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Medial opening wedge high tibial osteotomy in patients with posttraumatic medial tibial plateau bone defect: A case report

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ABSTRACT

INTRODUCTION: Traumatic uncontained bone defect in the knee joint is one of the most serious knee injuries. As the knee joint is the main weight-bearing joint of the body, the problem of weight loading should be addressed while restoring the bone defect. However, no consensus exists regarding the treatment of this injury.

PRESENTATION OF CASE: Two patients in separate cases initially sustained traumatic uncontained proximal tibial bone defects secondary to passenger traffic accidents. After recovery from the initial trauma, these patients underwent medial opening wedge high tibial osteotomy (MOWHTO) and femoral head allograft augmentation simultaneously.

DISCUSSION: Treatment of traumatic uncontained bone defect in the knee joint should be considered separately as tumorous or osteoarthritic bone defects. Especially, the effects of the defective supporting soft tissue structures should be considered.

CONCLUSION: We considered that MOWHTO was capable of solving problems of both bone stock restoration and weight loading. After the operation, the patients' knee joint pain was relieved and stable ambulation was possible.

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1. Introduction

Surgeons may encounter various knee injuries with high severity. Among them, total loss of the articulating bone in the knee joint is catastrophic; one cannot stand upright on the defective knee joint, and normal knee joint range of motion becomes impossible. In this injury, the problem of weight loading should be addressed while treating bone loss that occurred adjacent to the knee joint because the knee joint is a major weight-bearing joint of the body. Regardless of bone stock recovery, the injured knee joint is at risk of developing posttraumatic arthritis [1]. We considered that medial opening wedge high tibial osteotomy (MOWHTO) was capable of treating the problem of both bone stock restoration and weight loading. MOWHTO is a common joint-sparing surgical technique with numerous good to excellent result reports [2–4]. Here, we report two cases which were treated using MOWHTO with femoral head allograft for the traumatic medial tibial plateau bone defect and varus deformity. The patients were operated and followed in university hospital setting. The work has been reported in line with the SCARE criteria [5].

2. Presentation of cases

2.1. Case 1

A 57-year-old male patient, who was injured in the medial aspect of his left knee joint 22 months ago in a passenger traffic accident, visited an outpatient clinic. The patient was otherwise healthy before the accident. On admission, he was suspected to have sustained Gustilo–Anderson type 3B open fracture [6] with AO 41-B1 fracture based on the photographic and radiographic documentation of the initial injury (Fig. 1A and B). It was suspected that the bone fragment could not be salvaged because of severe comminution and contamination. The medial aspect of the patient's left knee was healed with large partial-thickness skin graft upon presentation to our clinic. The chief complaint was persistent global pain in the left knee, which was aggravated by weight-bearing activities. Resting pain was 9 in the visual analog scale (VAS) [7]. The bone defect in the medial tibial plateau was visible in the plain radiograph. The defective area was approximately 15% of the medial tibial plateau articular surface in three-dimensional computed tomography (3D CT) measurement using picture archiving and communication system (PACS) region-of-interest (ROI)-curved function in Maroview ver. 5.3 PACS (MAROTECH, Republic of Korea) (Fig. 2). His left lower extremity mechanical alignment showed a 2° varus deformity in the long-standing anteroposterior radiograph.

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Fig. 1. Case 1: (A) The patient presented highly contaminated Gustilo-Anderson type 3B open fracture upon initial trauma. (B) Uncontained medial proximal tibial bone defect secondary to AO 41-B1 fracture and proximal fibular fracture were observed in the immediate posttraumatic radiography.

His knee joint range of motion was limited to only 85° flexion from a 5° flexion contracture (Fig. 3). In the stress radiograph, the left knee showed grade 1 valgus instability. The medial meniscus, which was unsupported by a bony structure but surrounded by soft tissues fixed on the edge of the bone defect by a suture anchor, was detected on magnetic resonance imaging (MRI) (Fig. 4). The anterior and posterior cruciate ligaments were intact on MRI.

2.2. Case 2

A 19-year-old male patient who was run over by a truck 2 years prior visited an outpatient clinic. The patient was otherwise healthy before the accident. At the time of his initial injury, he sustained multiple skeletal traumas, including right femoral subtrochanteric fracture (AO 31-A3), left femoral shaft fracture (AO 32-A2), bilateral malleolar fracture (AO 43-B1 and 44-A1), and severe crushing in the medial aspect of his left knee which involved both the medial femoral condyle (AO 33-B2) and the medial tibial

plateau (AO 41-B1) (Fig. 5). The patient underwent an initial operation in the local clinic. Closed reduction of the right femur was maintained using external fixator, and the left femur underwent open reduction using dynamic compression plate. The anterosuperior half of the left medial femoral condyle and medial tibial plateau bone were severely comminuted and contaminated during the initial trauma, and could not be salvaged. The posteroinferior half of the left medial femoral condyle that contained most of the articular surface could be only salvaged and fixed on the distal femur using two 4.5-mm cannulated screws. In our clinic, he complained of persistent pain of the left knee during weight-bearing activities with posttraumatic varus limb alignment and limited motion. His pain was 8 in VAS. He had a huge bone defect in the medial tibial plateau and medial femoral condyle. His left lower extremity mechanical alignment showed 9° varus deformity in the long-standing anteroposterior radiograph because of deficient medial bone support. His knee joint range of motion was limited to 70° flexion from full extension. In the stress radiograph,

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