



Delayed Cyclops Syndrome : Symptomatic extension block four years after anterior cruciate ligament reconstruction

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Loss of knee extension after reconstruction of the anterior cruciate ligament may occur due to a neoproliferative fibrous nodule located anterolateral to the tibial tunnel, termed cyclops syndrome. This nodule occurs usually within the early postoperative period and results in diminished knee extension due to impingement on the intercondylar notch. We report a case of a 24-year-old female patient with an uncommon delayed-onset loss of knee extension due to a cyclops syndrome four years after anterior cruciate ligament reconstruction.

Keywords : cyclops syndrome ; delayed extension block ; ACL reconstruction.

INTRODUCTION

Limited range of motion (ROM) of the knee is one of the most frequent and challenging complications after anterior cruciate ligament (ACL) reconstruction and may cause the patient more discomfort than the pre-operative instability itself (2,14). Cyclops syndrome has been defined as a neoproliferative fibrous nodule, which acts as a mechanical extension block by impinging on the intercondylar notch after ACL reconstruction or after ACL rupture without surgical treatment (10,13,21). The symptoms of cyclops syndrome usually begin within the early postoperative period and may include loss of knee extension, an audible clunk near full extension, painful cracking, locking of the knee, stiffness and residual laxity (5,13).

Arthroscopic scar excision is usually successful to alleviate patients' symptoms and is recommended if an aggressive rehabilitation program with emphasis on regaining full knee extension fails (3,4,5,6,8).

We report a case of a patient with an uncommon delayed onset of loss of knee extension four years after ACL reconstruction. Clinical, MRI, arthroscopic and histological findings were consistent with a cyclops syndrome.

CASE REPORT

In June 2005 a 24-year-old woman presented with a left knee problem. Complaints started about two months earlier with anterior knee pain during and after exercise and gradual loss of knee extension. She had undergone four years before an ACL

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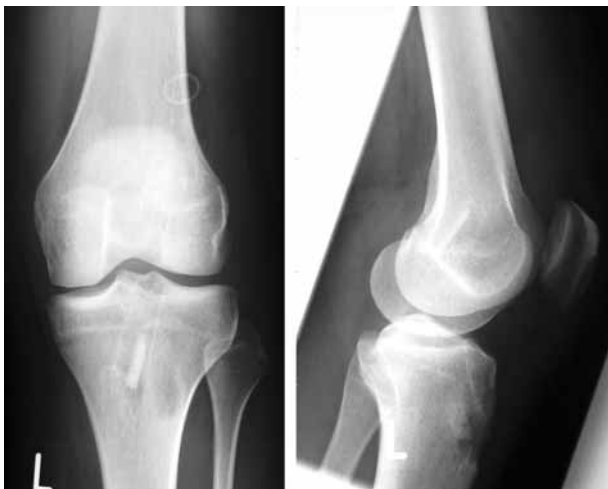


Fig. 1. — Plain radiographs of the left knee after ACL reconstruction with a bone-patellar tendon-bone transplant.

reconstruction using an autologous bone-patellar tendon-bone transplant fixed with SYSORB® screws (fig 1). Postoperatively she attended a physiotherapy program including isometric exercises, passive motion and proprioceptive training followed by quadriceps and hamstring strengthening. Full weight bearing was allowed after four weeks of partial weight bearing. She regained full ROM and returned to her daily life activities. Over the last four years she had no history of locking or giving way and denied having any new trauma after her reconstruction.

Examination in June 2005 did not reveal swelling or effusion of the knee. The Lachman test was 1+ positive but the pivot shift test was negative. No signs of meniscal or cartilage pathology were found. The extension deficit was 5° with pain at terminal extension; knee flexion was normal. Sagittal magnetic resonance imaging (MRI) scans showed a mass of low intensity signal on T1 weighted sections and of high intensity signal on T2 weighted sections, located immediately anterior to the ACL graft and consistent with a cyclops lesion (16) (fig 2a/b). Based on these findings standard knee arthroscopy was performed in August 2005, which revealed a fixed fibrous nodule adherent anteriorly to the ACL graft and impinging on the intercondylar notch in extension (fig 3a/b).

Except for a small area of a grade I cartilage lesion behind the patella no other abnormalities were found. The Cyclops nodule was successfully excised by mechanical shaving and radiofrequency ablation, freeing the ACL transplant which was intact but slightly elongated. Histological examination of the nodule showed vascularised dense fibrous connective tissue with spots of chondroid metaplasia.

After arthroscopy our patient underwent a short course of physiotherapy and regained full ROM after 3 weeks. At the last follow-up in April 2007 she had returned to her daily life activities.

DISCUSSION

Studies have shown that patients who do not regain full extension after ACL reconstruction experience more often anterior knee pain, patellofemoral problems or quadriceps weakening (11,18). Therefore, preservation of full range of motion after ACL reconstruction is crucial to regain a normal knee function and to ensure a high level of patient satisfaction. Improper graft positioning, arthrofibrosis, infrapatellar contracture syndrome (IPCS) or cyclops syndrome should be considered as differential diagnoses causing loss of knee extension after ACL reconstruction (10,17,19). The cyclops syndrome, described in 1990 by Jackson and Schaefer, is characterised as a neoproliferative fibrous nodule, impinging on the intercondylar notch when the knee is extended and acting as a mechanical extension block. Histological examinations revealed dense fibrous tissue which may contain osseous or chondroid formations, foreign body giant cells and newly formed vessels (4,5,14). Jackson and Schaefer supposed that the nodule originates from residual debris left attached to soft tissue during drilling of the tibial tunnel. Other authors found reparative processes within the ligament, remnants of the ACL stump, repeated microtrauma to the graft, insufficient anterior notch clearance, anterior tibial tunnel placement or immobilisation of the knee as triggering factors leading to graft hypertrophy or scar proliferation (3,7,8,12,21). However, a cyclops lesion can also be found in asymptomatic patients during second-

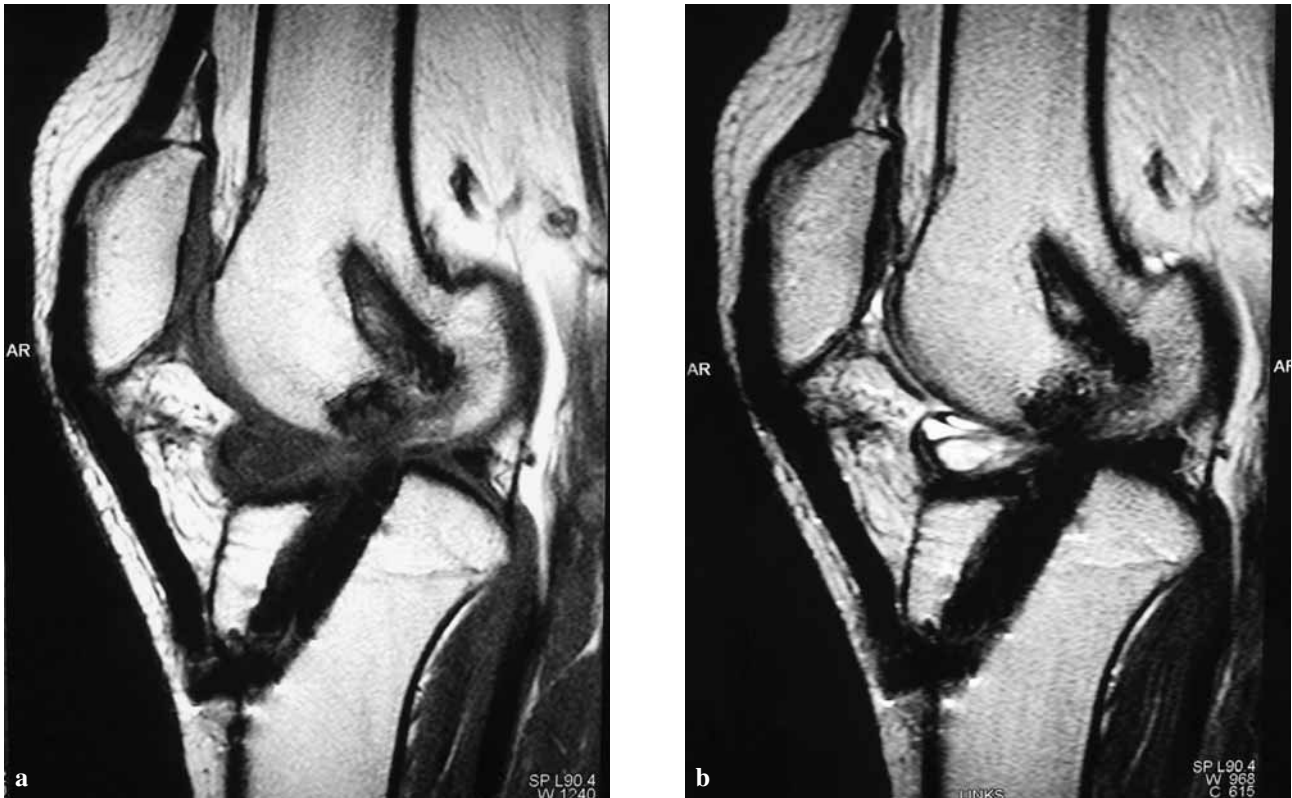


Fig. 2a/b. — MRI shows a mass of low intensity signal on T1 and of high intensity signal on T2-weighted sagittal sections located anterior to the ACL graft.

look arthroscopy or may develop in patients without evident causes (5,14). Therefore, recent studies failed to identify a single predictive risk factor and a multifactorial aetiopathogenesis appears likely (5,8).

The postoperative incidence of a cyclops syndrome varies from 1% to 18% with a decline in recent years (14,20). Minimal invasive surgery, early postoperative mobilisation, correct tunnel positioning, accurate removal of residual debris and delayed ACL reconstruction are probably responsible for this favourable development (8,20). Clinical findings vary from an asymptomatic extension deficit to painful cracking and knee stiffness. An audible clunk and pain at terminal extension is also a common finding (5). If an aggressive rehabilitation program with emphasis on regaining full knee extension fails, arthroscopic scar excision is recommended and is usually successful to alleviate the

patient's symptoms and to restore activity levels comparable to the results following uncomplicated ACL reconstruction (3,4,5,8).

A symptomatic extension block typically presents within the early postoperative period after reconstructive ACL surgery but has also been reported in patients with an ACL rupture treated non-operatively (13,21). However, a delayed cyclops syndrome after ACL reconstruction and after a chronic partial ACL rupture has been described recently (9,15). Irisawa *et al* concluded that the nodule had formed soon after injury but was asymptomatic over years. An aggressive rehabilitation program to correct a gradual loss of knee extension may have contributed to the sudden progress, as histological examination of the nodule disclosed newly formed and destroyed vessels. Histological examination in our patient revealed vascularised dense fibrous tissue with spots of chondroid

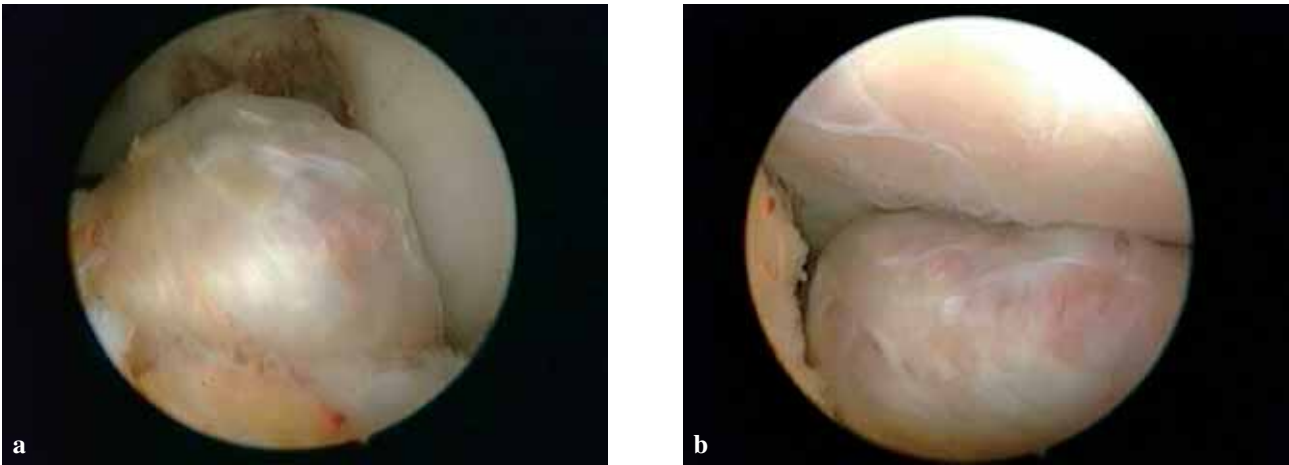


Fig. 3a/b. — Arthroscopic appearance of the cyclops nodule adherent to the anterior aspect of the ACL graft and impinging on the intercondylar notch when the knee is extended.

metaplasia but newly formed vessels were not observed. Thus, we could not decide whether the cyclops lesion was of new occurrence or whether an initial small nodule had steadily increased in size to eventually become symptomatic. This question remains unanswered since the phenomenon of a delayed Cyclops syndrome after ACL reconstruction has been described (15). However, a slowly but steadily increasing nodule might occur due to an inflammatory response after recurrent irritating stimuli to the graft (12). Based on these findings and on our personal experience we would therefore favour the hypothesis that the nodule had formed during the early postoperative period and only the symptoms of the Cyclops lesion were of late onset.

Particularly in patients with tunnel malposition, impingement of the graft against the intercondylar notch may result in repeated microtrauma with ventral fiber breakage and cyclops nodule formation. MRI sections showed correct tibial tunnel placement posterior to the slope of the intercondylar roof. However, the femoral tunnel was placed too anteriorly, in the third quadrant according to the classification of Bernard and Hertel (1). Whether femoral tunnel malposition was a causative factor in this case remains to be proven.

This report emphasises that a cyclops syndrome should be considered in the differential diagnosis in patients with a delayed onset of loss of knee exten-

sion after ACL reconstruction. A detailed physical examination, completed with MRI investigation is usually successful to relate patients' complaints to a cyclops syndrome. Arthroscopic scar excision is recommended and should be undertaken if conservative treatment does not restore full range of motion.

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