

## Case Report

# A Patient of Tibial Shaft Malunion and Implant Broken Treated with Clamshell Osteotomy Technique: A Case Report

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## Abstract

This is a case report of a 37 year-old male suffered from left tibial and fibular shaft malunion and broken plate after a open tibial and fibular shaft status post operation 2 years before at other hospital, with limping limb and pain for a period of conservative treatment still in vain. We treated this patient with clamshell technique to solve multiplanar deformity in a single stage with a intramedullary implant, and corrected the angulation and leg length discrepancy for 2.5 cm, the walking ability and range of motion of knee was improved after the revision surgery.

## The Introduction

This is a patient underwent several operations for open tibial and fibular shaft fracture at other hospital before, but he suffered from complications such as malunion, leg length discrepancy and implant broken after the treatment. We treated this patient with clamshell osteotomy technique for multi-planar correction with an intramedullary nail, now the patient recovered well.

## The Case Report

This is a 37 year-old male suffered from left tibial and fibular shaft open fracture after a motorcycle accident in 2020 and underwent several operations in other hospital such as

debridements, Open Reduction And Internal Fixation (ORIF) with plating and revision ORIF with plating. But after a serious treatments, he still complained about the limping and discomfort of his left leg. Post-operation 1 year, he still suffered from the discomfort, so he went to our clinic for help. X ray showed his left tibial and fibular shaft malunion and angulated for 10° with varus deformity in AP view, 26° anterior apex and translation 0.5 cm in lateral view; the plate was broken, 2 broken screws retention in the tibial shaft, 25° in rotation. Active range of motion(AROM) of knee was 0°-95° and AROM of ankle was in normal range. Initial serum CRP was 0.8 mg/dL. Leg length discrepancy was 5 cm (Figures 1,2).



**Figure 1:** Pre-operation left leg x ray.



**Figure 2:** Pre-operative appearance.

After discussion with this patient, the surgery was prepared as usual in supine position with radiolucency table under spinal anesthesia. Our revision surgery was remove the broken plate and the broken screws through the old incision scar from the anterior lateral approach of tibial shaft, adequate release the scar tissue and adhesion band, osteotomy of fibular shaft malunion site with care.

Drilled multiple bicortical holes with 3.0mm drillbit of the long axis of the malunion segment and we transected the segment with clamshell osteotomy technique by oscillating saw and osteotome along the long axis of tibial shaft from proximally to distally and subsequent with a laminar spreader separated medial and lateral cortex widely. Decortication and recannulization with burr and flexible reamer to prepare the bone bed and remove the dead bone tissue. After realignment with indirect reduction method, a guiding rod was placed from proximally along with the anatomic axis through the osteotomized segment and into the distal segment under fluoroscopy assisted. Reamed the canal as same as intramedullary nail preparation, we choose an intramedullary nail( 10mm in diameter, 320mm in length, manufactor: CHM) to fix the proximal and distal segment with antegrade fashion. Before the screws insertion, we rechecked again proximal and distal position under fluoroscopy and also rotation. Then proximal screws inserted with use of the jig in static position, and distal screws inserted with free hand in static position. Filled the gap with the bone fragments produced by reaming and autograft which harvested from anterior superior iliac crest of pelvis, the gap size was 0.8 cm in length. After irrigation of the surgical wound, close the wound layer by layer, and covered with negative pressure assisted wound treatment system which is self-made with a sterile sponge and a piece of 3M steri-drape with and sterile sputum tube which vacuum was set in ward with pressure 75mmHg continuous mode. Post operation 1 year follow up, whole leg film showed leg length was 2 cm which compared with 5 cm in pre-operation status, pelvic tilting to left side for compensation. Bony union with callus formation. AROM of knee was 0-120 and AROM of ankle was normal (Figures 3-5).



**Figure 3:** 1 year follow-up post-operative X ray.



**Figure 4:** 1 year follow-up whole leg view.



**Figure 5:** Post-operative appearance.

## The Discussion

The clamshell technique proved to be a useful technique to correct complex lower extremity deformity, and realignment the axis of the deformity limb by the intramedullary implant which is reamed, and saved the operation time if the clinical situation was unavailable of the Patient-Specific Instruments (PSI) which is the jig can be designed and printed according to the pre-operative computer tomography or MRI images [1-3]. Advantages also included early weight bearing, acute correction in a single staged surgery, use of the local reamed bone graft and acceptable union rate [4]. Union times can be long, complications are not uncommon, and some patients will require secondary procedures [5]. The clamshell osteotomy is not really a sound technique for bone lengthening, but it can be used to shorten a segment of bone. However, one of the advantages of the clamshell osteotomy in comparison to distraction osteogenesis is the lack of daily pin site care or propensity to develop pin site infections [6].

## References

1. George VR, Matt LG, Michael TA, David PB, Glenn AB, et al. (2009) The Clamshell Osteotomy: A New Technique to Correct Complex Diaphyseal Malunions. *The Journal of Bone & Joint Surgery* 91: 314-324.
2. George VR, Matt LG, Michael TA, David PB, Glenn AB, et al. (2010) The clamshell osteotomy: a new technique to correct complex diaphyseal malunions: surgical technique. *The Journal of bone and joint surgery* 2010.
3. Hafez MA, Kirti Moholkar K (2017) Patient-specific instruments: advantages and pitfalls. *SICOT J* 3: 66.
4. Litrenta J, Tornetta P, Mehta S, Jones C, O'Toole RV, et al. (2015) Determination of Radiographic Healing: An Assessment of Consistency Using RUST and Modified RUST in Metadiaphyseal Fractures. *Journal of Orthopaedic Trauma* 11: 516-520.
5. Johnson EE (1987) Multiplane Correctional Osteotomy of the Tibia for Diaphyseal Malunion. *Clinical Orthopaedics and Related Research* 1987: 223-232.
6. Purcell KF, Russell GV, Graves ML (2021) The Clamshell Osteotomy for Diaphyseal Malunion in Deformity Correction and Fracture Surgery. *Medicina* 57: 951.