

Results of Management of Distal radius fractures in osteoporotic patients by closed reduction and percutaneous fixation with bone substitute

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Abstract

Background

Fractures of the distal radius in elderly patients are often associated with metaphyseal defects that can lead to collapse, malunion and therefore decreased function. An alternative approach to simple reduction is to fill the defects with materials that can provide structural support.

Objective

The aim of this study to know result of bone graft substitute in the treatment for distal radius fractures in elderly

Patient and Methods

In our study 30 patients reported with the mean age 52.4 ± 10.27 . there was 18 males (60%) And 12 females (40%). fractures of distal end of radius in our study classified by Frykman's classification types I, II, III, V or VII . All patient subjected to closed reduction with K-wire fixation and bone substitute .

Results

At mean 16 weeks, our results show that patients treated with this method showed no metaphyseal defect, no collapse ,mean operative time range from 45 to 90 min and the mean union time from 9 to 14 weeks ,our result had satisfactory clinical outcome

Conclusion

Close reduction and pinning fixation with bone substitute in elderly patient is safe, efficient ,short time procedure ,minimal blood loss, good post- operative outcome and less hospital stay post- operative

Keywords

Distal radius fractures with Bone graft substitute.

Gartland and Werley classification [5] , AO Classification [6] , and Fernandez classification [7]).

Five measurements obtained from the plain films are useful for pretreatment assessment of the distal radius, and these measurements should be compared to normal side. Radial inclination: normally 23° to 24° (8), volar tilt (dorsal angle) normally 11° to 12° [8] , shortening (radial height): The normal distance between the 2 lines is 9 to 12mm(9) , radial shift (radial width) [10] and the dorsal shift: [11]

The aim of treatment is the restoration of anatomy, with full painless range of motion. The method selected to achieve this objective could be determined after careful study of the individual fracture. [12]

If the fracture associates with metaphyseal defects that could lead to collapse, malunion, decrease of the range of motion and grip strength, the alternative approach to simple reduction is to fill the defects with materials that could provide structural support. [13]

Introduction

Distal radius fracture is one of most common osteoporotic fracture in elderly patients. Reduction bone mineral density (BMD) has been identified as one of the most significant risk factors for distal radius fracture. Other risk factors, including lack of exercise, calcium and vitamin D deficiency, alcohol intake, family history, history of amenorrhea, and early hysterectomy. Patients may be asymptomatic until painful fracture. [1]

Distal radius fracture (DRF) refers to the fractures, beginning at the proximal end of pronator quadratus and ending at the radio-carpal articulation. [2]

There are several classifications for these fractures, based on the direction of displacement, the fracture configuration, the degree of comminution, and the mechanism of injury. The classification should be useful in selecting the most appropriate therapeutic method for the specific fracture pattern [3]. there are many classification lik Frykman classification [4],

try to hold the fracture in a good position until the trabecular defect is filled with new bone. In many cases, however, reduction is not maintained leading to an unsatisfactory outcome. In relation to locked plate fixation, being an open procedure, we wanted to be as minimal in our approach as possible, considering the age, morbidity and cost factors.

Probability (P) value

-It is significant if less than 0.05

-It is not significant if more than 0.05

Demography of data is shown in Table.

Our study has clearly shown that there are distinct advantages of using synthetic bone in addition to fixation of distal radial fractures in the elderly.

the study in Menofia university school.

Inclusion Criteria :

- Fracture Distal Radius.
- Closed fracture.
- Osteoporotic Patients.

Exclusion Criteria:

- Pathological Fracture.
- Opens Fracture.

Methods

When patient reach at ER after examination and radiological investigation , reduction under local anesthesia if possible to minimized soft tissue swelling ,followed by above elbow slab, admitted the patient and asking pre- operative laboratory test, and ECG,

Surgical procedure.

Preoperatively, the procedure was explained to the patient and informed consent was obtained. The affected arm was anaesthetised via brachial block , local IV or general anesthesia. Under image, the fracture was reduced using traction and counter-traction and fixed with two or more crossed percutaneous K wires passed from distal end radius to maintain reduction. Followed by dorsal incision about one cm above fracture site, the defect was noted and filled using bone substitute. The wound was then closed in two layers. A below-elbow cast was applied, and checks fracture reduction under c arm, then we make caste above elbow, the patient allowed active mobilization of thumb and fingers. (Figure)

Damage to neural and vascular structures could lead to permanent disability. Therefore, primary bony injury or secondary damage to the soft tissues must be diagnosed and managed to avoid disabilities. This study will focus on the result of the management of distal Radius fracture in osteoporotic patient, by close reduction and bone substitute. [13]

Patient and method

In our study 30 patients reported with the mean age 52.4 + 10.27. there was 18 males(60%)And 12 females (40%). fractures of distal end of radius in our study classified by Frykman's classification types I, II, III, V or VII . All patient subjected to closed reduction with K-wire fixation and bone substitute . All patients were followed post-operatively to assess the functional outcome, clinical outcome and radiological outcome. we use Mayo wrist score system to evaluate outcome, in our study we operate 30 cases with average follow up period from 4 to 6 moth ,

Radiological results following bone substitutes in distal radial fractures in our study there was no significant decrease in radial length over the period of follow-up up to 16 weeks. Radial length was well maintained throughout the follow-up period. Besides, there was no significant decrease in radial tilt over the period of follow-up up to 16 weeks. Also the functional variables analysis, there has been significant improvement in the range of all the movements in and around the wrist joint. All patients grip power also increased on each follow-up visits and were able to do their daily activities.

Result

The results of this study will be statistically analysed using the arithmetic mean, standard deviation, Student (t) test, and chi-square test by SPSS 16 program. (Table)

Discussion

Distal radius fracture is a common fracture in elderly patients. It results in a metaphyseal defect that leads to progressive displacement after initial reduction. Therefore, recognition of fracture pattern, reduction ,fixation ,and prevention of collapse is the key to successful management. Immobilization in a cast, external fixation and internal fixation with either Kirschner wires or plates are the methods, commonly used, to

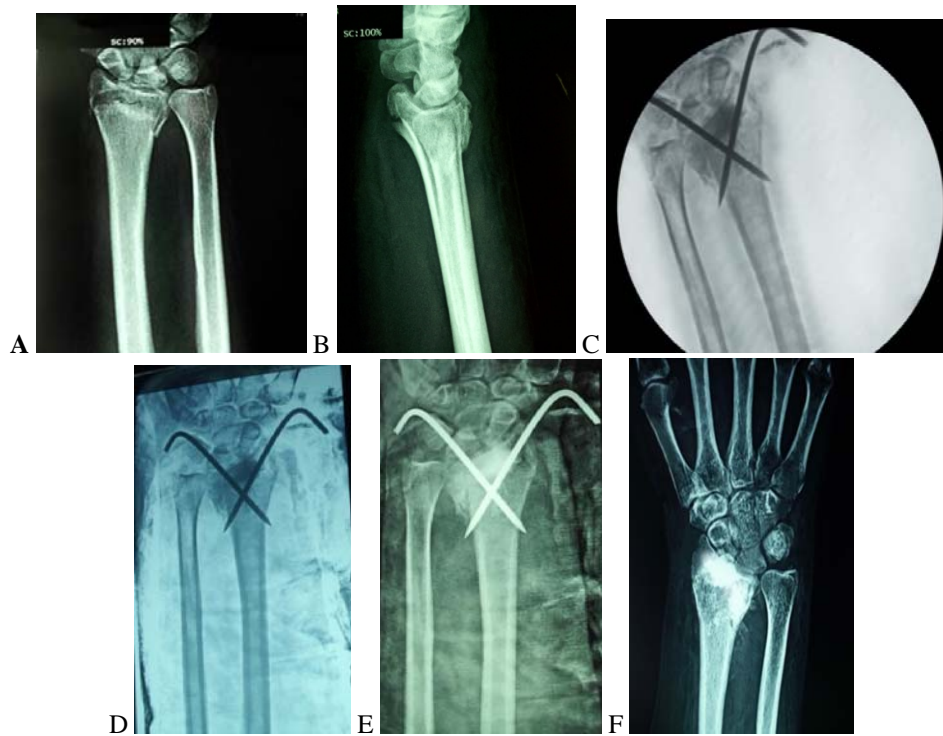


Figure A: Anter- poste view of distal radius fracture. **B:** lateral view of distal radius fracture. **C:** Intra-operative image under c-arm showing distal radius fracture fixed by two k- wire and bone substitute at fracture site. **D:** Immediate post-operative showing distal radius fracture fixed by two k- wire and bone substitute at fracture site. **E:** Four week post operative, anter- poste view of distal radius fracture four week post operative showing distal radius fracture fixed by two k- wire and bone substitute at fracture site. **F:** Four month post-operative, anter- poste view of distal radius fracture four month post operative

Table 1: Patients results.

Data		Excellent	Good	P – value (Fisher's Exact test)
Gender	Male	6	12	0.594# (Chi-square with Yates correction)
	Female	6	6	
DM		4	8	0.709
HTN		0	4	0.13
Mechanism of injury	Fall from height	8	8	0.284
	RTA	4	10	
Side	RT	4	4	0.678
	LT	8	14	
FRYKMAN CLASSIFICATION	Type I	6	0	0.007*
	Type II	2	2	
	Type III	2	8	
	Type V	0	2	
	Type VII	2	6	
Hospital stay	Two days	8	10	0.709
	Three days	4	8	

transmission with allograft. An alternative approach to deal with the trabecular defect is to fill it with a material, which provides immediate structural support. Reinforcement and shorter times for immobilization are achieved with satisfactory functional and anatomical results. Currently, ceramics are available in variable forms in the market, which are broadly divided into hydroxyapatite, tricalcium phosphate, biphasic calcium phosphate, and cement. These prod-

Fixation of comminuted extra-articular fractures of distal radius, with multiple kirschner wires alone, is insufficient to withstand forces across the fracture site and to prevent fracture collapse. Thus, these bone graft substitutes form a mode of solving this problem of collapse.

Bone graft substitutes added morbidity like site pain, long operative times, more bleeding and disease

concerned, there has been significant improvement in the range of all the movements in and around the wrist joint. All patients grip power also increased on each follow-up visit and were able to do their daily activities.

Our study has clearly shown that there are distinct advantages of using synthetic bone in addition to fixation of distal radial fractures in the elderly. We agree that the sample size being small and lacks control group, there is a weakness in this study.

However, this study has changed our clinical practice, and we now use synthetic bone grafts in distal radial fractures, in addition to fixation.

Conclusions

The first question that needs to be answered is, whether it necessary to use bone substitute in every distal fracture in elderly patients.

The quality of bone, size of bone defect, blood flow to fracture site of fracture and method of fixation all affect healing process and maintenance of reduction. So in significant bone defect which affects articular surface, bone substitute is necessary to avoid bone collapse if there is comminution fracture. But with less bone defect, it may be fixed with an angled locking plate where the articular congruity would be well supported and maintained by the use of distal locking screws. Minimal invasive like k-wire fixation and less rigid fixation like external fixator, needed support like bone substitute or graft.

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ucts are mainly indicated in filling of an osseous cavity or augmentation of bone to enhance its mechanical strength. They also have faster speeds of resorption [14].

Hydroxyapatite has two properties that make it attractive. First, it can be formed in a three-dimensional structure that is rigid and stable. Second, at a microscopic level, the building blocks of HA can be organized to form micro-pores of ideal size for osteogenesis and angiogenesis. The porosity, formed into hydroxyapatite, provides the essential design for proper bone ingrowth, thus creating a stable interface for new bone formation [15]. Synthetic grafts are readily available in different sizes and shapes and are supplied in sterile packet, thus preventing the spread of any kind of infection. The procedure can be performed under axillary or intravenous regional anesthesia and it offers a quick rehabilitation of the wrist and power of the grip.

In our study 30 patients reported with the mean age 52.4 ± 10.27 . There were 18 males (60%) and 12 females (40%). It is different from the age group reported by **chintan hedge ,vishvas shetty, sandeep wasnike, immthiaz and vijay shetty** in which thirty-one elderly patients were included in the study between May 2009 and June 2011.Among the previously mentioned patients, four patients failed to be followed up, leaving twenty-seven patients. Patients of both sexes above the age of 50 with extra-articular, closed comminuted fractures of distal end of radius of Frykman's classification types I, II, III, V or VII are included in our study. While in **chintan hedge study**, Frykman's classification types I, II, V or VI were included in the study. All patients were subjected to closed reduction with K-wire fixation and hydroxyapatite augmentation. All patients were followed up post-operatively to assess the functional outcome, clinical outcome and radiological outcome.Also, **chintan hedge** has used the patient-related wrist evaluation (PRWE) score, whereas we use Mayo wrist score system to evaluate outcome. In our study we operate 30 cases with average follow up period from four to six months, **chintan hedge** average follow up period was four months.

In the light of radiological results in our study following bone substitutes in distal radial fractures, there was no significant decrease in radial length over the period of follow-up up to sixteen weeks. Radial length was well maintained throughout the follow-up period. Besides, there was no significant decrease in radial tilt over the period of follow-up up to sixteen weeks. Radial tilt was also well maintained throughout the follow-up period.

Also in as far as the functional variables analysis is

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