

Rebound PCL Case Study

45 year old female, isolated PCL tear
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Indication

A 45-year-old female patient reported to our outpatient clinic with a slight limp complaining of a right knee injury that had started after a bicycle injury three months ago. She reported landing on the anterior, proximal aspect of her right knee. She further stated that the initial pain quickly subsided to a vague, general soreness about her knee. Experiencing no relief of pain and having a recurrent feeling of instability over the next weeks, she attended our clinic and the diagnosis of an isolated PCL tear was established.

Diagnostics

A thorough physical exam of the knee was performed to evaluate any potential concomitant lesions. Patient's gait and weight bearing posture was assessed accurately as static and dynamic alignment can provide an indication of a suspected PCL or peripheral deficiency. Manual posterior drawer test and step-off test were used to assess posterior knee stability and the Dial test ruled out an additional injury of the posterolateral corner. Long leg radiographs in standing anteroposterior and lateral knee radiographs were performed as part of our clinical routine. Moreover, the side-to-side difference (SSD) of the posterior tibial translation (PTT) was graded using a Telos Stress Device.

We have proceeded to solely perform stress radiographs in a chronic setting (at the earliest three month after trauma/ PCL reconstruction) to avoid additional strain on the healing ligament.

Treatment Overview / Treatment Goal

As the intrinsic healing ability of the PCL had ceased by time of admittance, a strict conservative treatment was ineligible. The patient subsequently underwent physical therapy to improve the impaired joint mobility and muscle performance. Finally, as the patient continued to have a recurrent feeling of instability and was not able to return to her pre-injury level of activity, we discussed PCL reconstruction using autologous hamstring tendons with the patient.



Surgical Treatment

The arthroscopic portals used were as followed: anteromedial (AM), anterolateral (AL) and posteromedial (PM). Subsequently to a routine arthroscopy to rule out accompanying meniscal or cartilaginous defects, the arthroscope was advanced posteriorly between the medial femoral condyle and the remnants of the PCL into the popliteal recess to create the PM portal. Femoral tunnel creation was done through a low AL portal in an inside-out fashion using dedicated drill guides centered at the anterolateral bundle of the PCL. Remnants of the PCL complex such as the meniscomfemoral ligaments or the posteromedial bundle were preserved. Tibial tunnel creation was performed via direct arthroscopic visualization using the additional PM portal. The PCL graft consisted of autologous 5-fold semitendinosus- and gracilis tendons.

Femoral and tibial fixation was performed in a hybrid manner using a biodegradable interference screw and an EndoPearl device on the femoral site and sutures tight over a bony bridge on the tibial site. Maximum manual pretension in approximately 90° of flexion was performed as our clinical routine.

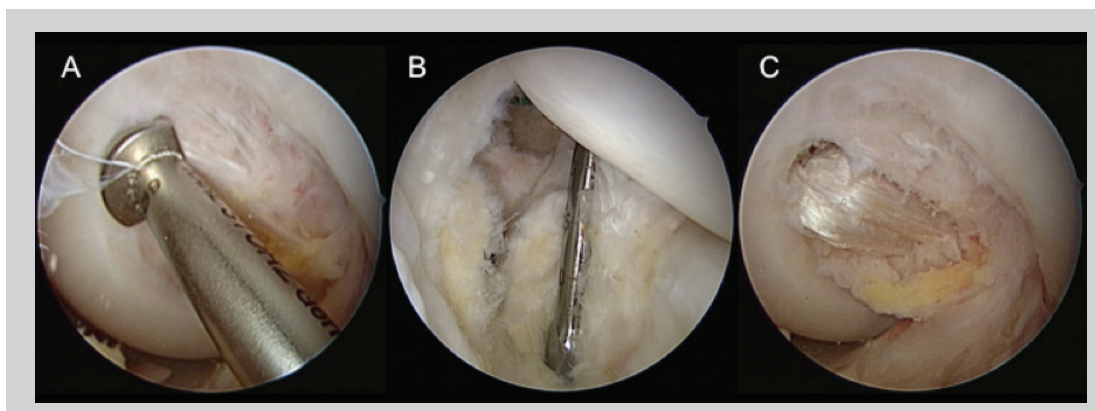


Figure 1: Femoral drilling, centered at the anterolateral bundle of the PCL (A). Tibial drilling (B). Remnant preserving PCL reconstruction, using autologous hamstring tendons (C).

Post-Surgical Rehabilitation

The rehabilitation protocol included immobilization for six weeks in a straight knee immobilizer with posterior tibial support, which performed an anteriorly directed force on the proximal tibia in order to counteract posterior tibial translation. The patient was encouraged to start isometric contraction of the quadriceps immediately after surgery. Partial weight bearing and gradual passive mobilization in prone position were performed during this period. After six weeks, the knee immobilizer with posterior pad was changed to the custom-made Rebound PCL and full weight bearing was gradually established. Gentle sporting activities, like jogging or swimming were permitted four months after surgery, because the patient already achieved the full range of motion and a near to normal quadriceps strength.

Reasons To Use The Rebound PCL Brace

The posterior cruciate ligament is composed of two bundles, the larger anterolateral and smaller posteromedial bundle. Both bundles function in a codominant and synergistic fashion as the primary restraint of posterior tibial translation during higher grades of knee flexion. Dr. Robert LaPrade and colleagues (LaPrade et al., *Knee Surg Sports Traumatol Arthrosc* (2015) 23:3070–3076) were able to demonstrate that the Rebound PCL brace applies increasing anterior forces to the proximal tibia at higher flexion angles, thus the physiological loading profile of the PCL is respected. Additionally, it has been advocated that a slow and rather conservative rehabilitation following PCL reconstruction is necessary for a successful clinical outcome.



Clinical Outcome

Upon completion of the first year post surgery, the patient returned to her pre-injury level of sports and daily activities. The patient was encouraged to continue stretching and quadriceps-strengthening exercises on a daily basis. She also underwent repeated stress radiographs during the follow-up. The posterior tibial translation (SSD) was successfully reduced from a SSD of 9 mm at the preoperative state to 3 mm at the two-year follow-up.

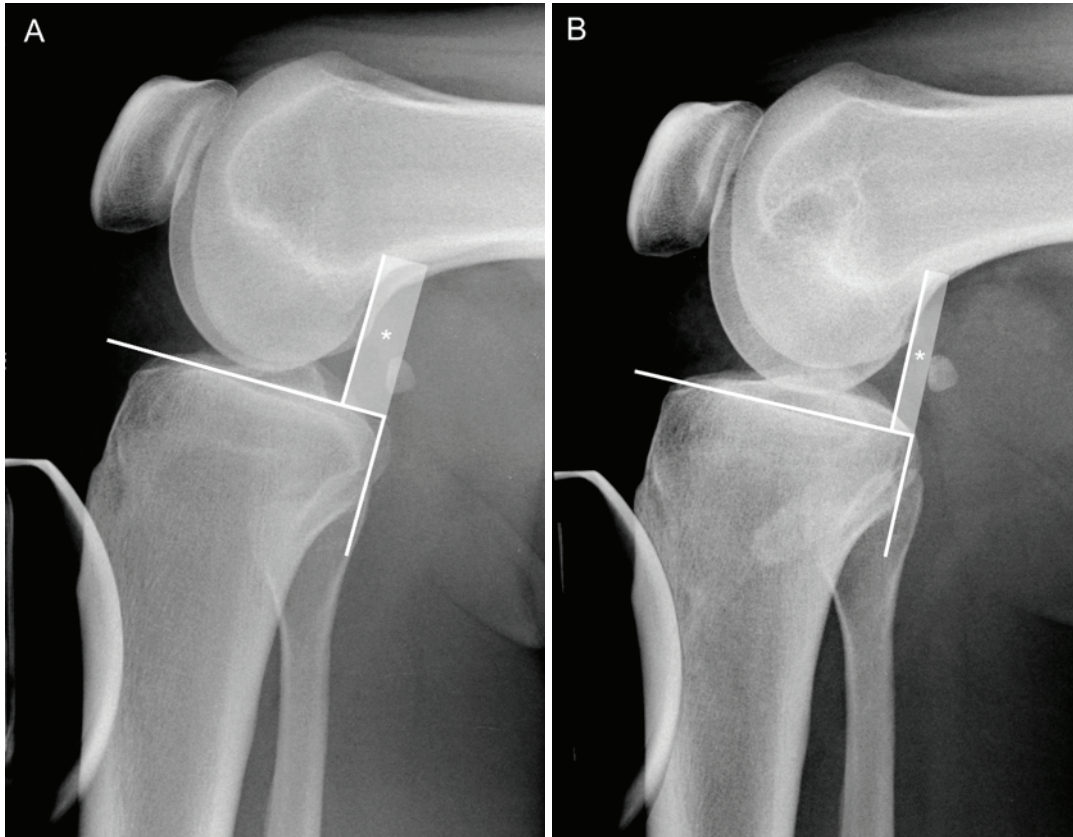


Figure 2: Posterior tibial translation (*) was determined according to the technique using peripheral bony landmarks. Perpendicular to the tangent of the joint line, the midpoints between the most posterior contours of the medial and lateral femoral condyles and tibial plateaus were created. The distance between these two points was regarded as the posterior tibial translation, which was reduced from a SSD of 9 mm at the preoperative state (A) to 3 mm postoperatively (B).

Conclusion

After initial non-surgical treatment of the PCL injury the patient presented recurrent feeling of instability and was not able to return to her pre-injury level of activity, we discussed PCL reconstruction using autologous hamstring tendons. After successful surgical treatment and consequent execution of the rehabilitation plan the patient was able to return to pre-injury level of activities. The Rebound PCL supported an accelerated rehabilitation by increasing weight bearing and ROM 6 weeks after surgery.

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