

# A report of nonunion at medial wedge high tibial osteotomy site and its management

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## Abstract

High tibial osteotomy (HTO) is an accepted treatment option for correcting deformities and reducing pain in the treatment of uni-compartment osteoarthritis of the knee. The principle is to redistribute the weight-bearing load. Medial open wedge HTO (MOWHTO) has gained popularity over lateral closed wedge osteotomy due to its decreased incidence of complications. MOWHTO surgical techniques have many variations in fixation techniques and in the use of bone grafts or bone substitute augmentation. In spite of the existing guidelines, there are no clear indications of grafting at the osteotomy site. Delayed union and nonunion although are possible complications, nonunion is especially rarely reported. Thus authors in this case report, like to point attention towards this under-reported complication and its management.

**Key words:** High tibial osteotomy complication, medial open wedge high tibial osteotomy, nonunion high tibial osteotomy

## INTRODUCTION

High tibial osteotomy (HTO) was introduced as early in 1961<sup>[1]</sup> and later popularized by Coventry in 1985.<sup>[2]</sup> It gained popularity for correcting deformities and reducing pain in the treatment of uni-compartmental osteoarthritic knee. The principle is to redistribute the weight-bearing load from the arthritic portion to the noninvolved articular cartilage portion of the knee. Use of medial opening wedge HTO (MOWHTO) has increased over the lateral closing wedge technique, for the treatment of varus knees because it offers improvements, it is easier to perform, corrects the deformity close to its origin, provides more predictable corrections and better preservation of the bone stock, and avoids injuries to the peroneal nerve and proximal tibiofibular joint. However, many complications, such as nonunion, infection, penetrating osteotomy cuts or screws into the tibiofemoral joint, tibial plateau fracture, and the loss of correction angle, have been reported in the literature.<sup>[3-5]</sup> MOWHTO surgical techniques have many variations in fixation techniques and in the use of bone grafts or bone substitute augmentation.<sup>[6-9]</sup>

Authors have reported two different methods of fixation. The first method involves the use of a T-buttress

plate with use of autologous tricortical iliac bone graft augmentation.<sup>[10]</sup> This method involves the issues of donor site morbidities, chronic pain, infections, and paresthesia.<sup>[11]</sup> Second method, which uses a locking compression plate without any bone grafts or bone substitutes, has been described.

Although autologous iliac bone grafts are considered to be the gold standard,<sup>[12,13]</sup> donor site morbidity with these grafts is unavoidable. The use of synthetic bone substitutes is an alternative. However, it has been reported to have several disadvantages, including delayed incorporation into bone, soft tissue irritation, and infections.<sup>[14]</sup>

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It was noted that the rate of delayed and nonunion following MOWHTO for medial compartment arthritis of the knee was relatively low and comparable to that reported for traditional closed wedge HTO.<sup>[12]</sup> Zorzi *et al.*<sup>[15]</sup> has also described that the use of autologous bone graft in MOWHTO <12.5 mm is unnecessary Meidinger *et al.*<sup>[16]</sup> reported 5.4% rate of nonunion. Risk factors influencing the development of a nonunion included smoking, body mass index and fracture of the lateral cortical hinge. No influence was detected for the degree of correction.

Nonunion although is a known complication, is rarely reported. The authors in this case report, like to point attention toward this complication, its management.

## CASE REPORT

A 42-year-old female with medial compartment osteoarthritis, varus alignment of the right knee [Figure 1] underwent



**Figure 1:** Preoperative X-ray showing medial compartment osteoarthritis

MOWHTO [Figure 2] for the same. Intra-operatively the medial osteotomy wedge was opened to 12° and the desired correction was achieved. The patient was advised nonweight-bearing mobilization with a walker during the rehabilitation. On subsequent follow-up postoperatively patient complained of persistent pain and clinically had tenderness at the medial osteotomy site. Radiographs showed that the osteotomy gap persisted with sclerosis of the osteotomy margins [Figure 3]. The patient was subsequently planned for bone grafting of the HTO site. Cancellous autogenous graft from right iliac crest mixed with bone graft substitute was used [Figure 4]. Postoperatively at subsequent follow-up the osteotomy site had completely healed and filled up radiologically [Figure 5] and clinically she had no tenderness at the osteotomy site.

## DISCUSSION

HTO is a valuable operation in a young and active population with medial compartment osteoarthritis and a varus knee deformity. The key to success depends on maintaining



**Figure 2:** Postoperative X-ray after medial open wedge high tibial osteotomy



**Figure 3:** Seven months postoperative X-ray showing nonunion at osteotomy site



**Figure 4:** X-ray after bone grafting procedure done



**Figure 5:** Postoperative follow-up X-ray showing healed osteotomy site

correction as well as the stability of the osteotomy. Medial opening wedge osteotomy creates a defect, which is inherently unstable. Although, the original technique suggested that no graft was required to fill the defect, recently *Zorzi et al.*<sup>[15]</sup> has shown that the complication rates, including delayed union and loss of correction, were higher in patients where the graft was not used.<sup>[17]</sup> Technique modification have been described, use of grafts have been termed unnecessary for defects <13 mm.

*Pornrattananeewong et al.* found that all osteotomies in their series became united within 8-12 weeks, regardless of patient demographics, including age, smoking status, or body weight.<sup>[10]</sup> *Warden et al.* in a study of 188 MOWHTO cases reported the occurrence of 6.6% delayed and as low as 1.6% nonunion cases following MOWHTO for medial compartment arthritis of the knee.<sup>[12]</sup> *Hooper et al.* reported a 2.8% nonunion rate when no osteoinductive agents were added.<sup>[17]</sup>

Our case report highlights the possibility of nonunion at the osteotomy with MOWHTO, with a small defect, its recognition, a timely line of management and its results.

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#### Conflicts of interest

There are no conflicts of interest.

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