires treatment. Whenever a rupture is detected, it is customary to treat the torn fibers and surrounding synovitis by debridement or shrinkage which relieves inflammation and improves the

ligament's mechanical qualities [2, 4, 12]. In order to assess the clinical value of treating LT ruptures with surgical debridement, it is essential to exclude accompanied pathologies. This study included 29 cases of LT ruptures of the hip with no other pathological finding. Ruptures can be classified as partial, complete, or degenerative [10] each with its own cause and associated intra-articular pathologies. Acute full thickness tears associated with dislocation were excluded as all were associated with further injuries. These acute tears are typically associated with chondral damage and labral tears [18]. Partial ruptures are mainly the result of minor trauma or repetitive stretching and may occur in isolation. In this study, all ruptures were found to be partial and were treated with arthroscopic debridement.

Those partial LT ruptures occurred mostly in young women who typically were involved in activities such as gymnastics, calisthenics, and dancing. Their complaints were of groin pain, often with radiation to the buttock. On physical examination, patients were found to be relatively lax and may have increased external rotation in extension. Imaging series were rarely helpful. MRI's occasionally showed asymmetry of the LT between sides or a small effusion.

The short term post op clinical outcome was good. The MHH score and NAH score improved postoperatively by 16 and 22 points, respectively. Byrd and Jones [6] presented excellent results of arthroscopic debridement performed on 23 patients with LT ruptures (8 of them were isolated ruptures) with no statistically significant difference between patients with isolated or concomitant lesions. Other smaller series and case report studies [3, 8, 9, 14] showed favorable results as well, although most were not solitary ruptures of the LT. Unfortunately, five of the patients in the current study suffered from persistent or recurrent symptoms which eventually lead to a second surgery after an average of 9 months. In the consecutive hip arthroscopy, all had recurrent partial tears of the LT that were treated by debridement and capsular tightening. All five patients had relief of their symptoms following the

second procedure. We believe it is important to maintain any intact ligament, rather than fully resect it; thus, there is always the possibility of further tearing of the remaining ligament in the future. We now perform anterior capsular tightening, as well as LT debridement, whenever there is any associated increased external rotation of the hip joint in extension, positive Dial test, or generalized ligamentous laxity at the preoperative examination [19, 22].

To our knowledge, the studies on LT isolated ruptures available in the literature are scarce. This study evaluates a relatively large series of such patients, yet it has several limitations. It lacks a control group, although all patients were initially treated nonoperatively for a minimum of 12 weeks, during which none improved. Another drawback is the absence of homogeneity, such as age or level of activity, although most patients were young females. All procedures were performed by the same surgeon which might not reflect other people's results. Finally, the duration of follow-up is relatively short, but comparable to that of recent published studies. We believe our preliminary results will remain favorable and are conducting a longer follow-up on these patients.

Conclusions

Arthroscopic debridement alone of the isolated Ligamentum Teres rupture has a short-term beneficial results in >80% of cases.

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