medial patellofemoral ligament mpfl reconstruction

medial patellofemoral ligament mpfl reconstruction is a specialized surgical procedure designed to restore stability to the knee joint by repairing or reconstructing the medial patellofemoral ligament. This ligament plays a critical role in preventing the patella, or kneecap, from dislocating laterally. Injuries to the MPFL often result from traumatic events or recurrent patellar dislocations, leading to pain, instability, and impaired knee function. Medial patellofemoral ligament mpfl reconstruction aims to alleviate these symptoms by reestablishing the ligament's integrity and normal biomechanics of the knee. This article provides a comprehensive overview of the anatomy, indications, surgical techniques, rehabilitation protocols, and outcomes associated with MPFL reconstruction. Understanding these aspects is essential for clinicians, patients, and researchers interested in effective management of patellar instability.

Anatomy and Function of the Medial Patellofemoral Ligament

The medial patellofemoral ligament (MPFL) is a critical soft tissue structure located on the medial side of the knee. It connects the medial aspect of the patella to the femur, specifically attaching near the medial epicondyle. The MPFL is responsible for providing approximately 50-60% of the restraining force against lateral displacement of the patella, especially during the early degrees of knee flexion.

Understanding the anatomical features and biomechanical role of the MPFL is essential for appreciating why reconstruction is necessary when this ligament is damaged. The ligament's orientation and tensile strength contribute to patellar stability by counteracting lateral forces during knee movement, thereby maintaining proper alignment and tracking.

Structure and Biomechanics

The MPFL is a fan-shaped ligament composed primarily of collagen fibers arranged to resist lateral translation of the patella. Its dynamic interaction with the quadriceps and surrounding soft tissues helps stabilize the patellofemoral joint during activities such as walking, running, and jumping.

Damage or rupture of the MPFL compromises this mechanism, often resulting in recurrent patellar dislocations.

Relationship with Surrounding Structures

The MPFL works in concert with other stabilizers of the knee, including the medial retinaculum, vastus medialis obliquus (VMO) muscle, and the trochlear groove of the femur. These structures collectively maintain the patella within its groove, preventing abnormal lateral displacement. Injury to the MPFL disrupts this balance, necessitating surgical intervention in many cases.

Indications for Medial Patellofemoral Ligament MPFL Reconstruction

Not all cases of patellar instability require surgical reconstruction. Careful evaluation is necessary to determine when medial patellofemoral ligament mpfl reconstruction is indicated. Generally, surgery is considered when conservative treatments fail or in cases of recurrent patellar dislocation.

Recurrent Patellar Dislocations

Patients experiencing more than one episode of lateral patellar dislocation are primary candidates for MPFL reconstruction. Recurrent dislocations often lead to chronic instability, cartilage damage, and progressive knee dysfunction. Surgery aims to restore stability and prevent further episodes.

Failed Conservative Management

Initial management of patellar instability typically involves physical therapy, bracing, and activity modification. When these measures do not provide adequate symptom relief or stability, surgical reconstruction of the MPFL is considered a definitive treatment option.

Associated Knee Pathologies

Certain anatomical abnormalities, such as trochlear dysplasia, patella alta, or increased tibial tubercle-trochlear groove (TT-TG) distance, may influence the decision to perform MPFL reconstruction. In some cases, combined surgical procedures addressing these factors are performed alongside ligament reconstruction to optimize outcomes.

Surgical Techniques Used in MPFL Reconstruction

Medial patellofemoral ligament mpfl reconstruction involves replacing the damaged ligament with a graft, which can be autograft, allograft, or synthetic. The choice of technique depends on surgeon preference, patient factors, and graft availability.

Graft Selection

Common graft options include the gracilis tendon, semitendinosus tendon, or a portion of the quadriceps tendon. Autografts are often preferred due to lower risk of rejection and disease transmission, while allografts provide the benefit of reduced donor site morbidity.

Surgical Procedure Overview

The procedure typically involves the following steps:

1. Arthroscopic or open inspection of the knee to assess cartilage and soft tissue status.
2. Harvesting the graft from the donor site, if autograft is used.
3. Creating tunnels or fixation points on the patella and femur that replicate the native ligament’s anatomical attachments.
4. Securing the graft in place using interference screws, anchors, or sutures to restore medial patellar restraint.
5. Verifying appropriate graft tension and patellar tracking throughout knee range of motion.

Advancements and Variations

Recent advancements in surgical techniques emphasize anatomic reconstruction, minimizing graft overtensioning, and preserving surrounding structures. Some surgeons utilize fluoroscopic or navigation guidance to improve tunnel placement accuracy. Additionally, minimally invasive approaches aim to reduce surgical morbidity and facilitate faster recovery.

Postoperative Rehabilitation and Recovery

Successful outcomes following medial patellofemoral ligament mpfl reconstruction depend heavily on a structured rehabilitation program tailored to individual patient needs. Rehabilitation focuses on restoring knee function, strength, and flexibility while protecting the reconstructed ligament during healing.

Early Phase Rehabilitation

The initial postoperative period emphasizes pain control, swelling reduction, and protection of the graft. Patients are often encouraged to use crutches and a knee brace to limit weight-bearing and knee motion. Passive range of motion exercises typically begin within the first week to prevent stiffness.

Strengthening and Functional Training

As healing progresses, physical therapy incorporates quadriceps strengthening, particularly targeting the vastus medialis obliquus muscle, to support medial patellar stability. Proprioceptive and balance training are introduced to enhance neuromuscular control and prevent re-injury.

Return to Activity

Gradual return to sports and high-impact activities is usually permitted around 4 to 6 months post-surgery, depending on recovery milestones and surgeon recommendations. Continued maintenance exercises are important to sustain knee stability long term.

Outcomes and Complications of MPFL Reconstruction

Medial patellofemoral ligament mpfl reconstruction has demonstrated favorable outcomes in terms of improved patellar stability, pain reduction, and functional recovery. Most patients report significant improvement in quality of life and return to pre-injury activity levels.

Success Rates

Studies indicate that MPFL reconstruction yields success rates exceeding 85% for preventing recurrent dislocation. Patient satisfaction is generally high, especially when surgical indications are appropriately identified and rehabilitation protocols are followed.

Potential Complications

While MPFL reconstruction is considered safe, complications can occur. These include:

- Graft failure or elongation leading to persistent instability.
- Patellar fracture due to tunnel placement or fixation techniques.
- Stiffness or limited range of motion postoperatively.
- Infection or wound healing problems.
- Pain related to hardware or graft irritation.

Strategies to Minimize Risks

Proper surgical technique, patient selection, and adherence to rehabilitation protocols are critical to minimizing complications. Surgeons must carefully plan graft fixation and tensioning to avoid overconstraint or maltracking of the patella.

Frequently Asked Questions

What is the medial patellofemoral ligament (MPFL) reconstruction?

MPFL reconstruction is a surgical procedure to repair or rebuild the medial patellofemoral ligament, which helps stabilize the patella (kneecap) and prevent it from dislocating.

When is MPFL reconstruction recommended?

MPFL reconstruction is typically recommended for patients with recurrent patellar dislocations or instability that do not respond to conservative treatments such as physical therapy and bracing.

What are the common techniques used in MPFL reconstruction?

Common techniques for MPFL reconstruction include using autografts (such as hamstring tendon) or allografts to recreate the ligament, with fixation methods like anchors or interference screws to secure the graft.

What is the typical recovery time after MPFL reconstruction surgery?

Recovery time after MPFL reconstruction generally ranges from 3 to 6 months, including physical therapy focusing on restoring range of motion, strength, and gradual return to activities.

What are the potential risks and complications of MPFL reconstruction?

Potential risks include infection, stiffness, graft failure, persistent instability, patellar fracture, and complications related to anesthesia, though most patients achieve good outcomes with proper surgical technique and rehabilitation.

Additional Resources

1. *Medial Patellofemoral Ligament Reconstruction: Techniques and Outcomes*
This comprehensive book covers the anatomy, biomechanics, and surgical techniques involved in MPFL reconstruction. It details patient selection criteria and postoperative rehabilitation protocols. The text also reviews clinical outcomes and potential complications, making it a valuable resource for orthopedic surgeons and sports medicine specialists.

2. *Patellofemoral Instability and MPFL Surgery: A Clinical Guide*
Focused on patellofemoral instability, this guide provides an in-depth analysis of MPFL reconstruction as a key treatment method. It includes case studies, imaging techniques, and surgical tips to optimize patient outcomes. The book is tailored for clinicians aiming to improve their

understanding of knee stabilization procedures.

3. *Advanced Techniques in MPFL Reconstruction*
This book explores the latest advancements and innovative surgical methods in MPFL reconstruction. It highlights minimally invasive approaches, graft options, and fixation methods. Surgeons will find detailed procedural illustrations and outcome data to enhance their surgical practice.

4. *Rehabilitation After Medial Patellofemoral Ligament Reconstruction*
This text emphasizes the rehabilitation phase following MPFL surgery, offering evidence-based protocols for recovery. It discusses phased rehabilitation strategies, return-to-sport criteria, and management of postoperative complications. Physical therapists and orthopedic teams will find practical guidance to support patient recovery.

5. *The Biomechanics of the Patellofemoral Joint and MPFL*
Providing a foundational understanding of knee joint mechanics, this book delves into the role of the MPFL in patellar stability. It integrates biomechanical research with clinical applications, helping surgeons appreciate the rationale behind reconstruction techniques. The book also discusses how biomechanical insights influence surgical decision-making.

6. *Sports Injuries of the Knee: MPFL Reconstruction and Beyond*
Addressing a broad spectrum of knee injuries, this resource focuses on MPFL reconstruction as a treatment for patellar dislocation in athletes. It covers diagnosis, surgical options, and rehabilitation tailored to sports professionals. The book also includes chapters on injury prevention and long-term management.

7. *Patellar Instability: Diagnosis and Surgical Management*
This text offers a thorough overview of patellar instability causes, diagnostic methods, and treatment options including MPFL reconstruction. It provides detailed surgical techniques and postoperative care recommendations. The book serves as a clinical reference for orthopedic residents and practicing surgeons.

8. *Graft Selection and Fixation Techniques in MPFL Reconstruction*
Focusing on the technical aspects of MPFL surgery, this book reviews various graft materials and fixation devices. It compares autografts, allografts, and synthetic options, along with their biomechanical properties. Surgeons will benefit from the comparative analysis and surgical tips provided.

9. *Complications and Revision Strategies in MPFL Reconstruction*
This specialized book addresses common and rare complications encountered after MPFL reconstruction. It offers strategies for prevention, early detection, and revision surgery techniques. The content aids surgeons in managing challenging cases and improving overall patient outcomes.

Medial Patellofemoral Ligament Mpfl Reconstruction

medial patellofemoral ligament mpfl reconstruction: Influence of Medial Patellofemoral Ligament Reconstruction on Patellofemoral Contact in Patients with Low-flexion Patellar Instability: an MRI Study Markus Alexander Siegel, Elham Taghizadeh, Thomas Lange, Andreas Fuchs, Tayfun Yilmaz, Philipp Maier, Hans Meine, Hagen Schmal, Kaywan Izadpanah, 2023 Abstract: Background: Medial patellofemoral ligament (MPFL) reconstruction is a well-established procedure for the treatment of patients with patellofemoral instability (PFI) at low flexion angles (0°-30°). Little is known about the effect of MPFL surgery on patellofemoral cartilage contact area (CCA) during the first 30° of knee flexion. Purpose/Hypothesis: The purpose of this study was to investigate the effect of MPFL reconstruction on CCA using magnetic resonance imaging (MRI). We hypothesized that patients with PFI would have a lower CCA than patients with healthy knees and that CCA would increase after MPFL reconstruction over the course of low knee flexion. Study Design: Cohort study; Level of evidence, 2. Methods: In a prospective matched-paired cohort study, the CCA of 13 patients with low-flexion PFI was determined before and after MPFL reconstruction, and the data were compared with those of 13 healthy volunteers (controls). MRI was performed with the knee at 0°, 15°, and 30° of flexion in a custom-designed knee-positioning device. To suppress motion artifacts, motion correction was performed using a Moiré Phase Tracking system via a tracking marker attached to the patella. The CCA was calculated on the basis of semiautomatic cartilage and bone segmentation and registration. Results: The CCA (mean ± SD) at 0°, 15°, and 30° of flexion for the control participants was 1.38 ± 0.62, 1.91 ± 0.98, and 3.68 ± 0.92 cm2, respectively. In patients with PFI, the CCA at 0°, 15°, and 30° of flexion was 0.77 ± 0.49, 1.26 ± 0.60, and 2.89 ± 0.89 cm2 preoperatively and 1.65 ± 0.55, 1.97 ± 0.68, and 3.52 ± 0.57 cm2 postoperatively. Patients with PFI exhibited a significantly reduced preoperative CCA at all 3 flexion angles when compared with controls ($P \leq .045$ for all). Postoperatively, there was a significant increase in CCA at 0° of flexion ($P = .001$), 15° of flexion ($P = .019$) and 30° of flexion ($P = .026$). There were no significant postoperative differences in CCA between patients with PFI and controls at any flexion angle. Conclusion: Patients with low-flexion patellar instability showed a significant reduction in patellofemoral CCA at 0°, 15°, and 30° of flexion. MPFL reconstruction increased the contact area significantly at all angles

medial patellofemoral ligament mpfl reconstruction: A Finite Element Study on the Medial Patellofemoral Ligament Reconstruction Bharath Koya, 2013 Patellar instability is a major problem among young individuals. Chronic patellar instability termed as patellar dislocation occurs mainly due to the reduction in the medial restraining forces for the patella, excessive Q-angle, patella alta and trochlear dysplasia. It causes a tear of the medial patellofemoral ligament (MPFL) in the majority of instances. The MPFL is the main passive stabilizer preventing patellar instability and accounts for 50-60% of the total restraining forces. Reconstruction of the torn MPFL is a surgical option performed in chronic cases to improve patellofemoral biomechanics and to provide better stability at the knee. Finite element analysis (FEA) makes it possible to simulate the surgical technique of reconstruction of the MPFL, observe the effects on the articular cartilage structures and determine the patellofemoral kinematics, which is not possible with in vivo imaging analysis. In the present study, subject specific computational (finite element) models were built in ABAQUS based on the 3D anatomical geometry of the patellofemoral joint from pre-op MRI scans. The femur and patella were modeled as rigid structures with quadrilateral elements. Patellofemoral articular cartilage was modeled as isotropic elastic structures with hexahedral elements. The quadriceps muscle group, patellar tendon and the MPFL graft were represented using linear tension-only springs. The quadriceps muscle force was calculated from the foot load that the patient was able to withstand at a particular flexion angle during the MRI scan. The MPFL reconstruction surgery was simulated by modeling the ligament with uniaxial connector elements and material properties representing the graft material. FE simulations with appropriate boundary and loading conditions showed that the lateral translation was restricted with a MPFL graft. Validation of these FE models was done by comparing the results with the kinematics obtained from an analysis based

on MRI scans taken before and after the MPFL reconstruction surgery. FEA results matched the trends observed in the results of the experimental study, but they failed to replicate them quantitatively. In addition, the ratio of tension in the patellar tendon and quadriceps muscles and the tension in the MPFL graft elements was obtained from the simulations. The technique used in the present study can be improved by dealing with the limitations of the modeling like meshing of the structures and material properties. The FE models can be used to study the inter-subject differences, graft attachment points and graft tensioning to help with the ligament reconstruction procedures.

medial patellofemoral ligament mpfl reconstruction: Patellar Instability Surgery in Clinical Practice Vicente Sanchis-Alfonso, 2012-11-19 Among all the extensor mechanism pathologies, lateral patellar instability is of great interest not only for the knee specialist, but also for the general orthopedic surgeon and trainee. The procedure that is most frequently performed to treat lateral patellar instability is the medial patellofemoral ligament (MPFL) reconstruction. The reason for this great interest in this procedure is obvious. Medial patellofemoral ligament reconstruction is the most frequently performed procedure in the extensor mechanism. It also is the most predictable and has the best clinical results of all the procedures in the extensor mechanism. In this handbook we analyse the different reconstruction techniques, step by step, for the MPFL reconstruction, as well as other techniques less frequently used in the patient with lateral patellofemoral instability. We also analyse the treatment of medial patellofemoral instability. It is a very practical book, aimed at the general orthopedic surgeon and also the ones specialized in the knee.

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and how they are among the most common clinical conditions managed in the orthopaedic and sports medicine setting. The correct diagnosis at an early stage is essential if subsequent treatment is to be successful and secondary complications are to be avoided. Nonoperative intervention is usually the first form of treatment; however, there is no consensus on the most effective method of treatment.

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the latest updates and new chapters are featured focusing upon robotic-assisted patellofemoral replacement, predictive diagnostic models in anterior knee pain patients based on artificial intelligence, brain network functional connectivity in anterior knee pain patients, and many other hot topics in the field. Anterior Knee Pain and Patellar Instability, 3rd Edition is an essential, multi-disciplinary textbook for all levels of orthopedic surgeons, physiotherapists, radiologists, biologists, pathologists, and bioengineers, who wish to learn more about this complex pathology that affects both young and older patients.

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arthroscopy and meniscus, articular cartilage procedures, knee ligament procedures, and patellofemoral procedures, you will appreciate the clear and concise, detailed, and visual approach of this atlas and video collection. Large full-color intraoperative photos, diagrammable illustrations, dedicated website, and companion DVD demonstrate the full range of procedures. This short, accessible multimedia resource shows you what you need to know and how to do it all. The result is a detailed, easy-to-use reference that no orthopedic surgeon should be without. This is a title in the Operative Techniques series. Please visit www.operativetechniques.com for more information. Includes full-text web access so you can search the text online and surgical video clips that let you see the experts perform the techniques and perfect your own. Discusses pearls and pitfalls with an emphasis on optimizing outcomes to improve the quality of your technique and learn the expert's approach to getting the best results. Outlines positioning, exposures, instrumentation, and implants to give you a step-by-step guide for every procedure. Provides post-operative care and expected outcomes including potential complications and brief notes on controversies and supporting evidence to give you important details about patient-focused surgery. Highlights key anatomies with color photos and illustrations as well as diagrams that present cases as they appear in real life to help you see every detail with clarity.

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