

Research Article

Current Trends in ACL Reconstruction Surgery in the United Kingdom

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Abstract We report the findings of our study examining the current practice for anterior cruciate ligament (ACL) reconstruction surgery in the United Kingdom. We sent a questionnaire to all surgeons registered as members or fellows of the British Orthopaedic Association in 2014 and collated responses via a third party website before analyzing the results. We then compared the responses received to the UK National Ligament Registry (UK NLR) 2015 Report. Our study represents the largest of its kind in the United Kingdom to date.

Keywords ACL; ACL reconstruction; UK National Ligament Registry; UK NLR

1. Introduction

Anterior cruciate ligament (ACL) injury remains a common sporting injury and the resulting knee instability causes considerable morbidity. Reconstruction of the ACL is a frequently performed operation worldwide. There remains uncertainty about which specific practices surgeons employ during reconstruction of the ACL. This study aims to investigate the operative practice of individual surgeons in the UK who perform ACL reconstruction. Discussions at specialist interest conferences only allow us to get an idea of practices for a specific group of surgeons who are engaged in those subspecialty bodies relevant to soft tissue knee surgery. We also wanted to investigate which operations other nonligament specialist surgeons were performing, (who may not outwardly express a subspecialty interest in soft tissue knee surgery). In order to capture all potential ACL surgeons we constructed a simple questionnaire and disseminated it electronically to all surgeons of consultant grade who were registered as members or fellows of the British Orthopaedic Association (BOA) in 2014. The results were then collated and analyzed accordingly.

2. Methods

The questionnaire was designed to ascertain specific information that we thought was relevant to both clinical practice and training. It comprised twenty multiple choice questions

with a supplementary comments box. The questionnaire was held in electronic format on a secure third party website (SurveyMonkey) with anonymity provided for all submitting participants. The web link for this online survey was then disseminated along with a covering letter explaining the purpose and intention of the study. A list of email addresses was compiled from the fellows and members of the BOA Handbook 2014 and emails were sent using blind carbon copy function to protect individual identity. The results of this survey were then collated and analyzed by a single surgeon (the corresponding author).

3. Results

A total of 168 surgeons responded to the survey. Each individual response was analyzed along with the trend as a whole. The respondent operative practices can be seen below.

3.1. Choice of graft

The most popular choice of graft among our respondents was ipsilateral hamstrings autograft (semitendinosis + gracilis (ST + G)) (77%, $n = 129$). Bone-patellar tendon-bone (BTB) autograft was the next most frequently selected first choice graft (14%, $n = 24$), with semitendinosis alone being the third most popular choice (6%, $n = 10$). Only two respondents selected cadaveric allograft as their first choice for ACL reconstruction surgery with one surgeon offering patient choice of graft and one surgeon indicating that the activity of the patient dictates the graft choice (citing use of BTB autograft for aggressively active male patients otherwise using hamstrings autograft—ST + G). None of the respondents preferred synthetic graft as a first choice for ACL reconstruction (see Figure 1).

The second choice graft (used when preferred graft is not available or contraindicated) was a more heterogeneous group. The most popular graft used as a second choice was

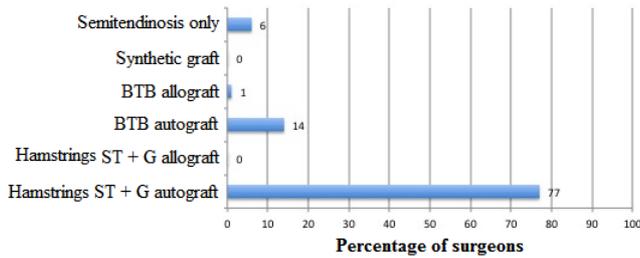


Figure 1: First choice graft.

bone-patellar tendon-bone autograft from the ipsilateral limb (42%, $n = 70$). The next most common choice was hamstrings autograft from the contralateral limb (ST + G) (28%, $n = 47$). Third most popular was hamstrings autograft (ST + G) from the ipsilateral limb (12%, $n = 20$) (13 BTB users, six ST only users and one cadaveric user). Three surgeons stated a preference for tibialis anterior tendon as their second choice graft while one preferred ipsilateral quadriceps tendon and another preferred tibialis posterior tendon. Only one respondent selected synthetic ligament as a second choice graft (Figure 2).

There was a fairly even split between those who had used cadaveric allograft and those who had never used it (53% and 47%, resp.). Synthetic ligament was less popular with 71% of respondents having never used synthetic graft during ACL reconstruction surgery, $n = 120$.

3.2. Reconstruction architecture, tunnel placement, and fixation

We found that our respondents did not favor the “double bundle” (synonym for double tunnel) technique described by Mott in 1983 [1] for reconstruction of the “anatomical” ACL with just less than 5% ($n = 8$) currently employing this method. There were 14 further surgeons who had abandoned the “double bundle” technique citing that they did not believe this to be a “gold standard” approach in eight responses, with four surgeons citing results being no better than single tunnel technique, one surgeon citing the fact that they perform all-inside surgical method, and one surgeon stating that they still use “double bundle” when there is a large footprint to cover, though did not give specific parameters for which they may change operative strategy.

Just less than 60% of surgeons who responded use a separate incision/arthroscopy port site (as described by Brown et al. [2]) to aid placement of the tunnels ($n = 100$) with 35% using transtibial drilling method, $n = 58$. Six respondents use a retrograde reaming technique to position the femoral tunnel (Arthrex FlipCutter). One respondent uses image intensifier, one respondent uses a modified transtibial method with “rose drills,” and one surgeon stated that they use “AM portal only”.

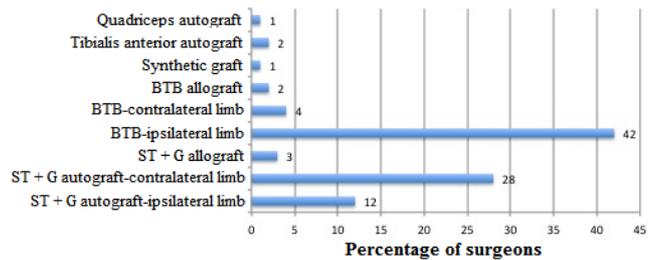


Figure 2: Second choice graft.

The most common single landmark used for siting the tibial tunnel of the reconstructed ACL was between the anteromedial (AM) and posterolateral (PL) bundles of the native ACL (65%, $n = 110$). Next most popular was the lateral meniscus (LM) (38%, $n = 64$), followed by tibial spine (30%, $n = 50$). The most common combination of landmarks for siting the tibial tunnel used by surgeons who responded was a combination of AM/PL bundles + lateral meniscus (26%, $n = 43$), followed by AM/PL interval + tibial spine (21%, $n = 36$), then AM/PL interval + PCL (15%, $n = 26$). Thirty-seven surgeons who responded (22%) use three or more landmarks as reference points for tibial tunnel placement. Only one surgeon used intraoperative X-rays by image intensifier.

When it came to siting the femoral tunnel, the most popular choice was a bony landmark on the femur (51%, $n = 85$). The second most popular choice was the native ACL footprint on the femur (43%, $n = 73$), followed closely by the clock-ray method (39%, $n = 66$). The most common combination of landmarks was clock-ray method + bony landmarks (20%, $n = 35$). Next most common was native ACL footprint on the femur + bony landmark (17%, $n = 28$), followed by native ACL footprint + clock-ray (10%, $n = 17$). Eleven surgeons (6.5%) used all three landmarks to site the femoral tunnel.

The most popular method of fixation of the graft at the femoral interface was the Smith & Nephew Endobutton (58%, $n = 94$). Twenty-five surgeons (16%) used a metal interference screw (non HPA coated) and eight used an absorbable interference screw (5%). A further eight surgeons used the DePuy RIGIDFIX system, three surgeons used Arthrex TightRope system, and two used Arthrotek EZ Loc (Figure 3).

The preference for fixation of the tibial tunnel was far more heterogeneous with 33% ($n = 53$) preferring metal interference screw fixation without HPA coating, 24% ($n = 39$) favoring absorbable interference screw fixation, 15% using a combination absorbable screw/sheath construct ($n = 24$), and 9% using a nonabsorbable screw/sheath construct ($n = 15$). Other choices of fixation for the tibial interface of the graft included staple fixation ($n = 1$) and combination of absorbable screw + staple ($n = 2$).

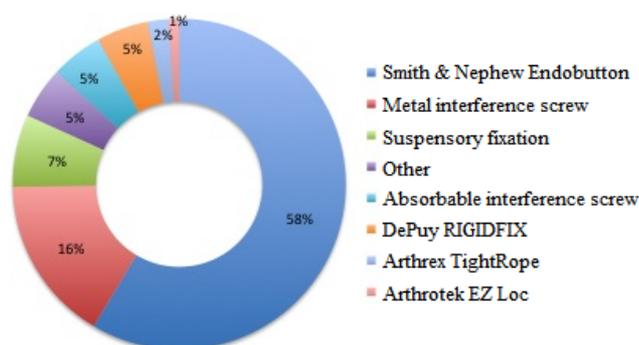


Figure 3: Fixation at femoral tunnel.

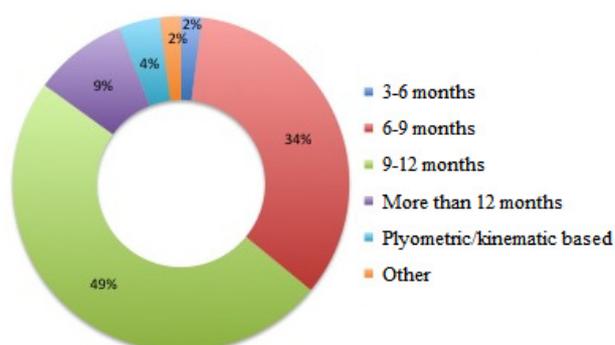


Figure 4: Resumption to full contact sports.

3.3. Operative numbers and subspecialty interest

The average number of ACL reconstructions performed by respondents was 48 reconstructions per calendar year (mode = 30 pa). The surgeon with the highest number of reconstructions performed per annum was 200 ($n = 2$) and 19 surgeons responded saying that they have performed 100 or more ACL reconstructions in the last year. The fewest number was two in the last calendar year with 11 surgeons performing 10 or fewer ACL reconstructions per annum.

The majority of respondents have a primary subspecialty interest in knee surgery (soft tissue + knee arthroplasty surgery) (59%, $n = 95$). Only 11% ($n = 17$) of respondents have a primary subspecialty interest in soft tissue knee surgery and 16% ($n = 25$) consider their primary interest to be lower limb (hip + knee) arthroplasty surgery. Five surgeons report themselves as sports injury surgeons and four surgeons cite trauma surgery as their primary interest. Three respondents consider their primary interest to be foot and ankle surgery and there was one surgeon who considered their primary interest to be pediatric lower limb reconstruction.

Interestingly, of the 20 highest volume surgeons (100 or more per annum) 15 (75%) use hamstrings autograft (ST + G), 3 (15%) use BTB autograft, and one uses four-strand semitendinosus graft. Only one surgeon (5%) of those performing 100 or more ACL reconstructions uses “double bundle” method (ST + G autograft) and one surgeon had previously but does not anymore. We found that of the 11 lower-volume surgeons who responded (fewer than 10 per annum) nine (82%) use hamstrings autograft (ST + G) and the remaining two (18%) use BTB autograft. Only two of these lower-volume surgeons (18%) use “double bundle” method. Furthermore, transtibial drilling with a straight guidewire was found to be the preferred method for lower-volume surgeons (those performing 10 or fewer ACL reconstructions per year) when compared to the whole cohort (36% and 35%, resp.) but was much less frequent in the highest volume surgeons (those performing more than 100 per year—16%).

3.4. Time to resumption of full contact sport after surgery

The majority of surgeons who responded recommend that patients who have had ACL reconstruction surgery resume competitive full contact sport at 9–12 months postsurgery (49%, $n = 79$). Just less than 34% ($n = 54$) recommend resumption 6–9 months postsurgery with only three surgeons allowing patients to return at the 3–6 month point. None of the surgeons surveyed allow patients to return to full contact competitive sport sooner than 3 months postsurgery. A small number of surgeons were more cautious still recommending return more than 12 months post ACL reconstruction (9%, $n = 14$). There were a small number of respondents (4%, $n = 6$) who commented that they base the return to sport on a combination of physiotherapy-led rehabilitation goals and plyometric analysis or isometric kinematic tools such as Kincom/Cybox assessment (Figure 4).

3.5. Comments in free text box

There was a free text box at the end of the questionnaire, which allowed respondents to add any information of comments that they might feel relevant or helpful to the study. There were some very interesting responses with the most consistent comments supporting the use of the UK NLR and our study. A number of surgeons commented that there was insufficient evidence to support or dispute the use of “anatomic” and “double bundle” methods for reconstruction of the ACL. Some surgeons highlighted that “gold standard” practice has changed many times over the years and some stated that their own practice had remained unchanged as they had experienced good outcomes with low failure rates.

4. Discussion

The debate regarding a “gold standard” for surgical reconstruction of the ACL remains contentious. Clearly no surgeon would perform an operative procedure that they believe to be unfit for purpose or substandard so we have to draw the conclusion that each of these surgeons who responded believe that their chosen method for this operation is either equal or superior to other options

available or that they find “in their hands” that it has better results than an alternative. While the predominant group who responded to our questionnaire consider their primary subspecialty interest to be knee surgery (59%), there are clearly others who do not and their operative numbers may raise the question of governance among some readers. There are other aspects of orthopedic practice currently under scrutiny with respect to frequency and volume of procedures performed such as revision hip arthroplasty and it remains to be seen if the spotlight will shine on surgeons performing ACL reconstruction too. It has been suggested that the frequency with which a procedure is performed by a surgeon is less important than the individual surgeon’s outcomes. However, if an individual surgeon is performing a procedure with low frequency as well as doing so with techniques that have become less popular among the surgeon cohort then they may leave themselves open to criticism when results are poor. Whether this is truly representative of the surgeon’s performance or whether other extraneous circumstances have had influence it is still worth considering.

The British Association for Surgery of the Knee (BASK) is one of the largest surgical subspecialist organizations in the UK, set up to represent knee surgeons in Great Britain. However, there are surgeons in the UK, as we have demonstrated, who do not consider themselves knee surgeons per se and therefore are not BASK members but who still perform ACL surgery. This presents a significant challenge to data capture.

Comparison to UK National Ligament Registry (UK NLR).

The UK NLR steering group has identified 304 surgeons who are defined as “enthusiasts,” 155 of whom have contributed to the UK NLR in the period 2013 to 2015 [3]. A total of 2,854 ACL reconstruction procedures (all primary) were registered on the UK NLR between December 2012 and February 2015. They define high-volume surgeons as those who perform more than 10 ACL reconstructions per year with those who perform less than 10 being considered low volume. Using these parameters, they have 43 low-volume surgeons of the 155 (28%) who have thus far contributed and note that six surgeons (4%) have performed over 100 procedures per year. The findings from our study of 168 surgeon respondents demonstrate 11 low-volume numbers (7%) based on the same criterion with 19 surgeons (11%) performing over 100 ACL reconstructions in the last year of which two reported performing over 200. There were other notable differences in the data on the UK NLR and our study (Figure 3): a lesser proportion of surgeons using Endobutton fixation for femoral tunnel (58% vs. 71%); half the proportion of surgeons using quadrupled semitendinosis graft (6%) compared with the NLR (12%); double the proportion using patellar tendon in our study

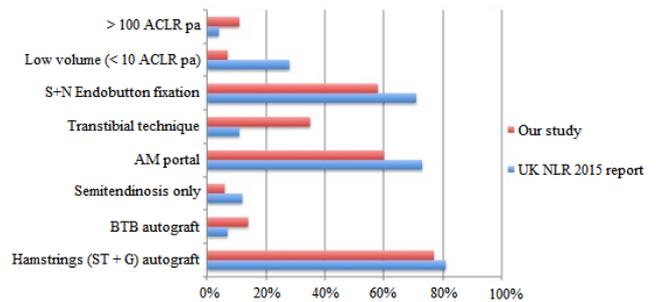


Figure 5: Comparison to UK NLR 2015 report.

(14% vs. 7%), and more than three times the proportion using transtibial drilling with a straight guidewire (35% vs. 11%) in our study (Figure 5).

Similarities between our study and the NLR include the use of hamstrings autograft (ST + G), 81% and 77%, respectively, and the proportion using interference screw fixation of the graft in the tibia, 20% and 22%, respectively.

The authors acknowledge that while UK NLR data concerning operative numbers is based on recorded procedures, our own study relies upon surgeons accurately recalling their annual operative numbers. This may result in overestimation or indeed underestimation of actual number of procedures performed.

5. Conclusions

The results of our study have shown a heterogeneous group of surgeons performing ACL reconstructions in the United Kingdom. While debate continues regarding “gold standard” practice in ACL reconstruction, it is clear from our results and those of the UK NLR that there are trends developing towards certain techniques especially use of hamstrings autograft and the use of anteromedial portal to aid positioning of the femoral tunnel. While the authors acknowledge that this sample size may not accurately report the practice all surgeons performing ACL reconstruction in the United Kingdom, we believe that this study is representative of current practice and that this is the most significant assessment of current UK practice in ACL reconstruction surgery to date.

Conflict of interest The authors declare that they have no conflict of interest.

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