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= Abstract =

Treatment of Femoral Neck Fracture by Osteosynthesis

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We reviewed respectively the results of treatment of femoral neck fracture using osteosynthetic methods, in 29 patients who were treated at the Department of Orthopedic Surgery, Guro Hospital, Korea university, from January 1991 to December 1995.

20 cases were stabilized by cannulated hip screw, 6 cases by compression hip screw and 3 cases by Knowles pin. With the average follow up of 26 months (12 - 45 months), we analyzed the cause of injury with age, fracture types by Garden 's method, the accuracy of reduction by Garden 's alignment index and the functional results of the hip by Harris hip score and walking capacity. The adequacy of reduction by Garden 's alignment index were as follows : anatomical in 14, acceptable in 12 and poor in 3 cases. The functional results by Harris hip score and walking capacity were as follows : excellent in 21, good in 3, fair in 2 and poor in 3 cases.

Complications after treatment of femoral neck fracture were one case of AVN, one case of non-union and two cases of combination of AVN and non-union. All these complications were developed in displaced femoral neck fracture with poor quality of reduction and directly

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correlated with initial displacement of fracture and reversely correlated with adequacy of reduction

Our conclusions are that treatment of femoral neck fracture using osteosynthesis is favorable in young age regardless of initial displacement and in old age without osteoporosis and displacement and satisfactory results are produced from acceptable to anatomical reduction of fracture.

Key Words : femoral neck fracture, osteosynthesis.

12 가 가 29
 . 12 3 9
 26 . 20-29 가 1 , 30-
 39 가 5 , 40-49 가 5 , 50-59 가 4 , 60-69 가 6
 3,5,23) 13) Knowles pin^{4,19,23)} , 70 8 가 12 ,
 가 17 . 가
 18 , 가 5 , 가 4
 가 2 (Table 1).
 Garden type I 10 , II가 3 , III가 4 , IV가 12
 , 60 type I 3 , III가 1 ,
 IV가 11 , 60 type I 7 , II가
 3 , III가 3 IV가 1 (Table 2).
 24 가 13 , 2 3
 가 9 , 4 9 가 5 , 8 14 가
 2 (Table 3). ,
 Singh 's index¹²⁾
 60 15
 1,2,7,11,18) 60 14
 9 (Table 4).
 Knowles pin
 29
 가
 1991 1 1995 12 20



8 • / 12 1

Table 1. Causes of injuries according to age

cause	slip	fall	T.A	crushing injury	total
Age					
20-29	0	1	0	0	1
30-39	0	1	3	1	5
40-49	1	3	1	0	5
50-59	3	0	0	1	4
60-69	5	1	0	0	6
70 <	8	0	0	0	8
Total17	17	6	4	2	29

Table 2. Types of fractures

Age	< 60	60 <	total
Garden type			
I	3	7	10
II	0	3	3
III	1	4	5
IV	11	0	11
Total	15	14	29

Table 3. Time interval between injury and operation

sex	male	female	total
interval			
< 24hr	7	6	13
2-3days	4	5	9
4-7days	0	5	5
8-14days	1	1	2
Total	12	17	29

Table 4. Number of each osteoporosis and non-osteoporosis

age	osteoporosis	non-osteoporosis	total
< 60	0	15	15
> 60	9	5	14
total	9	20	29

Table 5. Classification by fracture sites and fixatives

	CHS	cannulated HS	knowles pin	total
Subcapital	0	2	1	3
Transcervical	4	16	2	22
Basocervical	2	2	0	4
Total	6	20	3	29

Table 6. Analysis of reduction quality according to Garden alignment index

reduction type	No. of patient
anatomic	14
acceptable	12
poor	3
total	29

가 , 6 , 3
Knowles pin (Table 5).

가
Garden
160/180
155 180
155 180
가 (Table 6)

가
Harris hip score
, , ,
Garden 14)

가

, 6 , 10

Knowles pin
(Fig 1),

Garden

(Table 7)

. Garden

가

21

가 12

가 155

180

)가 9

(Garden

3

2

가

가

가 Garden

IV

Table 7. Functional results regarding to the types of fracture and adequacy of reduction

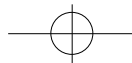
types of fracture					reduction adequacy			
result	I	II	III	IV	anatomic	acceptable	poor	total
Excellent	10	2	4	5	12	9	0	21
Good	0	1	0	2	2	1	0	3
Fair	0	0	1	1	0	1	1	2
Poor	0	0	0	3	0	1	2	3
Total	10	3	5	11	14	12	3	29



Fig 1-A. 48-year old female. Preoperative radiographs shows fracture of the femoral neck with displacement.

B. Postoperative radiographs reveals an anatomical reduction with multiple cannulated screws.

C. After screws removed, bony union was noted on radiographs.



10 • / 12 1

Table 8. Complication with respect to displacement

Type complication	displaced	non-displaced
AVN	1	0
Non-union	1	0
AVN + non-union	2	0
Total	4	0

5,13,19,23)

knowles pin

3-

knowles pin

가

가

가가

3

Singh's index

60

가

29

15

14

9

60

20

17

2

1 ,

, 1

knowles pin

가 1 ,

가 2

4 가

(Table 8).

23).

가

20)

Hook pin²⁴⁾

Spring-loaded four-

flanged nail²¹⁾

25).

가

가 가

가

가

가

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가

9),

가

10).

가

가

가

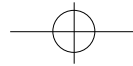
3).

1,2,7,11,18)

7,17)

15,16)

가



가

가

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6,12,13)

2

40-70%

7,11,18),

가1 , 1 ,

가2

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29

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1.

2.

가

3.

4.

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가

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REFERENCES

- 1) , : B:199, 1988.
- 14) **Garden RS** : The structure and function of the proximal end of the femur. *J Bone Joint Surg*, 43-
, 26:1113, 1991

- 2) , , :
- 3) , , , :
Canulated
, 32:68, 1997
- 4) **Arnold WD, Luden JP and Minkoff J** : Treatment of intracapsular fractures of the femoral neck. With special reference to percutaneous Knowles pinning. *J Bone Joint Surg*, 56-A:254, 1974.
- 5) **Asnis SE and Saglione LW** : Intracapsular fractures of the femoral neck. *J Bone Joint Surg*, 76-A:1793, 1994.
- 6) **Banks HH** : Nonunion in fractures of the femoral neck. *Orthop Clin N Am*, 5:865, 1974.
- 7) **Barnes R, Brown JT and Garden RS** : Subcapital fractures of the femur. A prospective review. *J Bone Joint Surg*, 58-B:2, 1976.
- 8) **Bentley G** : Treatment of nondisplaced fractures of the femoral neck. *Clin Orthop*, 152: 93, 1980
- 9) **Bentrud JG, Husby T, Graadahi O, and Alho A** : Implant holding power of the femoral head. A cadaver study of fracture screws. *Acta Orthop Scand*, 63:47, 1982
- 10) **Brown TI, Court-Brown C** : Failure of sliding nail-plate fixation in subcapital fractures of the femoral neck. *J Bone Joint Surg*, 61-3:342, 1979
- 11) **Calandruccio RA, and Anderson WE** : Post-fracture avascular necrosis of the femoral head. *Clin Orthop*, 152:49. 1980
- 12) **Chapman MW, Stehr JH, Eberle CF and Bovill EG** : Treatment of intracapsular hip fractures by the Deyerle method. A comparative review of one hundred and nineteen cases. *J Bone Joint Surg*, 57-A:735, 1975.
- 13) **Christie J, Howie CR and Armour PC** : Fixation of displaced subcapital femoral fractures. Compression screw fixation. *J Bone Joint Surg*, 70-B:199, 1988.
- 14) **Garden RS** : The structure and function of the proximal end of the femur. *J Bone Joint Surg*, 43-



- B:576, 1970.
- 15) **Garden RS** : Malreduction and avascular necrosis in subcapital fractures of the femur. *J Bone Joint Surg*. 53-B:183, 1971.
- 16) **Garden RS** : Reduction and fixation of subcapital fractures of the femur. *Orthop Clin N Am*, 5:683, 1974.
- 17) **Graham J** : Early or delayed weight-bearing after internal fixation of transcervical fracture of the femur. A clinical trial. *J Bone Joint Surg*, 50-B:562. 1968.
- 18) **Lowell JD** : Results and complications of femoral neck fractures. *Clin Orthop*. 152:162, 1980
- 19) **Martens M, Van Audekerche R, Mulier JC and Stuyck J** : Clinical study on Internal fixation of femoral neck fractures. *Clin Orthop*, 141:199, 1979.
- 20) **Meyers MH, Harvey JP and Moore TM** : Treatment of displaced subcapital and transcervical fractures of the femoral neck by muscle-pedicle-bone graft and internal fixation. A preliminary report on one hundred and fifty cases. *J Bone Joint Surg*, 55-A:257 1973.
- 21) **Nilsson LT, Stromqvist B and Thorngren KG** : Nailing of femoral neck fracture. Clinical and sciologic 5-year follow up of 510 consecutive hips. *Acta Orthop Scand*, 59:365, 1988.
- 22) **Singh M, Riggs BL and Beabout JW** : Femoral trabecular pattern index for evaluation of spinal osteoporosis. *Ann Intern Med*, 77:63, 1972.
- 23) **Springer ER, Lachiewicz PF and Gilbert JA** : Internal fixation of femoral neck fractures. A comparative biomechanical study of Knowles pins and 6.5mm cancellous screws. *Clin Orthop*, 267:85, 1991.
- 24) **Stromqvist B, Hanssen LI, Ljung P, Ohlin P and Thorngren KG** : Hook pin fixation in femoral neck fractures. A two year follow up study of 300cases. *Clin Orthop*. 218:58, 1987.
- 25) **Stromqvist B, Hanssen LI, Nilsson LT, and Thorngren KG** : Two year follow up of femoral neck fractures. Comparison of osteosynthesis methods. *Acta Orthop Scand*. 55:521, 1984.