

LAUGE-HANSEN SUPINATION-EVERSION FRACTURE STUDY

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INTRODUCTION

Fractures of the ankle are a very common injury. However, there is still much controversy regarding conservative versus operative treatment and the effectiveness of each modality. Several randomized studies have been published to attempt and document long term differences between treatment groups. In 1985, Bauer, et al., randomly selected ninety-two Danis-Weber type B ankle fractures for either open reduction and internal fixation or closed reduction and plaster cast.¹ Operative treatment was performed according to the AO principle of achieving stable fixation and anatomical reduction. Closed reduction and plaster casting was performed under general anesthesia after the stability of the syndesmosis was shown by attempting to pull the fibula laterally with a percutaneous hook proximal to the fracture. A plaster cast was then applied. Weight bearing was not allowed for six weeks in either group. All fractures consolidated properly. Using the criteria of Cedell² for evaluating the initial reduction, the operative group healed in a significantly better position. The nonoperative group did leave the hospital earlier than the operative group; mean 5 days compared with 9.5.

The patients were followed for an average of 7 years prior to evaluation for subjective, objective, and radiographic results. Subjective discomfort and life style changes were estimated using a questionnaire. The objective clinical exam evaluated the range of motion of the ankle, dorsiflexion of the foot in weight bearing, swelling or atrophy, resultant deformity, and gait study. Radiographic exam was performed, and utilized the same technique for evaluating the ankle as previously when viewing the original fracture reduction.² Arthrosis was classified using the criteria of Magnusson.³

Bauer's study in 1985 showed no significant differences in subjective, objective or radiographic results after 7 years, in operatively-reduced supination-eversion fractures, as compared to those similar fractures which were closed reduced. When postoperative arthrosis was present, it was found to be more severe in the later

stages of supination-eversion fractures. There was less post-traumatic arthrosis noted in unimalleolar fractures treated both closed or open, compared to trimalleolar fractures.

In a second study, the same group of investigators examined 143 patients who were conservatively treated with plaster cast immobilization for ankle fractures after an average of 29 years. Most patients (83%), were free of symptoms and in the remainder, the symptoms were moderate. Only a few had sought medical advice following their injury due to ankle discomfort. Eighty-two were free of radiographic signs of arthrosis.⁴

It is difficult to draw conclusions from the studies done in the past regarding the superiority of either the open or closed reduction methods. The different criteria applied for evaluating functional results limits effective comparisons between studies. Radiographic measurements of arthrosis are more uniform and usually, as in this study, based on the classification system of Magnusson.³ Cedell^{2,4} in comparing his operative results with the conservative results of Magnusson, found a strong correlation between his patients' subjective and objective results and the amount of arthrosis present radiographically. Wilson and Skilbred⁵ found that operative reduction was associated with a greater amount of arthrosis than nonoperative. Since their study is retrospective and not randomized, it is likely that the more serious fractures were almost always open reduced. Therefore, this group of patients were more likely to develop postoperative problems in comparison to the stage I-II supination-eversion injuries.

Yde and Kristensen⁶ found no statistically significant difference in SER stage 2 ankle fractures treated via open or closed techniques 3 - 10 years later, while SER stage 4 fractures showed a significant difference between open and closed treatment, with the open method producing better results.⁶ Kristensen and Hansen⁷ reviewed conservatively treated SE stage 2 type fractures after 21 years and found good subjective results and no arthrosis.

Cedell² found that SER type fractures treated with open reduction and internal fixation compared favorably with those treated conservatively. Changes in the incidence of SER IV injuries from the 1950s to 1980s suggests that this pattern of occurrence has become one of "fragility" fractures in elderly women with marked increases in generalized osteoporosis.⁸ This change in the incidence of fractures closely follows the incidence of hip and anterior forearm fractures in this elderly osteoporotic population.¹ These patients present therapeutic problems as the general health, osseous tissues, and expectations of the patient can mitigate against operative treatment. With the results of the Swedish study and others in mind, a broadening of the criteria for conservative treatment may be entertained. Therefore, the authors will attempt to retrospectively evaluate our own experience at Northlake Regional Medical Center (formerly Doctor's Hospital) over the last fifteen years in treating ankle fractures either by closed reduction and casting, or open reduction by AO-ASIF technique.

We will utilize the Lauge-Hausen classification system to categorize fracture type. This classification scheme allows soft tissue injury to be determined based upon a visible osseous end point. We will also evaluate medial and lateral malleolar position in those patients who radiographically demonstrate marked arthrosis, or in whom function or mobility is significantly diminished.

Objectives of the Study

To compare the results of operative versus non-operative treatment of Supination-External rotation ankle fractures for the purposes of determining the efficacy of each method of treatment.

Project Description

100 questionnaires from patients sustaining SER ankle fractures were completed and are to be considered for statistical tabulation. In addition, clinical and radiographic examination will be performed to further document the findings.

The sample base is derived from patients treated at Northlake Regional Medical Center (Formerly Doctors' Hospital) over the last 15 years who sustained SER type ankle fractures. The data base is to be broken down by age, years post-injury, and the procedures for treatment. Patients under 15 years of age will be excluded from the study.

SE Fractures - 25 < 8 years post op < 50 years of age Open reduction	SE Fractures - 25 < 8 years post op < 50 years of age Closed reduction
SE Fractures - 25 > 8 years post op < 50 years of age Open reduction	SE Fractures - 25 > 8 years post op < 50 years of age Closed reduction
SE Fractures - 25 < 8 years post op > 50 years of age Open reduction	SE Fractures - 25 < 8 years post op > 50 years of age Closed reduction

QUESTIONNAIRE DEVELOPMENT

Subjective Criteria

Part one of the questionnaire will include questions to determine the patients' symptoms and level of activity as well as inquiries to define general demographic data.

Objective Criteria

Part two of the questionnaire includes ratings on a scale of 1 to 4 (where 1 is excellent and 4 is poor) of the clinical examination in the following areas:

Dorsiflexion/ plantar flexion - dorsoplantar range of motion to be determined by comparing these ranges of motion to the uninjured ankle.

Medial and lateral ligament tenderness - to be determined by palpating the medial and lateral ankle ligaments and rating them on a scale of 1 to 4 (where 1 is absence of pain and 4 is severe pain)

Stability - ankle joint stability will be determined by stress testing in the frontal and sagittal plane. The amount of talar tilting in degrees, an anterior drawer test in millimeters, and functional instability will be tabulated as well.

Radiographic Criteria

Part three of the study will include ratings on a scale of one to four based on the radiographic changes of the joint. Arthrosis will be scored based upon the methods described by Magnusson³ and Cedell⁴. They are as follows: 1 - slight reduction of the joint space and slight formation of deposits on the joint margins. 2 - more pronounced changes than above, possibly with the addition of sclerosis in the subchondral bone. 3 - the joint space only about 1/2 the amount of the uninjured side and the pronounced formation of deposits. 4 - the joint space almost or totally eliminated.

Findings of the study will be published once the statistical information has been analyzed and reported.

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1. Name _____

2. Age _____

3. Sex M F

4. Years Post-Op _____

5. Fracture classification (Check One)

- SE I
 SE II
 SE III
 SE IV

6. Method of treatment (Check One)

- Open reduction
 Closed reduction

7. Please rate your pain, if any, during normal daily activity using the following scale:

- 1 - No pain
 2 - Slight pain
 3 - Moderate pain
 4 - Severe pain

8. Please rate your pain in relation to walking on the following scale:

- 1 - Able to walk without limp or pain
 2 - Able to walk with slight limp or mild pain
 3 - Moderately restricted in ability to walk
 4 - Severely restricted in ability to walk

9. Please rate your activity

- 1 - Fully perform the job
 2 - Can work normally but is restricted in some strenuous activities
 3 - Normal work but very limited in his activity
 4 - Totally disabled

10. Please rate your ability to run

- 1 - Able to run desired distances without pain
 2 - Able to run desired distances with slight pain
 3 - Moderate restriction in ability to run, with mild pain
 4 - Unable to run

Part II

11. Rate the patient on dorsoplantar ROM by subtracting total degrees of ROM OF the injured ankle from the degrees of ROM of the uninjured ankle. (Check One)

- 1 - 10 degrees or less
 2 - 11 to 25 degrees
 3 - 26 to 50 degrees
 4 - over 50 degrees

12. Rate the patient on medial and lateral ligament tenderness to be determined by palpating the medial and lateral ankle ligaments and rating pain on the following scale: (Check One)

- 1 - absence of pain
 2 - slight pain
 3 - moderate pain
 4 - severe pain

13. Rate the patient on dorsiflexion by subtracting total degrees of dorsiflexion of the injured ankle from the degrees dorsiflexion of the uninjured ankle. The scale is as follows: (Check One)

- | | |
|--------------------------|------------------------|
| <input type="checkbox"/> | 1 - 10 degrees or less |
| <input type="checkbox"/> | 2 - 11 to 20 degrees |
| <input type="checkbox"/> | 3 - 21 to 30 degrees |
| <input type="checkbox"/> | 4 - over 30 degrees |

14. Rate the patient on the stability of the injured ankle as compared to the uninjured ankle on the following scale. (Check One)

- | | |
|--------------------------|----------------------|
| <input type="checkbox"/> | 1 - Stable |
| <input type="checkbox"/> | 2 - Somewhat stable |
| <input type="checkbox"/> | 3 - Unstable |
| <input type="checkbox"/> | 4 - Severly Unstable |

Part III

15. Rate the patient on radiological changes of the joint using a 15 degree internally rotated ankle mortise view on the following scale: (Check One)

- | | |
|--------------------------|---|
| <input type="checkbox"/> | 1 - slight reduction of the joint space and slight formation of deposits on the joint margins. |
| <input type="checkbox"/> | 2 - more pronounced changes than above, possible with the addition of sclerosis in the subcondrol bone. |
| <input type="checkbox"/> | 3 - the joint space only about 1/2 as high as the uninjured side and pronounced formation of deposits. |
| <input type="checkbox"/> | 4 - the joint space significantly narrowed or obliterated. |

References

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Additional References

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