A novel technique for repairing a segmental patella fracture

Jay N. Patel, Priyal V. Bhagat, Juluru Rao

ABSTRACT

Introduction: Patellar fractures account for 1% of all fractures. Fractures of the patella occur from either a direct impact or eccentric contraction of the extensor mechanism. Treatment is dependent on the fracture pattern, displacement, articular surface congruity, and the status of the patient's extensor mechanism. Several techniques have been described for patellar fracture fixation.

Case Report: We present a case of a 60-year-old female that had a segmental fracture of the patella that included a small distal pole fragment. Initially, the fracture was fixed with lag screw fixation of the two major fragments. Subsequently, the small inferior pole fragment was fixed to the proximal construct with three-bone tunnel suture fixation technique.

Conclusion: This stable construct enabled us to start the patient on an early range of motion exercise program and has resulted in a good functional result at second-year follow-up. To our knowledge, this type of bony construct has not been reported before.

International Journal of Case Reports and Images (IJCRI)

International Journal of Case Reports and Images (IJCRI) is an international, peer reviewed, monthly, open access, online journal, publishing high-quality, articles in all areas of basic medical sciences and clinical specialties.

Aim of IJCRI is to encourage the publication of new information by providing a platform for reporting of unique, unusual and rare cases which enhance understanding of disease process, its diagnosis, management and clinico-pathologic correlations.

IJCRI publishes Review Articles, Case Series, Case Reports, Case in Images, Clinical Images and Letters to Editor.

Website: www.ijcasereportsandimages.com

CASE REPORT

PEER REVIEWED | OPEN ACCESS

A novel technique for repairing a segmental patella fracture

Jay N. Patel, Priyal V. Bhagat, Juluru Rao

ABSTRACT

Introduction: Patellar fractures account for 1% of all fractures. Fractures of the patella occur from either a direct impact or eccentric contraction of the extensor mechanism. Treatment is dependent on the fracture pattern, displacement, articular surface congruity, and the status of the patient's extensor mechanism. Several techniques have been described for patellar fracture fixation. **Case Report:** We present a case of a 60-year-old female who had a segmental fracture of the patella that included a small distal pole fragment. Initially, the fracture was fixed with lag screw fixation of the two major fragments. Subsequently, the small inferior pole fragment was fixed to the proximal construct with three-bone tunnel suture fixation technique. **Conclusion:** This stable construct enabled us to start the patient on an early range of motion exercise program and has resulted in a good functional result at second-year follow-up. To our knowledge, this type of bony construct has not been reported before.

Keywords: Knee, Orthopedics, Patella fractures, Patella, Trauma

How to cite this article

Patel JN, Bhagat PV, Rao J. A novel technique for repairing a segmental patella fracture. Int J Case Rep Images 2018;9(1):47–50.

Article ID: Z01201801CR10876JP

doi:10.5348/ijcri-201807-CR-10876

INTRODUCTION

Patellar fractures account for 1% of all fractures. Fractures of the patella occur from either a direct impact or eccentric contraction of the extensor mechanism. Treatment is dependent on the fracture pattern, displacement, articular surface congruity, and the status of the patient's extensor mechanism. Several techniques have been described for patellar fracture fixation. They include tension band fixation, cannulated screws, plating, etc. In severely comminuted fractures, partial patellectomy with restoration of the extensor mechanism may be the only treatment option. However, partial patellectomy is associated with several complications; shortening of the extensor mechanism, increased patellofemoral joint forces, and subsequent patellofemoral arthritis.

CASE REPORT

A 60-year-old female presented to our institution with a complaint of right knee pain after she had slipped and fallen onto her right knee. Radiographs revealed a segmental patellar fracture as shown in Figure 1A–C. A midline incision was made centered over the patella. The patella was found to have a large proximal fragment, a medium sized middle fragment, and a small distal pole

Jay N. Patel¹, Priyal V. Bhagat², Juluru Rao¹

Affiliations: ¹DO, RWJBarnabas Health, Jersey City Medical Center, Department of Orthopaedic Surgery, 355 Grand St, Jersey City, USA; ²MD, Northwell Health, Lenox Hill Hospital, 130 E 77th Street, New York, USA.

Corresponding Author: Jay N. Patel, DO, RWJBarnabas Health, Jersey City Medical Center, Department of Orthopaedic Surgery, 355 Grand St, Jersey City, NJ 07302, USA; Email: jaypatel37@gmail.com

Received: 31 August 2017
Accepted: 08 November 2017
Published: 01 January 2018

fragment attached to the patellar tendon. There was also rupture of the medial and lateral patellar retinacula.

Inspection of the fracture ends revealed comminution and bone loss. K-wires and reduction clamps were used to hold the provisional reduction between the proximal and middle segments of the patella. A 2.7 mm screw was used, via lag technique, to secure the proximal and middle fragments of the patella. Next, Krackow stitches using #5 FiberWire were placed through the patellar tendon, incorporating the inferior pole of the patella. Three bone tunnels were drilled through the proximal and middle fragments and the suture ends of the Krackow stitch were passed through the drill holes exiting the superior pole of the patella. The sutures ends were tied and buried under the quadriceps tendon. Under fluoroscopy, the knee was taken through flexion and extension and was found to be stable. The medial and lateral patellar retinacula were repaired using #2 FiberWire suture. Immediate postoperative radiographs are shown in Figure 2A–B.

Postoperatively, the patient was made weight bearing as tolerated in a knee immobilizer for six weeks. The range of motion was started two weeks after surgery. At her second-year follow-up, the patient has painless knee extension of 0 degrees and knee flexion of 120 degrees,

Figure 1: (A–C) Anteroposterior, lateral, oblique radiographs of a segmental patella fracture.

Figure 2: (A–B) Anteroposterior and lateral radiographs immediately postoperative.

comparable to the contralateral side. Radiographs at final follow-up show a healed patella with no visible fracture lines (Figure 3A–C). Clinical photos of the patient's range of motion are shown in Figure 4.

DISCUSSION

There have been several techniques described for the treatment of patella fractures. In comminuted fractures, management with inferior pole resection can result in patella baja and shortening of the extensor mechanism. Patella baja can lead to an increase in the compressive forces across the patellofemoral joint, potentially increasing cartilage wear within the patellofemoral joint, [1, 2] leading to early arthritis.

Advances in suture material strength and bone anchor techniques have provided sufficient strength for early mobilization after patellar tendon repair [3, 4]. However, in patella fractures with distal comminution or avulsion fractures, bone anchors are not recommended because the purchase of the bone anchor depends on having an intact cortex [4]. In cases where there is no intact cortex or insufficient bone stock is present, excising the bone fragments with attachment of the patellar tendon by transosseous pull out suture also requires a considerable period of immobilization of the knee in order for healing

Figure 3: (A–C) Anteroposterior, lateral, and sunrise radiographs at second year follow-up.

Figure 4: (A–B) Clinical photographs demonstrating the patient's range of motion at final follow-up.

to occur due to the weakness of synthetic non-absorbable sutures [5]. The tendon-to-bone junction requires at least six weeks to heal after a partial patellectomy [6]. This immobilization of the knee in extension delays rehabilitation, can result in weakness of the quadriceps muscle, and decreased functional restoration of knee range of motion [7].

In order to avoid delays in rehabilitation, techniques such as figure-of-eight wiring and patellotibial tubercle cerclage reinforcement have been described. The use of wiring may lead to implant failure, implant irritation, and the need for a secondary procedure. These techniques also make adjusting the length of the patellar tendon difficult, potentially leading to patella baja and increased patellofemoral joint wear [5–8]. In order to promote early knee mobilization Hung et al. [6] reinforced their patellar tendon-to-bone repair with a figure-of-eight tension band wire loop from the patella down to the tibial tubercle. The majority of the patients in their series were mobilized after one week. Though none of the patients had disruption of the repair, a high percentage did have radiographic arthritis at final follow-up likely due to the partial patellectomy. Breakage of the tension band wire is also a concern. Retaining the inferior patellar pole preserves the functional length of the extensor mechanism resulting in better functional outcomes regardless of fixation method [7].

CONCLUSION

With our technique, we were able to provide the patient with a stable construct, early range of motion, and good long-term results. To our knowledge, this type of bony construct has not been reported before.

REFERENCES

1. Johnson EE. Fractures of the patella. In: Rockwood C, Green D, Bucholz RW, Heckman JD, editors. Rockwood and Green's Fractures in Adults. 4ed. Philadelphia: Lippincott-Raven; 1996. p. 1956–72.
2. Terbrüggen D, Müller J, Dieterich H. Patellapolyresection. In: Burri C, Ruter A, Spier W, editors. Knochenverletzungen im Kniebereich. Berlin: Springer; 1974. p. 80–4.
3. Bushnell BD, Byram IR, Weinhold PS, Creighton RA. The use of suture anchors in repair of the ruptured patellar tendon: A biomechanical study. Am J Sports Med 2006 Sep;34(9):1492–9.
4. Gaines RJ, Grabill SE, DeMaio M, Carr D. Patellar tendon repair with suture anchors using a combined suture technique of a Krackow-Bunnell weave. J Orthop Trauma 2009 Jan;23(1):68–71.
5. Saltzman CL, Goulet JA, McClellan RT, Schneider LA, Matthews LS. Results of treatment of displaced patellar fractures by partial patellectomy. J Bone Joint Surg Am 1990 Oct;72(9):1279–85.
6. Hung LK, Lee SY, Leung KS, Chan KM, Nicholl LA. Partial patellectomy for patellar fracture: Tension band wiring and early mobilization. J Orthop Trauma 1993;7(3):252–60.
7. Kastelec M, Veselko M. Inferior patellar pole avulsion fractures: Osteosynthesis compared with pole resection. J Bone Joint Surg Am 2004 Apr;86-A(4):696–701.
8. Marder RA, Swanson TV, Sharkey NA, Duwelius PJ. Effects of partial patellectomy and reattachment of the patellar tendon on patellofemoral contact areas and pressures. J Bone Joint Surg Am 1993 Jan;75(1):35–45.

Author Contributions

Jay N. Patel – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Priyal V. Bhagat – Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Juluru Rao – Substantial contributions to conception and design, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor of Submission

The corresponding author is the guarantor of submission.

Source of Support

None

Consent Statement

Written informed consent was obtained from the patient for publication of this case report.

Conflict of Interest

Authors declare no conflict of interest.

Copyright

© 2018 Jay N. Patel et al. This article is distributed under the terms of Creative Commons Attribution License which permits unrestricted use, distribution and reproduction in any medium provided the original author(s) and original publisher are properly credited. Please see the copyright policy on the journal website for more information.

Access full text article on
other devices

Access PDF of article on
other devices

Edorium Journals: An introduction

About Edorium Journals

Edorium Journals is a publisher of international, high-quality, open access, scholarly journals covering subjects in basic sciences and clinical specialties and subspecialties.

Invitation for article submission

We sincerely invite you to submit your valuable research for publication to Edorium Journals.

Why should you publish with Edorium Journals?

In less than 10 words: "We give you what no one does".

Vision of being the best

We have the vision of making our journals the best and the most authoritative journals in their respective specialties. We are working towards this goal every day.

Exceptional services

We care for you, your work and your time. Our efficient, personalized and courteous services are a testimony to this.

Editorial review

All manuscripts submitted to Edorium Journals undergo pre-processing review followed by multiple rounds of stringent editorial reviews.

Peer review

All manuscripts submitted to Edorium Journals undergo anonymous, double-blind, external peer review.

Early view version

Early View version of your manuscript will be published in the journal within 72 hours of final acceptance.

Manuscript status

From submission to publication of your article you will get regular updates about status of your manuscripts.

Our Commitment

Six weeks

We give you our commitment that you will get first decision on your manuscript within six weeks (42 days) of submission. If we fail to honor this commitment by even one day, we will give you a 75% Discount Voucher for your next manuscript.

Four weeks

We give you our commitment that after we receive your page proofs, your manuscript will be published in the journal within 14 days (2 weeks). If we fail to honor this commitment by even one day, we will give you a 75% Discount Voucher for your next manuscript.

Favored author program

One email is all it takes to become our favored author. You will not only get 15% off on all manuscript but also get information and insights about scholarly publishing.

Institutional membership program

Join our Institutional Memberships program and help scholars from your institute make their research accessible to all and save thousands of dollars in publication fees.

Our presence

We have high quality, attractive and easy to read publication format. Our websites are very user friendly and enable you to use the services easily with no hassle.

Something more...

We request you to have a look at our website to know more about us and our services. Please visit:
www.edoriumjournals.com

We welcome you to interact with us, share with us, join us and of course publish with us.

Edorium Journals: On Web

Browse Journals

CONNECT WITH US