

# **BEST PRACTICE FOR PRIMARY ISOLATED ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION**

## **PREFACE**

This document sets out a statement of best practice for primary isolated Anterior Cruciate Ligament Reconstruction. It represents a consensus statement from the British Orthopaedic Association, the British Association for Surgery of the Knee and the British Orthopaedic Sports Trauma Association. It is hoped that the Guide, an interim statement, will inform Surgeons, Trusts and Purchasers and also improve the care of patients with this injury.

## **1. INTRODUCTION**

- 1.1 This is a statement of best practice in primary Anterior Cruciate Ligament (ACL) reconstruction for an isolated rupture and has been approved by the Council of the British Orthopaedic Association, the British Association for the Surgery of the Knee and the British Orthopaedic Sports Trauma Association.
- 1.2 When establishing standards in a cash limited system with regional variation in manpower and facilities we acknowledge that an acceptable level of care may fall short of best practice.
- 1.3 This document relates solely to best practice in ACL reconstruction and will not consider the management of complex knee injury.
- 1.4 Many studies of the operation of ACL reconstruction identify its efficacy and high patient satisfaction rates in the short term <sup>(1-4)</sup>. The majority of patients are relieved of the symptoms of instability which may have compromised their quality of life, and even their functional capacity, before the operation.
- 1.5 In the UK there is a notable variation in the surgical techniques, post operative management and patient selection among surgeons with a paucity of data regarding outcomes.
- 1.6 From available data, this document identifies best practice in general terms. It is not a statement which claims to be applicable to all patients or in all circumstances. Each Consultant or those working under the supervision of a Consultant must continue to take into account the individual requirements of each patient. Presently, there is a shortfall of auditable standards for the operation and associated care. Standards can only be set by the widespread collection of uniform data, centred on NHS Trusts and made available for regional and national audit.
- 1.7 This document should be read in conjunction with "The Advisory Book on Consultant Trauma and Orthopaedic Services".

## **2. THE INDICATIONS FOR THE OPERATION**

- 2.1 The aim of ACL reconstruction is to restore functional stability of the knee without compromising other joint functions, particularly range of movement.
- 2.2 The prime indication for ACL reconstruction is symptomatic instability.
- 2.3 Each patient should be individually assessed taking into account the type and frequency of physical activity and laxity at presentation <sup>(5)</sup>. In certain circumstances primary reconstruction may be considered appropriate once the initial inflammatory response to injury has settled, the knee is “quiet” with no swelling and a full range of movement has been restored <sup>(6,7)</sup>.
- 2.4 The presence of an unstable and repairable meniscal lesion in combination with ACL insufficiency is a strong indication for early combined ACL reconstruction and meniscal repair rather than meniscectomy <sup>(8,9)</sup>.
- 2.5 There is no evidence that reconstruction of the ACL reduces the incidence or progression of degenerative change <sup>(5,10-14)</sup> but early stabilization reduces the incidence of meniscal pathology. Although no long term studies are available it is reasonable to conclude that this will have a protective effect.
- 2.6 Age and degenerative change are not in themselves contraindications for ACL reconstruction <sup>(15-18)</sup>.
- 2.7 Anterior Cruciate ligament injuries in patients who have not reached skeletal maturity pose particular problems and should be managed by surgeons with a special interest in the injured knee.

## **3. THE OUTPATIENT CONSULTATION**

- 3.1 The effect of an unstable knee on the quality of life is self evident but varies significantly in its range of symptomatology and functional deficit between individuals.
- 3.2 The majority of the patients in the United Kingdom still present to the Orthopaedic department as an elective referral some time after the index injury <sup>(19)</sup>. Government targets for the first NHS outpatient appointment are not generally achievable, nor sustainable, given the shortage of Consultant Orthopaedic surgeons in the UK. This adds significantly to the delay in recognition of the injury.
- 3.3 Discussion regarding management options for the ruptured ACL should ideally involve a surgeon with a Certificate of Completion of Surgical Training, or Consultant, who, by definition, are on the GMC's Specialist Register.

- 3.4 The British Orthopaedic Association regards 15-20 minutes as the minimum time allowed for the first consultation.
- 3.5 A confidential environment with access for relatives, and the reliable availability of notes and X-rays are essential for the consultation.
- 3.6 After clinical examination and general medical assessment the Consultant should provide the patient with an explanation of the problem in understandable language and discuss the available treatment and outcomes of any proposed ACL reconstruction preferably in his or her hands. The precise reasons for the operation should be given.

#### **4. WAITING FOR THE OPERATION**

- 4.1 In a cash-limited service, it is accepted that there will always be a delay before elective operations can be carried out. Consultants are expected to manage their waiting lists ethically and patients should be admitted for operation according to clinical priority and social circumstances.
- 4.2 Excessive waiting list delay in reconstruction for a patient with functional instability may prejudice the outcome of surgery by causing additional damage to the menisci and articular surfaces, thereby increasing the potential for degenerative change<sup>(20-22)</sup>.

#### **5. PRE-OPERATIVE ASSESSMENT**

- 5.1 A managed system of pre-operative assessment is recommended as good practice. Such arrangements are now commonplace and allow the most efficient use of scarce resources. Normally, the assessment should take place within six weeks of the operation.
- 5.2 Pre-operative assessment clinics are staffed by Doctors, Clinical Nurse Practitioners and Specialist Physiotherapists working to protocols with the ability to involve Anaesthetists and Professions Allied to Medicine to guard against cancellations, identify co-morbidities and allow discharge planning. There is also an opportunity for patient education.
- 5.3 The clinics should include patient education, referring to the operative technique and the anticipated post operative rehabilitation program.

#### **6. THE ADMISSION TO HOSPITAL**

- 6.1 The limb for operation should be marked in an area which is still visible after draping, and an explanation of anaesthesia given by the anaesthetist involved.

- 6.2 The patient must give consent to the operating surgeon. Guidance for surgeons on this process has been given by the Senate of Surgery of Great Britain and Ireland. Consent may be given in the outpatients, the pre-admission clinic, or in the ward.
- 6.3 The procedure can be performed on a Day Case basis with appropriate domiciliary support.

## **7. HOSPITAL FACILITIES REQUIRED FOR THE OPERATION OF PRIMARY ANTERIOR CRUCIATE RECONSTRUCTION**

- 7.1 Primary ACL reconstruction operations are best carried out in hospitals where Consultant backup from medical and surgical disciplines is available.
- 7.2 Adequate numbers of trained nurses and the skills of Professions Allied to Medicine must be available.
- 7.3 The potential for cross infection should be reduced to a minimum. Patients should be admitted to and nursed on elective orthopaedic or day case wards that are staffed by a team experienced in the care of patients who have undergone ligament reconstructions.

## **8. REQUIRED THEATRE RESOURCES**

- 8.1 The use of ultra clean air theatres is considered to be best practice for units performing any surgery with the implantation of foreign material or open joint surgery. There is however no published evidence specifically in respect of ACL reconstruction to support this.
- 8.2 The operating theatre should be dedicated to clean elective orthopaedic surgery or joint reconstruction. Shared facilities with other clean surgical disciplines is acceptable practice when using ultra clean air, but data supporting this practice is not available.
- 8.3 The surgeon must have trained assistance during the operation, and a trained scrub nurse fully familiar with the required complex instrumentation is mandatory. In the absence of junior staff, additional Nursing assistants or specifically trained Surgeon's assistants must be available.
- 8.4 A full range of specialised implants and instruments must be readily available. Appropriate impenetrable clothing and drapes are also essential.

## **9. THE SURGEON**

- 9.1 The completion of Higher Surgical Training and acquisition of a CCST allows a surgeon entry to the Specialist Register of the GMC and enables Consultant practice in the NHS. Consultants with this training and registration are equipped with the skills and knowledge to make judgements and exercise discretion when selecting patients for the operation.
- 9.2 The surgeon undertaking ACL reconstruction should have received appropriate and adequate training, either by working as an SpR with a surgeon who has a special interest in this procedure, or as part of subsequent CPD.
- 9.3 The theoretical and practical skills of a Consultant Surgeon performing primary ACL reconstruction operations must be maintained by Continuing Professional Development (CPD).
- 9.4 Anterior Cruciate Ligament reconstruction operations performed by surgeons in training must be supervised by Consultants. The level of supervision should be according to the experience of the trainee.
- 9.5 During the 5<sup>th</sup> and 6<sup>th</sup> years of Higher Surgical Training, some trainees receive advanced training in ligament reconstructive surgery, including the surgical management of the more complex cases and secondary operations [revisions]. They are usually appointed as Consultants to NHS posts in which knee surgery is a major component of their elective work. There is an expectation that many more such highly specialised surgeons will need to be trained in order to cope with the volume of complex reconstructive surgery.
- 9.6 The operation requires an anaesthetist with the appropriate skills and techniques for ACL reconstruction.

## **10. RECORD KEEPING AND THE OPERATION NOTES**

- 10.1 Good records are a basic tool of clinical practice, and should be typed.
- 10.2 The records must include the name, date of birth and address of the patient, and the referring general practitioner should be identified. The hospital number should be clear. The hospital and surgeon with responsibility of care should be named.
- 10.3 The admission note should record the general medical condition of the patient as well as fitness for operation. It should contain a clinical history, the full clinical examination findings, pre-existing medical history, and all current disabilities. The purpose of the operation should be stated. All medication and allergies should be recorded.

- 10.4 An explanation of the proposed procedure as well as the risks and benefits should be recorded. The operating surgeon should normally complete the consent form with the patient. If this is done in outpatients or the pre-assessment clinic, only a short delay should take place before the surgery is undertaken.

### **Operative and Post-Operative Records**

- 10.5 It is best practice that operative notes be made in writing, or dictated for immediate typing and signature by the operating surgeon. If a pre-arranged pro forma is being used the operating surgeon should personally complete the pro forma.
- 10.6 A record of the operation should be made immediately following surgery and should include:
- The name of the operating surgeon, assistants and the name of the Consultant responsible
  - The diagnosis made and the procedure performed
  - Description of the findings
  - Details of tissue removed, altered or added
  - Details of serial numbers of prostheses and other implanted materials
  - Details of sutures used
  - An accurate description of any difficulties or complications encountered and how these were overcome
  - Immediate post-operative instructions
  - The surgeon's signature and the date of the operation
- 10.7 The anaesthetic record, signed by the anaesthetist, should contain:
- The name of the anaesthetist and, where relevant, the name of the Consultant anaesthetist responsible
  - Pre-operative assessment by the anaesthetist, and the date the assessment was performed
  - Drugs and doses given during anaesthesia and route of administration
  - Type and site of any regional anaesthetic used
  - Monitoring data
  - Intravenous fluid therapy, if given
  - Post-anaesthetic instructions
  - The anaesthetic record should be filed with the clinical notes

- 10.8 Progress after operations, including early complications, should be listed. The date of discharge and arrangements for continuity of care should be recorded.
- 10.9 It is accepted that all notes should be contemporaneous and should not be altered; errors should be identified in the Orthopaedic records within the general hospital records and should be easily identified within the case notes. All computer-assisted recording should conform to the Data Protection Act.
- 10.10 Follow-up notes should allow another doctor to assume the care of the patient at any time.
- All doctors referred to in an entry must be identified by name and designation
  - Details of written and verbal information given to general practitioners, patients, relatives and carers, whether at admission or later, must be recorded
  - Details of all investigations considered and whether the investigation has actually been requested should be noted
  - Ideally there should be at least one entry every day recording the patient's progress
  - An entry should be made when the management of the patient is changed or when there is an additional procedure
  - An entry should be made whenever a doctor is called to see a patient
  - Deletions should be made with a single line and signed and dated
- 10.11 All patients should have a good quality post operative antero-posterior and lateral radiograph of the knee.
- 10.12 There should be an agreed protocol for the retention of all documents and X-rays.
- 10.13 In Private Practice the whole process should follow the same high standard.

## **11. THE CHOICE OF GRAFT AND MODE OF FIXATION**

- 11.1 There are three types of intra-articular graft available: autograft, allograft or synthetic ligaments.
- 11.2 No one graft is applicable for every patient and graft choice should be tailored to the individual. The surgeon should be familiar and proficient in a standard technique.

- 11.3 **AUTOGRAFT** - The most commonly used are bone-patellar tendon-bone and four strand hamstring. The results of these graft techniques are equally satisfactory at five years<sup>(23)</sup>. The quadriceps tendon has recently gained attention<sup>(24)</sup>.
- 11.4 **ALLOGRAFT** - Commonly available allografts include achilles and patellar tendons. There are sterility, storage and cross infection issues which should be understood by the surgeon and discussed with the patient. They are most commonly used in revision or complex surgery.
- 11.5 **SYNTHETIC LIGAMENTS** - Synthetic ligaments are not currently recommended for routine primary intra-articular knee reconstruction<sup>(25,26)</sup>.
- 11.6 **MODE OF FIXATION** - There are a wide variety of fixation techniques and surgeons should be aware of their biomechanical properties and limitations<sup>(27)</sup>. Fixation techniques that can demonstrate no long term morbidity should be given preference. Newer techniques that may offer theoretical advantages must undergo careful laboratory and clinical evaluation in a few centres before routine use.

## 12. PROPHYLAXIS AGAINST DEEP VENOUS THROMBOSIS AND PULMONARY EMBOLISM

- 12.1 The risk of deep venous thrombosis following ACL surgery is very low and prophylaxis is not indicated as a routine.
- 12.2 In the high risk case thromboprophylaxis should be considered.

## 13. PROPHYLAXIS AGAINST INFECTION

- 13.1 All patients should receive a perioperative intravenous broad spectrum antibiotic.

## 14. SURGICAL TECHNIQUE

- 14.1 A thorough examination under anaesthetic prior to reconstruction is mandatory and the findings should be recorded in the operation note.
- 14.2 Although there are theoretical advantages, arthroscopically assisted ACL reconstruction has shown only minor advantages in postoperative symptoms when compared with mini-arthrotomy and no significant benefits at two years<sup>(28,29)</sup>. Arthroscopic techniques with appropriate equipment should enable optimal visualisation of the intra-articular anatomy and facilitate the treatment of concomitant pathology.
- 14.3 The use of a tourniquet is neither mandatory nor contraindicated.
- 14.4 The aim of reconstruction is to produce stability without restricting motion. The femoral tunnel should be placed at 11 o'clock in the right knee and 1



o'clock in the left knee at the back of the intercondylar notch when viewed arthroscopically. Anterior positioning of the femoral tunnel produces restriction of flexion<sup>(30)</sup> capturing the knee, which can lead to permanent motion loss or graft failure due to stretching.

- 14.5 "Over the top" positioning of the graft does not anatomically recreate the femoral attachment but has produced successful long-term results.
- 14.6 The tibial tunnel should be placed in the posterior 1/3 of the ACL tibial footprint. Anterior positioning of the tibial tunnel produces a block to extension and impingement which may lead to early graft rupture.
- 14.7 After fixation of one end of the graft, the knee should be cycled through a full range of movement to ensure that there is no excessive graft movement and also to check that the graft does not impinge. This should be recorded in the operative note.
- 14.8 There is no definite evidence that an extra-articular lateral tenodesis improves the clinical results of autograft reconstruction of the ACL<sup>(2,31-34)</sup>. There is however evidence that load sharing occurs in vitro between the the extra-articular tenodesis and the intra-articular graft<sup>(35,36)</sup>.

## **15. POST OPERATIVE MANAGEMENT**

- 15.1 There is no evidence to support the use of postoperative immobilisation with splintage or plaster, restricted weight bearing, continuous passive motion or bracing<sup>(37-39)</sup>.
- 15.2 Early restoration of a full range of movement, particularly extension, has been shown to be beneficial and does not compromise joint stability<sup>(40-42)</sup>.
- 15.3 There should be a suitable locally agreed protocol designed to return the patient to their pre-injury level of functional activity available to patients, physiotherapists and general practitioners.

## **16. THE FOLLOW-UP OF PATIENTS AFTER ANTERIOR CRUCIATE RECONSTRUCTION**

- 16.1 The follow-up arrangements that surgeons and hospitals make for ACL patients vary widely across the UK. Most surgeons discharge patients after six to twelve months and few patients are followed beyond five years. For best practice long term follow-up should be undertaken using an accepted assessment system, preferably the new International Knee Documentation Committee (IKDC). To enable accurate outcome measures to be evaluated, resources should be made available for prolonged follow-up. Data from each Trust would then be available in a common format for regional and national audits.

16.2 Follow-up by using questionnaires with X-ray checks by non-medically qualified practitioners is used in some centres, but there is no audit evidence of the efficacy of such arrangements.

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