

Ilizarov 외고정 장치를 이용한 경골 원위부 골절의 중기 추시 결과

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목 적: 경골 원위부 골절을 Ilizarov 외고정으로 치료한 후 중기 추시 결과 및 골간단부의 지연 유합과 골절 형태에 따른 임상적 결과를 분석하였다.

대상 및 방법: 최소 2년 이상 (31~82개월) 추시 관찰이 가능하였던 23예의 환자를 대상으로 하였다. 골절은 AO 분류상 A형 10예, B형 2예, C형 11예였다. 방사선적으로 골간단부 골절편의 전위 정도와 골유합 기간을 분석하였으며, 관절염의 정도를 평가하였다. 임상적 결과는 AOFAS점수로 평가하였으며, 골간단부 전위 정도에 의한 지연 유합과 골절 형태에 따른 상관 관계를 분석하였다.

결 과: 평균 골유합 기간은 21주 (12~42주)였으며, AOFAS 점수는 평균 68점 (44~90점)이었다. 골간단부의 지연 유합은 골간단부 골절편이 3 mm 이상 전위된 경우 연관이 있었지만 ($p=0.01$), 최종 추시상 임상적 결과와는 연관성이 없었다 ($p=0.32$). 골절 형태에 따른 임상적 결과와 관절염 점수는 연관성이 있었으며 ($p=0.02$), C형 골절 11예 중 6예 (55%)에서 관절염으로 진행하였다.

결 론: 원위 경골 골절의 치료에서 외고정 기간을 줄이기 위하여 골간단부 골절선을 3mm 이내로 정복하는 것이 중요하며, 골절의 관절면 침범 정도가 중요한 예후 인자로 생각된다.

색인 단어: 경골 원위부 골절, 지연 유합, 골간단부 전위, Ilizarov 외고정

Mid-term Results of Distal Tibial Fractures Treated with Ilizarov External Fixator

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Purpose: We analyzed the mid-term results of distal tibial fractures treated with ilizarov external fixator and functional results according to delayed metaphyseal healing and fracture pattern.

Materials and Methods: We reviewed 23 distal tibial fractures treated with ilizarov external fixator followed for minimum two year (mean 53 months). There were 10 A fractures, 2 B fractures, and 11 C fractures according to the AO classification. Radiographically, we analyzed bony union time according to translation of diaphyseal-metaphyseal fracture line and assessed arthritic score. Functional results was assessed with AOFAS score and analyzed according to delayed healing and fracture pattern.

Results: Average union time was 21 weeks. Delayed healing of metaphyseal fracture line was associated translational displacement >3 mm ($p=0.01$). AOFAS score was averaged to 68 and there was no statistical significance between delayed metaphyseal healing and functional results ($p=0.31$). But, low AOFAS score and arthritis score was related to fracture type ($p=0.02$). In 11 C fractures, radiographic arthritic change were developed in 6 cases (55%).

Conclusion: The main prognosis of distal tibial fractures depends on articular involvement and to shorten the external fixation time, metaphyseal fracture should be reduced within 3mm.

Key Words: Distal tibial fracture, Delayed union, Translation of metaphyseal fracture, Ilizarov external fixator

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서 론

31 82

53

45 (17~85)

15 , 8 3 ,

9 , 11

2 , 1 ,

1 , 1 , 1 ,

2 , 1 , 5

Ilizarov

AO , A 10 , B

2 , C 11 18

5

18 14

B C

K-

가 Ilizarov

ring half pin 2

1 2 ring

18

대상 및 방법

1. 연구대상

2000 8 2004 11

Ilizarov

2 가 23

(PTB cast)

2. 연구방법

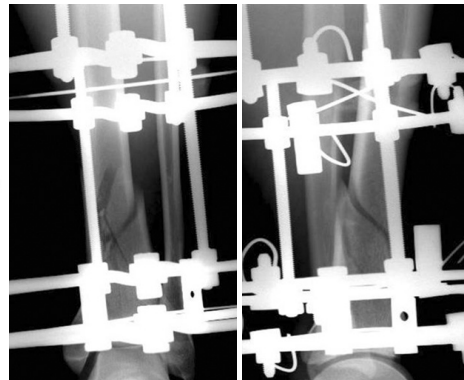
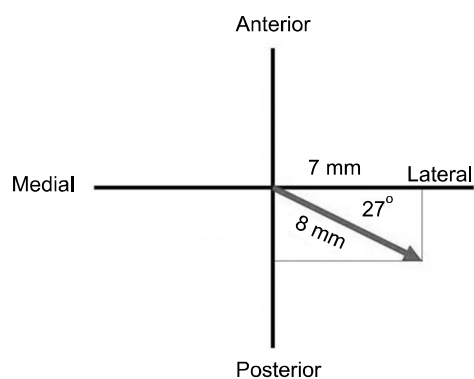


Fig. 1. Displacement of the diaphyseal-metaphyseal fracture line was measured by the method described by Green and Gibbs.

$$\text{Translation (mm)} = \sqrt{\text{APtrans (mm)}^2 + \text{LATtrans (mm)}^2}$$

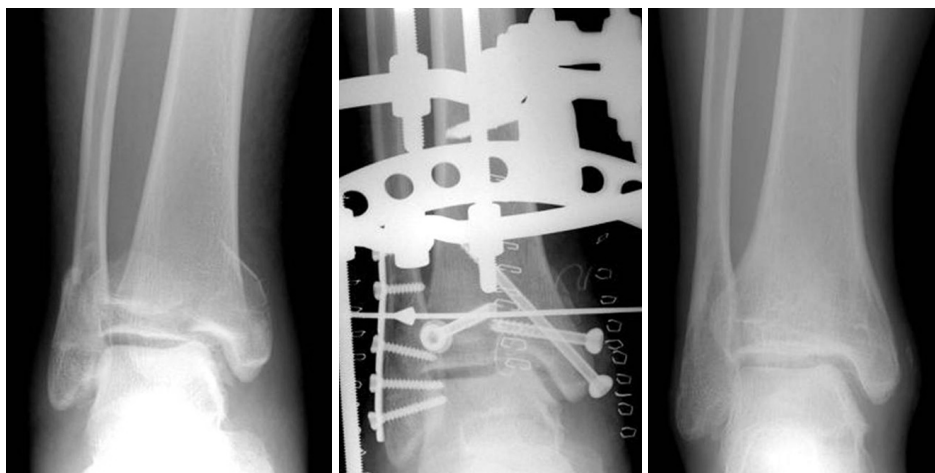


Fig. 2. A 17-year-old male was suffered from right distal tibial fracture. He was treated with Ilizarov external fixator and minimal invasive screw fixation for intra-articular fracture. The last follow-up x-ray show complete union of fracture.

Gibbs⁹⁾ (Fig. 1) Green (true translation)
Williams³⁸⁾ 가
10 , 가
가
AOFAS score¹¹⁾ 가
(excellent, 90~100), (good, 75~89),
(fair, 50~74) (poor, 50)

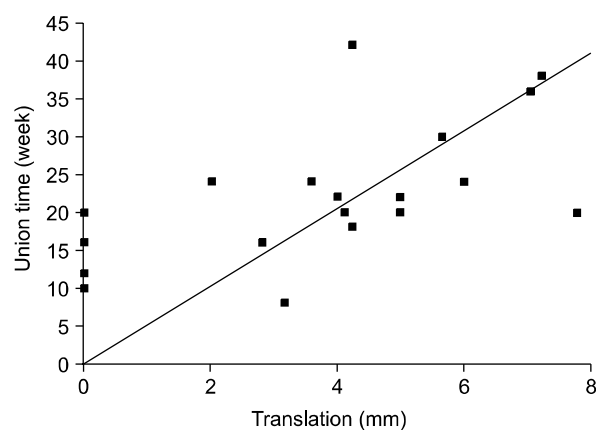


Fig. 3. This graph shows that residual translational displacement is closely related to delayed metaphyseal healing ($p=0.01$).

MedCalc software
Mann-Whitney U-test Correlation coefficient

10 , 3 mm
13
AOFAS 가
68 (44~94) 가 2 (9%), 8 (35%),
10 (43%) 3 (13%) 23 10
(44%)

결 과

21 (12~42) ,
13 (4~41)
23 22 (96%) 가
(Fig. 2), 1
가
3.2 mm (0~7.8 mm) , 3 mm

1. 골 간단부 골절편의 전위 정도에 따른 결과

가
가 (p=0.01) (Fig. 3). 3 mm
15.8 , 3
24.9
가 3 mm

($p=0.01$).

($p=0.04$), 3 mm
9.6 , 3 mm
15.7

($p=0.01$).

3 mm
71 , 3 mm
66
가

AOFAS
AOFAS

($p=0.32$) (Table 1).

2. 골절 형태에 따른 결과

A B
8.8 , C 5.7

($p=0.02$).

B 75 , C AOFAS 61 A

($p=0.02$).

3. 합병증

(pin tract infection) 6
4
10 , 1
3
6 C
2
1

(Fig. 4).

Table 1. Results according to 3 mm translation

| | Union time (weeks) | Fixation time (weeks) | AOFAS score |
|---------|-----------------------|--------------------------|----------------|
| <3 mm | 15.8 | 9.6 | 71 |
| >3 mm | 24.9 | 15.7 | 66 |
| p value | 0.01 | 0.01 | 0.32 |



Fig. 4. A 47-year-old female was suffered from right distal tibial fracture. She was treated with Ilizarov external fixator. But, after removal of external fixator, anterior angulation and posttraumatic arthrosis was developed. Then, total ankle arthroplasty was performed.

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