



E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2021; 7(1): 815-816
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www.orthopaper.com
Received: 14-10-2020
Accepted: 02-12-2020

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A case report on non-union in scaphoid fracture using bone graft

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DOI: <https://doi.org/10.22271/ortho.2021.v7.i1m.2573>

Abstract

Scaphoid is the most common carpal bone to get fractured in the wrist. Scaphoid fracture is very challenging to treat since it has a tenuous vascular pattern. Non unions and degenerative arthritis can occur due to diagnostic delay and treatment inadequacy. Surgical management with newer techniques have emerged for the treatment of non-union in scaphoid fractures. Despite the advancement of the newly developed fixation techniques, including open and percutaneous fixation, the non-union rate of scaphoid remain as high as 10% after surgical management. Scaphoid non union can present with or without avascular necrosis of proximal pole, and may show a humpback deformity on the radiograph. Surgical treatment is directed at correcting the deformity with open reduction with internal fixation with bone grafting.

Keywords: Bone graft, scaphoid fracture, carpal bone

Introduction

A Scaphoid fracture with displacement has a non-union rate of more than 90%. Avascular necrosis of Scaphoid occurs most frequently in proximal pole fractures with a incidence of more than 30%. Treatment delay is one of the most common causative factor for the non-union of Scaphoid. Various surgical modalities and advancement in treatments are available in practice now for the Scaphoid bone non-union.

Case Report

A 35 year old male presented to emergency room with a chronic left sided wrist pain for a period of 12 weeks. He had a history fall on outstretched hand 12 weeks back and sustained injury to the left wrist. For which he had underwent native management at his native place. Aggravated on wrist movement during his occupation and pain relieved on rest. Pain was disturbing his activity of daily living. Clinical examinations revealed that tenderness over the anatomical snuff box, range of movements over the left wrist was painful. Radiological investigations like plain radiographs was done and found to have old non-healing Scaphoid fracture over the proximal pole. Magnetic Resonance Image confirmed non-union of Scaphoid.

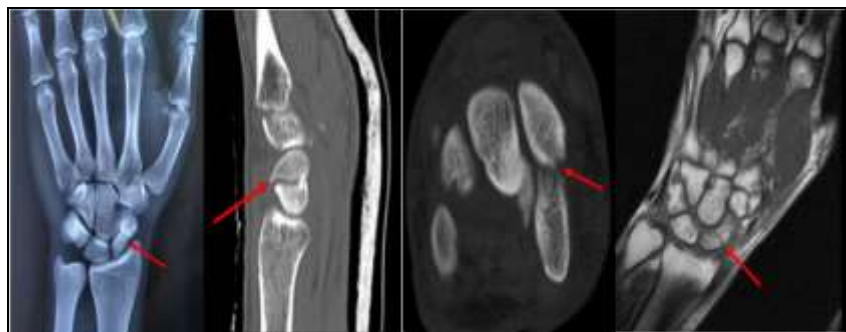


Fig 1: (A) X-ray AP view of right wrist showing transverse fracture through the scaphoid bone (red arrow). (B) CT Sagittal images of same patient showing fracture through the scaphoid bone (red arrow). (C) MRI T1WI Axial and Sagittal images demonstrating breach in scaphoid bone (red arrow)

Operative Procedure

Patient in supine position, hand in arm table under aseptic precaution Volar incision over Flexor carpi radialis tendon ending distally over the scaphoid tuberosity was made. Scaphoid bone was identified and the non-union of it was exposed by dorsiflexion and ulnar deviation of wrist. Sclerotic ends were freshened and cavity formed extending well into each adjacent fragments. Cancellous bone graft was obtained from the iliac crest and filled into the cavity. Stabilization of two fragments done with Guide wires with the help of image intensifier. Through the guide wire Herbert screw fixation done. And reduction was found satisfactory under the guidance of image intensifier. This technique is termed as Matti-Russe (inlay grafting).

Discussion

The incidence of Avascular necrosis is nearly 40%, occurring mostly in the fractures involving proximal 1/3rd. Vascular supply for the Scaphoid is determined pre-operatively by Gadolinium enhanced Magnetic Resonance Imaging and by intra-operatively assessing the bleeding from the bone. If any small fragment was found to be undergoing non-union, excision of proximal pole is done. Bone grafting is considered to be a better option than Pulse electromagnetic field for scaphoid non-unions. Degenerative arthritis is one of the last term complication. The goals of treatment were to relieve symptoms, correct the carpal deformity, achieve union and delay the onset of wrist arthrosis.

Vascularised bone grafting is indicated in non-union and avascular necrosis and failed previous iliac grafting. Sources of vascularized pronator quadratus pedicle graft from the distal radius, iliac crest free flap, distal dorsolateral radius and pedicle bone grafts based on the 1 to 2 intercompartmental suprapretinacular artery.

Cancellous bone grafting for scaphoid non-union was first described by Matti and modified by Russe which produced more than 90% union rates. This technique do no have associated shortening or angulation. Screw fixation is superior than K-wire fixation after bone grafting.

Conclusion

Early diagnosis of scaphoid fracture can solely alter the risk of non-union with or without avascular necrosis. For non-union scaphoid fractures, open reduction with internal fixation with bone grafting is most productive modality compared to others. The use of vascularized bone grafting was observed to have better outcome when compared to conventional bone grafts. Hence, we conclude that the vascularized bone grafting has better functional and radiological outcome in cases of non-union of scaphoid fracture.

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