

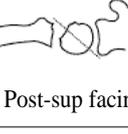
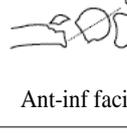
3 4

가

<	>				
:		3, 4			
12	:	Neer 3, 4		21	
				UCLA shoulder rating scale	가
:		Neer 3, 4			
(subtype)				2	
UCLA	가		가 9 8 (89%),	10 4 (40%)	
:					
	가		가		
			가가		
:					

: Chang-Hyuk Choi M.D.
 Department of Orthopedic Surgery, School of Medicine,
 Catholic University of Taegu,
 3056-6, Daemyoung 4 Dong, Nam Gu, Taegu, 715-718
 Tel : (053)650-4276
 Fax : (053)650-4272
 E-mail : chchoi@cuth.cataegu.ac.kr

Table 2. Reclassification on simple radiographs

Angulation pattern	Valgus type	Varus type
Facing of humeral head		
	Post-sup facing	Ant-inf facing
Dominant tuberosity		
	Post-sup facing	Ant-inf facing
	Great tuberosity dominant	Lesser tuberosity dominant

8,11,18),
 가 2,6),
 가
 Neer
 CT
 (interobserver reliability)
 (intraobserver reproducibility)
 22)
 (facing)
 가
 , 4
 (1cm)
 1995 3 2000 6 3
 4 가 가 21 12
 (1cm)
 (valgus posterosuperior facing type)
 (varus anteroinferior facing type)
 3 4 (Table 1, 2).

Table 1. Reclassification of 3 & 4 part fracture of proximal humerus

Valgus post-sup facing fracture	case
Valgus post-sup facing GT * dominant 3 part fracture	(Valgus 3P) 8
Valgus post-sup facing GT dominant LT † displaced 4 part fracture	(Valgus 4P D) 2
Valgus post-sup facing GT dominant LT undisplaced 4 part fracture	(Valgus 4P UD) 0
Varus ant-inf facing fracture	case
Varus ant-inf facing LT dominant 3 part fracture	(Varus 3P) 6
Varus ant-inf facing LT dominant GT displaced 4 part fracture	(Varus 4P D) 3
Varus ant-inf facing LT dominant GT undisplaced 4 part fracture	(Varus 4P UD) 2

* Greater tuberosity † Lesser tuberosity

가 가 UCLA
 shoulder rating scale1)(Table 3)
 가 2

Table 3. UCLA shoulder rating scale

	score
Pain	10
Function	10
Active forward flexion	5
Strength of forward flexion	5
Satisfaction of the patient	5

excellent : 34-35points, good : 28-33points
 fair : 21-27 points, poor : 0-20points

1.
 21 가 13 , 가 8 ,
 61.5 (32-94) , 2 8
 9 , 8 ,
 4 . 4 ,
 5 , 4 .

2.

5,18,19)

가 ,

3

(valgus posterosuperior facing type ; great tuberosity dominant), (Fig 1)

(varus anteroinferior facing type ; lesser tuberosity dominant), (Fig 2, 3)

Neer

21
 10 (47%), 11 (53%) ,

(posteriosuperior facing) 10



Fig 1 : Valgus posterosuperior facing GT dominant 3 part fracture(Valgus 3P) : Initially classified as Neer's 3 part fracture



Fig 2 : Varus anteroinferior facing LT dominant 3 part fracture(Varus 3P) : Initially classified as Neer's 3 part fracture



Fig 3 : Varus anteroinferior facing LT dominant GT undisplaced 4 part fracture(Varus 4P UD) : Initially calssified as Neer's 3 part fracture.

(anteroinferior facing) 11
 10 , 1 4.
 3 , 가 2
 , UCLA 가 10 4
 , 가 (40%)
 가 (Table 4), (p<0.05).
 가
 4 ,
 18,19) ,
 가 , 가
 (dominant tuberosity) 가
 , 4 가
 가
 가
 1 가
 ,
 ,
 , 4 (Varus
 Anteroinferior facing LT dominant GT undisplaced 4 part
 fracture)
 3.
 10
 5 , 4
 , 4 1 11
 , 5 , 5
 , 4 1
 2 , 2
 , 1
 1 가

가 .
 가 2
 . UCLA 가 10 4
 9 8 (89%) ,
 (40%)
 (Table 4), (p<0.05).

Table 4. Comparison of valgus to varus pattern (UCLA scale)

	excel	good	fair	poor	total
valgus 3p*	3	4	1	0	8
valgus 4p†	0	1	0	0	1
Valgus	3	5	1	0	9
varus 3p	1	2	3	0	6
varus 4p	0	1	1	2	4
Varus	1	3	4	2	10

* 3part † 4part (P < 0.05)

9
 8 (89%) , 10
 4 (40%)
 (Table 5), (p<0.05).

Table 5. Comparison of functional results by operative methods

Operation	UCLA	Valgus 3p†	Valgus 4p‡	Varus 3p	Varus 4p	total
TBW* & Screw	Excellent	5	0	2	1	8
	good					
	Fair	0	0	1	1	1
Plating	Poor					
	Excellent	2	1	0	0	4
	good					
	Fair	1	0	3	2	6
	Poor					

* Tension band wiring † 3part ‡ 4part (P<0.05)

5.
 1 , 1 ,
 1 가

2 가 2 (- -) ,
 . 2 - -)
 가 ,
 1

가 , 3
 , 3

4,6,12) 가 3 4
 가 가

16) AO 15)가 Neer
 . Neer (firm fixation)
 Codman⁵⁾ , 가 (minimal
 4 , stable fixation) 가 2,4,6,13) Darder ⁷⁾
 가 K-
 Neer 3 64% Wanner ²³⁾ ,
 2 가 3 2 1/3
 (dual plate stabilization) 69%

3,20,21) Siebenrock²¹⁾ (dual 1/3 plate)
 Neer 26%, AO 3 1
 38% , Brien³⁾ Neer 65% , T 3 1
 . Sjoden²²⁾ 3D CT 가 .

가 88% , 40%
 , 가 Gerber ⁹⁾ 가

100%, - 91% . Jakob ¹⁰⁾ 4
 , 74%

UCLA shoulder rating score

Neer 3 4

가 가

가

REFERENCES

- 1) **Amstutz HC, Sew Hoy AL and Clarke** : Anatomic total shoulder arthroplasty. Clin Orthop, 155:7-20, 1981.
- 2) **Bigliani LU, Flatow EL and Pollock RG** : Fractures of the proximal humerus. In: Rockwood CA Jr, Green DP, Bucholz RW and Heckman JD ed. Fracture in Adults. Vol 1.4th ed, Philadelphia, Lippincott-Raven:1055-1107, 1996.
- 3) **Brien H, Notfall F, McMaster S, Cummings T, Landells C and Rockwood P** : Neer's classification system : A critical appraisal. J Trauma, 38:257-260, 1995.
- 4) **Choi CH and Cuomo F** : Proximal humerus fractures. Curr Opin Orthop, 11:256-263, 2000.
- 5) **Codman EA** : Rupture of the supraspinatus tendon. Clin Orthop, 254:3-26, 1990.
- 6) **Craig EV** : The shoulder-master techniques in orthopaedic surgery. New York, Raven Press:245-289, 1995.
- 7) **Darder A, Sanchis B, Gsstali E and Gomar F** : Four-part displaced proximal humeral fractures: operative treatment using Kirschner wires and a tension band. J Orthop Trauma, 7:497-505, 1993.
- 8) **Deplama AF** : Surgery of the shoulder. 3rd ed, Philadelphia, J.B. Lippincott:372-406, 1983.
- 9) **Gerber C, Schneeberger AG and Vinh TS** : The arterial vascularization of the humeral head. J Bone Joint Surg, 72-A:1486-1494, 1990.
- 10) **Jakob RP, Miniaci A and Anson PS** : Four part valgus impacted fractures of the Proximal humerus. J Bone Joint Surg, 73-B:295-298, 1991.
- 11) **Jobe CM** : Gross anatomy of the shoulder. In Rockwood CA Jr and Masten FA III. The shoulder. 1st ed, Philadelphia, Saunders:34-97, 1990.
- 12) **Kristiansen B and Kofoed H** : Transcutaneous reduction and external fixation of displaced fractures of the proximal humerus. J Bone Joint Surg, 70-B: 821-824, 1988.
- 13) **Louis UB** : Fractures of the proximal humerus. In Rockwood CA Jr and Masten FA III. The shoulder. 1st ed, Philadelphia, Saunders:287-334, 1990.
- 14) **Moore KL** : Clinically oriented anatomy. 3rd ed, Baltimore, Williams & Wilkins;501-553, 1992.
- 15) **Muller ME, Nazarian S, Koch P and Schatzker J**

- : Humerus, proximal segment. In : The Comprehensive Classification of Fractures Long Bones. Ed by Muller ME. Springer-Verlag: 330-343, 1990.
- 16) **Neer CS** : Displaced proximal humeral fractures: I. Classification and evaluation. J Bone Joint Surg, 52-A:1077-1089, 1970.
- 17) **O'Brien SJ, Arnoczky SP, Warren RF and Rozbruch SR** : Development anatomy of the shoulder and anatomy of the glenohumeral joint. In: Rockwood CA Jr and Masten FA III. The shoulder. 1st ed, Philadelphia etc. WB Saunders, 1-33, 1990.
- 18) **Perry J** : Muscle control of the shoulder. In: Rowe CR ed. The shoulder. New York, Churchill Livingstone:17-34, 1988.
- 19) **Saha AK** : Dynamic stability of the glenohumeral joint. Acta Orthop Scand, 42:491-505, 1971.
- 20) **Sidor ML, Zuckerman JD, Lyon T, Koval K, Cuomo F and Schoenberg N** : The Neer classification system for proximal humeral fractures. An assessment of interobserver reliability and intraobserver reproducibility. J Bone Joint Surg, 75-A:1745-50, 1993.
- 21) **Siebenrock KA and Gerber C** : The reproducibility of classification of fractures of the proximal end of the humerus. J Bone Joint Surg, 75-A:1751-55, 1993.
- 22) **Sjoden GO, Movin T, Aspelin P, Guntner P and Shalabi A** : 3D-radiographic analysis does not improve the Neer and AO classifications of proximal humeral fractures. Acta Orthop Scand, 70:325-8, 1999.
- 23) **Wanner GA, Romero J, Hersche O, et al.** : Dislocated proximal humerus fracture-results after stabilization with a double plate. Langenbecks Arch Chir Suppl Kongressbd, 115:1211-1212, 1998.

Abstract

Comparison study between valgus and varus type in Neer 's 3 and 4 part proximal humerus fracture

Chang-Hyuk Choi M.D., Koing-woo Kwon M.D., Shin-kun Kim M.D.,
Sang-wook Lee M.D., Dong-kyu Shin M.D., Seung-Jin Lee M.D.

*Department of Orthopedic Surgery, School of Medicine
Catholic University of Taegu, Taegu, Korea*

Purpose : We reclassified three- and four-part proximal humerus fractures by Neer ' s classification into valgus & varus type, and compared the results of these groups.

Materials & methods : 21 cases classified as three- and four-part fracture in Neer ' s classification were treated surgically and followed for 12 months. We reclassified the 21cases valgus and varus type fractures, according to angulation of fractures, facing of humeral head, and dominant displaced tuberosity. Functional evaluation was done by UCLA shoulder rating scale.

Results : Neer ' s three- and four-part proximal humerus fractures could be reclassified based on angulation, facing of humeral head, and dominant tuberosity displacement. The functional results according to UCLA shoulder rating scale were good or excellent in 8 of 9 cases of valgus type(89%), and at 4 in 10 cases of varus type(40%). The clinical result of the valgus type was better than that of the varus type.

Conclusion : Based on reclassification system of proximal humerus fractures, clinical results and radiographic findings including angulation, facing of head, and dominant tuberosity displacement showed close relationship. Neurovascular complication were more frequent in the varus type. Therefore, careful evaluation including surgical approach and soft tissue status should be considered in the varus type of complex proximal humerus fracture.

Key Words : Proximal humerus, Fracture, Valgus, Varus

Address reprint requests to _____

Chang-Hyuk Choi M.D.

Department of Orthopedic Surgery, School of Medicine,

Catholic University of Taegu,

3056-6, Daemyoung 4 Dong, Nam Gu, Taegu, 715-718

Tel : (053)650-4276

Fax : (053)650-4272

E-mail : chchoi@cuth.cataegu.ac.kr