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Primary prophylactic bone grafting for distal end radius fracture, Is it justified?

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Abstract
Background: Our objective was to evaluate role of primary percutaneous bone grafting for extra articular fracture distal end radius and its usefulness in preventing secondary complications – collapse and stiffness.
Methods: 60 patients of extra articular fracture distal end radius were divided into two arms. All patients were treated with closed reduction and fixation in form of k-wires or external fixator or combination of both. Odd numbered patients (Group A) were treated with primary percutaneous bone grafting and even numbered patients (Group B) were treated with fixation without bone grafting. Patients were followed up to 1 year after fracture union with radiological and clinical evaluation based on modified Mayo wrist score.
Results: Irrespective of other factors, Radiological union was found to be faster by 12 days avg. in patients treated with primary percutaneous bone grafting. Modified Mayo wrist score also improved in patients treated with primary percutaneous bone grafting.
Conclusion: Though long term, multi centric, larger pool of patients based study is required to justify the use of primary percutaneous bone grafting in case of distal end radius extra articular fractures, in selected group of patients, it definitely helped to prevent secondary complications and improve functional outcome.

Keywords: fracture distal radius, extra articular, percutaneous bone grafting Osteoporosis

1. Introduction
D/E radius is one of the commonest fractures [1-3] since existence of mankind and it is having bimodal age distribution[4]. High energy fractures are comminuted, intra articular and associated with other trauma and requires CT scan for evaluation and treatment with a specific approach, whereas low energy fractures are mostly seen in elderly population, extra articular and usually osteoporotic fractures with less degree of displacement [5-9].
Extra articular fractures are associated with a range of complications, like wrist stiffness, late collapse and arthritis of wrist joint and functional impairment. As the fractures involve the metaphyseal area of distal end of radius most of the fractures are associated with some degree of metaphyseal impaction and when reduced leave some void at fracture site. In elderly patients in addition to this metaphyseal void, there is poor bone healing due to osteoporosis [10-15]. Based on this observation we decided to use primary percutaneous bone grafting (taken percutaneously from iliac crest under local anaesthesia with special bone graft retrieving trephine needle) for extraarticular fractures of D/E radius. And assess the usefulness of the same for prevention of secondary complications and improve functional outcome.

2. Materials and Methods
60 patients, who presented with extra articular fracture of distal end of radius, were enrolled under the program for evaluation between April 2014 to August 2014 at our institution, and were numbered from 1 to 60. All patients underwent fixation with K wire, External Fixator or combination of both based on Severity of fracture and bone quality. Patients of Group A (i.e. Odd numbered patients) were treated with percutaneous bone graft taken from iliac crest under local anaesthesia in addition to fixation, whereas patients of Group B (Even numbered patients) were treated with only with Fixation.

All the patients were called upon for weekly assessment for 1st month, followed by biweekly assessment up to three months and then at 1 year. Radiographs were carried out at 1 month, 2 months and 3 months and 1 year. Clinical and functional assessments with Modified Mayo Score were carried out, once radiological signs of fracture union were visible and fixation was removed. Proper physiotherapy and supportive medicines were given to all the patients.

2.1 Observation and results

Statistical methods used: Chi Square test Out of 60 patients 41 were female and 17 were male. 2 patients were having bilateral fractures. Average Age was 57 years with range from 43 years to 71 years.

Average time for radiological union in Group A was 37 days (Range: 30 – 48 days) and in group B was 49 days (Range: 37 – 67 days), which is a significant difference.

Modified Mayo Wrist Score assessment was done and in Group A Average score (79; Range: 58-97), was better than average score in Group B (67; Range: 48-87).

2.1 Case 1

A 52 year old male patient was treated by closed reduction with k wiring and external fixator and percutaneous bone grafting. Post operatively patient had no collapse and good range of movements.

2.3 Pre op

Fig 1: Post op

Fig 2

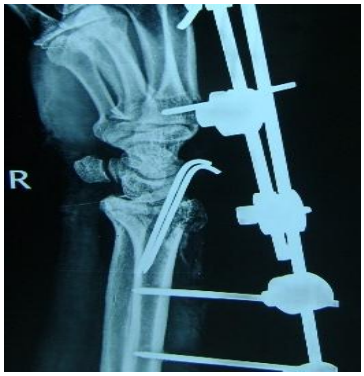

Fig 3: 6 month follow up:

Fig 4

Fig 5

2.4 Case 2

A 40 year old male patient having RTA was treated with k wire but showed collapse at 3 months. Percutaneous bone grafting was not carried out in that patient suggestive of increased probability of collapse.

2.5 Pre-op

Fig 6: Immediate post-operative

Fig 7

Fig 8: 3 months follow up

Fig 9

Fig 10

3. Discussion

As we can see from the results, women are affected as twice as men, because of more severity of osteoporosis in them and more chances of domestic fall in them. As these are low energy fractures, most of them can be treated with reduction under anaesthesia and K Wire or External fixator. As we have said, the rate of late collapse in distal end radius fracture due to metaphyseal void is one of the important factors in functional outcome. This metaphyseal void also leads to delay in healing and hence longer period of immobilization of wrist which leads to delayed physiotherapy and hence stiffness of wrist joint. As most of the patients of distal end radius fracture are of elderly age group their healing potential is poorer and some form of augmentation can be helpful in better healing of fracture. The main concern with Primary bone grafting is added morbidity and patient compliance. However due to percutaneous retrieval of bone graft under local anaesthesia, we have been able to convince patients without any problems. As introduced material at fracture site is having Osteogenic, Osteoinductive and Osteoconductive property and with very less additional cost, We have been able to achieve union at a faster rate and hence faster removal of external fixator or K wires and hence early rehabilitation and thereby prevention of secondary complications of stiffness and late collapse [16-19, 26-28]

Modified Mayo Wrist Score is also better in patients with primary percutaneous bone grafting as compare to patients who have been treated with fixation. There was no infection at bone graft harvest site or introduction site. Some superficial K-wire and external fixator infection do occur, which resolve well once proper pin tract care taken during union and removal of implant [20-25].

However our patient group size is very small, it is a retrospective study and was done at only one centre.

4. Conclusion

From above experience we conclude that, Primary percutaneous bone grafting in extra articular fracture distal end radius is definitely beneficial to the patient due to early union, faster rehabilitation and decrease in late collapse and stiffness. However further evaluation required with multicentric, prospective, randomised double blind studies.

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