

Reconstruction of severe patellar infera syndrome with free vascularised composite tensor fascia lata flap

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ABSTRACT

Post-traumatic severe patella infera and intra-articular adhesion may lead to a severe knee stiffness. We report a 29-year-old man, a muslim prayer leader, who had a previous knee injury. He presented with knee movement from ten degrees to 30 degrees, patellar infera with a length of patella to length of patellar tendon ratio of 2:5, and severe knee arthrofibrosis. He underwent incision of the patella ligament and open arthrofibrosis release, leaving a tendon gap and skin defect of 5 cm. Reconstruction was successfully done using a free vascularised composite tensor fascia lata flap. He regained full range of knee motion with normal strength quadriceps mechanism at five months after surgery, and remained in full function at 18 months follow-up.

Keywords: fascia lata, free vascularised flaps, patellar infera syndrome, post-traumatic adhesion, tensor fascia lata graft

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INTRODUCTION

Poorly-treated knee injuries can lead to progressive deterioration from peripatellar and fat-pad soft tissue contractures, joint stiffness, quadriceps weakness and permanent shortening of patellar ligament and eventually, patello-femoral arthrosis. These conditions have been known as the patellar infera syndrome.⁽¹⁾ We report a patient with severe patellar infera syndrome, which was successfully treated with open release and reconstruction with a free vascularised composite tensor fascia lata flap.

CASE REPORT

In March 2006, a 29-year-old man, a muslim prayer leader, presented to Orthopaedic Clinic of Universiti Sains Malaysia with the complaint of left knee stiffness for 18 months after primary repair of a traumatic patellar ligament rupture. He developed severe pain on knee movement in the early post-operative period, preventing him from undergoing

regular physiotherapy. Clinically, his knee motion was only 10°–30°. The patella was located very inferior and could not be mobilised. Physiotherapy failed to improve the motion. His left hip and ankle joint were normal. Left knee joint radiograph (Fig. 1a) showed patellar infera with a length of patella (LP) to length of patellar tendon (LT) ratio of 2:5.

The patient underwent open release of adhesion. The patellar ligament had to be transversely incised to allow a complete release of patella from the peripatellar fat pad and intercondylar region (Fig. 1b). The patellar retinacula and quadriceps tendon were also released from the femoral condyles and trochlea. It left a patellar ligament and skin gap of 5 cm at 90° flexion. The flap dissection was based on preoperative Doppler ultrasonography of cutaneous perforators. The initial incision was medial to the proposed skin paddle to expose the fascia lata, which was then incised anteriorly above the rectus femoris muscle. Dissection was then proceeded laterally until the lateral intermuscular septum. Cautious dissection of the fascia was then continued until identification of the musculocutaneous perforator, which was located 25 cm from the anterior superior iliac spine in this patient. The perforator was then traced retrogradely to ascertain its origin from the descending branch of the lateral circumflex femoral vessels which was located along the intermuscular septum (Fig. 2). Following that, the fascia was dissected from the lateral border until reaching the perforator. The descending branch of the lateral circumflex femoral vessels was then traced until its origin at the profunda femoris vessel, where it was divided to achieve a pedicle of 14 cm length.

The defect was reconstructed with the free composite tensor fascia lata flap. The pedicle vessels were anastomosed to the superomedial genicular artery and its committant vein. It was positioned at the proximal and medial part of the flap which is not involved in knee motion. The fascia lata was anchored to bridge the gap without tension at 45° flexion. Stability of the extensor mechanism was provided by circlage wire from the patella to the tibial tubercle, without causing any traction to the transferred fascia lata flap (Fig. 1d).

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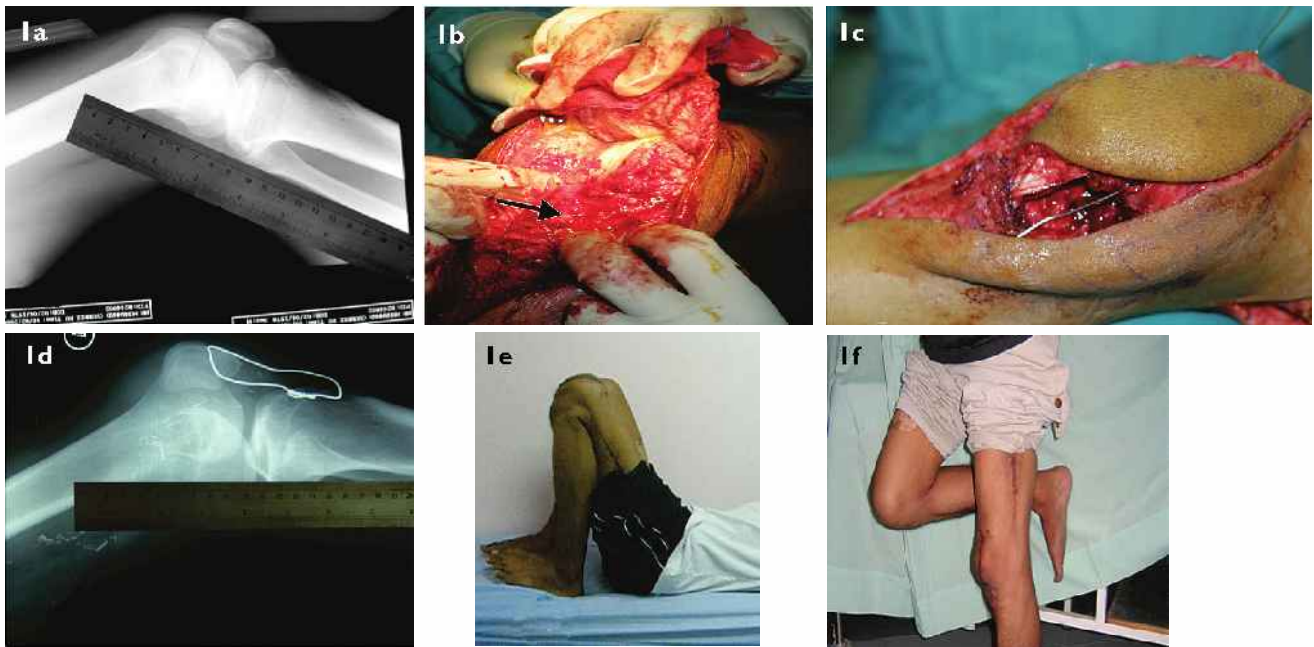


Fig. 1 (a) Preoperative radiograph shows the patella infera with a LP:LT ratio of 2:5. (b) Operative photograph shows the location of the patellar adhesion (arrow). (c) Operative photograph shows the vascularised tensor fascia lata composite replaced the gap between the tibia tubercle and tip of patella, with the rectangular wire protection connecting the patella to the tibia tubercle. (d) Postoperative radiograph shows the rectangular wire from the patella to tibia tubercle with a LP:LT ratio 1:0, protecting the fascia lata flap from tension or contracture. (e) Clinical photograph shows full flexion of the knee. (f) Clinical photograph shows the patient's ability to stand on the affected leg after removal of the wire protection.

Postoperatively, the knee was stabilised at 45° flexion with a plaster back-slab for three weeks to allow tissue healing at optimum position for rehabilitation. This prolonged immobilisation during the post-operative period caused recurrent knee stiffness that required arthroscopic release. An extended duration of epidural anaesthesia postarthroscopic release was given for immediate physiotherapy. He was given adequate oral analgesia during the rehabilitation process. Five months after surgery, he was able to flex the knee fully (Fig. 1e). In the most recent assessment at 18 months, the patient had regained normal quadriceps strength (Fig. 1f) and resumed his work as a muslim prayer leader. His final range of knee motion was 0°–160° with an extension lag of less than 10°. There was no donor site morbidity.

DISCUSSION

Knee flexion of up to 30° is adequate for a normal gait and flexion of up to 90° is necessary for activities of daily living. However, most of our Asian population and some religious practices require a full knee flexion to sit or pray. As this patient is a religious teacher and muslim prayer leader, he needed to fully flex his knee. Patellar infera in this patient could have been due to segmental tendon loss and primary end-

to-end repair. Progressive tissue contracture around the patella and intra-articular fibrosis could have been worsened by prolonged immobilisation before tendon healing. Prolonged knee pain preventing him from doing physiotherapy could have been due to reflex sympathetic dystrophy, a known cause of this condition.⁽¹⁾ The early phase of the patellar infera syndrome may be treated with physiotherapy, while moderate cases require arthroscopic release.^(1,2)

In this case, the patella location was very low, making the medial and lateral arthroscopic portals difficult. Open arthrofibrosis release did not allow knee mobilisation until a further elongation of quadriceps mechanism. Further lengthening of the quadriceps tendon would cause a severe weakness of an already-elongated muscle. Lengthening of the extremely short patella tendon with Z-plasty was not possible in this patient. Option of reconstruction with a non-vascularised tendon from a hamstring or Achilles tendon is not an ideal option in a scarred area with very poor blood supply. It is not possible if the skin is deficient after release, like in this case. Vascularised tissue composites, like sartorius or tensor fascia lata, represent a better option.^(3,4) Poonnoose et al had successfully used the tensor fascia lata, graft to construct the chronic quadriceps mechanism rupture

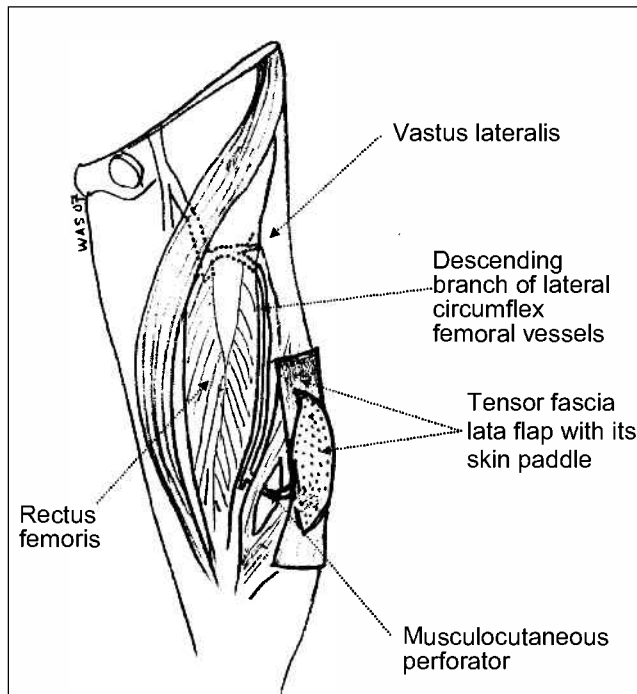


Fig.2 Schematic diagram of the tensor fascia lata flap.

following patellectomy.⁽⁴⁾ Severe patellar infera with very severe peripatellar contracture in this patient required extensive tissue release, including transverse incision of the patellar tendon. It left a skin and patellar tendon gap that required a vascularised tissue composite containing ligament and skin.

Vascularised tensor fascia lata with its skin composite provided the replacement of the tendon as well as its skin defect. Owing to the highly vascularised tissue composite, the healing process was uneventful. The availability of a long fascia from the donor site, which can be harvested without causing a significant functional morbidity,⁽⁵⁾ allows the fascia to be folded into a double-layer reconstruction, producing a new strong ligamentous structure. Elevation of this flap is

safe because there are reliable perforators supplying it. A long vascular pedicle with a proximal end vessel diameter of up to 2 mm can be obtained with a dissection up to the deep femoral vessels.⁽⁶⁾ The disadvantage of this flap is the irregular derivation of the pedicle. However, this can be overcome by doing preoperative Doppler ultrasonography.⁽⁶⁾

Using a temporary protection wire from the patella to the tibial tubercle, as well as prolonged postoperative epidural anaesthesia, allows immediate passive motion to prevent recurrent of fibrosis. However, the transferred vascularised tissue composite does not allow complete and aggressive knee mobilisation before it has stabilised. This had resulted in recurrent fibrosis that required arthroscopic release that was possible with the normal location of the patella. Open arthrofibrosis release and reconstruction of the patellar ligament gap with a free vascularised composite tensor fascia lata flap offer a good alternative treatment to this severe patellar infera syndrome in achieving desired motion, stable and full knee function.

REFERENCES

1. Noyes FR, Wojtys EM, Marshall MT. The early diagnosis and treatment of developmental patella infera syndrome. *Clin Orthop Relat Res* 1991; 265:241-52.
2. Paulos LE, Rosenberg TD, Drawbert J, Manning J, Abbott P. Infrapatellar contracture syndrome. An unrecognized cause of knee stiffness with patella entrapment and patella infera. *Am J Sports Med* 1987; 15:331-41.
3. Hess P, Reinders J. Transposition of the sartorius muscle for reconstruction of the extensor apparatus of the knee. *J Trauma* 1986; 26:90-2.
4. Poonnoose PM, Korula RJ, Oommen AT. Chronic rupture of the extensor apparatus of the knee joint. *Med J Malaysia* 2005; 60:511-3.
5. Dorai AA, Halim AS. Extended double pedicle free tensor fascia latae myocutaneous flap for abdominal wall reconstruction. *Singapore Med J* 2007; 48:e141-5.
6. Koshima I, Fukuda H, Yamamoto H, et al. Free anterolateral thigh flaps for reconstruction of head and neck defects. *Plast Reconstr Surg* 1993; 92:421-8.