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The Knee

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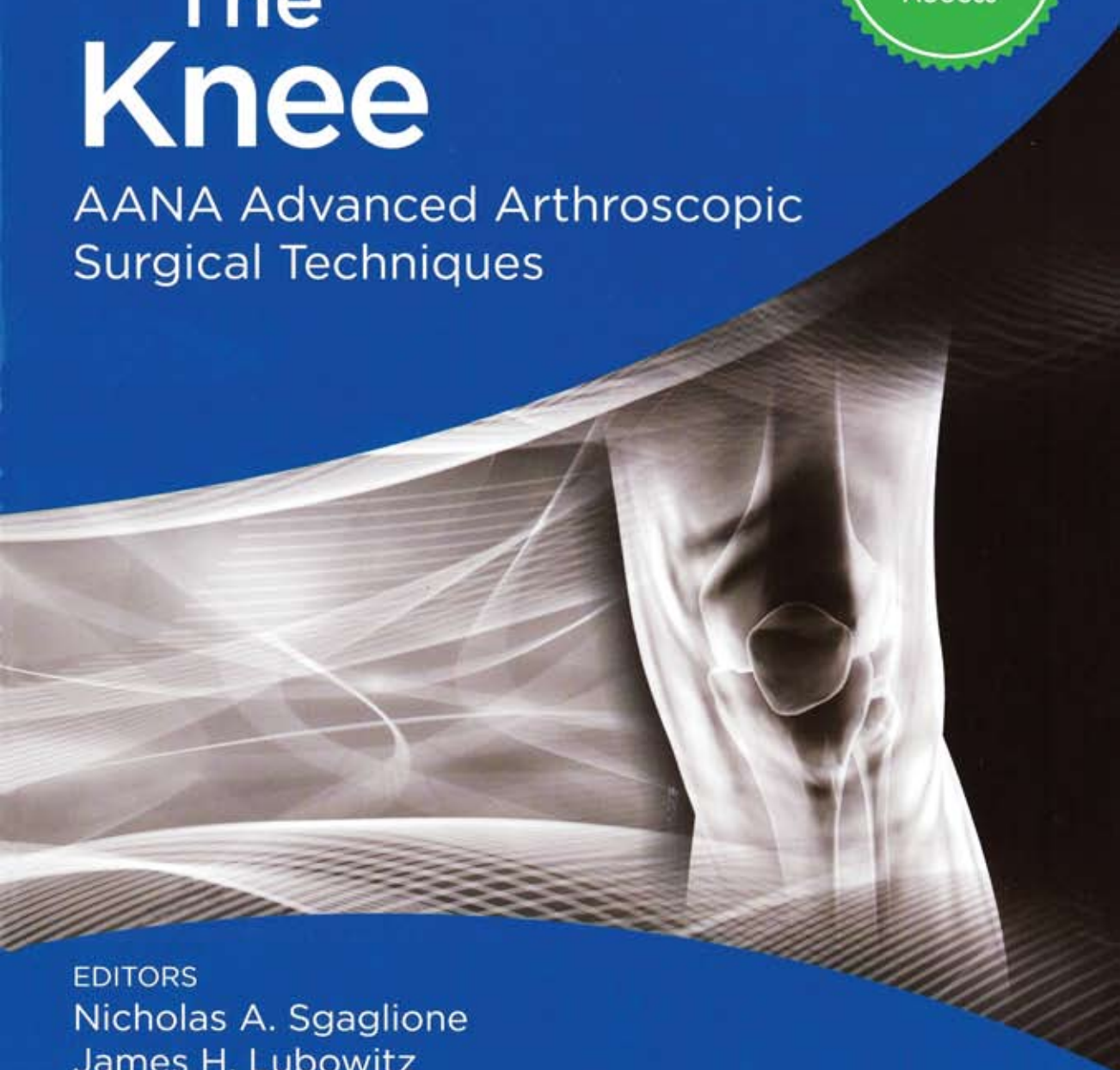

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Published by SLACK Incorporated and AANA | ARTHROSCOPY ASSOCIATION OF NORTH AMERICA

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ISBN: 978-1-61711-999-6

Published by: SLACK Incorporated
6900 Grove Road
Thorofare, NJ 08086 USA
Telephone: 856-848-1000
Fax: 856-848-6091
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Library of Congress Cataloging-in-Publication Data
AANA advanced arthroscopic surgical techniques. The Knee / edited by Nicholas A. Sgaglione, James H. Lubowitz, Matthew T. Provencher.
p. ; cm.
Advanced arthroscopic surgical techniques
Knee
Preceded by: AANA advanced arthroscopy. The knee / [edited by] Robert E. Hunter, Nicholas A. Sgaglione. Philadelphia, PA : Saunders/Elsevier, c2010.
Includes bibliographical references and index.
ISBN 978-1-61711-999-6 (alk. paper)
I. Sgaglione, Nicholas A, editor. II. Lubowitz, James H., editor. III. Provencher, Matthew T., editor. IV. Arthroscopy Association of North America, issuing body. V. AANA advanced arthroscopy. The knee. Preceded by (work): VI. Title: Advanced arthroscopic surgical techniques. VII. Title: Knee.
[DNLM: 1. Arthroscopy--methods. 2. Knee Joint--surgery. WE 870]
RD561
617.5'820597--dc23
2015030718

Printed in the United States of America.

Last digit is print number: 10 9 8 7 6 5 4 3 2 1

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Arthroscopic Treatment of Patellar Tendinopathy (Jumper's Knee)

Jason L. Koh, MD and Neil C. Dunleavy, MD

Introduction

Patellar tendinopathy is widely recognized as a degenerative process of the patellar tendon, occurring with increased frequency in jumping athletes. In 1973, Blazina et al[1] coined the term *jumper's knee* to describe the condition, which has a strong predilection for affecting athletes involved in intense repetitive jumping activity, such as basketball and volleyball. Lian et al[2] showed an overall prevalence of jumper's knee in 613 elite athletes of 14.2%, with the highest prevalence in volleyball (44.6%) and basketball (31.9%) players.

Although first viewed as an inflammatory condition and often referred to as patellar tendinitis, it is now understood from histopathological study that the condition is mostly degenerative and multifactorial, likely involving a complex cascade of events resulting in damaged, painful tissue. Excessive or repetitive loading during jumping has been implicated as a cause.[3-5] Some evidence has found a longer distal nonarticular facet in patients with patellar tendinopathy,[6] but others have not identified significant differences that could contribute to impingement as a cause of patellar tendinopathy.[7] The proximal posterior degenerated tendon tissue has shown evidence of neoinnervation and neovascularity in addition to collagenous disorganization.[8,9] In addition, Hoffa's fat pad has been implicated for impinging on a protruded inferior pole of the patella and developing sensitive pain receptors as part of the disease process.[10]

Treatments have varied greatly in nature and success. A trial of nonoperative treatment is well supported in the literature, with most authors recommending at least 3 to 6 months of conservative measures prior to considering surgical intervention.[11-13] Most clinicians advocate a short period of discontinuation from the offending activity and a structured physical therapy program focusing on eccentric quadriceps strengthening exercises and knee range of motion (ROM). Other nonoperative measures have included a short course of nonsteroidal anti-inflammatory drugs, cryotherapy, platelet-rich plasma injections, and low-energy radial extracorporeal shock wave therapy.[14-16]

When conservative measures fail to provide adequate relief of symptoms, surgical management is considered. Traditionally, open surgical methods have been applied with success, with the goal of removing the degenerated area of patellar tendon while often excising the protruded inferior

Sgaglione NA, Lubowitz JH, Provencher MT, eds. *The Knee: AANA Advanced Arthroscopic Surgical Techniques* (pp 135-143).

pole of the patella.[17-19] In recent years, open surgery has increasingly been replaced by arthroscopic techniques. Support for arthroscopy comes not only from its minimally invasive nature but also its proposed ability to address the complex nature of the degenerative process in a more reliable and complete manner, including excision of the protruded inferior pole of the patella without harming intact tendon tissue, resection of the proximal posterior painful fat pad, direct resection of affected tendon tissue, cauterization of tendon neovasculature, and the possible use of more accelerated rehabilitation.[20-26]

Multiple studies support open and arthroscopic procedures as successful management strategies for chronic patellar tendinopathy unresponsive to conservative treatment,[21] with a recent trend favoring arthroscopy. In a recent systematic review, Marcheggiani Muccioli et al[20] found that satisfactory results were achieved in 92.4% of arthroscopically treated patients and in 87.2% of patients treated with open surgery. Return to sport rates also favored arthroscopy (84.2% vs 76.6%).[20] However, evidence is limited, and no randomized controlled prospective trials have compared open vs arthroscopic treatment. Arthroscopic treatment has been demonstrated to be superior to sclerosing injections in one randomized trial.[27]

Indications

Arthroscopic debridement is indicated for the treatment of an established, chronic patellar tendinopathy that has failed at least 3 to 6 months of nonsurgical management that includes eccentric strengthening exercises for the knee extensor mechanism.[12,22] It has been described for the treatment of proximal to mid-tendon lesions; arthroscopic debridement of patella tendinopathy at the insertion of the tendon to the tibial tubercle is technically difficult to perform due to challenges in the visualization of this area.

- Chronic patellar tendinopathy
- Failed 3 to 6 months of nonsurgical treatment, including eccentric strengthening
- Proximal to mid-tendon lesions

Controversial Indications

No significant controversy exists with regard to proceeding to surgical management after failure of nonsurgical treatment. No clear data support arthroscopic compared to open surgical treatment[20] or distal pole resection of the patella in addition to tendon debridement alone.[12]

- Has not failed eccentric strengthening of the extensor mechanism
- Distal lesion

Pertinent Physical Findings

Tenderness is usually located at the junction of the distal pole of the patella and the proximal patellar tendon.

- Best test: Point tenderness at the attachment of the patellar tendon to the inferior pole of the patella
- Pain with squatting or jumping
- Soft tissue swelling at the inferior pole of the patella/patellar tendon
- Mild warmth at the patella tendon

Pertinent Imaging

- X-rays: Anteroposterior, lateral, and sunrise views; usually normal but may show enthesophyte (traction spur) at the inferior patella
- Ultrasound: May show a hypoechoic region in the patellar tendon or a thickened tendon in areas of degeneration. Color Doppler ultrasound may show increased vascularity[23]
- Magnetic resonance imaging ([MRI] T1 and T2): May show increased signal in areas of degeneration; may show tendon thickening

Equipment

The following are required to perform this procedure: standard arthroscopy equipment; a spinal needle for portal localization; a 4-mm, high-definition, 30-degree arthroscope; an arthroscopic shaver; an arthroscopic burr; and a 90-degree arthroscopic radiofrequency ablation device.

Positioning and Portals

The patient should be placed supine with ability to flex the knee. Tourniquets, posts, or leg holders should be placed proximal enough to allow placement of a superior portal for viewing purposes.

Step-by-Step Description of the Procedure

Preoperatively, the size and location of the lesion can be identified on MRI or ultrasound. Axial views can provide information about the medial-lateral size and location of the tendon, and sagittal views can give the length of area. Prior to induction, the patient is examined and the area of maximal tenderness and discomfort is noted and marked. This provides a guide for the area of treatment.

The knee is prepped and draped to allow a superolateral portal, as well as the standard inferolateral and inferomedial portals. Placement of a thigh tourniquet is recommended, but it may not often require inflation. The inferior portals are made, and a thorough diagnostic arthroscopy is performed.

Following standard treatment and visualization through the inferolateral portal, a proximal superolateral portal is created (Figure 10-1). The scope is switched from the inferolateral to the superolateral portal (Figure 10-2) and is used to examine the inferior pole of the patella (Figure 10-3) and fat pad (Figure 10-4). A needle can be placed directly through the preoperatively marked area of the lesion into the joint (Figure 10-5), helping identify the area of damage intra-articularly. Once the needle can be seen, it is removed and a skin incision for a transpatellar tendon portal is created directly in line with the area of damage. A blunt trocar and cannula are introduced through the tendon and fat pad into the joint following the previously defined needle trajectory (Figure 10-6). An arthroscopic shaver or radiofrequency ablation device is used to resect the proximal aspect of Hoffa's fat pad (Figure 10-7). This will allow visualization of the degenerated patellar tendon and also allow for excision of a possible source of pain. Care is taken not to damage the tendon during this process. The entire fat pad need not typically be resected because the area of degeneration is typically focused to the proximal posterior aspect of the tendon. The undersurface of the patellar tendon and its fibers can be easily visualized at this point (Figure 10-8).

Figure 10-1. Identify the location of the superior portal with a spinal needle to ensure appropriate visualization.

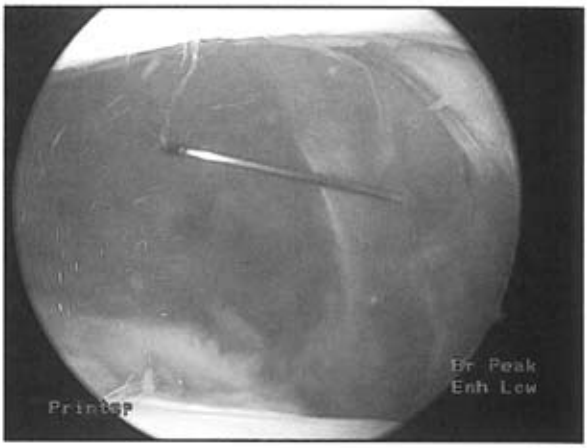


Figure 10-2. Diagram of the superior portal. The authors prefer the superolateral portal for ease of use and less trauma to the vastus medialis obliquus, which decreases quadriceps irritation.

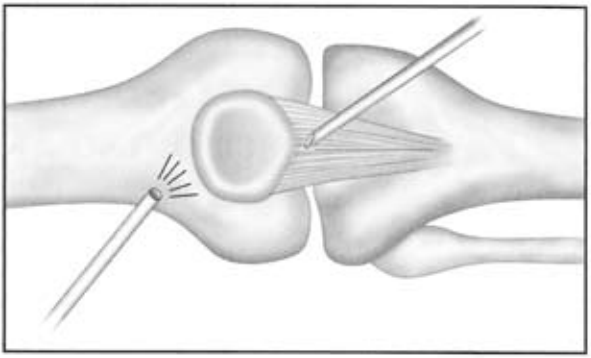
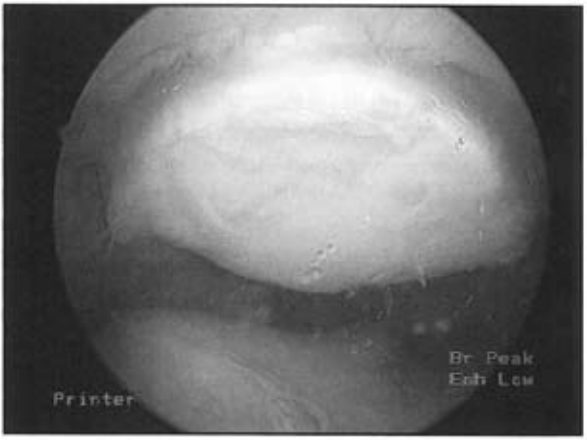


Figure 10-3. Typical view from the superior portal showing the patella and trochlea.



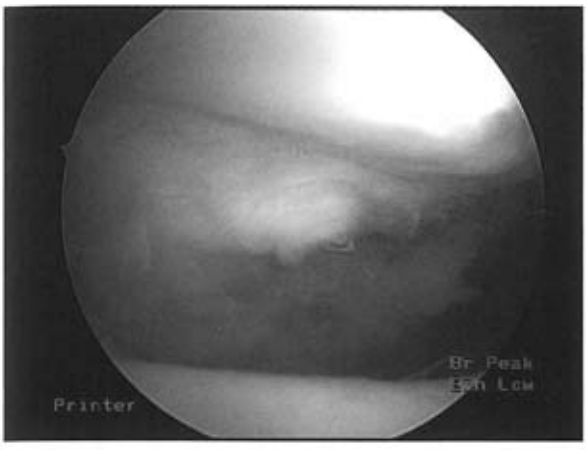


Figure 10-4. View of the infrapatellar fat pad at the inferior pole of the patella. Typically, the scope needs to be advanced distally to view this region.

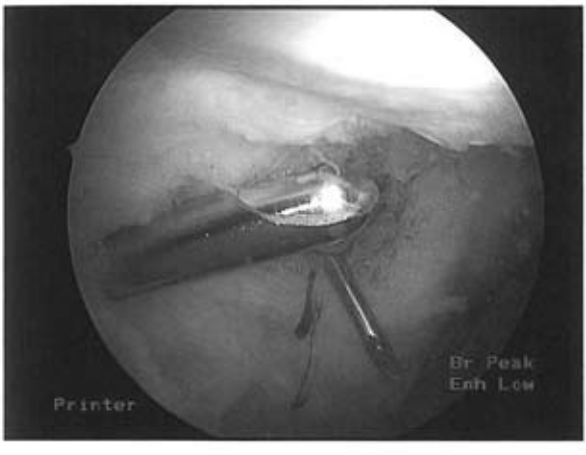


Figure 10-5. View showing the spinal needle through area of maximal tenderness of the patellar tendon and advanced through fat pad. This helps localize the lesion. If desired, a medial or lateral portal shaver can help clear away the fat pad.

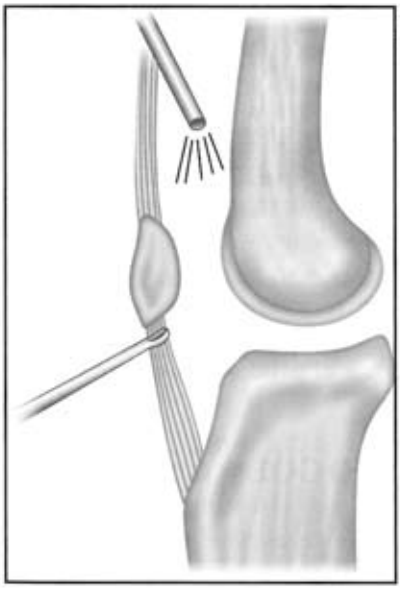


Figure 10-6. Diagram of relative location of the scope and transpatellar tendon portal.

Figure 10-7. The infrapatellar fat pad is removed posterior to the tendon lesion.

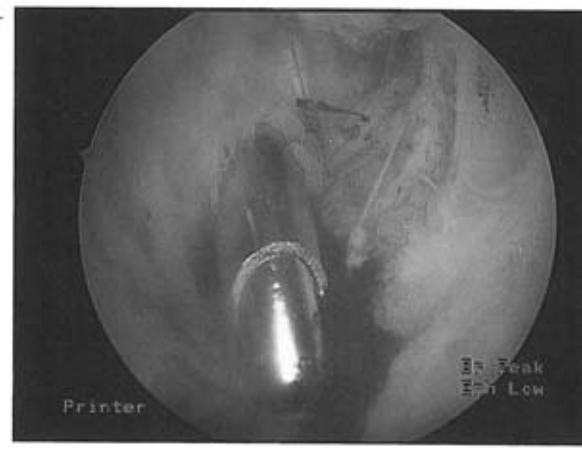


Figure 10-8. Tendon fibers (vertically oriented) are exposed.

The patellar tendon should be inspected completely to identify areas of mucoid degeneration or hypervascularity characteristic of chronic patellar tendinopathy. These degenerated areas should be resected with the arthroscopic shaver. Debridement of the damaged tissue can also be guided by preoperative imaging. Viewing from multiple portals is recommended to ensure thorough removal of degenerated tissue. Typically, an 8- to 10-mm wide segment of degenerative tendon at the central inferior pole of the patella is removed (Figure 10-9). Intact tendon tissue should be carefully protected and preserved. The adequacy of the debridement of degenerative tissue can be confirmed by placing the arthroscope into the central portal and inspecting the margins of the resection. Any neovessels found within the tendon should be cauterized. If felt necessary, an osteoplasty of the inferior patella is performed with an arthroscopic burr or bone-cutting shaver, to both enhance a healing response within the tendon and remove a potential source of painful impingement.

Postoperative Protocol

Postoperatively, early ROM and immediate weightbearing are encouraged to avoid stiffness and accelerate recovery of function. Eccentric strengthening closed chain exercises are initiated as quadriceps function returns. Running typically is allowed by 5 to 6 weeks postoperatively. Return to sport is guided by collaboration of the patient, the physician, and the physical therapist.

Return to sport is often accomplished by 10 to 12 weeks postoperatively.[24]

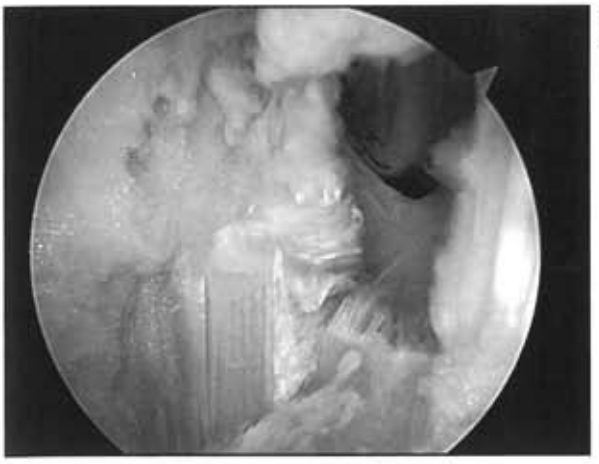


Figure 10-9. The patellar tendon is debrided at the area of abnormality.

Potential Complications

Although rare, vigorous resection of the patellar tendon can lead to partial or complete patellar tendon rupture. Inability to cauterize neovessels can theoretically lead to hematoma. Osteophytes at the site of the inferior patellar osteoplasty are occasionally found postoperatively but are often asymptomatic.

Top Technical Pearls for the Procedure

1. Establish a superior viewing portal (superolateral preferred) to visualize the fat pad.
2. Place a spinal needle through a preoperatively identified area of pathology (imaging, maximum tenderness to palpation).
3. Create a transpatellar tendon portal and place the shaver into the joint.
4. Obtain proper visualization of the degenerated patellar tendon by resecting an adequate amount of Hoffa's fat pad.
5. Resection margins can be assessed by placing the scope through the transpatellar tendon portal to see if residual degenerative tendon or neovessels remain.

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