



Journal club: 2 December 2013

Chairs: Mr M Wilkinson, Mr R Varma, Mr P Anilkumar

Convener: Mr I Findlay

King's College Hospital, London Journal Club

"Traumatic Knee Dislocations"

Engebretsen L, Risberg MA, Robertson B, Ludvigsen TC, Johansen S. Outcome after knee dislocations: a 2-9 years follow-up of 85 consecutive patients.

Knee Surg Sports Traumatol Arthrosc 2009;17:1013-26.

Reviewer: Miss A Clark-Morgan

Paper's Background

Dislocation of the knee is a rare injury, constituting 0.02-0.2% of all orthopaedic injuries, but with many spontaneously reducing its true incidence is underestimated. The diagnosis has thus been expanded to include injuries with at least two of the four major ligaments of the knee disrupted from a single traumatic episode. Early arthroscopic reconstruction is the mainstay of today's treatment and this paper focuses on simultaneous reconstruction of the ACL and PCL, and repair or reconstruction of the medial and lateral structures.

Dislocation of the knee is a serious injury and is 27% of the time associated with a life threatening illness. It is also often accompanied by fracture, popliteal artery injury and / or peroneal nerve palsy. The amputation rate after traumatic knee dislocation is reported as 10%.

Aims

This paper aims primarily to follow a consecutive series of knee dislocation patients to document their associated injuries, surgical treatment, knee function and osteoarthritis at a minimum of two years follow up. In addition, the group aim to examine the difference in outcome between patients with knee dislocations from high versus low energy trauma.

Methods

This is described as a prospective cohort study. It is a single centre study, involving 122 consecutive patients treated for knee dislocations at the only level one trauma centre in that region of Norway - Ullevaal University Hospital - between May 1996 and December 2004. Of these, 85 met the inclusion criteria of ACL, PCL and medial or lateral side injury with a minimum of 2 years follow up. The exclusion criteria were severe intra-articular fracture of the same knee or skeletal immaturity. Patient data was then entered into a database for interrogation.

On admission, history and examination was supplemented with radiographs and MRI of the affected knee. Serial assessment of limb pulses, colour, warmth and ABPIs guided vascular investigations – asymmetry between limbs lead to angiography. Peroneal nerve function was also assessed. Acute

injuries were supported with a hinged brace and used CPM for seven days pre-operatively to minimize chances of fluid extravasation during arthroscopy. Within two weeks of injury, acute patients underwent surgical reconstruction based on their admission and arthroscopic findings. Diagnostic arthroscopy was followed by tendon harvest and meniscal repairs. Autograft tendons for ACL and PCL replaced Achilles' tendon or quadriceps tendon allografts after 1998 - hamstrings for PCL and bone-patellar tendon-bone for ACL. Posterior lateral corner reconstruction followed femoral graft fixation and then tibial fixation of the PCL and secondly ACL. Finally the MCL was reconstructed.

A standard rehabilitation process followed all surgeries: epidural analgesia for 2-4 days, knee brace for 8 weeks and passive ROM exercises immediately post-operatively. The aim was to be PWB and have 90 degrees of flexion by week 4. Progressing to FWB with strengthening exercises after this and returning to full activity usually by months 9 to 12. The outcomes measured at follow up were radiographic evidence of osteoarthritis and knee functional assessments through clinical testing and questionnaires. This is level 5 evidence as data is being used to develop a standard of care.

Results

Although 122 patients were treated, only 85 were included in this study illustrating some loss to follow up. All statistical calculations were appropriate to data type. A summary of useful results follows:

- 53% were male
- 60% underwent surgery within 14 days of injury
- 51% were high energy trauma, 18% of which were motorcycle crashes
- 47% were sports injuries
- 67% of the low energy traumas were due to sports injuries, a statistically significant older population (mean age 47 years compared to 38 years, $P=0.002$)
- 21% sustained peroneal nerve injury, of these one patient had a complete palsy
- 6% sustained popliteal artery injury, all these were diagnosed by asymmetrical examination and confirmed with angiography, bypass or embolectomy and external fixation was followed by ligament reconstruction 3-6 months later
- 87% had radiographic evidence of osteoarthritis in the injured side
- Complications included post-operative arthrofibrosis in 6%, three superficial wound infections and one deep wound infection requiring repeated surgeries and a gastrocnemius flap, 3 patients developed deep vein thrombosis.

Conclusions

Despite the majority of patients having radiographic evidence of osteoarthritis, this study shows major knee dislocations do achieve a post-operative median Lysholm score of 83 (above 84 is considered good knee function), perform regular activity and a hop test greater than 83% of the uninjured side. High energy trauma does lead to less favourable results compared to low energy trauma, though there is greater variation in this category. Overall there is large variation in the data as they did not exclude any of the knee dislocations seen during the time frame, but this is also what makes the data noteworthy. Their extensive literature review illustrates this and is highly informative reading. Here the trends for vascular injury are shown as well (serial examination, rather than immediate imaging) and this study is of the same standard concluding ABPI to be a rapid, reliable tool for determining arterial injury - guiding the need for subsequent angiography.

Our Conclusions

Overall this is a thorough study that gives useful information in establishing the treatment standard for knee dislocations. The literature review is an excellent summary of treatment evidence and trends - worthy reading. It may be argued this is a retrospective study looking back at data collected, but this data has been collected prospectively with the study in mind. It is not a

randomised controlled trial and despite the loss to follow up, it is ethically and practically the best level of evidence currently available. Given this, it is interesting there have been no further updates since its publication in 2009. Single stage reconstructions are the only mode of treatment employed in this study, so there is limited gain for many centres providing staged procedures. It is also interesting to see the potential role for serial ABPI measurement, especially in the medico-legally driven world of healthcare, when the majority of patients undergo imaging based on injury mechanism as well as clinical findings. As imaging becomes more routine, the role of clinical examination alone has yet to be tested through the courts.

Recommendations for our Practice

From our departmental journal club discussion of this paper, consideration is being given to single stage reconstruction and the role of vascular assessment to guide imaging in cases of knee dislocation.

Howells NR, Brunton LR, Robinson J, Porteus AJ, Eldridge JD, Murray JR. Acute knee dislocation: an evidence based approach to the management of the multiligament injured knee. *Injury* 2011;42:1198-204.

Reviewer: Mr James Tebby

Paper's Background

Written by the Avon Orthopaedic centre in Bristol, UK.

Aims

The aim of the paper was to collate up-to-date evidence, including more recent prospective studies and systematic reviews, regarding some of the more controversial aspects of management of acute knee dislocations. They then hoped to give evidence-based guidance as to how to assess and manage these injuries. Further to this the paper looked to provide the reader with an overview of these injuries, including definitions, epidemiology, classification systems and focused assessment.

Methods

This study was a review of the evidence available relating to the aspects of managing a knee dislocation in hospital from initial assessment through to rehabilitation. As such the paper has reviewed the areas for discussion based on the chronology that would happen in hospital. Special focus was made on describing the neurological and vascular components of these injuries. They also look to generate some algorithms for management. The paper then moves its attention to the multi-ligament injured knee and the management of this connected but sub-acute component of the injury. It then gives recommendations for repair versus reconstruction for most of the main ligaments along with rehabilitation of the knee joint.

Results

The paper gives up-to-date statistics with regards to the incidence of knee dislocation, specific injury patterns and associated complications. There is a discussion of previous results regarding ligament specific repair or reconstruction.

Conclusions

These injuries are rare but severe. They need vigilant assessment and monitoring, even in the absence of initial findings. Definitive intervention should be timed well and performed by a specialist knee surgeon. Ligament repair/reconstruction should occur in one sitting. PLC should always be reconstructed, MCL may not always need repair, avulsions may be anchored back in place.

Harvesting of grafts and graft use should be carefully considered. Even with care as described the patient may still do badly and should expect a reduced level of function.

Our Conclusions

The paper has performed the majority of its aims. It presents a good overview of dislocation of the knee. It then uses the most current evidence to provide algorithms for the assessment and management of these patients. The paper goes through a logical progression of clinical findings/assessment followed by emergent management. It then focuses on up-to-date evidence based management of the residual multi-ligament injuries. Although it does not describe the specific techniques used it gives a brief outline of available grafts and options for repair vs. reconstruction. At this stage the authors are presenting their expert opinion regarding how they treat these injuries, often the data is inconclusive or is based on outcomes from single ligament injuries rather than multi-ligament injuries.

Recommendations for our Practice

Be vigilant and have a high index of suspicion surrounding these injuries. One-off assessment of vascular integrity is insufficient and ABPI measurements are a useful non-radiating and non-invasive test to perform. When applying external fixators, be aware of future investigations and management (MRI compatible, 10cm clearance above and below the knee joint). The multi-ligament knee injury should be repaired/reconstructed by a specialist knee surgeon.

Merritt AL, Wahl CJ. Rationale and treatment of multiple-ligament injured knees: the Seattle perspective.

Oper Tech Sports Med 2011;19:51-72.

Reviewer: Mr S Akilapa

Background

Multiple-ligament knee injuries pose a formidable threat to knee stability and function. These complex injuries are usually a consequence of high energy trauma and may be associated with fractures, nerve or blood vessel damage. Management warrants a rationale and robust decision making process to enable patients fulfil their routine as well as recreational aspirations. Proposed treatment strategies in published literature have been quite varied and sometimes inconsistent.

Aims

To validate the treatment strategies adopted by a single surgeon at a tertiary referral centre through a transition of high volume knee dislocations associated with multiple ligament knee injuries.

Methods

- Retrospective Case Series. Level IV Evidence
- 138 Patients enrolled consecutively over five years, Level 1 Trauma Centre, USA
- Injury Distribution: Two Ligament Injuries (35%), Three Ligament Injuries (30%), Four Ligament injuries (22%).
- “All or None” Single Stage Approach to Treatment at two to three weeks.

Results

- Excellent knee function and stability at 12 weeks;
- Seven patients (5%) had recalcitrant arthrofibrosis.
- Four patients (2.8%) had ligament re-rupture or dysfunctional instability
- Two patients(1.4%) required knee fusion after recurrent deep infections

Conclusion

Successes related to evolution of surgical technique: pre-arthroscopic dissection, optimal tunnel placement, staged fixation of intra-articular fractures and ligament reconstruction

Our Conclusions

- Large Cohort
- High risk of Selection Bias (Retrospective Study)
- Heterogenous Population (Limited adjustment for Confounders)
- No Control Group
- Unclear risk of Attrition Bias

Recommendations for Practice

Caution has to be applied in the interpretation of the results based on the lack of methodological rigor as highlighted. Prospective studies with better reported outcome measures, robust subgroup analyses and adequate adjustment for confounders would provide invaluable information on how to manage these complex injuries.