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Dual Onlay Graft

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= Abstract =

Modified Dual Onlay Graft for Nonunion of the Humeral Shaft

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There have been some difficulties in treatment of nonunion of the humeral shaft with osteoporosis. We report here the results on the treatment of nonunion with osteoporosis by using modified dual onlay graft method. The six cases among 34 nonunions of humeral shaft were operated by modified dual onlay graft. Initial treatments were applied one hanging arm cast, two plate fixations, three intramedullary nailings. In the 3 cases of them, we performed plate fixation and bone graft as secondary treatment. However, nonunion occurred with loosening of fixation. Modified dual onlay graft was applied from 6 to 36 months (average 12 months) after fracture of humerus. The proximal and distal humeral nonunion surface was made decorticated and flattened, and then reduction was performed. On the lateral side of nonunion site, 6 holes plate was fixed and on the medial side, fixed with 5-9 cm cortical bone which was harvested from proximal tibia. Cancellous bone graft was performed around nonunion area. Long arm splint was done for 2-4 weeks after operation. The union period was in the range of 3.5-6 months (average 4.9 months) in all six cases. Quicker bone union was achieved as the bone block got longer and the number of the fixation screw increased. We conclude that modified dual onlay graft method is the one of effective methods to treat nonunion of humeral shaft fracture with osteoporosis.

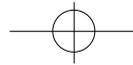
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Key Words: Humerus, Nonunion, Modified dual onlay graft

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Table 1. Initial and Secondary Methods of Treatments

	Methods	No. of cases
Initial Treatment	Hanging arm cast	1
	Plate and screw	2
	Intramedullary nailing	3
Secondary Treatment	Plate with bone graft	3

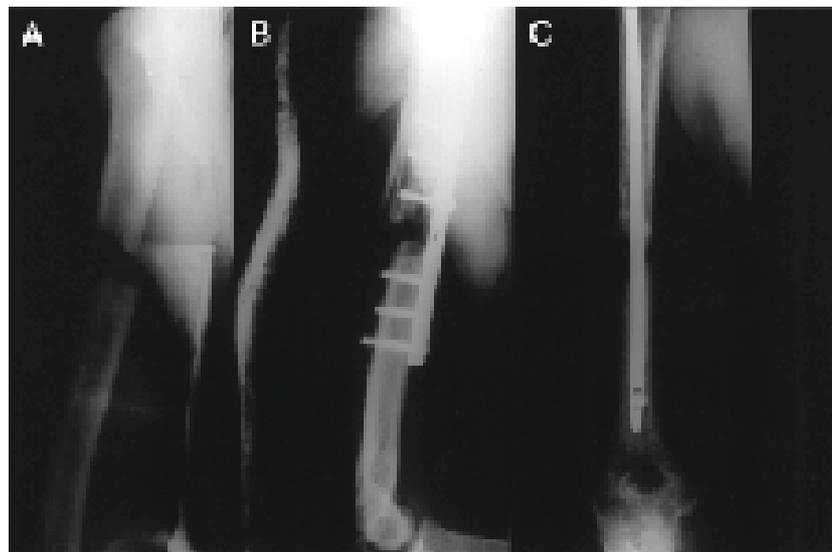


Fig 1. Inadequate initial treatment of humeral shaft fracture
A. Radiograph after hanging arm cast shows nonunion
B. Radiograph obtained after inadequate plate fixation shows nonunion
C. Radiograph after intramedullary nailing shows distraction of fracture site

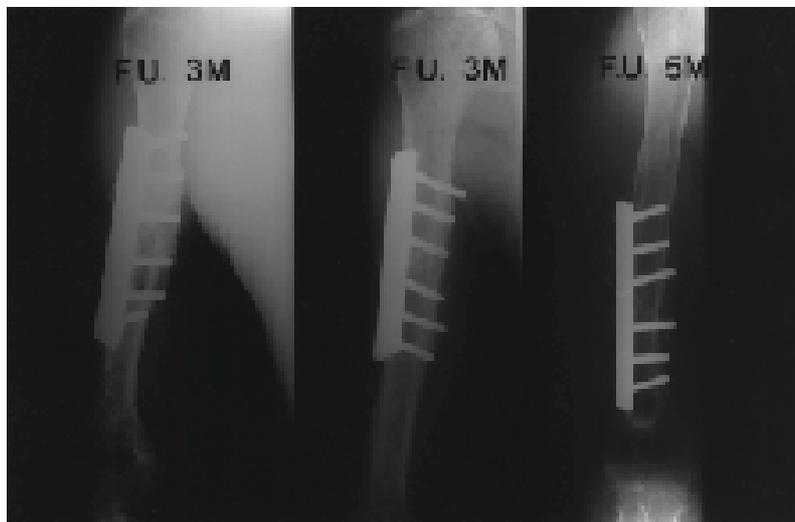
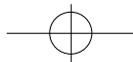


Fig 2. Follow-up radiograph shows bone union

dual onlay graft

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Table 2. Union Period

Bone block(cm)	Clinical union(Mos.)	Radiologic union(Mos.)
5/5.5	3	6
6.5/7	2.5	5
8/9	1.5	3.5
Mean	2.3	4.9

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dual onlay graft 6 가 4

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3 6 2

1 2

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(Table 1).

(Fig 1), 가 2

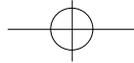
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2. Dual onlay graft 6 3 12

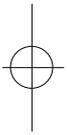
0.5 cm

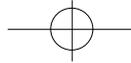
(bone onlay) 5-9 cm 1.3 cm





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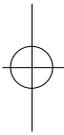


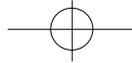


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REFERENCES

Taylor¹⁹⁾ 가 1,7,11)
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 Samiento 16) 30° 3 cm
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 1) , :
 30-2 : 424-429, 1995.
 2) , , :
 23-1 : 237-247, 1988.
 3) **Boyd HB, Lipinski SW and Wiley JH** : Observation on nonunion of shaft of long bone with statistical analysis of 842 patients. *J Bone Joint Surg*, 43-A:159, 1961.
 4) **Carroll, S.E.** : A study of the nutrient foramina of the humeral diaphysis. *J Bone Joint Surg*, 45-B : 176, 1963.
 5) **Coventry BM and Lauren, LE** : Ununited fracture of the middle and upper humerus. *Clin Orthop*, 69:192-198, 1970.
 6) **David HT and William D** : Nonunion of the humerus. *Clin Orthop*, 204:162-168. 1986.
 7) **Foster RJ, Dixon GL Jr., Bach AW, Appleyard RW and Green TM** : Internal fixation of Fractures and nonunions of the Humeral shaft. *J Bone Joint Surg*, 67-A:857-864, 1985.
 8) **Healy WL, White GM, Mick CA, Brooker AF, Jr and Weiland AJ** : Nonunion of the humeral shaft. *Clin Orthop*, 219:206-213, 1987.





- 9) **Holm CL** : Management of humeral shaft fractures. Fundamental nonoperative techniques. *Clin Orthop*, 71:132, 1970.
- 10) **Pritchett JW** : Delayed union and non-union of fractures. *J Bone Joint Surg*, 46-B:627-643, 1968.
- 11) **Pritchett JW** : Delayed union of humeral shaft fractures treated by closed flexible intramedullary nailing. *J Bone Joint Surg*, 67-B:715-718, 1985.
- 12) **Rockwood CA Jr. and Green DP** : Fracture in adult., 4th ed. philadelphia *JB Lippincott Co.* 261-284, 1996.
- 13) **Wray, J.B.** : The Influence of Various Hormones on the Fracture-Healing Process. *Clin. Ortho. Rel. Res.*, 50:324, 1967.
- 14) **Herbsman, H., Powers, J.C., Hirschman, A., and Shaftan, G.W.** : Retardation of Fracture Healing in Experimental Diabetes. *J. Surg. Res.*, 8:424-431, 1968.

