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Surgical management of posterior knee dislocation associated with extensor apparatus rupture

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ABSTRACT

Objective: The purpose of this study was to report the clinical and functional results of patients who underwent surgical management for posterior knee dislocation associated with extensor apparatus rupture.
Introduction: Posterior knee dislocations associated with extensor apparatus ruptures are defined as rare but complicated injuries, which are difficult to return to the level of activity prior to the injury. The study demonstrated a hypothesis that good knee stability and early gain of range of motion could be achieved with deliberate design of the treatment protocol and proper application of the instruments.
Methods: Fifteen patients with posterior knee dislocations associated with extensor apparatus ruptures were evaluated after reduction and repair of extensor apparatus. Following that, multiple-ligament reconstruction in association with use of a lateral knee-spanning external fixator was applied for at least six weeks. Ligament reconstructions were performed using allografts. Range of motion and knee stability were both measured at each follow-up evaluation at a mean time of 36 months. The assessment was made using the Lysholm Knee Scoring Scale.
Results: The mean Lysholm scale score was 87.6 (range 73–95), with excellent in 11 cases, good in two, and fair in two. In the final evaluation, the range of motion was a mean range of 123.4° (range 100–135).
Conclusion: The use of a lateral knee-spanning external fixator ensured the safety of repaired vessels, knee stability after reduction, and early rehabilitation with range of motion.

1. Introduction

Posterior knee dislocation associated with extensor apparatus rupture is a rare injury that can lead to multiple ligament injuries [1–4]. Moreover, these injuries can lead to neurovascular compromise. Functional outcomes are difficult to return to the level of activity prior to the injury [5,6].

Results from recent studies have shown that early surgical management of knee dislocations is essential to return the range of motion of the knee joint and reduce the complication rate [4,7–10]. For those patients with knee dislocations associated with vascular injuries, management remains a great challenge because it demands early diagnosis and timely treatment [5,11].

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The objective of this study was to present long-term functional outcomes for patients with posterior knee dislocation associated with extensor apparatus rupture treated at the present institution. The hypothesis was that good knee stability and early gain of range of motion could be achieved with deliberate design of the treatment protocol and proper application of the instruments.

2. Patients and methods

Between 2009 and 2014, a total of 21 patients with posterior knee dislocation associated with extensor apparatus rupture were surgically treated with knee reduction and extensor apparatus reconstruction at the present institution. Patients were included if they presented with obvious clinical symptoms and radiological signs of a knee dislocation associated with extensor apparatus rupture, with or without vascular injuries. Exclusion criteria were being unwilling to participate in the study (one case) and severe injury in the knee region in association with massive soft tissue defects (one case); four patients were lost to follow-up. The remaining 15 patients were retrospectively reviewed.

An extensive patient history and careful physical examination were obtained at the very start of the study. Extra attention was paid to the neurovascular status of the lower extremities. Standard X-ray and computed tomography (CT) scans were required together with digital subtraction angiography (DSA) in cases that were considered as being associated with vascular injuries. The senior authors performed all of the surgeries. The technique chosen for the knee reduction, extensor apparatus reconstructions, and the type of graft used were based on the characteristics of injury of each patient. For the four patients associated with vascular injuries, the initial treatment included an early Doppler ultrasound examination, and main vessel exploration and repair. The Lachman test and anterior drawer, varus/valgus stressing, and posterior sag test were performed to evaluate the stability of knee joint after ligament repair and knee-spanning external fixator removal.

All patients were reviewed in the clinic by the surgeon who performed the surgery, and a well-trained research physician and physiotherapist independently performed scoring following a standard protocol. At the time of follow-up, the orthopedic surgeon examined the knee stability and range of motion for each patient. The functional outcome was determined with the Lysholm Knee Scoring Scale. The Lysholm Knee Scoring Scale is a well-validated measure used to evaluate outcomes of knee ligament surgery in patients; [12,13] it is a 100-point scale that assesses pain, locking, swelling, and stair climbing. There were no further evaluations for the limb, use of support, and squatting.

The clinical research ethics committee of the present institution approved this study. All the registered patients gave their informed consent.

2.1. Surgical management

The priority of surgical management was determined by detailed investigations of knee dislocation and neurovascular status, including radiographies before surgeries and repeated assessment during the surgeries (Figures 1, 2). Surgery was undertaken as soon as possible, and in all cases the knee was reduced as soon as possible after all of the investigations had been completed and

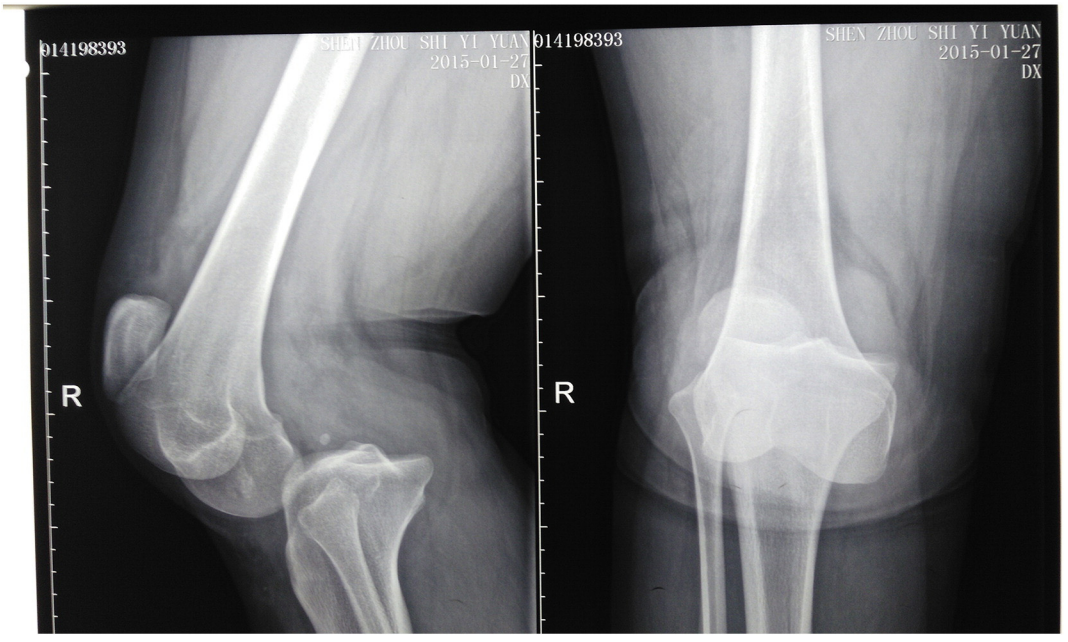

Figure 1. Plain knee radiographs, of a 32-year-old female admitted to hospital six hours after a vehicle collision injury, illustrating a combined right posterior knee dislocation associated with patella tendon rupture.

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