A knee dislocation is complete displacement of the tibia in relation to the femur with disruption of 3 or more stabilizing ligaments. Traumatic open knee dislocations are rare and challenging to treat due to associated severe ligamentous and soft tissue damage, and high incidence of neurovascular injury. In the literature, no agreed treatment algorithm can be found to achieve the best functional outcomes. A literature review was done on PubMed and EBSCO and no studies were found that focused on the treatment of open knee dislocations. The authors have obtained the patients’ written informed consent for print and electronic publication of this case series.

Case Descriptions

We present three cases of grade III open knee dislocations treated with either amputation or external fixation. Each injury was the result of significant high-energy trauma. Each patient was treated in a regional level one trauma center emergency department (ED) and was evaluated using the advance trauma life support (ATLS) protocols. All patients had multiple computed tomographic (CT) scans performed including CT angiography and magnetic resonance imaging of the affected extremity. Each patient had a significant vascular injury, two had complete transaction and one had an intimal tear of the popliteal artery. The three patients were taken to the operating room (OR) from the trauma bay with an average ED time of 148 minutes.

Immediate and definitive treatment of the affected extremity was decided after discussion between the trauma, vascular, and orthopedic surgeons. The major deciding factors for limb salvage were:

1. The amount of injury to the soft tissue
2. The degree of disruption of the neurovascular structures
3. The extent of concomitant lower extremity fractures

Each patient went to the OR for emergent irrigation and debridement with the application of knee-spanning external fixation to address possible infection risk and knee instability due to torn ligaments.

One patient had a vascular injury deemed irreparable by the vascular surgeon so the popliteal vessels were ligated and a knee disarticulation was performed. Another patient had a popliteal artery transaction treated with an emergent reversed saphenous graft. The two cases amenable to limb salvage were closed with an negative pressure dressing. Each patient went for repeat irrigation and debridement at least twice before definitive treatment. One patient was definitively treated with the original knee-spanning external fixation, one was revised to hinged external fixation of the knee, and the last was revised to a trans-femoral amputation. Future ligamentous reconstruction would be performed as deemed necessary.

Future research is required to determine the benefits of the proposed treatment algorithm for open knee dislocations, especially grade III. We recommend initial emergent irrigation and debridement with insertion of antibiotic beads and application of spanning external fixation. This patient should return to the OR for multiple repeat irrigations and debridements. Limb salvage versus amputation is best determined after discussion with the trauma, orthopedic, and vascular surgeons. Factors discussed should include viability of soft tissue, zone of injury, neurovascular structures, concomitant bony injury, and time from initial injury to OR.