International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2021; 7(4): 112-113

www.orthopaper.com
Received: 17-08-2021
Accepted: 20-09-2021

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Shaft of humerus non-union: operated with fibular strut graft and long PHILOS

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DOI: https://doi.org/10.22271/ortho.2021.v7.i4b.2872

Abstract
The treatment of humeral shaft fractures ranges from conservative modalities to operative fixation, including plate osteosynthesis and intramedullary fixation. Non union is a complication of both conservative as well as operative intervention. This article discusses the successful outcomes achieved with long PHILOS with fibular strut graft in five cases. It is shown that fibular strut graft bridging non union site in conjunction with long PHILOS could be high potency healing material in atrophic non union humerus.

Keywords: Humerus non-union, PHILOS, plate osteosynthesis

Introduction
Humerus fractures are a common injury accounting for 5%–8% of all fractures [1]. Incidence of nonunion is found up to 15%of cases [2]. This differs depending on the location of the fracture. Smoking, alcohol abuse, diabetes mellitus and age, unstable primary osteosynthesis, open fractures, vessel injury and infection are common risk factors for developing a non-union [2].
There are several options for treating nonunions, including external fixation, open reduction with internal plate fixation, and adjuncts such as autograft, allograft, stem cells, platelet-rich plasma, demineralized bone matrix, and bone morphogenetic proteins. However there is no consensus regarding the standard of care, and the best treatment may depend on patient factors, surgeon preference, and fracture characteristics [3].
A fibular allograft provides bony purchase for fixation as well as rotational stability and bridging of nonunion defects [4].
We reviewed outcomes of a patient who underwent revision surgery for nonunion of the humerus using a fibular graft as an intramedullary strut.

Case
35 yr female presented with humeral shaft non union with implant failure with type 2 Diabetes mellitus. The initial humeral shaft fracture was treated with locking compression plate and resulted in non union (figure 1).After plate removal Long PHILOS with fibular strut autograft was the choice of treatment. 4 months later patient presented with improved arm function, x-rays showed stable positioned graft and signs of solid incorporation (figure 2). Follow up x rays 6 and 10 months (figure 4 and 5).

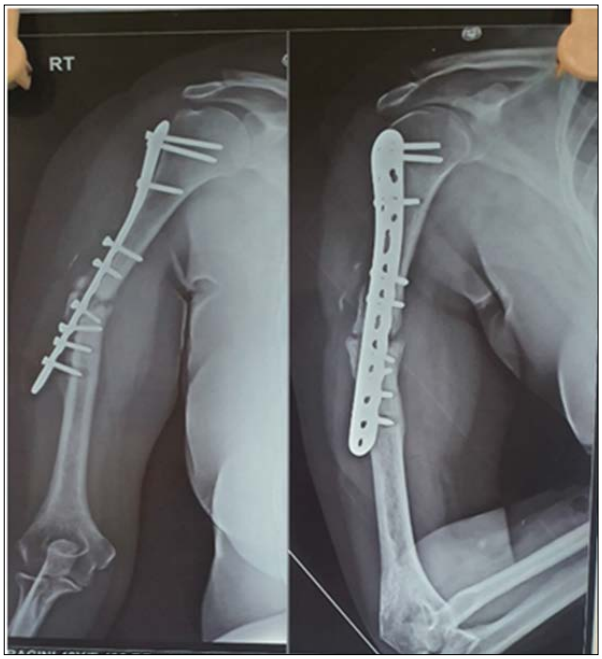

Fig 1: Showing atrophic non-union with implant failure

Fig 2: Showing signs of union after 3 months post surgery

Fig 3: Clinical picture showing improved range of motion and function

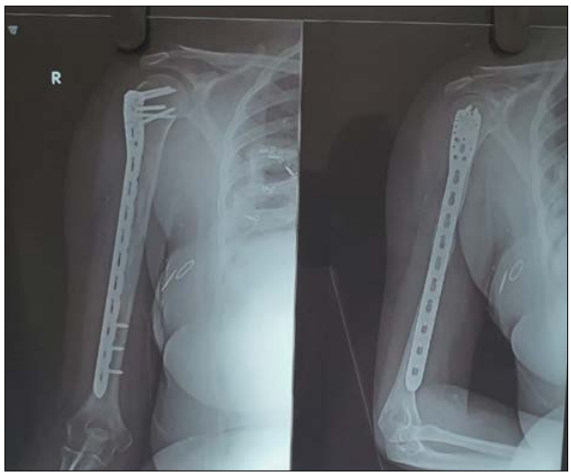

Fig 4 and 5: 6 and 10 months post op showing further union

Result

Post-operative period was uneventful subsequently patient showed improved range of motion.

Conclusion

Our technique for treating humeral shaft nonunions with a fibular allograft strut, especially those in the middle and distal thirds, represents a reasonable alternative to vascularized bone grafting. Technique of repairing non-union humerus fractures with fibular strut graft can result in high union rates.

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