
<	>
:	
가	25 ~ 30%
.	가
:	가
73	2
가	30
	(%)
AOFAS(American Orthopaedic Foot and Ankle Society)	
Chi-square	5%
: AOFAS	가
가 1	7 , 23
:	
:	
가가	

:
100-799, 6가 18-79,
TEL : +82-2-2260-7198, 7192
FAX : +82-2-2278-9570
E-mail : youngos@freechal.com

* 2002
* 2002

Table 1. AOFAS Ankle-Hindfoot Scale (100 points Total)

Pain(40 points)	
None	40
Mild, occasional	30
Moderate, daily	20
Severe, almost always present	0
Function(50 points)	
Activity limitations, support requirement	
No limitations, no support	10
No limitation of daily activities, limitation of recreational activities, no support	7
Limited daily and recreational activities, cane	4
Severe limitation of daily and recreational activities, walker, crutches, wheelchair, brace	0
Maximum walking distance, blocks	
Greater than 6	5
4-6	4
1-3	2
Less than 1	0
Walking surfaces	
No difficulty on any surface	5
Some difficulty on uneven terrain, stairs, inclines, ladders	3
Severe difficulty on uneven terrain, stairs, inclines, ladders	0
Gait abnormality	
None, slight	8
Obvious	4
Marked	0
Sagittal motion(flexion plus extension)	
Normal or mild restriction(30 °or more)	8
Moderate restriction(15 °29 °)	4
Severe restriction(less than 15 °)	0
Hindfoot motion(inversion plus eversion)	
Normal or mild restriction(75%-100% normal)	6
Moderate restriction(25%-74% normal)	3
Marked restriction(less than 25% normal)	0
Ankle-hindfoot stability(anteroposterior, varus-valgus)	
Stable	8
Definitely unstable	0
Alignment(10 points)	
Good, plantigrade foot, ankle-hindfoot well aligned	10
Fair, plantigrade foot, some degree of ankle-hindfoot malalignment observed, no symptoms	5
Poor, nonplantigrade foot, severe malalignment, symptoms	0

Chi-square

(Table 4.).

가 1,25)

Table 3. Difference in Fixation Methods.

Fixation	Mean	
	no-pain group	pain group
Cast	2	1
Internal Fixation		
not fix PM	15	4
fix PM	6	2
Total	23	7

PM : posterior malleolus
Pearson Chi-Square value(2.485) was less than critical value(5.99, =0.05). So, there was no significant difference in fixation methods.

Table 4. Significance of radiologic and clinical factors.

Factors	Mean		
	no-pain group	pain group*	
PM [†] size(%)	8.8	26.1	0.851
Gap(mm)	1.1	1.7	0.042
Step off(mm)	0.5	1.4	0.011
Age(yr)	48.7	47.0	0.521
ROM(wks)	7.6	7.0	0.125
PWL [‡] (wks)	7.6	7.4	0.249
FWL [§] (wks)	12.6	12.6	0.761

p : p-value by Logistic regression test, significant
p-value<0.05
† PM: posterior malleolus
‡ PWL: partial weight loading
§FWL: full weight loading

25~30%
11,12,13,14,21)
(static incongruity)
incongruity),
(dynamic
20)

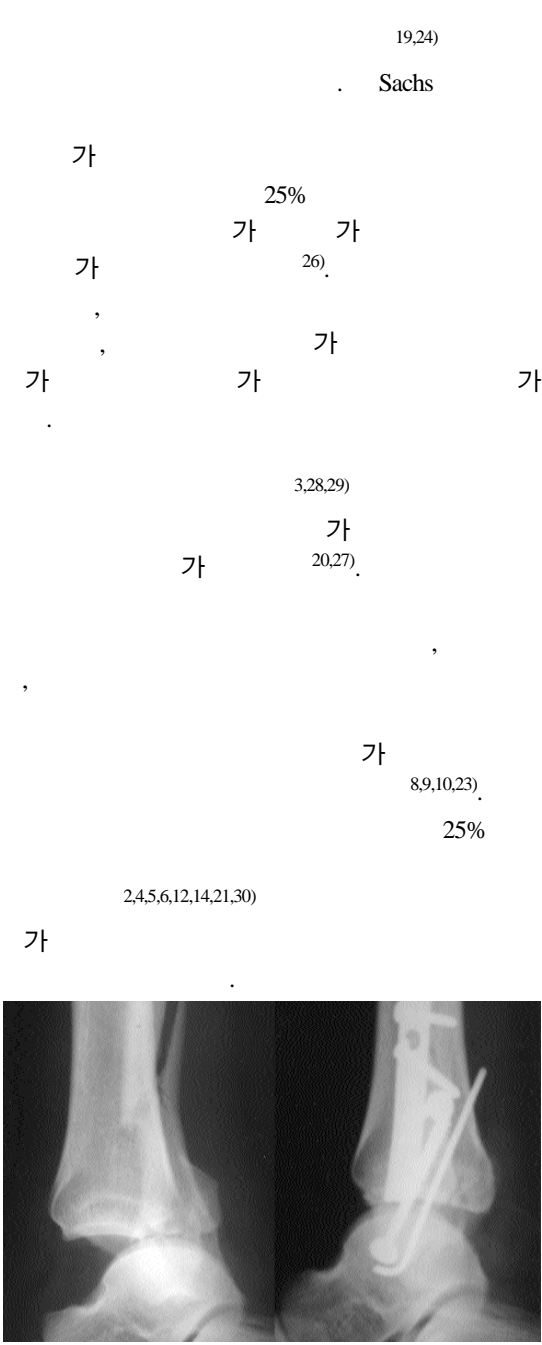


Fig. 1. Radiographs showing initial and immediate post-operative findings. Minimal gap(1mm) and no step off were found and size of the posterior malleolar fragment was 28% of the joint surface. Clinical result was excellent based on AOFAS scale 100.

가
25%
7 25% 1
가 6
가
가 (Table 3.)
가 (Table 4.)



Fig. 2A-B. (A) Initial and immediate post-operative lateral plain radiographs. Two millimeter fracture gap was found without step off and size of the posterior malleolar fragment was 22% of the joint surface. Clinical result was not so good because of joint pain. (B) Follow up radiograph shows remnant gap on the articular surface(arrow).

2~3
16,18) 30 가 21
3 가
가
Ebraheim CT 가
가

가
가
25% 가

(Figure 2.).
가

17)

가

가

가

가

REFERENCES

- 1) **Boggs LR** : Isolated posterior malleolar fractures. Am J Emerg Med, 4-4: 334-336, 1986.
- 2) **Brodie IAO and Denham RA**: The treatment of unstable ankle fractures. J Bone Joint Surg, 56-B:256-262, 1974.
- 3) **Broos PL and Bisschop AP**: Operative treatment of ankle fractures in adults: correlation between types of fracture and final results. Injury, 22-5: 403-406, 1991.
- 4) **Cho HO, Kwak KD, Cho SD and Lee SR**: Factors affecting the outcome of the ankle fractures. J Korean Orthop Assoc, 26: 1654-1659, 1991.
- 5) **Chung WK, Park DC and Lee SW**: A clinical study of the severe ankle fracture. J Korean Orthop Assoc, 22: 601-609, 1987.
- 6) **Desouza LJ, Gustilo RB and Meyer TJ**: Results of operative treatment of displaced external-abduction fractures of the ankle. J. Bone Joint Surg, 67-A: 106-1074, 1985.
- 7) **Ebraheim NA and Wong FY**: External rotation views in the diagnosis of the posterior colliculuc fracture of the medial malleolus. Am J Orthop, 25: 380-382, 1996.
- 8) **Harper MC and Hardin G**: Posterior malleolar fractures of the ankle associated with external rotation-abduction injuries. Results with and without internal fixation. J Bone Joint Surg, 70-A: 1348-1356, 1988.
- 9) **Heim FA**: Trimalleolar fractures: Late results after fixation of the posterior fragment. Orthopaedics, 12-8: 1053-1069, 1989.
- 10) **Holt ES**: Arthroscopic visualization of the tibial plafond during posterior malleolar fracture fixation. Foot Ankle Int, 15-4: 206-208, 1994.
- 11) **Jaskulka RA, Ittner G and Schedl R**: Fracture of the posterior tibial margin: Their role in the prognosis of malleolar fractures. J Trauma, 29-11: 1565-1570, 1989.
- 12) **Jeong HJ, Kim CK and Chung SW**: Treatment of the posterior malleolar fracture. J Korean Society Fractures, 11-4: 924-931, 1998.
- 13) **Kang CN, Kim JO, Lee SB, Kang OY and Shin MS**: Treatment of the posterior lip fracture of distal tibia using posteromedial approach. J Korean Society Fractures, 8-3: 594-599, 1995.
- 14) **Kim SJ, Choi IYU and Ahn TK**: A clinical study of the trimalleolar fractures of the ankle. J Korean Society Fractures, 2-2: 145-154, 1989.
- 15) **Kitaoka HB, Alexander IJ, Adelaar RS, Nunley JA, Myerson MS and Sanders M**: Clinical rating systems for the ankle-hindfoot, midfoot, hallux, and lesser toes. Foot Ankle Int, 15-7: 349-353, 1994.
- 16) **Klossner O**: Late results of operative and non-operative treatment of severe ankle fractures. Acta Chir Scand Suppl, 293: 1-93, 1962.
- 17) **Lesic A, Milovic I, Bumbasirevic M and Simic A**: Surgical and nonsurgical therapy of malleolar fractures. Srp Arc Celok Lek, 120: 11-12, 1992.
- 18) **Lindsjo U**: Operative treatment of ankle fracture-dislocations: a follow-up study of 306/321 consecutive cases. Clin Orthop, 199: 28-38, 1985.
- 19) **Lounsberry BF and Metz AR**: Liping fracture of lower articular end of tibia, Arch Surg, 5:678. 1922.
- 20) **Macko VW, Matthews LS, Zwirkoski P and**

-
- Steven SA:** The joint-contact area of the ankle. *J Bone Joint Surg*, 73-A: 347-351, 1991.
- 21) **McDiniel WJ and Wilson FC :** Trimalleolar fractures of the ankle. *Clin Orthop*, 122: 37-45, 1977.
- 22) **Michelson J and Maryland B:** Current concept review: fractures about the ankle. *J Bone Joint Surg*, 77-A:142-152, 1995.
- 23) **Mont MA, Cedlin ED, Weiner LS and Miller AR:** Postoperative radiographs as predictors of clinical outcome in unstable ankle fractures. *J Orthop Trauma*, 6-3: 352-357, 1992.
- 24) **Nelson MC and Jensen NV:** The treatment of trimalleolar fractures of the ankle, *Surg Gynecol Obstet*, 71:509, 1940.
- 25) **Nugent JF and Gale BD:** Isolated posterior malleolar ankle fractures. *J Foot Surg*, 29-1: 80-83, 1990.
- 26) **Sachs W, Kanat IO, McLaughlin E and Burns DE:** A Surgical approach to a displaced ankle fracture. *J Foot Surg*, 23-4: 302-307, 1984.
- 27) **Scheidt KB, Stiehl JB, Skrade DA and Barnhardt T:** Posterior malleolar ankle fractures: an in vitro biomechanical analysis of stability in the loaded and unloaded states. *J Orthop Trauma*, 6-1: 96-101, 1992.
- 28) **Stormont DM, Morrey BF and An KN:** Stability of the loaded ankle: relation between articular restraint and primary and secondary static restraint. *Am J Sports Med*, 13: 295-300, 1985.
- 29) **Vrahas M and Veenis B:** Intraarticular contact stresses with simulated ankle malunions. *J Orthop Trauma*, 8-2: 159-166, 1994.
- 30) **Yde J and Kristensen D:** Ankle fractures: Supination-eversion fractures of stage IV. *Acta Orthop Scand*, 51: 981-990, 1980.

Abstract

The role of posterior malleolar fragments in ankle pain after trimalleolar fractures

Su-Young Bae, M.D., Dong-Hoon Sihm, M.D.

Department of Orthopedic Surgery, National Medical Center, Seoul, Korea

Purpose : There are some criticisms of indication for internal fixation of the posterior malleolar fragments in trimalleolar fractures. We tried to find out clinical and radiologic factors which affect on a clinical outcome of trimalleolar fractures.

Materials and Methods : Thirty three patients who were treated for trimalleolar fractures and given anatomical reduction of lateral and medial malleolus were included. We divided patients into two groups, a group without the pain and the other group with the pain. Preoperative and postoperative lateral plain radiographic films were used to estimate fragment size, post-reduction gap and step off. By reviewing the medical records, other factors such as the time of ankle motion, weight loading and whether posterior malleolus was fixed, or not were studied. A clinical outcome was evaluated by AOFAS(American Orthopaedic Foot and Ankle Society) scaling system. We performed statistical analysis using Logistic regression analysis and Chi-square test on each factors.

Results : There was no definite difference between two groups on the functional outcome. There was one case showing limited ankle motion. Seven patients were involved in the group with the pain and 23 in the group without the pain. The remnant fracture gap and step off of joint surface statistically showed the meaningful correlation with the pain but a fragment size and a surgical fixation, time of motion and weight loading did not show any significances.

Conclusion : We doubt the significance of the size of posterior malleolar fragment. We concluded that anatomical reduction of posterior malleolus is the most significant factor of a clinical outcome regardless of the size or internal fixation, especially the pain after trimalleolar injuries.

Key Words : Ankle, Trimalleolar fracture, Posterior malleolus, Ankle pain

Address reprint requests to _____

Su-Young Bae
18-79, Ulchiro-6ga, Choong-gu, Seoul, 100-799,
National Medical Center
TEL : +82-2-2260-7198, 7192
FAX : +82-2-2278-9570
E-mail : youngos@freechal.com