The goal of this study is to demonstrate the role of insufficient which may result to inadequate anatomic reduction. Post healthcare cost associated with the subsequent treatment of instability, decreasing patient morbidity and reducing overall has been shown to give better patient long articulating surfaces and ligaments from tibia, fibula and talus. Ankle joint is a complex based on CT. Cases were randomized, providing a total of 400 paired results for data comparison.

Statement of Purpose

The goal of this study is to demonstrate the role of computerized tomography (CT) for treatment of ankle fractures, and its influence on decisions for fixation constructs, surgical approach and post-operative management.

Level of Evidence

Level III, Scientific

Literature Review

Ankle joint is a complex ginglymoid joint composed of various articulating surfaces and ligaments from tibia, fibula and talus. Appropriate anatomic reduction following acute ankle trauma has been shown to give better patient long-term satisfactory results with decreased post-traumatic osteoarthritis, ankle instability, decreasing patient morbidity and overall reducing healthcare cost associated with the subsequent treatment of post-traumatic ankle arthritis. Fracture identification, interpretation of morphology of fracture fragments, and articulatory incongruity when assessing with plain radiographs is insufficient which may result to inadequate anatomic reduction. CT scans provide necessary 3-dimensional morphology to understand ankle fracture patterns, and thereby necessary for operative planning and guide post-operative management.

Methodologies and Procedures

- 8 foot and ankle surgeons were given a sequence of questions for 25 skeletally mature X-ray ankle trauma cases, followed by 25 corresponding randomized CT scans of the same patients (Total of 50 radiographic films).
- Series of questions inquired regarding osteous fracture identification, surgical treatment management including choice of fixation, posterior malleolus fixation, order of fixation, incision approach, and patient position on operative table, and post-operative management for both X-ray and CT cases.
- The same series of questions were provided for each plain radiograph and corresponding CT images and the differences of the surgical management were recorded.
- CT scans were advanced imaging correlated with the X-Ray ankle trauma cases and were randomized when surgeons were asked to evaluate.
- X-Ray standard 3 view series were provided (DP, MO, Lateral views), and full CT scan to ensure proper evaluation.
- A total of 400 paired results for data comparison were obtained.
- We collected radiographic data from our hospital database September 2010 to May 2013, and all 25 skeletally mature ankle fracture cases received X-ray films along with advanced CT scan.

Figure 1. Plain Radiograph with Corresponding CT Image from Our Study

Results

25 ankle trauma plain films reviewed, followed by CT imaging by 8 surgeons (n=200) (Table 1):
- 33% (66/200) change in fracture diagnosis
- 90.4% (183/200) change in fracture identification
- 48.9% (97/200) change in fixation plan
- 31.5% (63/200) posterior malleolar fixation modification
- 42.0% (84/200) change in order of fixation
- 43.5% (87/200) incision placement adjustment
- 23.5% (47/200) patient position change
- 41.2% (82/200) postoperative management altered with increased non-weight-bearing status secondary to identification of complexity of fracture after reviewing CT.

Analysis & Discussion

Computed tomography (CT) scan provides the ability of practitioners to accurately assess essential information regarding configuration of fracture fragment and heelily in deciding optimal, more comprehensive, and cost effective post-operative management (3). Surgeons who refused CT scans from initial evaluation on plain radiographs revealed 45% modification of fracture identification, which concurrently resulted to 48.3% change of fixation management (Figure 1). CT scan protocol of 41% once complexity of fracture morphology was demonstrated significant increase in non-weight-bearing protocol (4). It should be emphasized the significant difference in surgical management and post-operative protocol in these fractures if surgeons decided to order a CT scan after initial evaluation of plain film.

References

1. Edgar Sy, DPM, 1Jonathan Mollineda, DPM, 1Mario Cala, DPM, 1Jacqueline Brill, DPM

1: Jackson North Medical Center, Department of Podiatry, Miami, Florida

With a CT scan that provides surgeons with 3-dimensional morphologic imaging, a more comprehensive fracture configuration accordingly result in a surgical plan that will promote stable anatomic reduction eliciting post-operative satisfaction and less probability for post-traumatic osteoarthritis and future additional surgeries.

None

Analysis & Discussion (Continued)

With a CT scan that provides surgeons with 3-dimensional morphologic imaging, a more comprehensive fracture configuration accordingly result in a surgical plan that will promote stable anatomic reduction eliciting post-operative satisfaction and less probability for post-traumatic osteoarthritis and future additional surgeries.

None

Level of Evidence

Level III, Scientific

Disclosures

None

Results (Continued)

Cases surgeons refused CT scans from initial plain film review (n=66):
- 45% (29/66) cases osteous fracture identification
- 48.3% (32/66) fixation management adjustment
- 35% (23/66) increase in postoperative malleolus fixation
- 45% (29/66) change in order of fixation
- 46.7% (30/66) incision placement adjustment
- 16.7% (11/66) patient position change
- 35% (23/66) increased postoperative non-weight-bearing duration post-operatively

Management Change when Refused CT Imaging

| Treatment Management Change After Reviewing CT | 
| --- | --- | --- | --- | --- | --- |
| Incision adjustment | 19.7% (13/66) | 43.5% (23/53) | 39.1% (66/168) | 44.8% (97/214) | 48.5% (97/200) | 50.0% (97/194) | 51.3% (97/190) |
| Position modification | 10.0% (6/66) | 23.5% (16/68) | 28.0% (18/64) | 33.0% (66/198) | 33.3% (66/200) | 40.0% (66/165) | 41.0% (66/162) |
| Fixation modification | 5.0% (3/66) | 20.0% (13/65) | 28.0% (18/64) | 5.0% (10/200) | 10.0% (20/200) | 13.3% (27/200) | 13.5% (27/200) |
| Weightbearing status | 1.5% (1/66) | 15.0% (10/67) | 28.0% (18/64) | 35% (21/60) | 35% (21/60) | 41.0% (27/66) | 43.5% (27/62) |

Figure 1. Plain Radiograph with Corresponding CT Image from Our Study

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