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Staged management of knee dislocation in polytrauma injured patients

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KEYWORDS

Polytrauma
Knee dislocation
Multiligament injury
Schenck classification
Staged operative procedure

ABSTRACT

Introduction: Knee dislocation in the polytrauma setting is rare. The optimal method that this injury should be managed remains controversial. We therefore undertook a study to evaluate the incidence and outcomes of knee dislocation in polytrauma patients treated in our institution.
Patients and methods: From January 2005 to February 2011, two hundred-seventy five polytrauma patients were managed in our institution. Knee dislocation was present in 14 patients (4%): 4 females, mean age 46 years (range 19-52), mean ISS 24 (range 18-34) and 10 males, mean age 45 years (18-48), mean ISS 28 (range 18-48). Knee dislocation was classified according to the Schenck classification. MRI was used routinely for accurate assessment of the knee lesions. Treatment protocol consisted of initially management with the ATLS guidelines, neurovascular assessment, emergency surgical care simultaneously with reanimation procedures and hospitalization at ICU. Upon full evaluation and stabilization of the patient's physiological status and acquisition of a knee MRI scan, one- to three-stage operative treatment was performed. Decision for one- or more-stage treatment was based on the evaluation of the systemic and local clinical status, injury classification, timing of surgery, and consequences that remained after associated injuries. Clinical outcome was evaluated by IKDC 2000 Subjective knee evaluation, IKDC Clinical Examination Scales and the Tegner-Lysholm scale. A specific accelerated rehabilitation program was completed according to the surgical treatment. The mean follow up was 2 years (range 19-48 months).
Results: Patients had a different type of knee dislocations: five KD II, six KD III, two KD V2 and one KD V3. Clinical results were low in patients that underwent the three-staged protocol, and good and high in one- or two-staged operative treatment respectively at the two year follow up. The difference between the results in three groups of treated patients was visible but not statistically significant.
Conclusion: The physiological state of the patient along with the type of knee lesion dictates a timing and type of stage treatment. The best postoperative clinical results are fulfilled with the one-stage treatment and it should be the first choice of knee dislocation therapy. Two-stage treatment should be performed only if the general clinical status of polytrauma injured patient or local knee status does not allow a complete knee reconstructive surgery. Three-stage treatment results with the worst outcome and it should be avoided.

Introduction

Polytrauma is a medical term describing the condition of a person who has been subjected to traumatic injuries and its severity is expressed by an established scoring system such as the Injury Severity Score (ISS).[1,2] In the polytrauma setting, injuries to the lower extremities are frequently present. Knee dislocation in particular, while rare can be associated with increased morbidity. This injury could be an isolated soft tissue lesion or it can be more extensive involving bone, ligament, vascular and neural tissue damage. There are several principles that guide the management of knee dislocation.[3–11] However, optimal management strategy for this type of injury in polytrauma injured patients remains controversial and has not been investigated adequately.

The aim of this study therefore was to present our institutional experience in the management of knee dislocation injuries in polytrauma patients and to describe our staged operative approach.

Patients and methods

From January 2005 to February 2011, adult patients presented in our institution with polytrauma ISS >16 and had sustained a knee dislocation were eligible to participate in this study.

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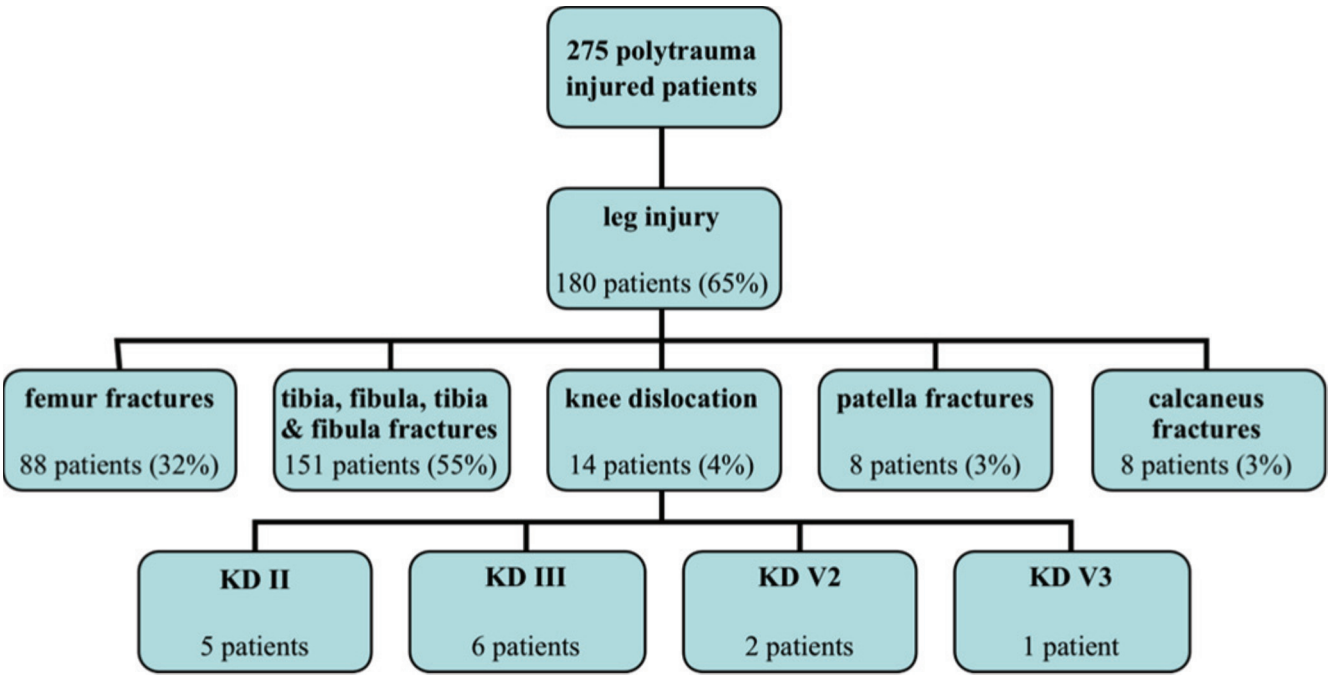

Fig. 1. Polytrauma injured patients in Clinic for Traumatology Zagreb 2005-2011.

Exclusion criteria were children and patients lost to follow up. Approval for the study was obtained from the local Ethics committee. All participants signed an informed consent form.

All polytrauma patients were initially managed with the advanced trauma life support (ATLS) guidelines. Neurovascular assessment was performed with examination of distal and popliteal pulses, Ankle Brachial Pressure Index measurement and Doppler Ultrasound. Emergency surgical care including knee dislocation reduction and immobilization in 20° of flexion was also performed simultaneously with reanimation procedures and hospitalization at Intensive Care Unit. Upon full evaluation and stabilization of the patient's clinical status, a knee MRI was performed[12–14] followed by stage operative treatment that combined one to three separated surgical procedures.[15–24] Anticoagulant therapy was prescribed in all patients from the first day of hospitalization by administration of subcutaneous nadroparine calcium 0.4 ml, once daily, except at the day of operative treatment, followed by oral warfarin 3-6 mg once daily, from the mean 5th day postoperatively (range 4th-9th), untill the patient was instructed to start full weight bearing. Each operative procedure was followed by appropriate targeted rehabilitation accordingly to the surgical treatment performed.[25,26] In general, postoperative treatment was started with splint immobilization for 48 hours. Further rehabilitation was carried out strictly on an individual basis focusing on control of postoperative pain, reduction of the joint swelling and protection of the graft (hinged brace locked in 0-30°, restoration of full range of motion, muscle strengthening and a gradual progression to previous functional activities). Demographic data and patient history, surgical interventions, complications and clinical outcomes were all recorded and analyzed.

Clinical outcome was assessed at the final follow up. Specific outcome instruments (IKDC 2000 Subjective knee evaluation, IKDC Clinical Examination Scales and Tegner-Lysholm scale) were utilised.[27–36]

The mean follow up was 2 years (range 19-48 months).

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) statistical software program version 16.0 (SPSS Inc., Chicago, IL, USA). The chi-square and Fisher tests were used to test the differences between types and results of treatment.

Results

Two hundred-seventy five polytrauma patients (183 men) were treated in our Intensive Care Trauma department with a mean age of 46 years (range 15-84). Among them, one- hundred eighty patients had thoracic, abdominal or head trauma combined with different types of lower limb injuries. Knee dislocation was present in 14 patients (4%) - 4 females, mean age 46 years (range 19-52), mean ISS 24 (range 18-34) and 10 males, mean age 45 years (18-48), mean ISS 28 (range 18-48). Among them, 2 patients were injured during a sports activity, 10 in traffic accidents, and 2 during a physical work activity. The mean hospital stay was 21 days (range 7-35).

Knee Dislocation Diagnostics

Plain X-ray, CT and MRI scan were used for diagnostics work up. We found a range of combined different tissue lesions according to the Schenck classification[37] (Figure 1):

KD II in 5 patients with bi-cruciate ligament rupture, KD III in 6 patients - 5 patients with PCL corner/LCL/ACL/ PCL ruptures (Figure 2) and 1 patient with CL/MFPL/ACL/PCL rupture, KD V2 in 2 patients with combined bi-cruciate ligament injury and tibial tubercle avulsion fracture, KD V3 in 1 patient with combined bi-cruciate ligament, MCL injury and tibial tubercle avulsion fracture.

Associated injuries treatment

Three patients sustained rib fractures and chest injuries, and were treated with surgical chest drainage because of hemothorax over a period of 4, 5 and 7 days respectively. Two patients had a liver hematoma, two had a spleen hematoma, five patients had a brain injury, and three had a brain contusion and edema with a minimal subdural hematoma, and all of them were treated conservatively. Three patients had a concomitant transient