Mid-Substance Patellar Tendon Repair with Augmentation of Dermal Allograft and Internal Bracing: a Case Report

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INTRODUCTION

Patellar tendon ruptures affect less than 0.5% the population annually[1], however the disability associated with loss of the extensor mechanism is tremendous. Specific research on mid-substance patellar tendon ruptures is limited and can be difficult to repair given poor tissue quality at the rupture site. Internal bracing is a relatively new technique that has been used on tears of the Achilles tendon[2], AC joint of the shoulder[3], and LUCL of the elbow[4]. Within the knee specifically, internal bracing has been described in ACL[5], MCL and posteromedial corner[6], and proximal patellar tendon[7] tears.

Recently, Rothfeld et al studied the internal brace technique in cadaveric mid-substance patellar tendon tears and demonstrated that internal bracing augmentation is superior to suture repair alone and equivalent to augmentation using steel cerclage wire[8]. Further, dermal graft has limited but good outcomes when used as augmentation in tendinous tears of the Achilles[9], rotator cuff[10–14], and pectoralis[15]. Unfortunately, there are few studies examining augmentation of mid-substance patellar tendon tears.

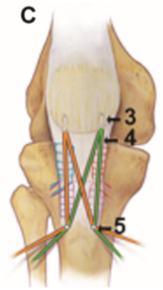

FIGURE 1. Illustration of the internal bracing technique for mid-substance patellar tendon tears directly from Sanchez et al[7]. Arrow 3 indicates the medial patellar anchor. Arrow 4 indicates 2 suture tape limbs loaded into the anchor. Arrow 5 indicates the tibial anchor seated with ipsilateral and contralateral suture tape limbs.

CASE REPORT

A 26 year old male in the military with history of contralateral patellar tendinitis presented after running and hearing a “pop” with severe pain in the left knee. Examination revealed a knee effusion, high-riding patella, and loss of extensor mechanism. X-ray and MRI confirmed diagnosis of a mid-substance patellar tendon tear. The patient elected for operative intervention.

FIGURES 2A and 2B. Radiographs of the affected knee demonstrating patella alta with small avulsion fracture of the distal pole of the patella.

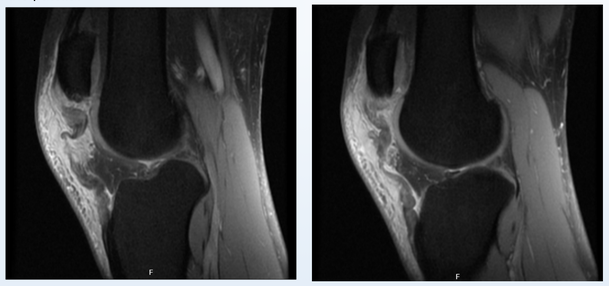

FIGURE 3A and 3B. Sagittal MRI demonstrating a high grade partial versus complete mid-substance patellar tendon tear with suggestions of tearing at the proximal pole and resulting patella alta.

SURGICAL TECHNIQUE

Intra-operatively, the patella tendon tear was mid-substance with a proximal longitudinal split in its midline. Overall, the tendon was macerated and tissue quality was poor. The decision was made to primarily repair the tendon followed by augmentation using dermal graft and an internal brace technique. After appropriate debridement, the longitudinal split of the proximal patella tendon was reapproximated using #1 Vicryl in an inverted interrupted fashion. Suture tape in a Krackow running fashion was then placed for future approximation of the proximal and distal tendon edges.

An Arthrex internal brace kit was then prepared. 4.75 BioComposite SwiveLocks were placed into the medial and lateral aspects of the patella. At this point, the tendon edges were appropriately tensioned and sutures were tied. An Arthrex dermal patch was manually sized as to fit from the distal pole of the patella to the tibial tubercle. Once the tibial tubercle was debrided for anchor placement, the dermal patch was placed. Core sutures from the SwiveLocks in the patella were used to secure the medial and lateral edges of the dermal graft. Then, one limb from each anchor was brought down, one medially and laterally to perform a box- and X-type of formation onto the graft. The suture ends were secured with an Arthrex 4.75 PEEK SwiveLock on both the medial and lateral aspects of the tibial tubercle with little tension. Core sutures at the tibial aspect were then used to secure the distal corners of the graft.

The retinaculum was closed using #1 Vicryl, subcutaneous tissue with 3-0 Monocryl, and skin using staples. After applying dry sterile dressings, the extremity was placed in a hinged knee brace.
The patient could weight bear as tolerated in hinged knee brace locked in extension.

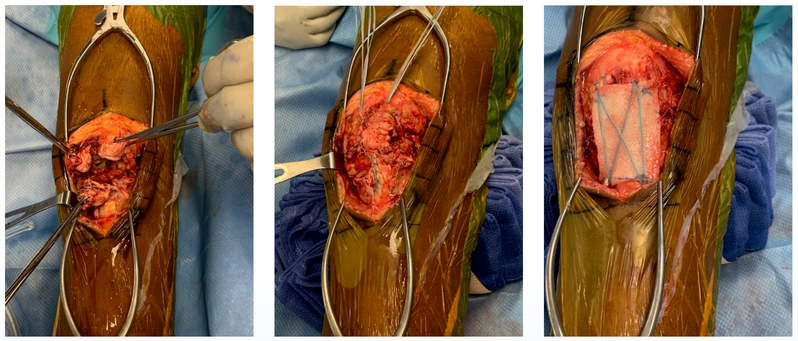

FIGURE 4A. Intra-operative photo demonstrating mid-substance patella tendon tear with longitudinal midline split and macerated tendon edges. FIGURE 4B. Intra-operative photo demonstrating primary tendon repair. FIGURE 4C. Intra-operative photo demonstrating augmentation with internal bracing and dermal allograft.

RESULTS

At 2 week follow up, flexion to 40 degrees was begun with weekly increases of 15 degrees; the knee remained locked in extension for ambulation. At 6 weeks, the patient began gradual full flexion and isometric active extension of the knee with weaning of the brace. At 3 months, aggressive strengthening began. At 5 months post-op, the patient reported doing very well with steady improvements in quadriceps strength and muscle size.

DISCUSSION

Repair and graft reconstruction options for patella tendon tears of the native knee include suture, metal wire, autograft, allograft, and synthetic graft. The use of metal wire often necessitates a subsequent operation for removal of hardware. Augmentation with autograft has been described using semitendinosus tendon[16] and contralateral bone-patellar-bone[17]. However, autologous grafting has inherent risks of donor site morbidity. Augmentation has also been described using allograft of Achilles[18], patellar[19], and hamstring[20] tendons, extensor mechanism[21,22], and synthetic ligament[23].

Internal bracing using knotless suture anchors allows for direct bony fixation and minimizes risk of knot slippage. Consideration must be taken in the added mass of suture and graft using this technique, which may not be appropriate in the setting minimal soft tissue coverage. To date, there are no published case reports nor clinical studies describing repair of mid-substance patellar tendon ruptures using dermal graft augmentation or the internal brace technique beyond the previously mentioned studies[7,8].

CONCLUSION

This case report describes a surgical technique that may be considered in the case of poor tissue quality in mid-substance patellar tendon tears. Future research is needed to determine the clinical efficacy of both the internal brace technique and dermal graft augmentation in the treatment of patellar tendon ruptures.

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