

be unreasonable to lay the blame entirely on the device. Whilst LARS recommend an optimal surgical technique and fixation method, the published literature includes a wide variety of operative techniques and fixation options and the device has performed well despite this.

It should be noted that in a systematic review of the published literature Hammoud, et al.⁶⁸ reported a re-rupture rate of 11.8% for multi- ligament reconstructions, and 12.5% for isolated PCL reconstruction. In the Danish ACL reconstruction registry which incorporates data from 85% of knee reconstructions in the country the two year ACL revision rate was 3%.⁶⁹ Obviously revisions do not equate to re-ruptures and the re-rupture rate in the large, expert surgeon, series by Salmon, et al. of 6.4% may be a more appropriate figure for comparison.² Either way the published re-rupture rate for LARS compares favourably at 1.4% for ACL and 2.6% for all published applications. This applies overall and at all individual time points. See table.

Re-rupture rate at various time points from the included ACL studies.

Time points (Years)	1-2	2-3	4-5	7-10
LARS	0%	0%	0 -1.9%	3.7%
Autograft	0-4%	0%-6%	6.4% - 13%	7.7%-11.1%
Allograft	0%	4.3%	3.3%-4.3%	9%

In the cited literature there was a tendency to avoid directly reporting neoligament rupture and precise definition was not clear. Whilst clinical examination or laxity testing may suggest re-rupture confirmation by arthroscopy or MRI imaging was not commonplace in many studies that were focusing on alternative outcomes.

3.4. Further surgery

With regards to other further surgical procedures the LARS literature does not appear to differ significantly from autograft and allograft. There are some instances of graft

laxity that were addressed with 're-tightening' of LARS which appears to be an option unique to LARS, however instances of laxity developing over time due to graft slippage are not unique to LARS. Indeed stability testing showed superiority for LARS over autograft in many studies and no significant decline over time.²² The need for screw removal was common in all three graft types and in some series this was regarded as the norm. LARS was associated with very few infective complications. In stark contrast to previous synthetic ligaments that were plagued with high rates of early complications (synovitis, tunnel widening, re rupture or loosening) the overall the incidence of complications with LARS was very low.

3.5. Donor site morbidity

A systematic review of the literature suggested that primary outcome of knee stability may not be particularly dependant on graft choice (autograft versus allograft).⁷⁰ In light of this finding of the negative effects of each graft type is worth consideration. Both LARS and allograft offer the benefits of avoiding donor site morbidity. This complication is not consistently reported in autograft studies, as some donor site morbidity is seen as inevitable, or is down played. The typical outcome scores such as IKDC and Lysholm are not sensitive to donor site morbidity, but when studies do report on symptoms such as kneeling pain for BPTB, hypoaesthesia or hamstring weakness for 4SHG the incidences are not trivial.

In order to appreciate the morbidity caused, analysis of comparative studies in the ACL literature is required. In ACL reconstruction studies comparing patellar tendon and hamstring autograft the long-term consequences of each graft harvest are reported to have a significant prevalence (anterior knee pain, and hamstring weakness).^{49 53 54 71} BPTB graft harvest has been shown to have significantly higher rates of long term kneeling pain (up to 59% of at 10 years), as well as a 14% extension strength deficit at one year.^{14 23} Hamstrings graft harvest has been shown to be associated with a 10% reduction in hamstring strength at 1 year as well as a 58% incidence of pain at 3 years.^{14 23 72} Previously when some donor site morbidity