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Knee dislocation and vascular injury: 4 year experience at a UK Major Trauma Centre and vascular hub

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ABSTRACT

Introduction: Knee dislocation is a rare but potentially devastating injury. Quoted rates of associated vascular compromise vary dramatically between 3.3% and 64%, and the best approach to investigate and diagnose such an injury remains controversial. We aim to evaluate our own 4-year experience of knee dislocation and vascular injury as a UK Major Trauma Centre and vascular hub.

Methods: Knee dislocation was defined as disruption of at least two major stabilising ligaments of the knee and gross instability requiring an operation. Patients were identified from the Department of Trauma and Orthopaedics patient database across a 4 year period from 2010 to 2014. Electronic patient records, imaging and hard notes were retrieved and reviewed retrospectively and relevant information recorded.

Results: Twenty-five cases of knee dislocation were identified. Male to female ratio was 11.5:1 with a mean age of 33 years (range 17–71). One patient had a vascular injury which ultimately required a femoro-popliteal bypass graft. Twenty-four patients had documented examination findings pertaining to the vascular status of the limb. Seventeen patients had specific reference to the presence or absence of pedal pulses. The remaining seven cases were documented as either "warm well perfused" or "neurovascularly in-tact". Nine patients were discharged directly from the emergency department with outpatient follow up. All admitted cases had documented vascular examination findings the following day. Two patients had additional adjunctive non-invasive investigations. No patients were examined with duplex ultrasound, although two patients had pulses confirmed with hand-held doppler ultrasound. Three patients had an angiogram. Four cases have a documented discussion with or review from a vascular surgeon.

Discussion and conclusions: Our rates of vascular injury are in line with the most recent and largest study to date. Non-invasive investigation and selective angiography has been safe in identifying significant vascular compromise, however, there is inconsistency in management pathways, and too much reassurance attributed to the presence of pedal pulses on initial examination. Safety and consistency could be improved with the introduction of a formalised evidence-based protocol for the initial evaluation of knee dislocation and vascular injury.

Introduction

Knee dislocation, or multi-ligamentous injury of the knee, is recognised to be a rare injury, quoted to represent between 0.02% and 0.2% of all orthopaedic trauma [1]. Dislocation entails the complete disruption of the tibiofemoral articulation, which most commonly presents as an anatomically reduced but highly unstable knee, requiring damage to a minimum of two major stabilising ligaments. Even if not presenting in a dislocated position, it should be managed as such, due to the severity of the injury [2].

Clinicians should have a high index of suspicion for associated popliteal artery injury. Fixed proximally onto the medial femoral epicondyle at the fibrous insertion of adductor magnus, and distally tethered by the tendinous arch of soleus, movement of the artery is restricted leading to traction injury, particularly in

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anterior and posterior dislocations [3,4]. Rates of vascular injury have been quoted between 3.3% and 64%, the large variation in reported values reflecting the rarity of the injury and relatively low numbers in the majority of studies [5–12]. The lowest value of 3.3% came from the most recent and largest study to date, which reviewed 8050 limbs from a North American insurance database [5]. This could be considered a welcome finding given the poor prognosis associated with such an injury. Up to 20% of patients with vascular compromise will eventually require amputation, increasing to more than 80% with an ischaemic time of over 8 h [2–5,8,13]. Early recognition and management of a compromised limb is therefore vital. For this reason, the traditional approach has been for all cases to be assessed with angiography, however, modern thought is for a more selective approach, with adjunctive investigations used to guide decision making [10,14–16].

The aim of this study was to evaluate our experience of knee dislocation and concomitant vascular injury over the last 4 years, as a vascular hub and major trauma centre in the UK. The authors are particularly interested in how local rates compare to other quoted values in the literature, and the quality of our assessment and management.

Methods

We performed a retrospective review of patients with a diagnosis of knee dislocation, or multi-ligamentous injury of the knee, admitted over a 4 year period between 2010 and 2014. Our hospital is one of 26 adult and children's Major Trauma Centres (MTC) in the United Kingdom (UK). Patients were identified from the Department of Trauma and Orthopaedics patient database.

A multi-ligamentous injury of the knee was defined as disruption of at least two major stabilising ligaments of the knee and gross instability requiring an operation. The study includes patients who presented with both dislocated and reduced knees, as it was assumed that to obtain a multi-ligamentous injury the knee must have been dislocated. Therefore, those presenting in a reduced position had either done so spontaneously or been reduced by paramedics. Electronic patient records (EPR), picture archiving and communication system (PACS) imaging software, operation notes, clinic letters and clinical notes were retrieved and reviewed for each case to confirm the diagnosis and clinical course. Relevant case information was recorded for our study including patient demographics, mechanism and laterality of injury, examination findings, investigation results, and management.

Results

We identified 25 cases of knee dislocation between 1st January 2010 and 31st December 2014. A schematic representation of individual patient pathways can be seen in Fig. 1. Twenty-three patients were male and two female; male to female ratio = 11.5:1. Age range was 17–71 years; mean age was 33 years. All cases were assessed within 8 h of presentation to the accident and emergency department (A&E).

One patient had a vascular injury which ultimately required a femoro-popliteal bypass graft. Twenty-four patients had documented examination findings pertaining to the vascular status of the limb. This included seventeen cases where there was specific reference to the presence or absence of dorsalis pedis (DP) and posterior tibial (PT) pulses. The remaining seven cases were documented as either "warm well perfused" or "neurovascularly in-tact".

Nine patients were discharged directly from A&E with outpatient clinic follow up. The remaining cases were admitted to hospital on the day of presentation. All admitted cases had documented vascular examination findings the following day.

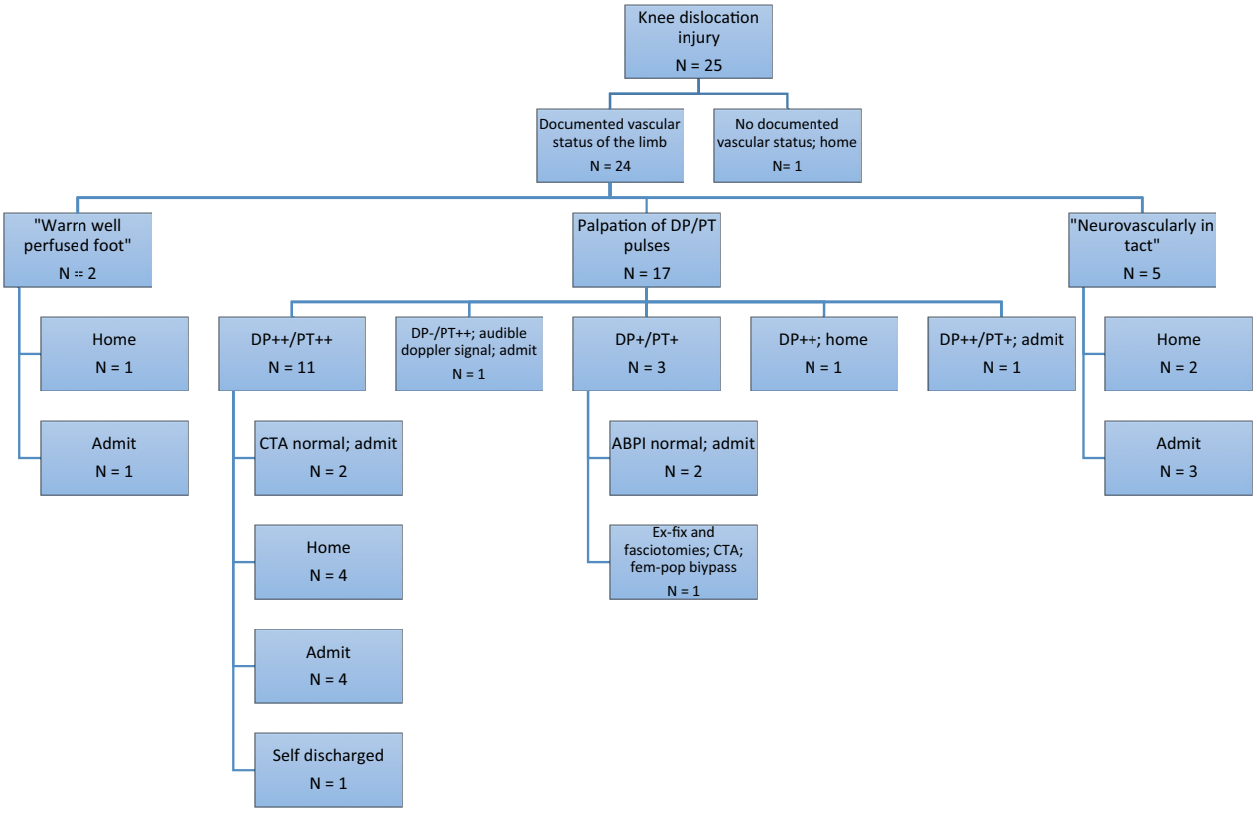

Fig. 1. Schematic representation of individual patient pathways in the assessment of their vascular status. "Home", discharged from A&E with outpatient clinic follow up in place; "admit", admission to hospital which included regular vascular observations for a minimum of 24 h.