The Role of Lateral Retinacular Release in the Treatment of Patellar Instability.

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Running Title: Lateral retinacular release for patella instability
Introduction:

Anterior knee pain is generally perceived as a difficult condition to treat for Orthopaedic surgeons. Treatment regimens have been described since the Roman times (Galen 129-200 AD)\(^1\). Even though our understanding of the extensor mechanism and the patellofemoral joint has improved tremendously, many questions remain open and continue to be investigated. One of these questions is the role of a lateral retinacular release in the treatment of anterior knee pain. This procedure, performed open, mini-open or arthroscopically has been proposed as an isolated procedure, in combination with proximal realignment procedures of the patella or in combination with distal realignment procedures \(^2\)-\(^{17}\). While several authors have been able to show that the isolated lateral release can be a successful procedure in patients with isolated lateral patellar tightness the role of lateral release for the treatment of patella instability is much less clearly established.

The goal of this review article is to shed light on the role of the lateral retinacular release for the treatment of patellar instability.

Diagnosis of patella instability:

The clinical diagnosis of patella instability can be challenging. Merchant and Mercer described the first lateral retinacular release in 1974 but did not emphasize the importance of history and physical exam findings for the indication of this procedure \(^9\). Hughston et al. first stressed the importance of history and physical exam findings and also described what they called the "passive lateral
hypermobility" of the patella. They described a “loose” and a “tight” retinaculum. Post outlined the key physical exam findings that need to be established for the evaluation of clinical instability in his excellent review.

In brief, the entire involved lower extremity has to be taken into account. Factors such as core weakness, increased valgus alignment, generalized ligamentous laxity and increased foot pronation as well as increased femoral anteversion have shown to be factors that can contribute to anterior knee pain and patella instability. History of the initial onset of pain, symptoms of subluxation, specific injuries or painful positions or activities (i.e. ascending / descending stairs) have to be recorded. It has been clearly established that muscular tightness (quadriceps, hamstring, IT band, hip extensors) plays a significant role for patellar stability. The muscle balance of the VMO versus the vastus lateralis is important since a significant imbalance between VMO and vastus can lead to a dynamic instability of the patella during active extension of the knee. This can be assessed clinical by looking for the J-sign. This describes the course of the patella coming from full extension and a lateral position and suddenly reducing to a medial or centered position in the trochlea with further flexion. This inverted –J course of the patella is called the “J-sign”. While the true anatomical correlation of this phenomenon is unclear, Johnson could show that this is a finding that is unique to patients with anterior knee pain indicating abnormal patella tracking. Patella mobility is another major factor that needs to be evaluated. The assessment of medial/ lateral patella glide (also know as “Sage sign”) as well as patellar tilt help determine if the peripatellar soft tissue...
restraints predispose the patella to lateral subluxation. The assessment of the overall extensor alignment can be performed by assessing the Q-angle\textsuperscript{21}. This should be done at 30° and 90° in order to assess the dynamic component of the Q-angle. This dynamic assessment of the Q-angle mimics what may happen when a patient plants their foot, flexes the knee and externally rotates the tibia. Post concludes that the simple determination of the position of the tibial tubercle in line or lateral to the midline of the patella may be just as helpful since no reliable data exists that determines the exact value of a “pathologic” Q-angle\textsuperscript{14}.

Once the clinical diagnosis of patella instability has been made imaging modalities may help to corroborate the clinical findings.

**Imaging:**

While static imaging of the patello-femoral joint is helpful one has to keep in mind that the pathology may be mainly a dynamic one. The examiner therefore has to take the physical findings into account while assessing the radiographic studies.

The routine standing anteroposterior views may help in the overall assessment of knee alignment but generally do not yield much information concerning the stability of the patella. More informative is the evaluation of patellar height, the relationship of the patella to the trochlea and the anatomic shape of the trochlear groove in the 30° flexion lateral view of the knee. This view allows the assessment of patellar height by any of the published parameters (Insall/Salvati, Blackburn/Peel or Caton / Linclau). In addition this view allows for the analysis of
the trochlear groove as described by Dejour et al. \(^1\). The requirements are a perfect lateral radiograph (posterior condyles overlapping). The sunrise view of the patella in 30° of flexion (Merchant view) has been advocated to evaluate patellar tracking in the trochlea. Teitge described a bilateral stress-radiograph in this position utilizing a standardized lateral force \(^{23}\).

A CT scan of the patellofemoral joint at 0°, 15°, 30° and 45° knee flexion providing precise midpatellar transverse images has been found helpful and sensitive in the evaluation of patellar instability \(^{24-25}\). In addition if a CT scan slice of the trochlear groove is overlayed with a CT slice of the proximal tibia showing the tibial tubercle, the trochlea tibial tubercle distance (TG/TT) can be determined. This parameter helps to diagnose excessive lateralization of the tibial tubercle \(^{26}\).

An MRI scan may provide useful information about the status of the lateral retinaculum (thickening) or the medial restraints (MPFL) as well as cartilage injuries in the patellofemoral joint.

**Isolated lateral release for patella instability:**

Throughout the last two decades it became clear that anterior knee pain is more than just one entity. The history of the isolated lateral retinacular release portrays this evolution of knowledge in a typical fashion. The lateral retinacular release was initially indiscriminantly used for anterior knee pain, patella instability and also as a treatment for osteoarthritis of the patellofemoral joint \(^{2-17}\). Ficat introduced the concept of the “excessive lateral pressure syndrome” \(^{27}\) which
helped to redefine the indication for an isolated lateral release. It has now been recognized that this condition is an acceptable indication for an isolated lateral retinacular release that yields reproducible and predictably good results.  

To this date there are no published randomized controlled clinical trials (Level 1 evidence) assessing the effect of an isolated lateral retinacular release on the outcome of patellar instability. All currently available material is at best level 4 evidence (retrospective case series, or review articles). A formal systematic review is therefore not possible.

Evaluating the published case series, numerous authors have reported their results. While some authors initially reported acceptable success of this procedure for patella instability most studies showed disappointing mid and long-term results. The average percentage of satisfaction of patients in studies with more than 4 years follow up is only 63.5% whereas the short term (< 4 years) satisfaction is 80% (Table 1). Aglietti et al. compared three different treatment options for recurrent patella dislocations in a retrospective study He found that the isolated lateral release showed by far the worst long term outcomes and led to recurrent dislocations in 35% of their patients. This finding is corroborated by Dainer et al. who showed that an isolated lateral release as treatment for recurrent patella dislocation is as effective as a diagnostic knee scope and does not improve the clinical outcome. Kolowich et al. performed a study investigating patients after isolated lateral retinacular release. They divided the results into two groups. Group 1 consisted of patients that had a good or excellent outcome and group 2 consisted of patients with average or poor
outcome. In this study she could show that patients doing poorly after isolated lateral release predominantly had symptoms of patella instability in addition to pain\textsuperscript{21}.

Furthermore it has been recognized that overzealous lateral release or failure to assess concomitant pathology of the patellofemoral joint can lead to catastrophic results. If the lateral retinacular release is carried out further proximal than the superior patella pole, it can cause medial patellar instability. In the presence of severe medial patellar articular lesions (as can often be seen in patients who suffered numerous patella dislocations) a lateral retinacular release may increase the load to the defect which may be detrimental. Furthermore, if the patient has an increased Q angle, isolated lateral release may in fact increase the Q angle resulting in increasing symptoms of instability.

Fithian, Fulkerson and others have therefore recommended the lateral release as an adjunct procedure for a proximal patellar alignment in combination with medial retinacular reefing or reconstruction of the medial patellofemoral ligament (MPFL)\textsuperscript{22,28,32}.

**Lateral release as adjunct to patellofemoral alignment procedures for patellar instability:**

Lateral release of the retinaculum alone does not restore normal orientation of the malaligned extensor mechanism. This is the reason why most leading surgeons recommend a combined proximal realignment of the patella. The most important factor in the assessment of these patients is the evaluation of
the medial patellar restraints. If the medial patellofemoral ligament (MPFL) is felt to be ruptured or absent a MPFL reconstruction may be necessary. If the MPFL appears intact but an increased medial patellar glide is present an imbrication of the medial retinaculum can be performed. Insall first recommended an imbrication of the medial retinaculum. Many authors today feel that the imbrication and / or reconstruction of the MPFL should be adjusted to the original anatomic length allowing a normal lateral patella glide. Clinically this is difficult to judge. The passive patellar glide can be utilized as a guideline when compared to the opposite side. This can be done manually or with intrumented laxity testing, as described by Fithian et al. A lateral release is almost always added to these medial imbrication procedures to allow a centered glide of the patella. It is important that the lateral release is done cautiously and not in an excessive fashion.

In cases of anatomic malalignment of the extensor mechanism requiring a distal or even a combined proximal and distal realignment a lateral release is often added after the realignment has been performed. Particularly after a tubercle anteromedialization (Fulkerson) the lateral retinaculum can capture the patella tendon. In these cases the lateral retinacular release should be performed under direct vision. The extent of the release is usually limited to the amount necessary to allow a free passage of the patellar tendon throughout the entire range of motion.
Dangers of lateral retinacular release in patella instability:

The lateral retinacular release is often looked at as a quick, small and forgiving procedure that can be performed percutaneously or arthroscopically. While there are technical errors during the surgical release that can lead to excessive bleeding, skin injury or subcutaneous burns, the most imminent danger and complication of an isolated lateral release is the overzealous or non-indicated lateral release leading to medial patella instability. Medial patellar instability is a debilitating situation that can be frustrating to deal with for the patients as well as for the surgeon. To avoid this problem Fulkerson advised limiting the lateral release to the required amount as judged by the desired effect. He recommends that the retinaculum should not be released past the proximal pole of the patella in order to avoid detachment of the vastus lateralis obliquus. Historically, some authors recommended sufficient lateral release to evert the patella anywhere from 45 to 90 degrees. In most cases this may be too much of a release.
Conclusion:

Concluding this review of the literature it appears that the most important question to ask may be when a lateral retinacular release can be recommended for the treatment of patella instability? The answer to this question can be summarized in a few bullet points:

- An *isolated* lateral retinacular release has little or no role in the treatment of acute or recurrent patella instability. This procedure should be reserved for the few patients with a clearly identified lateral patella compression syndrome in presence of a tight lateral retinaculum and clearly discernable lateral retinacular pain.

- A lateral release procedure may be added as an *adjunct procedure* to a proximal or distal realignment of the extensor mechanism. In these cases the release has to be done judiciously and has to be gauged by the desired effect (i.e. release of contracted lateral retinaculum due to chronically ruptured MPFL).

- Care has to be taken that the lateral retinaculum is not "over-released" leading to a potentially devastating medial patellar instability.

- If a patient who has patellar instability and an increased Q angle undergoes isolated lateral release, increased patellar instability symptoms may occur secondary to a dynamic increase in the Q angle.
Literature:


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