

Functional and Radiological Outcome with Matti-Russe Grafting in Non-Union of Scaphoid

Outcome in
Nonunion of
Scaphoid
Fractures

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ABSTRACT

Objective: To evaluate the functional & radiological outcome in nonunion of scaphoid fractures – fixed with Matti-Russe grafts.

Study Design: Prospective Interventional Case Series.

Place and Duration of Study: This study was conducted at the Ameer-ud-Din Medical College, Lahore/ General Hospital, Lahore from June 2015 to June 2018.

Materials and Methods: A total of 20 patients included having age between 18-50 years with more than 4 months old fractures in scaphoid. All the fractures were treated before conservatively. The follow up was carried out at 3 and 6 months post-operatively. Both radiological evidences and functional assessment carried out and documented in Mayo's wrist score.

Results: The mean age was 31±8 years with male preponderance. Most of the patients have mean duration of injury 6±2 months. Almost half of the patients were having avascular necrosis (AVN) of the proximal pole of scaphoid. 75% of the patients resulted in good radiological healing and Mayo's Wrist Score (MWS) have value as pre op MWS 53 to post op MWS 84 which is statistically significant.

Conclusion: The results of both functional & Radiological data showed promising outcome with this technique so we conclude that Matti-Russe procedure is very effective procedure for nonunion of scaphoid but we recommend comparative study of different treatment options.

Key Words: Matti-Russe technique, Mayo's Wrist Score (MWS), Avascular Necrosis (AVN), Herbert Screws

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INTRODUCTION

Scaphoid fracture is considered the most common fracture of the carpal bones. It often occurs with fall on outstretched hand with hyperextension of the wrist leading to the direct impact on scaphoid bone which can be associated with fracture of Ulna or distal radius.^{1,2}

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These fractures are diagnosed with high index of suspicious as it is possible that initial x-ray will not reveal the fracture and a second set of x-rays are needed after 10 days follow up. Sometimes the decision of conservative management can lead to nonunion of the fracture with or without avascular necrosis of segment of the bone. The blood supply of this bone is very precarious which makes it prone to avascular necrosis especially in waist or proximal pole fractures. Delay in diagnosis and management can lead to osteoarthritis of the wrist or inter carpal joints.^{3,4,5} Despite the invention & application of new treatment strategies nonunion is as high as 10% with or without a vascular necrosis of proximal of the pole and can result in humpback deformity of the bone itself and later osteoarthritis with poor function and quality of life of the patient.^{6,7} In acute settings of less than 4 weeks old fractures of the scaphoid, closed or open reduction of the fracture with Herbert's screw fixation is the treatment of choice but in the chronic cases the management plan is modified with fixation & bone grafting. Different choices of grafts are available and used as vascularized bone graft, non-vascularized cortical bone graft, corticocancellous bone graft and only cancellous bone graft with different fixation techniques. In our study we used the Modified

Matti-Russe graft with k wire as stabilizing tool. The technique was initially presented by Heriman Matt in 1937 and later modified by Otto-Russe in 1960. Three studies^{6,8,9,10} evaluated the results of Matti-Russe technique and found to have promising results in non-union of long standing and displaced fractures.¹¹ So it is considered that Matti-Russe technique is established and well accepted technique in our setting which is simple and less expensive, so in our study we apply the modified Matti-Russe technique and evaluate radiological and functional satisfaction levels in the management of such fractures.

MATERIALS AND METHODS

This study was carried out in the Department of Orthopaedic Surgery at Lahore General Hospital, Lahore. The patients were admitted from the outpatient clinic between June 2015 to June 2018. We included the patients between 18-50 year of age with different modes of trauma leading to scaphoid fractures. The most of the patients were treated conservatively. The patients with open fractures, infections, previous shoulder surgery, poly trauma and patients having proven scapho-lunate dislocations were excluded from the study. The evaluation of such patients was performed clinically along with radiological investigations like X-rays & MRI of the wrist to rule out the avascular necrosis (AVN) of any of the fracture fragment. In all the patients modified Matti-Russe procedure with volar approach was carried out, the fracture fragments were identified and both proximal and distal portions of bones excavated by removing fibrous tissue from fracture site. The gap is filled with cortico-cancellous graft taken from the distal radius fracture is compressed and held with pointed reduction clamp and k-wire is inserted from dorsal to volar side percutaneously.

The reduction was confirmed in 3 dimensional views under c-arm and thumb spica cast was applied. The definition of union in scaphoid fracture is non-tender snuff box and radiological trabecular crossing of the fracture lines. The considered mean time of union is between 9-12 weeks.^{3,12} So we evaluated our cases at 03 months and 06 months post operatively. The k-wires were removed at 12 weeks with also removal of spica cast. At both follow up the patients were assessed with pain recognition, return to regular employment, range of movements. The grip strength was measured by asking the patients to squeeze the index finger of the examiner (Figure 1).

RESULTS

The mean age was 31±8 years with male preponderance. Most of the patients have mean duration of injury 6±2 months. The mode of injury was distributed in sports, RTA and fall at home which was quite common in female patients. Almost half of the

patients were having avascular necrosis (AVN) of the proximal pole of scaphoid which was diagnosed and confirmed on MRI. 75% of the patients resulted in good radiological healing and Mayo’s Wrist score (MWS) have value as preoperative MWS 53 to postoperative MWS 84 which is statistically significant. Rest of 25% of the cases the union was delayed and only in 2 of the cases the nonunion was established at 6 months, one case was re-operated and found to have subclinical infection and debridement was performed and in 2nd case re-fixation was performed with another bone graft. We observed in one of our patient the limitation of radial deviation but rest of the movements were satisfactory.

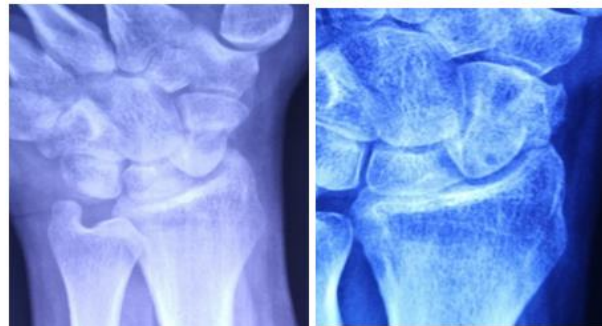


Figure No.1: A. Nonunion scaphoid B. Union after Matti-Russe graft

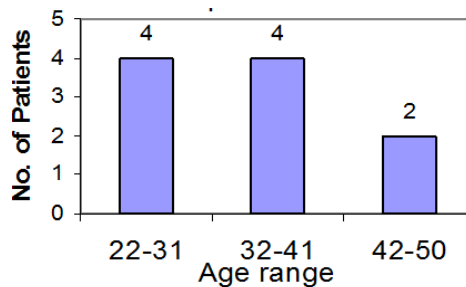


Figure No.2: Age distribution of patients.

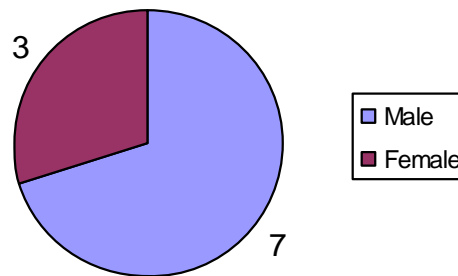


Figure No.3: Sex distribution

Table No.1: Comparison preoperative & postoperative Mayo’s wrist score

Preoperative Mayo’s wrist score	Postoperative Mayo’s wrist score
Mean ± SD	Mean ± SD
52.90±4.90	84.20±9.05
P value <0.05	

DISCUSSION

This study was performed at Lahore General Hospital by two surgeons in all the patients of established nonunion of the scaphoid bone with or without AVN proven on MRI of the wrist. The results of our study are quite satisfactory. If we will compare our results with the studies of same nature with same procedure, our results are both clinically and statistically better. In the study of Kolodziej et al¹³ in which the same procedure was performed without stabilization with K wires, the nonunion rate found 28%. In study by Bullens et al¹⁴ good to excellent result were observed in all the parameters like ROM, hand grip strength and weight lifting with longer follow up of 3-5 years. In another study different procedures like Herbest screws fixation, Matti-Russe technique, Fisk Fernandez technique and vascularized bone graft were performed but statistically no significant difference was found in bony union & rest of the parameters but Matti-Russe procedure was found to be cost effective method¹⁵ of treatment which also suit to our setting. Bertelli et al studied the persistence of nonunion with history of 2 years nonunion, the patients were treated by vascularized bone graft harvested from thumb with pedicle at first dorsal metacarpal artery by palmar approach. After one year the union rate of about 90% achieved which is almost the same as in our study but with this procedure the morbidity and dissection was significantly high.¹⁶ In some of the studies the vascularized bone grafting for nonunion and avascular necrosis are considered but the graft harvested from medial femoral condyle with union rate was the same (88%).^{17,18} At the cost of more morbidity, need for expertise & expensive equipment. It is also found no significant difference of the timing of the surgery on union of scaphoid fractures so it was assumed the union is independent of the age of the patient and its duration from the time of injury but carpal collapse and osteoarthritis can lead to the poor outcome in such fractures. If the patient is having nonunion with Pseud arthrosis this Matti-Russe technique had statistically significantly better outcome (81%). In those patient's supination & pronation was satisfactory but radial deviation and extension is impaired. This same finding, we observed in one of our patient but even the extension was satisfactory than the radial deviation which was clinically poor.

CONCLUSION

The results of both functional & Radiological data showed promising outcome with this technique so we conclude that Matti-Russe procedure is very effective procedure for nonunion of scaphoid but we recommend comparative study of different treatment options.

Author's Contribution:

Concept & Design of Study:	Muhammad Khalid-ur-Rehman
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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