CASE REPORT

Thrombotic popliteal block following simultaneous bi-cruciate single-stage arthroscopic reconstruction in a neglected multiligamentous knee injury in a smoker

Ranajit Panigrahi,¹ Amita Kumari Mahapatra,² Nishit Palo,³ Ashok Priyadarshi³

¹Department of Orthopaedics, Hi-Tech Medical College, Bhubaneswar, Odisha, India

²Department of Physiology, Hi-Tech Medical College, Bhubaneswar, Odisha, India

³Department of Orthopedics, Hi-Tech Medical College, Bhubaneswar, Odisha, India

Correspondence to

Dr Ranajit Panigrahi, ranajitpanigrahi@gmail.com

Accepted 11 June 2015

SUMMARY

We report a case of neglected multiligamentous injury that developed a complete thrombotic popliteal artery block following arthroscopic surgery. A 56-year-old man, a farmer, presented with an 8-month history of instability of the right knee. Examination revealed ipsilateral anterior (ACL)/posterior cruciate ligament (PCL) injuries. MRI and diagnostic arthroscopy confirmed complete ACL/PCL tear. Single-stage arthroscopic ACL/PCL reconstruction was performed. Postsurgery, the operated limb appeared swollen, firm and cold, without sensation or toe movement. Angiogram revealed complete thrombotic block of left popliteal artery. Fogarty's catheterism was performed and distal vascularity re-established. At 28 months, the patient was back at work with good functional outcome. We failed to examine the patient preoperatively in spite of his advanced age, history of beedi smoking and tobacco use, and presence of feeble vascular pulsations with thickened skin over leg and foot. Thus, in multiligamentous injuries, patient selection and thorough detailed clinical examination are the keys to successful arthroscopic procedures.

BACKGROUND

Simultaneous anterior (ACL) and posterior cruciate ligament (PCL) ruptures are rare but indicate high energy trauma with serious damage to the vasculature, ligaments and tendons around the knee joint, following early degenerative arthritis, resulting in obvious instability.¹ Although the treatment of complex knee joint instability has attracted a lot of attention in recent years, a standardised treatment algorithm is lacking.¹⁻³

During the past three decades, arthroscopy has revolutionised the way knee surgery is performed and the applications of arthroscopic procedures in the knee joint have enormously increased with the improvement in surgical technique and advent of new arthroscopic equipment.⁴ Arthroscopic-assisted reconstructions of ACL and, increasingly, of the PCL, are becoming standard procedures, but are restricted to only a small number of arthroscopists.¹

Numerous studies have shown arthroscopically assisted reconstruction technique of the ACL using either hamstring or patellar tendon autografts to be a safe and reliable procedure, but results after arthroscopic reconstruction of the PCL are limited in the orthopaedic literature and remain less consistent.

In this report, we present a neglected multiligamentous knee injury in a smoker who developed a thrombotic popliteal block following simultaneous bi-cruciate single-stage arthroscopic reconstruction and presented with several challenges, with a lesson to be learnt.

CASE PRESENTATION

A 56-year-old man, a farmer, presented with an 8-month history of instability of the left knee and inability to perform heavy labour. The patient had undergone trauma to the right knee 8 months prior, where his knee was hit from behind while pulling a heavy rickshaw. At the time, the patient was carried to a local primary health centre and was given medications; the pain and swelling subsided but the patient was not able to perform heavy labour due to knee instability.

On examination, the patient was moderately built and nourished with a history of beedi smoking and tobacco chewing for 35 years. Minimal swelling was seen over the left knee, with varicosities and thickened skin over the left leg and foot, with reduced sensitivity. Tender joint line and diminished pulsations of the left dorsalis pedis artery and posterior tibial artery, as compared to the normal side, were noted. Lachmann, Pivot Shift, Anterior and Posterior Drawer Sign, Dial Test and Sag Sign (Godfrey's Test) tests were positive. No motor deficits were observed except for sensory bluntness due to thickening of skin over the left foot. Range of movement was from 20° to 70° (p=4).

INVESTIGATIONS

X-ray stress radiography suggested ACL and PCL injuries, with increased anterior and posterior translation, as compared with the normal side. MRI suggested a complete tear of ACL and PCL of the left side (figure 1). Diagnostic arthroscopy revealed complete tear of ACL and PCL.

DIFFERENTIAL DIAGNOSIS

- ▶ Postarthroscopy embolic syndrome
- ▶ Reflex popliteal artery occlusion syndrome
- ▶ Water intoxication syndrome

TREATMENT

A single-stage arthroscopic ACL/PCL reconstruction was performed after clearance from the anaesthetist and cardiologist. First, PCL reconstructed via standard AM (anteromedial), AL (anterolateral) and PM

CrossMark

To cite: Panigrahi R, Mahapatra AK, Palo N, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2015-209933

Figure 1 MRI suggesting a complete tear of anterior (ACL) and posterior cruciate ligaments (PCL) of the left knee.

Figure 2 Patient positioning and technique.

Figure 3 Postoperative angiogram revealing complete popliteal thrombotic block with well-developed collateral circulation.

Figure 4 Fogarty's catheterism/balloon angioplasty and extracted thrombi.

Figure 5 On table Doppler ultrasound confirming patent dorsalis pedis artery circulation.

(posteromedial) portal with right hamstring graft, then ACL reconstructed (single bundle) anatomically with contralateral semitendinosus graft (figure 2).

On the day of surgery, the operated lower limb appeared swollen, firm and cold, with feeble dorsalis pedis and posterior pulsations and the patient unable to sense or move the toes. A Doppler ultrasound revealed sluggish but patent circulation in the dorsalis pedis, and posterior and anterior tibial arteries. The patient was put on unfractionated heparin intravenously on advice of the cardiothoracic and vascular surgery (CTVS) expert. On first postoperative day, 16 h following surgery, the patient's condition did not improve, his foot was still swollen, toe movements (p1) were minimal and extremities were cold. Angiogram was performed, revealing complete acute-on-chronic thrombotic block of the left popliteal artery with well-established collaterals around the affected knee (figure 3).

Within an hour, balloon catheter angioplasty failed to recanalise the popliteal artery. Finally, 17 h postsurgery, the thrombi were extracted by Fogarty's catheterism performed by CTVS

experts (figure 4). Portable Doppler confirmed a triphasic pattern of dorsalis pedis artery (figure 5). Following surgery, the patient's extremities became warm to touch, with normal capillary refill time and distal vascularity improved but still subminimal.

On second postoperative day, the patient's toe movements improved (p3) and temperature became normal; however, his distal vascularity remained patent but subminimal. Isometric quadriceps exercises and toe movements were encouraged. Isotonic quadriceps exercises, cycling, theraband exercises and non-weight bearing walking with an invalid walker were encouraged from third postoperative day (figures 6 and 7).

OUTCOME AND FOLLOW-UP

The patient was discharged 7 days after surgery with a range of movements 50–700 over the left knee. He was followed up weekly for 8 weeks, then monthly for 6 months, and thereafter once every 3 months. At 28 months postsurgery, the patient is happy, without problems and back at work. On examination, the right knee surgical scars had healed, anterior/posterior drawer and Godfrey's tests were negative, with a range of movements 5°–120° (p=5) with no instabilities, and a good functional outcome (Friedman and Wyman) was noted (figure 8).

DISCUSSION

The arthroscopic-assisted reconstructions of the ACL and increasingly of the PCL are becoming standard procedures for multiligamentous knee injuries, but the technically difficult combined ACL/PCL reconstruction is restricted to a small number of arthroscopists and only a few reports discuss simultaneous ACL and PCL reconstructions.

As in our case, we failed to examine the patient preoperatively in terms of vascular status in spite of old age and long history of beedi smoking and tobacco use. Presence of feeble vascular pulsations and thickened skin over leg and foot were suggestive of the underlying pathology. Often, due to heavy work load and improved diagnostics, preoperative clinical examination is neglected, however, it should be remembered that patient selection and thorough detailed clinical examination are the keys to successful arthroscopic procedures.

Various factors predispose a patient to increased thromboembolic events such as obesity, age beyond 40 years, leading a sedentary life, immobilisation, being bedridden, having diabetes, smoking, oral contraceptive abuse, vascular occlusive diseases (atherosclerosis, Raynaud's disease, sickle cell disease, Berger's disease), malignant disease (polycythaemia, multiple myeloma), previous vascular operations for varicose, arteriovenous fistula,

Figure 6 Postoperative physiotherapy.

Figure 7 Postoperative physiotherapy.

Figure 8 Patient at 28-month follow-up.

aneurysm, etc; and faulty preoperative technique, including excessively high or low tourniquet pressure, faulty application of tourniquet and long duration of tourniquet use, are related to increased incidences of thromboembolic events, especially in arthroscopy.⁵ Following major surgeries, thrombus formation and emboli have been reported as early as within 48 h.⁵

Early diagnosis relies on a high degree of suspicion and monitoring with Doppler ultrasound scans, impedance or roentgenographic phlebography and arterial blood gas (ABG) values. Preventive measures such as use of compression stockings, physiotherapy, external pneumatic compression, electrical calf stimulation and early ambulation initiated postoperatively reduce chances of thrombotic events. In established cases, supportive care (hydration and ventilation), antithrombotic drugs such as heparin, dextran and aspirin, with or without surgical Fogarty/open thrombectomy, constitute the treatment options.

Only a few studies report results after arthroscopically assisted combined ACL/PCL reconstruction or PCL reconstruction with posterolateral corner (PLC) reconstruction procedures.³ Early complete reconstruction can achieve good functional results and patient satisfaction with overall restoration of sports and working capacity and early return to work. Following knee arthroscopy, most patients achieve a functionally stable knee with considerably improved subjective knee function.

Lastly, in multiligamentous injuries, patient selection and thorough detailed clinical examination are the keys to successful arthroscopic procedures. A detailed preoperative clinical exam-

ination can save the surgeon from a potentially disastrous outcome. Patient selection and postoperative rehabilitation are the keys to successful outcomes in a multiligamentous knee injury.

Learning points

- ▶ Internal derangement of the knee is difficult to treat.
- ▶ Initial evaluation of the patient has a pivotal role in patient recovery.
- ▶ Meticulous tourniquet timing is essential for successful treatment.
- ▶ Successful diagnosis requires use of CT, MRI and ultrasound as adjuncts to X-rays.
- ▶ Assessment in the initial 24 h postoperation is vital.
- ▶ Physiotherapy plays an important role in recovery and rehabilitation.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Martinek V, Imhoff AB. Combined anterior cruciate ligament and posterior cruciate ligament injury—technique and results of simultaneous arthroscopic reconstruction. *Zentralbl Chir* 1998;123:1027–32.
- 2 Piontek T, Gorzela KC, Szulc A, *et al*. Arthroscopically assisted combined anterior and posterior cruciate ligament reconstruction with autologous hamstring grafts—isokinetic assessment with control group. *PLoS ONE* 2013;8:e82462.
- 3 Strobel MJ, Schulz MS, Petersen WJ, *et al*. Combined anterior cruciate ligament, posterior cruciate ligament, and posterolateral corner reconstruction with autogenous hamstring grafts in chronic instabilities. *Arthroscopy* 2006;22:182–92.
- 4 Kim TK, Savino RM, McFarland EG, *et al*. Neurovascular complications of knee arthroscopy. *Am J Sports Med* 2002;30:619–29.
- 5 Turek SL. *The Hip-Orthopaedics principles and their application*. Vol 2. 4th edn. 1171–2.

Patient's perspective

I had an old knee injury due to which I was not able to perform my routine daily activities and suffering in my professional life. Due to the efforts and guidance of the team of doctors, I am able to perform my professional and routine activities to my best capabilities. I am satisfied with the results of my treatment.

Copyright 2015 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow