



Why autologous hamstring tendon reconstruction should now be considered the gold standard for anterior cruciate ligament reconstruction in athletes

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L Pinczewski, J Roe, L Salmon

The aim of anterior cruciate ligament (ACL) reconstructive surgery is to provide the patient with a timely return to sport allowing them to participate without any further meniscal damage and having a

normal knee function which results in neither clinical nor radiologic evidence of osteoarthritis later in life. Long term study of both endoscopically performed patellar tendon and hamstring tendon graft reconstructions show that this is more likely to be achieved with hamstring tendon graft rather than patellar tendon graft.

ACL reconstruction carried out endoscopically with the patellar tendon graft was popularised last century in the late 1980s and early 1990s due to the advent of easily

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performed interference screw fixation, and the rapid bone to bone healing of the graft. However donor site morbidity was common, persistent, occasionally severe and particularly disabling in females and trades people who knelt. Longitudinal follow-up demonstrated the development of fixed flexion deformities at the 2 and 5 year post-operative mark associated with the development of Grade B changes in the patellofemoral and medial compartments.^{1,2} These changes were noted on side to side comparative radiographs. The aetiology of this osteoarthritis was found to be two fold, firstly related to patellar ligament contracture resulting in patella baja of 5–10% of overall patella ligament length. This results in altered patellofemoral contact pressures. As well, authors³ have noted ACL reconstruction with the patellar tendon graft is associated with decreased knee flexion moments during the stance phase of gait resulting in higher impact loads in the medial compartment, when compared to hamstring tendon grafts. These findings may explain the aetiology of medial compartment degenerative change associated with the patellar tendon graft.⁴

The major argument against hamstring tendon graft reconstruction was the

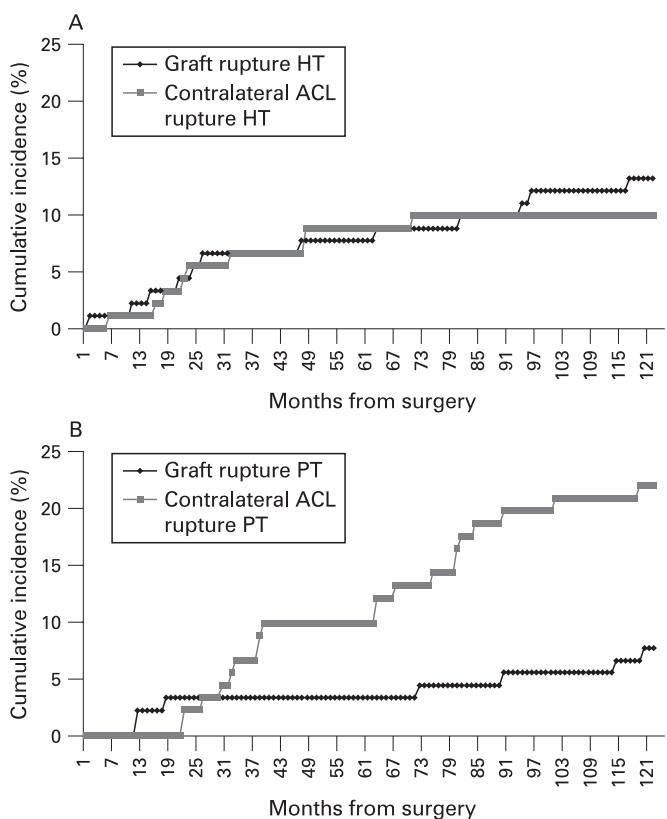
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Figure 1 Incidence of anterior cruciate ligament graft and contralateral anterior cruciate ligament rupture in the (A) hamstring tendon (HT) group and the (B) patellar tendon (PT) group.

perception of graft laxity. Since 1995 the technical aspects of the surgical fixation of hamstring tendons has evolved to equal stability measures in the post reconstruction knee utilising interference screw aperture fixation, reverse threaded screws for femoral fixation, supplementary tibial fixation to prevent slippage and increasing screw and diameter length. Hamstring tendon, like patellar tendon, is collagen, and collagen does not stretch. Both have 1–2% of elongation due to the natural crimp of collagen fibres. If fixation is secure, patellar tendon is shown to be

joined to the tunnels within 6 weeks and hamstring tendons by 8 weeks. Frequently quoted laxity results utilising hamstring tendons are not a function of the graft material, but rather of the surgical technique and placement of the graft and of fixation techniques. When fixation is standardised, no significant differences in laxity is noted.^{5–7} Comparison of suspensory fixation techniques for hamstring tendons and interference screw techniques are not valid, due to the inherent lack of stiffness of the former graft construct.

Some surgeons' preference to stay with patellar tendon graft in athletes is not totally without foundation. Anecdotally, it is felt that patellar tendon graft reconstructions fail less often than hamstring tendon graft reconstructions. Large scale meta analysis^{5–8,9} and systematic reviews¹⁰ report no difference in graft rupture rates between hamstring and patellar tendon grafts when fixation is standardised. From our own prospective series of hamstring and patellar tendon ACL reconstructions followed for 10 years we have found for every 100 patients undergoing an ACL reconstruction and returning to active sport over a 10 year period approximately 20% or 2 per year will suffer a further cruciate injury whether they have a hamstring tendon or patellar tendon graft (fig 2). The difference lies in the distribution of injuries. With patellar tendon graft reconstructions the index knee has a lower re-injury rate but a significantly higher contralateral ACL rupture rate (fig 1b). Following the use of hamstring tendon reconstruction the incidence of graft rupture and contralateral ACL rupture remains equal (fig 1a). While the effective outcome for the patient is the same regardless of graft choice, the surgeon with the lower graft re-rupture rate would understandably feel that his reconstruction has withstood the challenges of re-injury better than the native contralateral knee ligament. But apart from the surgeons' perception, the result for the patient is equally catastrophic and compounded later in life with a higher incidence of osteoarthritis if the patellar tendon is used.

The gold standard for ACL reconstructive surgery is to obtain an ideal outcome for the patient for the rest of their life, not for the short period of their career. This is more likely to be seen following hamstring tendon graft and interference screw fixation of that graft rather than any other form of fixation for hamstring tendon graft or for patellar tendon graft.

Accordingly hamstring tendon ACL reconstruction with interference screw fixation should now be considered the gold standard for ACL reconstructive surgery.

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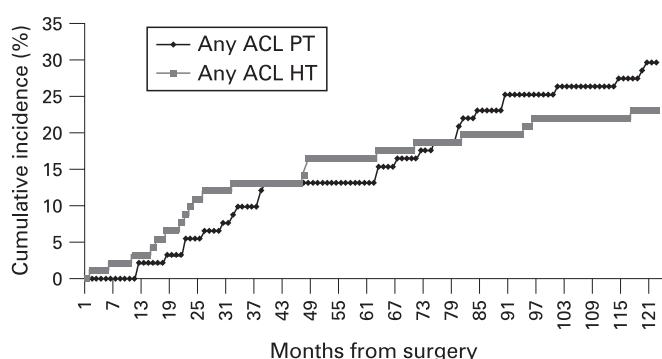


Figure 2 Combined incidence of anterior cruciate ligament graft or contralateral anterior cruciate ligament injury in the patellar tendon (PT) and hamstring tendon (HT) groups.

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