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= Abstract =

Ankle Fracture with Syndesmosis Separation - Radiographic Landmark and Results of Trans-Syndesmotic Screw Fixation -

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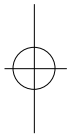
In the treatment of ankle fracture, anatomical reduction and restoration of ankle mortise is very important. But trans-syndesmotic screw fixation for syndesmosis separation is dependent on the condition in operation field. The purpose of this study is to analyse the radiographic and clinical results, to evaluate the need for trans-syndesmotic screw fixation, and to know the effectiveness of radiographic landmarks for diagnosis of the syndesmosis separation, retrospectively. The patients were divided into two groups. The Group (25 cases) were treated with trans-syndesmotic screw and group (42 cases) were treated without trans-syndesmotic screw fixation.

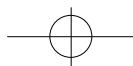
The clinical results were excellent in 13, good 9 in group and excellent in 19, good in 17 in group. The radiographic results were excellent in 16, good in 8 in group and excellent

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in 23, good 14 in group . In the radiographic findings, the false negative result of tibiofibular overlap was 15.6 % (M: 20.8 %, F: 10.4 %), tibiofibular clear space was 16.8 % (M: 21.6 %, F: 11.9%) and ratio of tibiofibular overlap to fibular width was 14.2 % (M: 14.9 %, F: 13.6 %). There was no significant statistical difference in the ratio of tibiofibular overlap to fibular width between male and female.

We consider that the ratio of tibiofibular overlap to tibiofibular width are more reliable diagnostic criteria for syndesmosis separation than the tibiofibular overlap and tibiofibular clear space. Trans-syndesmotomic screw fixation is not always required to maintain the integrity of the tibiofibular syndesmosis if the diastasis was satisfactorily reduced with rigid fixation.

Key Words : Ankle fracture, Syndesmosis separation, Radiographic landmark, Syndesmosis fixation.

(tibial

plafond) 1 cm

(Fig 1-A,B).

, 1) - (tibiofibular overlap 10 mm
, 2) - ° (tibiofibular clear space 5 mm
, 3) -
(tibiofibular overlap to fibular width ratio 24 %), 가
(false negativity)

1.

67 47 가 20 ,
16 78 35.4 .

1992 3 1997 12
1 가가 67
25 1 , 42
2 Danis-
Weber²¹⁾ Lauge-Hansen¹⁵⁾
(Table 2).

Table 1. Cause of injury

Cause of injury	No(%)
Traffic accident	35(52)
Slip down	17(25)
Fall down	6(8.9)
Sports injury	4(5.9)
others	5(7.4)
Total	67

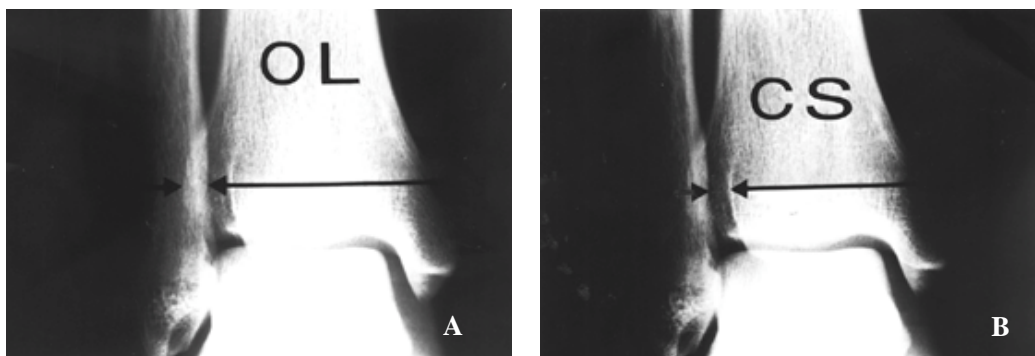
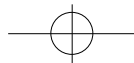


Fig 1. Measurements made on the anterior-posterior radiograph of the ankle
A : tibiofibular overlap B : tibiofibular clear space

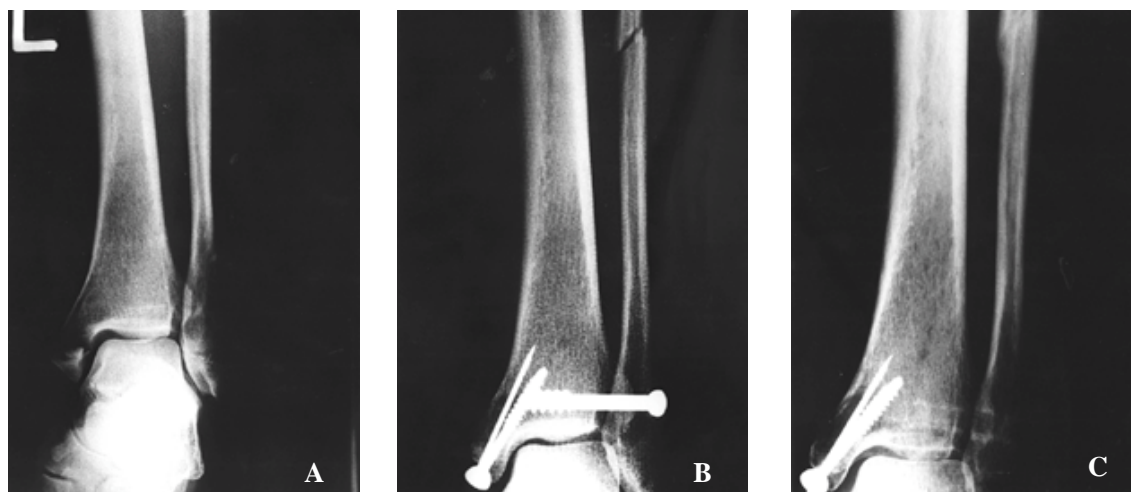


Fig 2. A Pronation-External rotation injury by traffic accident
B Internal fixation of the medial malleolus and maintenance of the reduction of the distal tibiofibular joint with a syndesmotomic screw.
C There was no recurrence of diastasis at follow-up radiograph.

Table 2. Comparison of classification between Danis-Weber method and Lauge-Hansen method(modified by Pankovich)

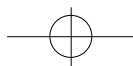
Danis-Weber	No	Lauge-Hansen	No
Type BS(+) [§]	27	SE [*]	18
		PA [†]	5
		PE [‡]	1
		unclassified	3
Type C	40	SE	11
		PA	5
		PE	20
		unclassified	4
Total	67		

* SE : supination-external rotation

† PA : pronation-abduction

‡PE : pronation-external rotation

§S(+), syndesmosis separation



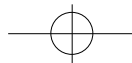
가 10 8 , 20 cm 30
 17 가 30 16 , 40 12 (Fig. 2).
 , 50 14 .
 5.
 2. 2
 가 35 가 17 , 4 6
 6 4 , 가 5 (Table 1). 8 12
 3. 9
 Danis-Webe^{r21)}
 Type B 가 , Type BS(+) 가 27
 , Type C 가 40 . Pankovich¹⁸⁾
 Lauge-Hansen¹⁵⁾ -
 29 , - 21 , - 10
 , 가 7
 (Table 2). Meyer¹⁷⁾ Phillips¹⁹⁾
 (Table 3). 25
 22 ,
 4. 24 ,
 42
 36 , 37
 (Table 4).
 Cotton¹¹⁾ 25 1) 5.8 mm,
 3 2) 5.7 mm,
 2 15.6%,

Table 3. Criteria used in assessment of the result(Meyer, 1980).

Result	Clinical	Radiological
Excellent	No pain with full ROM	Normal X-Ray
good	Pain after strenuous activity	Calcification of interosseous
	15° loss of motion	or deltoid ligament
Fair	Pain with normal activity	Malunion or Nonunion
	15° - 30° loss of motion	
Poor	Over 30° loss of motion	Joint narrowing or marginal osteophytes
	Constant pain	

Table 4. Clinical & Radiologic results according to syndesmosis fixation

	Syndesmotic screw fixation group	Non Syndesmotic screw fixation group		
	Clinical	Radiological	Clinical	Radiological
Excellent	13	16	19	23
Good	9	8	17	14
Fair	2	1	5	4
Poor	1	0	1	1



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16.8%, 3) 17.7%, 14.2%, , Type C
 . 1) 가
 6.7 mm, 20.8%, 2) 6.2 mm, . Danis-Weber
 21.6% , 3) 17.5%, Pankovich¹⁸⁾
 14.9% . 1) 4.5 mm, Lauge-Hansen ,
 10.4%, 2) 5.1 mm, 가 7
 11.9% 3) 18.0%, .
 13.6% . Bonnin⁴⁾
 1)
 (P<0.05), 2), 3) ,
 가 (P>0.05).
 , 1), 2)
 ,
 (P<0.05), 3) 가 ,
 (P>0.05)(Table 5). , mortise view, stress view ,
 가 . Pettrone
 19)
 가 5 mm
 가 . Husfeldt¹³⁾
 가
 5.5 mm 가 , Harper
 Keller¹²⁾ 12
 .
 Lauge-Hansen¹⁵⁾ Danis-
 . Danis-
 Weber²¹⁾ AO
 Weber
 , 가
 가
 , Type B
 Ostrum¹⁷⁾
 24%
 1) 100

Table 5. Radiographic measurement result in males and females.

Diagnosis criteria	Average			FN † (%)		
	Male	Female	Mean	Male	Female	Mean
TF* overlap less than 10 mm	6.7	4.5	5.8	20.8	10.4	15.6
TF clear space greater than 5 mm	6.2	5.1	5.7	21.6	11.9	16.8
TF overlap : fibular width ratio less than 24%	17.5	18.0	17.7	14.9	13.6	14.2

* TF, tibiofibula

† FN, false negativity

1) - 10 mm
 87 % , 2) - 5 mm 3 15mm
 7 % , 3)
 24 %
 2 %
 가 . Close⁸⁾
 1), 2), 3) 가 , 가
 1), 2)
 1) 가 (P<0.05),
 가
 2), 3)
 (P>0.05)(Table 5).
 24 % 1) 6 10 가
 가
 1
 1
 Alldredge²⁾
 Boden³⁾

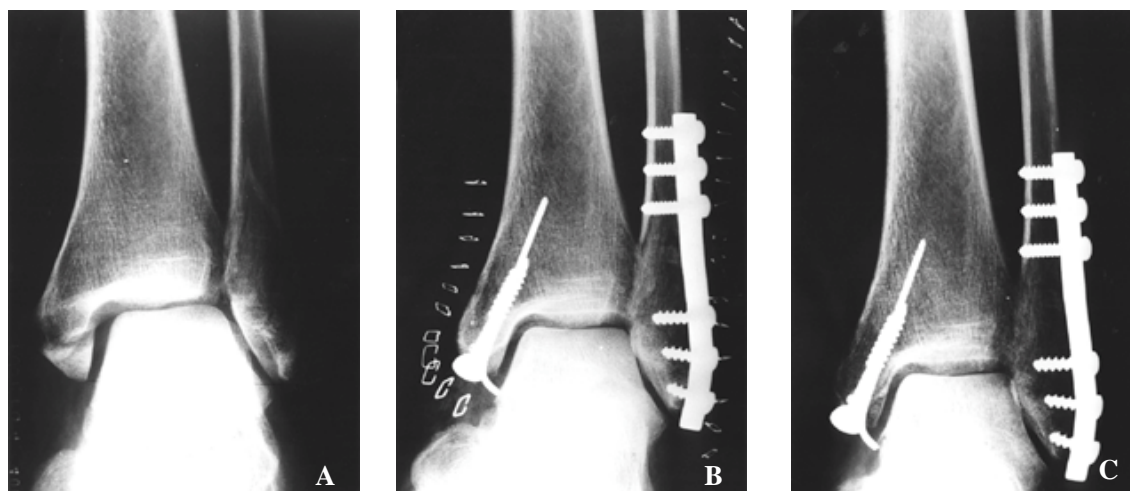
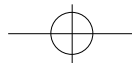


Fig 3. A Supination-External rotation injury by slip down.
 B Syndesmotic screw fixation was not required to maintain the integrity of the syndesmosis.
 C There was no recurrence of diastasis at follow up radiograph.



1992 3 1997 12
67

(25)

)

- 24 %

가

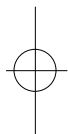
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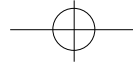
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