

· · · ·

[]

:
:
46
,
9
:
,
가
,
가
:
가
:
10 mm
가 5 mm
:
,
,

:
602-715, 3가 1
: 82-51-240-5167, Fax: 82-51-254-6757
e-mail: sskim2@mail.donga.ac.kr

* 2002 .

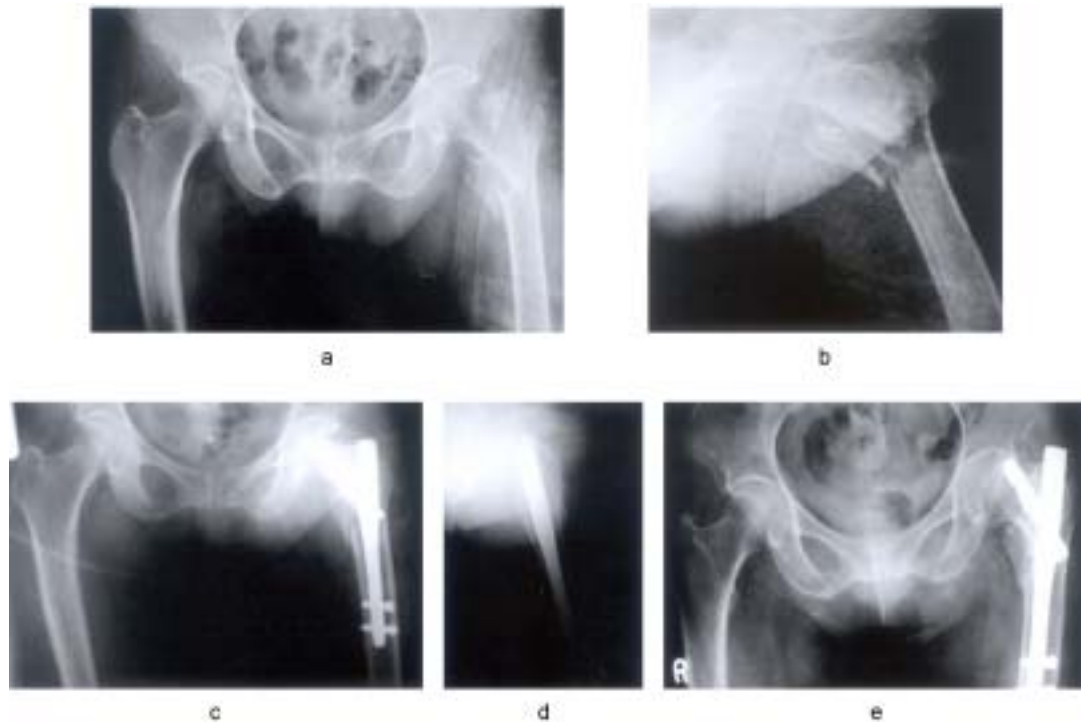


Fig. 1A. A 79-year-old female with intertrochanteric fracture on her left hip. **a, b:** Preoperative AP and lateral x-ray shows an unstable fracture without medial support. **c, d:** AP diastasis is 13 mm, postoperative displacement of lesser trochanter is 5 mm, position of lag screw is superior position and TAD is 25 mm in postoperative AP and lateral x-ray. **e:** Twelve months after surgery, the AP x-ray shows union failure with cutting out of the lag screw. Sliding of lag screw is 5 mm and the neck shaft angle is 120°.

21 5 (p<0.05). 9 7 , 46 11 ,
7 (20.6%), 4.7 mm (4.7±3.6), 가
2 (9.5%)가 , -21.9 (-21.9±4.9),
3 (8.9%), -3.0 (-3.0±6.4)
4 (19.0%)가 . , , ,
Singh ,
2. ,
72.8 (72.8±8.5), (Table 3).
61.9 (61.9±19.5) 70 ,
가 9.3 mm (9.3±6.1), 5 mm,
4.2 mm (4.2±4.6), ,
가 9 mm (9±7.5) 10 mm, 130
2.7 mm (2.7±4.3), 140
가 가

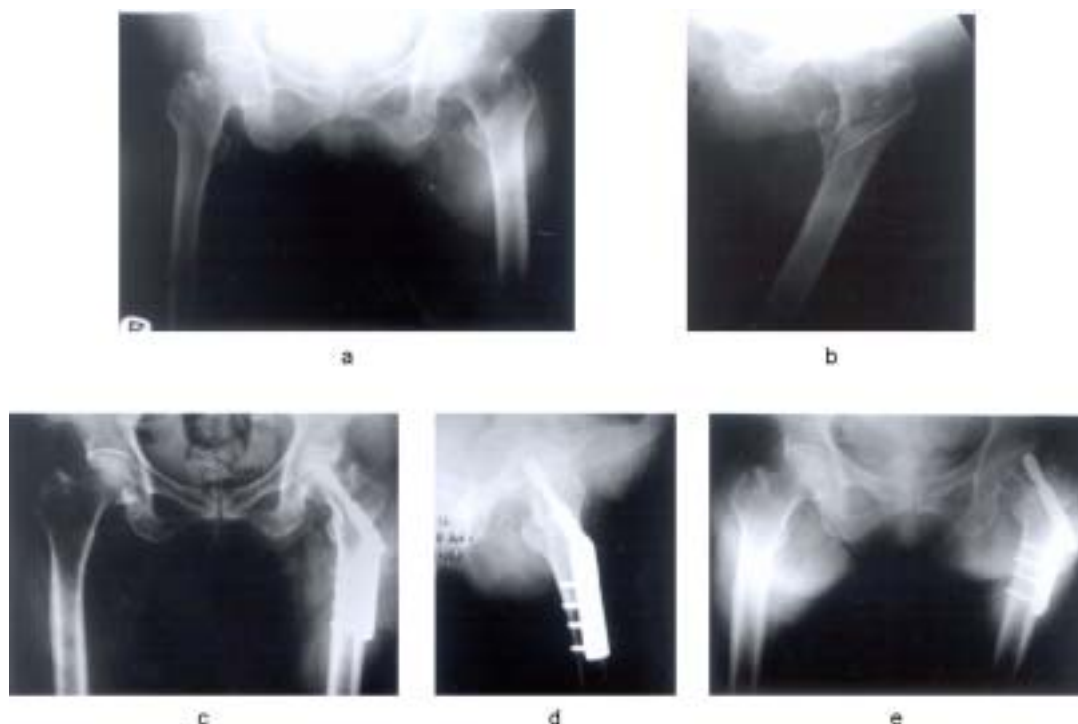


Fig. 1B. A 82-year-old female with intertrochanteric fracture on her left hip. **a, b:** Preoperative AP and lateral x-ray shows an unstable fracture without medial support. **c, d:** AP diastasis is 9 mm, postoperative displacement of lesser trochanter is 0 mm, position of lag screw is superior position and TAD is 30 mm in postoperative AP and lateral x-ray. **e:** Ten months after surgery, the AP x-ray shows union failure with cutting out of the lag screw. Sliding of lag screw is 12 mm and the neck shaft angle is 110°.

Table 1. The number of cases according to fracture type

Fracture type		Implant	Gamma nail (*)	[†] CHS (*)°	Total
Stable	Displaced two-fragmentary		8 (1)	3	11
	Three-fragmentary without posterolateral support		2 (1)	2	4
	Three-fragmentary without medial support		18 (1)	7 (2)	25
Unstable	Four-fragmentary		2 (2)	1	3
	Associated subtrochanteric		4 (1)	8 (1)	12
Total			34	21	55

*The number in the blank is the number of cases of non-union, [†]CHS: compression hip screw

가 , 10 mm 10
(odd ratio) mm 44.9
가 5 mm 5 (Table 4).
mm 163.5

Table 2. The number of cases of position of lag screw by Kyle's method

		Superior			
		3 (2)	9 (4)	3	
Anterior	2 (1)	25 (1)	8 (1)	Posterior	
	1	1	3		
		Inferior			

*The number in the blank is the number of cases of non-union

가
가 ,
가 19,20)

Table 3. Comparison between non-union group and union group by various factors

Factors		Group	Non-Union	Union	p value
Preoperative factors	*Age (year)		72.8±8.5	61.8±19.5	0.0115
	Fracture type (unstable/total)		7/9	33/46	0.3079
	Displacement of [†] LT (mm)		3.5±4.3	6.2±6.8	0.1289
	*AP diastasis (mm)		9.3±6.1	4.2±4.6	0.0386
	Lat diastasis (mm)		7±10.0	2.9±2.8	0.2538
	*Position of lag screw (superior or anterior/total)		11/46	7/9	0.0036
Postoperative factors	Tip-Apex Distance (mm)		20.4±6.5	24.2±12.4	0.3856
	Number of reduction of [†] LT (cases of reduced [†] LT/cases of [†] LT fracture)		1/6	5/24	0.7717
	*Postoperative displacement of [†] LT (mm)		9±7.5	2.7±4.3	0.0380
	*Sliding of lag screw (mm)		7.9±5.3	4.7±3.6	0.0287
	Postoperative varus or valgus change (cases of changes/total)		40/46	9/9	0.7815
	*Change of neck shaft angle (°)		-21.9±4.9	-3.0±6.4	<0.0001

*p<0.05, [†]LT: lesser trochanter

Table 4. The results of multivariate logistic regression analysis

Factors	p value	Odds ratio
Sex	0.78	
Age (70)	0.14	
AP diastasis (5 mm)*	0.02	163.5
Postoperative displacement of [†] LT (5 mm)	0.42	
Position of lag screw (superior or anterior position are unacceptable)	0.10	
Sliding of lag screw (10 mm)*	0.04	44.9
Change of neck shaft angle (130~140°)	0.93	

*p<0.05, [†]LT: lesser trochanter

가

Jensen⁷⁾ , 가

, ⁴⁾ 가 , ^{15,16)} Larsson ¹²⁾ ,

가 가 가

가

가

3 Evans-Jensen 가

Baumgaertner ²⁾ TAD가 25 mm

가 TAD가

¹⁴⁾ 13 12 가 Singh 가

가 3 TAD

, Laros Moore¹¹⁾ 가 , Watson ¹⁸⁾ 14%

가

10 , Davis ⁵⁾

가 Singh

가

가

Apel ¹⁾ 57%,

17% 가 가 , Larsson ¹²⁾ Davis ⁵⁾ 5 mm

가

¹³⁾ , 163.5

가 , ⁴⁾

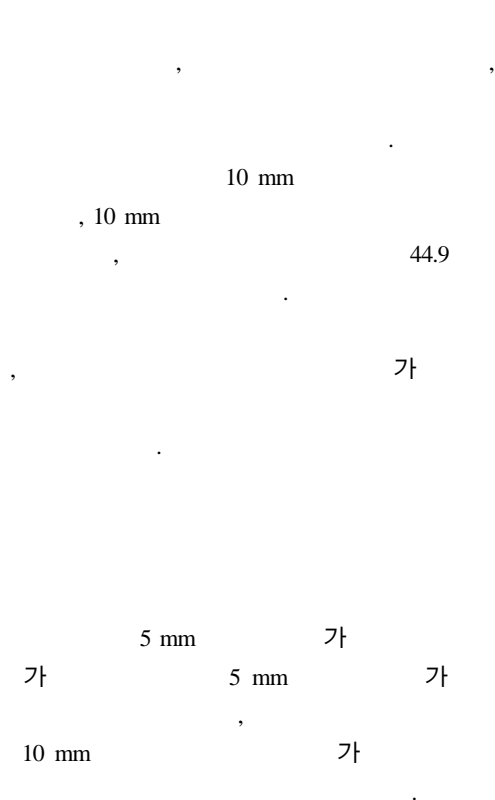
2B 가

3 ¹⁹⁾ 15 mm

가 가

가

8) 10 mm



REFERENCES

- 1) **Apel DM, Patwardhan A, Pinzur MS and Dobozi WR:** Axial loading studies of unstable intertrochanteric fractures of the femur. *Clin Orthop*, 246: 156-164, 1989.
- 2) **Baumgaertner MR, Curtin SL, Lindskog DM and Keggi JM:** The value of the tip-apex distance in predicting failure of fixation of peritrochanteric fractures of the hip. *J Bone Joint Surg*, 77A: 1058-1064, 1995.
- 3) **Bridle SH, Patel AD and Bircher ML:** Intramedullary fixation of intertrochanteric fractures of the femur using gamma nail: A randomised prospective comparison with dynamic hip screw. *J Bone Joint Surg*, 73B: 330-334, 1991.
- 4) **Chung YR, Ahn YC and Kim HD:** Treatment of unstable intertrochanteric fracture of the femur using sliding hip screw in the elderly. Fixation of lesser trochanter and radiographic results. *J of Korean Hip Society*, 14: 40-48, 2002.
- 5) **Davis TRC, Sher JL, Horsman A, Simpson M, Porter BB and Checketts RG:** Intertrochanteric femoral fractures. Mechanical failure after internal fixation. *J Bone Joint Surg*, 72B: 26-31, 1990.
- 6) **Haentjens P, Casteleyn M, DeBoeck H, Handelberg F and Opdecam M:** Treatment of unstable intertrochanteric and subtrochanteric fracture in elderly patients. *J Bone Joint Surg*, 71A: 1214-1225, 1989.
- 7) **Jensen JS:** Classification of trochanteric fractures. *Acta Orthop Scand*, 51: 803-810, 1980.
- 8) **Kim SY, Choi YC, Kim SJ, Park IH, Park BC and Ihn JC:** Peritrochanteric fractures of the femur treated with gamma nail. *J Korean Orthop Assoc*, 37: 325-330, 2002.
- 9) **Kyle RF, Gustilo RB and Premer RF:** Analysis of six hundred and twenty-two intertrochanteric hip fractures: a retrospective and prospective study. *J Bone Joint Surg*, 61A: 216-221, 1979.
- 10) **Laros GS:** Intertrochanteric fractures. In: *Evart CM ed. Surgery of musculoskeletal system*. 2nd ed. New York, Churchill Livingston: 2613-2639, 1990.
- 11) **Laros GS and Moore JF:** Complications of fixation in intertrochanteric fractures. *Clin Orthop*, 101: 110-119, 1974.
- 12) **Larsson S, Friberg S and Hansson LI:** Trochanteric fractures influence of reduction and implant position on impaction and complications. *Clin Orthop*, 295: 130-139, 1990.
- 13) **Lee JM and Kim KY:** Treatment of unstable trochanteric fractures using sliding hip screw with wiring of lesser trochanter. *J Korean Orthop Assoc*, 35: 861-866, 2000.
- 14) **Lee SH, Ha SH and Park SJ:** The Asian-Pacific gamma nail for intertrochanteric fracture of the femur. *J Korean Orthop Assoc*, 34: 819-824, 1999.
- 15) **Leung KS, So WS, Shen WY and Hui PW:** Gamma nails and dynamic hip screws for peritrochanteric frac-

-
- tures. J Bone Joint Surg, 74B: 345-351, 1992.
- 16) **Linsey RW, Teal P and Probe KL:** Early experience with the gamma interlocking nail for peritrochanteric fractures of the proximal femur. J Trauma, 31: 1649-1658, 1991.
 - 17) **Singh M, Nagrath AR and Maini PS:** Change in trabecular pattern of the upper end of the femur as an index of osteoporosis. J Bone Joint Surg, 52A: 457-467, 1970.
 - 18) **Watson JT, Moed BR, Cramer KE and Karger DE:** Comparison of the compression hip screw with the Medoff sliding plate for intertrochanteric fractures. Clin Orthop, 348: 79-86, 1998.
 - 19) **Yoon HK, Oh KH, Kang KH, Kim JI and Park MH:** The unstable intertrochanteric fracture of treated with sliding compressions hip screw. The comparison between anatomical reduction and non-anatomical reduction groups. J Korean Orthop Assoc, 31: 225-234, 1996.
 - 20) **Yoon TR, Lee KB, Lee YK and Rowe SM:** Intertrochanteric fracture of the femur using a sliding compression hip screw in the elderly. Functional and radiographic results. J of Korean Hip Society, 11: 125-133, 1999.

Abstract**Analysis of Failures of Union of the Intertrochanteric Femoral Fractures**

**Sung Soo Kim, M.D., Sung Keun Sohn, M.D., Myung Jin Lee, M.D.,
Min Soo Kang, M.D., Sang Kook Kim, M.D.**

*Department of Orthopedic Surgery, College of Medicine,
Dong-A University, Busan, Korea*

Purpose: The purpose of this study was to analyze the factors influencing the failure of union in the intertrochanteric femoral fractures.

Materials and Methods: Authors divided the patients treated with lag screws into two groups, 9 cases of the non-union group and 46 cases of the union group. And analyzed the preoperative, intraoperative and postoperative factors influencing the union.

Results: Age, displacement in AP film after surgery, displacement of lesser trochanter after surgery, superior or anterior position of lag screw, displacement of lag screw and change of neck-shaft angle were significantly higher in the non-union group. Displacement in AP radiograph after surgery and displacement of lag screw were two significant factors by multivariate logistic regression analysis.

Conclusion: In case of intertrochanteric fracture treated with lag screw, the probabilities of union failure are increased when the displacement is more than 5 mm in AP plane postoperatively and the sliding of lag screw is more than 10 mm in follow-up.

Key Words: Femur, Intertrochanteric fracture, Union failure

Address reprint requests to _____

Sung Soo Kim

3ga-1, Dongdaesin-dong, Seo-gu, Busan, 602-715, Korea

Department of Orthopedic Surgery, College of Medicine, Dong-A University

Tel : 82-51-240-5167, Fax : 82-51-254-6757

E-mail : sskim2@mail.donga.ac.kr