

가

가

4).

가

2). 1940 Kuntscher가

1,3,6,7,9,10).

(interlocking nail)

1995 3 2000 10
82
가 75
가 7 4
, 3
41 (17 , 71
) , 59 , 가 12
16 (12 , 32)
,
,
, AO ,
, - , , - ,
Gustilo Anderson⁵⁾
AO A , B , C
75 7 (9.3%)
가 6 , 가 1 296
146 , 150 4
1
가 146 6
, 150 1
6
1
(Table 1).

Table 1. Location of Screw Breakage

	All reviewed cases	Breakage cases
Proximal & Distal	284	0
Proximal	146	6
Distal	150	1
Total	296	7

IC 34 , UTN 27 , ZMS 14
IC 4 , UTN 1
, ZMS 2 (Table 2).

Table 2. Types of Nail

	All reviewed cases	Breakage cases
IC Nail	34	4
UTN	27	1
ZMS Nail	14	2
Total	75	7

가 1 ,
- 가 11 , 가 49 , -
가 11 , 가 1 , 가 2
1 ,
4 , - 2
(Table 3).

Table 3. Location of Fracture Sites

	All reviewed cases	Breakage cases
Upper third	1	0
Junction Upper/Middle third	11	1
Middle third	49	4
Junction Upper/Middle third	11	2
Middle third	1	0
Segmental	2	0
Total	75	7

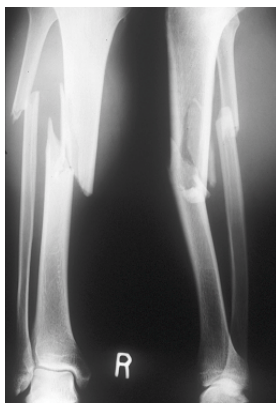
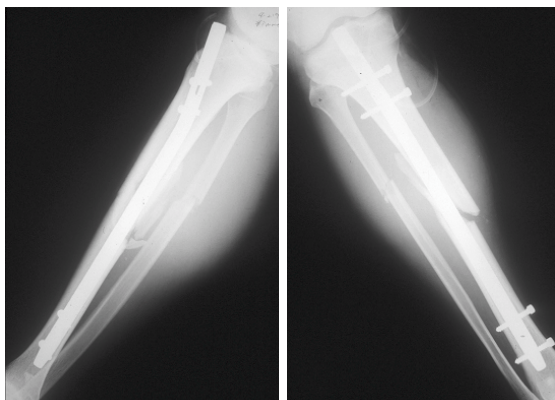
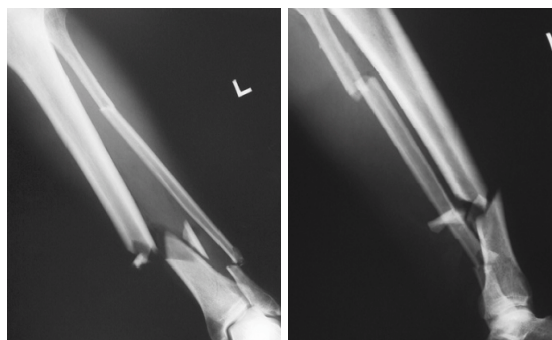
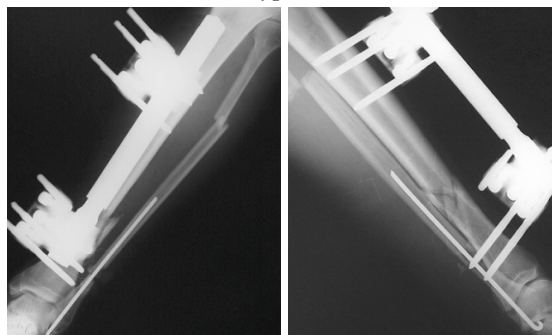
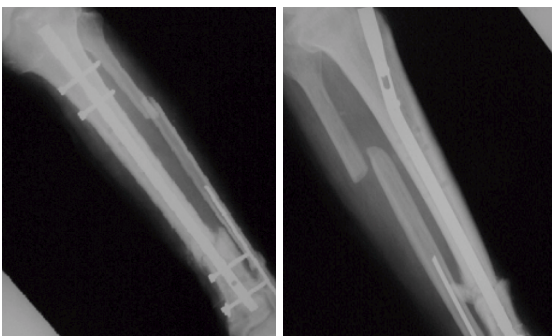
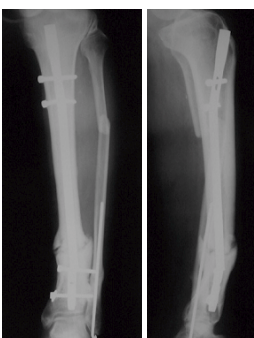
75 55
19 Gustilo Anderson 1 13 , 2 4
, 3a 2 3b 1
55 1 , 19
6 가
(Table 4).

Table 4. Grade of Open Fracture

	All reviewed cases	Breakage cases
Closed	55	1
Open Grade	13	4
Open Grade	4	1
Open Grade a	2	0
Open Grade b	1	1
Total	75	7

Table 5. AO Classification of Fracture

	All reviewed cases	Breakage cases
A	35	1
B	37	5
C	3	1
Total	75	7

**Fig. 1-A :** Preoperative radiograph of closed AO type B fracture.**Fig. 1-B :** The fracture site was distracted and malreduced after IM nailing.**Fig. 1-C :** The second proximal locking screw was broken.**Fig. 2-A :** It is preoperative radiograph of open type IIIb and AO type C fracture.**Fig. 2-B :** The fracture was stabilized temporally with external fixator.**Fig. 2-C :** Intramedullary nailing was performed.**Fig. 2-D :** The proximal second screw and nail were broken. It was defined as a nonunion.

AO A 35 , B 37 , C 3 Ruiz 9)

A 35 1 , B 37 .

5 , C 3 1 B C 1 ,

가 . 가 3 1

2 .

(Table 5)(Fig. 1).

가

1 ,

1

(Fig. 2).

가

가

가

8mm 9mm

7cm

7).

1 7cm

가

가

(dynamization)가 가

(stress concentration) 가

. Ruiz 9)

가

가

(bone to bone contact) 가

AO B C

가

가

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가 ,

가

7 6 가

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Abstract

Screw breakage in tibial interlocking nailing

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Purpose : The aims of this study were to investigate the prevalence and the causes of screw breakage in tibia nailing.

Materials and Methods : Between 1995 and 2000, eighty-two tibial diaphyseal fractures were treated with interlocking nails. The loss of follow-up was 7 cases. We retrospectively reviewed seventy-five cases. We investigated the rate and location of metal failure and evaluated the fracture pattern, the presence of distraction after nailing and union abnormality.

Results : Screw breakage was identified in seven cases (9.3%) and most frequently occurred on the second proximal locking screw. Screw breakage occurred in AO type B or C type fractures, fracture site distraction after nailing, open fracture, delayed union and nonunion.

Conclusion : The main cause of screw breakage is unstable bone to bone contact on the fracture site caused by comminution or distraction. The open fracture, delayed union, and nonunion also contributing factors for screw breakage. For preventing screw breakage, it is necessary to avoid fracture site distraction and delay full weight bearing in cases having unstable fracture site contact.

Key Words : Tibia fracture, Intramedullary nailing, Screw breakage