

## Original Article

# Total knee arthroplasty after nonunion of lateral closing wedge high tibial osteotomy

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**Abstract:** High tibial osteotomy (HTO) is an effective surgical procedure for patients who have medial compartmental osteoarthritis of the knee with varus deformity of the limb. Historically, the most common form of HTO was a lateral closing-wedge. Lateral closing-wedge procedure provides a stable construct for earlier weight-bearing and bone union. This procedure has a very low risk of nonunion (<1%) due to apposition of large cancellous surfaces. We present a case of nonunion after a lateral closing wedge high tibial osteotomy (LCWHTO) which is treated with total knee arthroplasty. As in our case, surrounding bone quality may be poor and proximal fragment may not be large enough to be fixed. Salvage procedures as total knee arthroplasty should be preferred in such cases.

**Keywords:** High tibial osteotomy, nonunion, revision

## Introduction

High tibial osteotomy (HTO) is an effective surgical procedure for patients who have medial compartmental osteoarthritis of the knee with varus deformity of the limb. The abnormal load on the medial compartment of the knee is directed to the lateral compartment with this procedure [1].

HTO can be applied by three different procedures. Historically, the most common form of HTO was a lateral closing-wedge [2, 3]. Other procedures are medial opening wedge and dome techniques.

Complications of the HTO may include delayed union and nonunion [4]. Lateral closing-wedge procedure provides a stable construct for earlier weight-bearing and bone union [5].

We present a case of nonunion of lateral closing wedge high tibial osteotomy treated with total knee arthroplasty.

## Case report

A-74-year-old woman had been diagnosed as right knee osteoarthritis and received a LCWHTO which fixed by an external fixator at

another medical center 3 years previously. She visited our clinic 3 years after the operation. She had complained of pain and inability to load on her right leg. A nonunion on the osteotomy site detected on X-rays (**Figure 1A** and **1B**) and three dimensional computed tomography images (**Figure 2**).

The patient underwent a total knee arthroplasty for her right knee (**Figure 3**). It was revealed that there was a non-union at the osteotomy site and surrounding bone quality was poor during surgery. Proximal tibial bone cuts was performed through the just distal of the non-union site. Full metal wedge was applied for the tibial component.

Total knee replacement rehabilitation procedure was performed post-operatively. There was no knee pain at the end of the tenth month. Full weight-bearing and 100°-110° of knee flexion was regained at the same time.

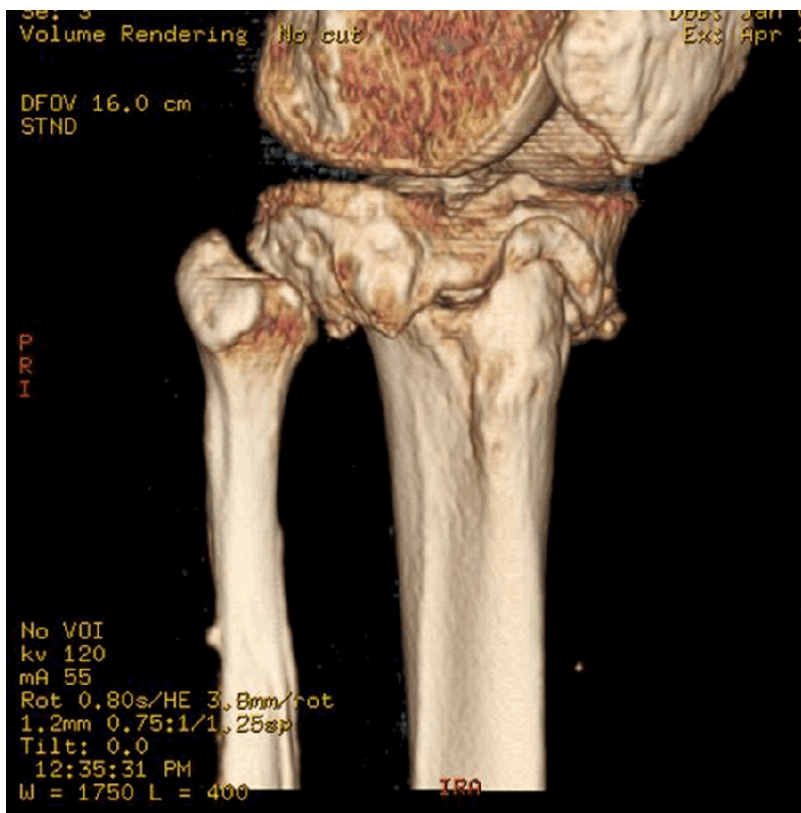
## Discussion

The traditional lateral closing-wedge osteotomy popularized by Coventry et al [6, 7]. Although medial opening wedge procedure has gained popularity in recent times, lateral closing wedge procedure is still frequently applied.

## High tibial osteotomy revision with arthroplasty



**Figure 1.** A. Preop AP X-ray demonstrate non-union at the osteotomy site. B. Preop lateral X-ray demonstrate non-union at the osteotomy site.



**Figure 2.** Preop three dimensional computed tomography images demonstrate non-union at the osteotomy site.

Easier technique, achieving more predictable correction, maintaining bone stock, correction of deformity close to its origin, and avoidance of peroneal nerve, proximal tibiofibular joint and the anterior leg compartment are the advantages of a medial opening wedge procedure when compared to a lateral closing wedge osteotomy [8]. Despite these disadvantages lateral closing wedge procedure is still applied due to certain advantages. The gap created in the proximal tibia in medial opening wedge high tibial osteotomy (MOWHTO) may cause problems, such as delayed bone union or correction loss in theory [9]. Nonunion was considered as one of the complications of MOWHTO [10]. According to 21 surgeons' results from 182 completed cases of MOWHTO [11] the second commonly approved disadvantage of MOWHTO was delayed or nonunion. According to Insall et al [3] lateral closing wedge high tibial osteotomy (LCWHTO) has a very low risk of nonunion (<1%) due to apposition of large cancellous surfaces. However, a recent meta-analysis revealed no significant differences in complication incidence, including nonunion between MOWHTO and LCWHTO [12].

Although nonunion after LCWHTO is to be much less frequent, it should be treated appropriately. Traditional nonunion treatment modalities can be applied in the presence of



**Figure 3.** Postoperative AP and lateral view of the right knee at the end of the tenth month.

adequate and quality bone stock at the osteotomy site. However, the bone may not always have these features.

In summary, total knee arthroplasty with tibial metal wedges may be performed as a salvage surgery for non-union of LCWHTO especially those closer to the knee joint line than it should be made.

As in our case, surrounding bone quality may be poor and proximal fragment may not be large enough to be fixed. Total knee arthroplasty should be preferred in such cases. This procedure was also applied in our case.

## Disclosure of conflict of interest

None.

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