

13 , 4 , 2000 10

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2 3

■ ● *

*

< >

10, schanz 4, 6 2 3 45 (I, 16), (II, K-3, 17), (III, 12)

가

I 가 III 가

가 II 80, III 73 II

I 가 17 (38%) II

1 10.4

2 3

7,20)

4-5%

가

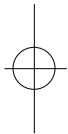
2).

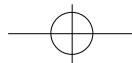
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C-arm

10,13,14,15,16,17)

2

3

K-

schanz

1995 2 1999 3

60 6

12)

가 가

45

(arm sling)

(pendulum exercise)

51

가 23

3

6

, 가 22

가

30 (66.7%) 가

, 12 (26.7%),

3 (6.6%)

가

가

(deltopectoral approach)

1) simple shoulder test

17)

Hawkins⁸⁾

24)(Table 2).

Neer

19)

Kronberg

25)

가

(Table 3).

Table 2. Postoperative pain evaluation by Hawkins

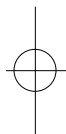
5	No pain
4	Slight pain
3	Pain after unusual activity
2	Moderate pain
1	Marked pain
0	Complete disability

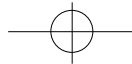
Table 1. Fracture types, age, follow up period, function score, pain score and range of motion according to the operative methods.

	Group I	Group II	Group III
Fracture type			
Two part	12	10	4
Three part	4	7	8
Average age(yrs)	54(11-87)	47(14-68)	54(25-61)
Follow-up period(mon)			
Average	14	10	18
Range	8-31	7-18	10-35
Function score	54(32-90)	80(45-93)	73(42-92)
Pain index	2.2	3.5	3.2
Range of motion			
Forward elevation	110(37-153)	152(55-167)	141(48-161)
Abduction	60(11-97)	92(42-112)	88(39-103)
External rotation	10(0-20)	23(13-35)	19(10-32)

Group I, treated with conservative method; II, treated with closed reduction and internal fixation;

III, treated with plate and screw fixation.



**Table 3.** Radiographic evaluation from introduced by Kronberg

Good	Only minimal displacement of bone fragment
Acceptable	Both tubercles in place
Poor	Both tubercles in place Varus impaction of humeral head >1cm displacement of greater or lesser tubercle or both humeral head shaft in contact with humeral head Varus or Valgus impaction of humeral head

5).
2 3
32 (20-46)
85 (58-110)
velpeau
(Group I) 16 ,
(Group II) 17 ,
(Group III) 12
paired t-test 가
2.
가
54(32-90)
80(45-93)
71(42-92)
가 (p<0.05)
(p>0.05) (Table 1). Hawkins 7)
2.2 가 (p<0.05)
3.5,
3.2
(p>0.05) (Table 1).
3.
Kronberg 25)
6 (38%), 5 (31%), 5
(31%) , 8
(47%), 8 (47%), 1 (6%) (Fig 1, 2,
3), 8 (67%),
3 (25%), 1 (8%)
가 (p<0.05),
가 가 (p<0.05),
(p<0.05). 10.4 (5 -15)
(p>0.05).
4.
5
(11%) 가
3 (7%), 2 (4%), 2 (4%),
2 (4%), 1 (2%)
(Table 1).

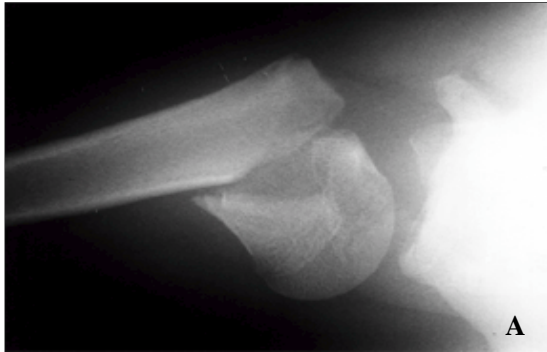


Fig 1A. Preoperative radiograph of a two part fracture of the proximal humerus in a 20 years old male.

1B. Postoperative radiograph after closed reduction and 2 K-wires fixation.

1C. Radiograph at 14 months shows good union and remodeling of fracture site.

(Fig 4).
(Table 4).

6,22)

11,24)

30 (67%) 가

Neer 19)가

velpeau

7), 15%

가 19). 1970 Neer¹⁹⁾

가

4

5,19).

2 3

가

3).

가

4-5%

15%

19).



Fig 2A. Preoperative radiograph of a comminuted three-part fracture of the proximal humerus in a 39-year-old male.

2B. Postoperative radiograph after closed reduction and 3 Schanz pins.

2C. Radiograph at 6 months shows good anatomical reduction.

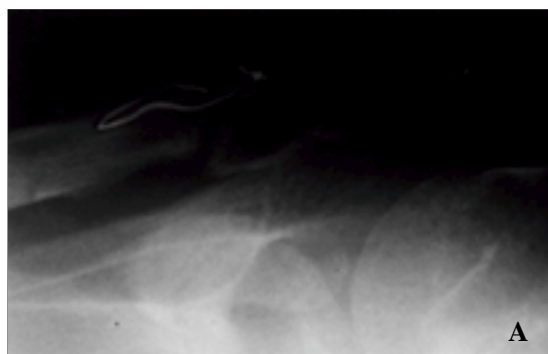
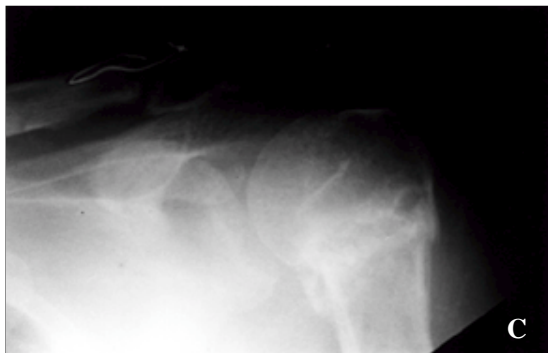
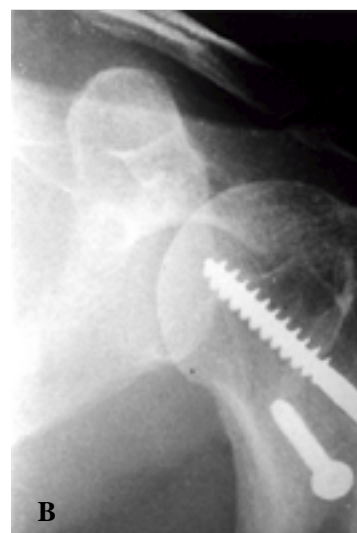


Fig 3A. Preoperative radiograph of a two-part fracture of the proximal humerus in a 41-year-old male treated with two cancellous screws.

3B. Radiograph at 10 months shows union and remodeling of fracture site.



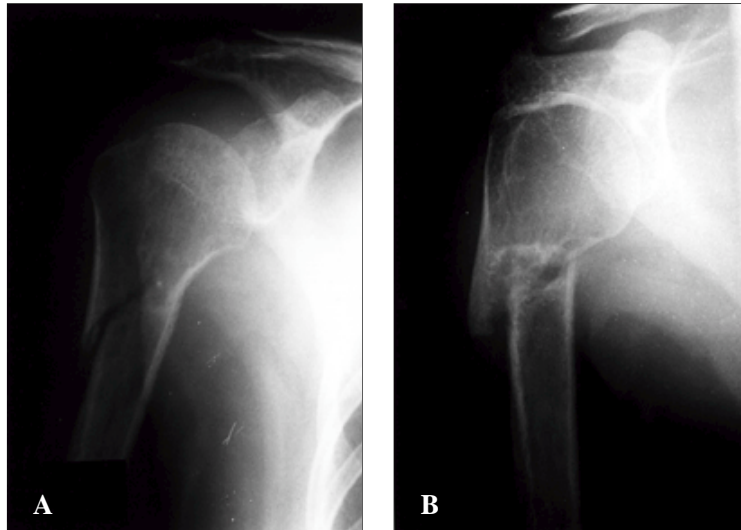
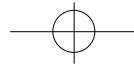


Fig 4A. Preoperative radiograph of a two part fracture of the proximal humerus in a 28 years old female treated with conservative method.

4B. Radiograph at 8 months shows a surgical neck fracture with displacement and nonunion.

Table 4. Complications

	Group I	Group II	Group III
Stiffness	5		
Deltoid Atrophy			2
Metal Failure			1
Pin track inf.*		2	
Pin migration		2	
Nonunion	2		1
AVN [†]		1	1

* : Infection

† : Avascular necrosis

10,13,14,15,16,17). Neer¹⁹⁾

(Fig 5).

2 2 3
2 , 3

가 10 , schanz

K-
2

가 3

2 ,

가

가 9,12),
K-
schanz , 가

13,20,23)
가

17).
가,

가 8,24).

17 K-
가 4 ,

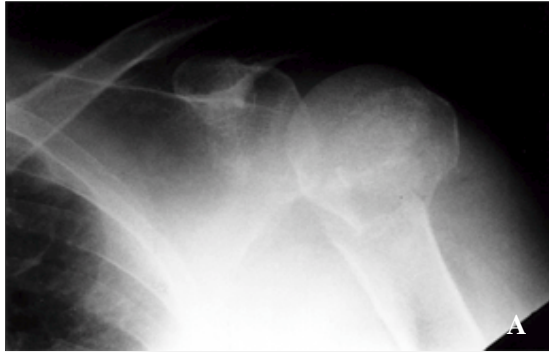
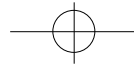


Fig 5A. Preoperative radiograph of a two part fracture of the proximal humerus in a 76 years old female.

5B. Postoperative radiograph after 3 K-wires.

5C. Radiograph at 3 months shows avascular necrosis of humeral head.

1 (Fig 5, Table 4)

3-6
2
11) 3 4

71%

가

8,21) . Kristiansen Chritensen¹⁵⁾

4 47%

55% 가

가

2 ,

1 , 가 1
(Table 4).

13.5 24) (cannulated)

8 12

4)

10.4 (

7-15)

2 3

가

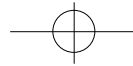
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가

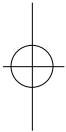
2 3

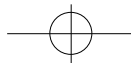
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Abstract

Treatment of the Two part or Three part Fracture of Proximal Humerus

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Purpose : The current study is performed to evaluate the clinical outcomes of treatment for two part or three part fractures of proximal humerus.

Material and Methods : Forty-five cases that followed up over 6 months were divided into three groups : conservative treatment(Group I, 16 cases), closed reduction with internal fixation(Group II, K-wire 10, schanz pin 4, cancellous screw 3, 17 cases) and plate and screw fixation(Group III, 12 cases). The range of motion, pain index with self assessed functional score, anatomical reduction and bone union period and complications were examined.

Results : The range of motion was worst in group I, and anatomical reduction was best in group III. The functional score of group II(average 80), group III(average 73) were higher than group I, but there were no significant differences between group II and group III. Complications were noted in 17 cases, which occurred mostly in group I and III. Avascular necrosis of humerus head was noted in one case of group II. Bone union period was average 10.4 weeks.

Conclusion : If anatomical reduction could be obtained by closed reduction and internal fixation with K-wire, schanz pin and cancellous screw in 2 part or 3 part proximal humerus fracture, it would provide a sufficient fixation for early rehabilitation and bone union, while minimizing complications.

Key word : Proximal humerus, Two part or three part fracture, Closed reduction and internal fixation.

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