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Ankle Fractures in the Elderly: Initial and Long-term Outcomes

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ABSTRACT

Background: **Surgical management of ankle fractures will be an increasing part of the orthopaedic practice for aging adults. To date, there are few studies comparing outcomes after ankle fracture surgery between patients over and under 65 years. The purpose of this study was to evaluate short- and long-term outcomes after surgical treatment of isolated malleolar fractures in both the elderly and non-elderly population.** ***Materials and Methods:*** **Charts and radiographs were reviewed for 25 patients over age 65 and 46 patients under age 65 who underwent operative treatment of an ankle fracture during a 2-year period. Postoperative complications and need for placement in a skilled nursing facility following discharge were noted. The SF-36 and the Olerud and Molander Ankle Score were completed. Mean duration of followup in patients greater than 65 was 27 months and 24 months for patients less than or equal to 65 years.** ***Results:*** **Patients over 65 had a higher number of postoperative complications (40% vs. 11%, $p < 0.007$), and required nursing home placement more frequently than patients under 65 ($p < 0.0001$). At long-term followup, the data showed no significant difference in patient reported physical outcomes.** ***Conclusion:*** **Early postoperative outcomes after operative fixation of ankle fractures suggest significantly worse outcomes for patients over age 65. However, long-term function in the elderly was comparable to patients under age 65 in this sample. The elderly population had a significantly better mental composite score than the non-elderly.**

Level of Evidence: III, Retrospective Case Control Study

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Key Words: Ankle Fracture; ORIF; Elderly, SF-36; OMA; Functional Outcome

INTRODUCTION

Ankle fractures are among the most common osseous injuries to the lower extremity, and remain a significant source of morbidity for both the young and the elderly. Recent cross-national studies have shown a significant increase in the incidence and severity of ankle fractures among the elderly population.[3,5,8,9,13,12] The incidence in the United States has been estimated as high as 4.2 per 1,000 Medicare patients during a 3-year period.[14] Despite the growing incidence of severe ankle fractures in the elderly population, there is still much controversy in the orthopedic community regarding the best management for these fractures.[1,2,4,6,15,18,20,21,23] Closed management with manipulation in the face of a poorly reduced joint can contribute to poor long-term outcomes.[2,4,6,16,23] This includes significantly higher rates of malunion and non-union,[1,4] decreased ankle range of motion, morbidity associated with casting and lower ankle function scores.[16] While open management can restore articular congruity, it naturally carries attendant risk. This is particularly true in the elderly population, where perioperative risk, complications from skin issues, and contributing risk of comorbid disease all tend to be higher.[4,15–18]

Given the perception of increased operative risks in the elderly population, we undertook this retrospective review of patients who underwent operative management of isolated ankle injuries to determine if older patients had higher preoperative co-morbidities, higher postoperative complications, and differences in long term outcomes when compared to the population under 65 years of age. We hypothesized that the elderly patient population would be less healthy, have higher perioperative morbidity, but would have equivalent long term patient reported outcomes as measured by the SF-36 and Olerud and Molander ankle scores. This information could help guide patient and surgeon decision making about operative treatment of ankle fractures in our aging population.

MATERIALS AND METHODS

This investigation was approved by and performed in accordance with the guidelines of the institutional review board at our hospital. We performed a retrospective review of all patients treated surgically for ankle fracture between January 2004 and December 2005. For the purpose of this study, patients with tibial pilon fractures, concomitant lower extremity fractures, or revision surgeries were excluded. Patients with diabetes and/or neuropathy were not excluded. All ankle injuries were classified by location of fracture: lateral malleolus, medial malleolus, or bi/tri malleolar fracture. The indication for surgery in all patients was a displaced fracture with an incongruent ankle joint. A consecutive series of 256 patients over the age of 18 who had operative fixation of an isolated ankle fracture was identified using departmental billing codes and hospital records. Of these 256 patients, 25 were over age 65. A 25% random sampling of the patients under 65 was taken resulting in a study group of 46 patients under age 65, and 25 patients over age 65.

Operative fixation of lateral malleolar fractures included interfragmentary screws and lateral plating. Medial malleolar fractures were fixed with either screws or Kirschner wires. Syndesmotic widening was treated with one or two syndesmotic screws when indicated. An external fixator was used in one patient with skin compromise.

The medical record of each patient was reviewed to determine the patient's gender, age at time of fracture, disposition at discharge, medical comorbidities and documented postoperative complications. Anterior-posterior, lateral, and mortise injury films were evaluated for all patients to determine the fracture pattern. The SF-36 health survey and the Olerud and Molander ankle score questionnaire were mailed to all patients. Those patients who did not return the questionnaires were contacted by phone. Patients unable to be reached by either mail or telephone were considered lost to followup. Four fellowship trained orthopaedic trauma surgeons (JJW, WL, KB, RCA) independently reviewed all followup X-rays, and graded the results as either union, nonunion, or malunion. Reviewers were blinded to patient age group. Differences in means between the two groups were analyzed with Student t-tests, differences in rates by Fisher exact tests (chi square). The level of significance was set at $p < 0.05$.

RESULTS

Demographics

Table 1 presents the demographic data for the patients in our initial study group comparing the elderly and non-elderly patients. Elderly patients were more frequently female, had significantly more comorbidities, and were more likely to have sustained a bi-malleolar or tri-malleolar type fracture. The average age was 77 (range, 65 to 93) in the over-65 group, and 48.5 (range, 18 to 64) in the under-65 group.

Table 1: Initial demographics data comparing the elderly and non-elderly patients

	Patients <65	Patients >65	*p* value
Mean age	48.5	77	<0.0001
Male gender	52%	24%	0.038
Fracture pattern			
Lateral malleolus	35%	20%	0.19
Medial malleolus	11%	8%	0.70
Bi/Tri malleolar	52%	18%	0.10
Comorbidities	1.04	2.24	0.0001

Nineteen women and six men made up the over-65 group; 22 women and 24 men made up the under-65 group. The average number of co-morbidities (by organ system involved) was 2.24 in the over-65 group, and 1.04 in the under-65 group. Classification of comorbidities by organ system was also performed on our patient population (Table 6).

Initial outcomes

Table 2 presents the initial outcomes assessed in our study group. This included the need for facility placement on hospital discharge and number of complications. Initial outcomes in the elderly showed more frequent need for placement ($p < 0.0001$) and higher complication rates ($p = 0.007$). There were five complications in five patients under 65 and ten complications in nine patients over 65. Complications included superficial infection, wound breakdown or prolonged drainage, skin ulcers and perioperative medical complications. One patient under 65 developed a synostosis. Complications following operative treatment are presented in Table 3.

Long-term outcomes

Sixteen patients in the over-65 group and 17 patients in the under-65 group completed the SF-36 and Olerud

Table 2: Initial outcomes in the elderly and non-elderly ankle fracture patients

	Patients <65 ($n = 46$)	Patients >65 ($n = 25$)	*p* value
Facility placements	2 (4%)	16 (64%)	<0.0001
Complications	5 (11%)	10 (40%)	0.007

Table 3: Complications following operative treatment of ankle fractures

	Patients <65 ($n = 46$)	Patients >65 ($n = 25$)
Superficial infection	1/46 (2%)	1/25 (4%)
Wound problems	3/46 (7%)	5/25 (20%)
Skin grafting	0	1/25 (4%)
Synostosis	1/46 (2%)	0
Skin ulcers	0	1/25 (4%)
Medical complications	0	2/25 (8%)

Table 4: Demographics comparing the elderly and non-elderly patients completing outcomes measures

	<65	>65	p value
Age (mean years)	43.2	76.3	<0.0001
Male (%)	41%	19%	0.31
Fracture type			
Lateral malleolus	65%	19%	0.008
Medial malleolus	6%	6%	0.96
Bi/Tri malleolar	24%	75%	0.003
Comorbidities	1.35	2.25	0.06
Followup timing (mean months)	24.3	26.7	0.33

and Molander ankle score questionnaires and had a radiographic review. In the over-65 group, six patients declined to complete the outcomes measures, one patient expired during the followup period, and two were lost to followup. Full followup was available for 16 of 25 patients (64%). In the under-65 group, five patients declined to complete the outcomes measures and 24 patients were lost to followup. Full followup was available for 17 of 46 patients (37%). Statistical analysis of demographic and fracture pattern differences in our final study group showed twice as many patients in the under-65 age group were male and the predominant injury pattern was lateral malleolus ($p = 0.008$), where the elderly group tended to have bi- or tri-malleolar fractures ($p = 0.003$) (Table 4).

Outcomes data can be found in Table 5, which showed nearly identical OMA scores. SF-36 physical composite scores trended higher in younger patients but without being significantly different ($p = 0.17$), while mental composite scores were significantly higher in elderly patients ($p = 0.04$). With regard to radiographic outcomes, the two groups were very similar. Radiographic review demonstrated one malunion in the over-65 patient group and no malunions or non-unions in patients under 65 ($p = 0.97$) at most recent followup.

DISCUSSION

Our health care system is faced with a growing number of elderly patients and challenges in caring for the geriatric trauma patient.[7,19,22,24] Many are affected by osteoporosis, which may increase fracture risk, decrease bone quality, and make both fracture fixation and healing more challenging.[10,11] These patients frequently have multiple medical risks thus increasing their chance of perioperative complications. Clearly, if the risk of surgery in this population is higher, then understanding the potential benefit is very important in guiding patient and surgeon treatment decisions.

In our retrospective study we showed that the elderly population did have poorer preoperative health (based on number of comorbidities), more require facility placement upon discharge, and have a higher perioperative complication rate when compared with the younger patients. However, in general, long-term outcomes among the two groups were similar. The mean Olerud and Molander ankle score was not significantly different ($p = 0.91$) when analyzed by age group, nor was the physical composite score of the SF-36 ($p = 0.17$). Elderly patients actually exhibited a higher mental composite score ($p = 0.04$). The explanation for this

Table 5: Final outcomes data of elderly and non-elderly ankle fracture patients

	Patients <65 ($n = 17$)	Patients >65 ($n = 16$)	p value
OMA score	74	73	0.91
SF-36			
Physical composite	49	46.11	0.17
Mental composite	43.2	46.1	0.04

Table 6: Patient co-morbidities by organ system

Co-Morbidities by Organ System	
Cardiovascular	Musculoskeletal
Pulmonary	Integumentary
Neurologic	Hematologic
Endocrine	Gastrointestinal
Psychiatric	Genitourinary

is unclear but could include different expectations of recovery in the elderly group. Radiographically outcomes were also quite similar with all but one patient in both groups having acceptable alignment.

Our study has some limitations which are important. First, all patients underwent surgery. Thus one inherent bias is the assumption that patients will do better with surgery than without when significant displacement occurs. All patients had joint incongruence initially, regardless of age, which was the indication for surgery in all cases. While operative treatment produced similar results in both groups, these results may not translate to the non-operative care of ankle fractures in a similarly aged population.

Secondly, this study has all the inherent limitations of retrospective analyses. It is quite possible that some high risk elderly patients were not offered surgery as an alternative or declined surgical care because of their co-morbidities or severity of their injury. If this were the case, our analysis may underestimate the disparity between the overall health of older and younger patients. Clearly, the 40% complication rate in the elderly would suggest that this selection bias, if present, is small. Another limitation of our study is the large number of patients lost to follow in the younger age group ($n = 17$ for younger than or equal to 65; $n = 16$ for over 65). This bias could skew the outcomes obtained in our study as well as the complication rates. Since our hospital is a large tertiary referral center, some of the patients could have gone to their local orthopedic surgeon for followup or cancelled further appointments because of good outcome. However, we can not speculate whether the outcome of these patients lost to followup was favorable or not. Also the demographics in the final outcome group showed significantly more bi/tri malleolar fractures in the elderly population ($p = 0.008$) and more isolated fibular fractures in the younger than or equal to 65 group (0.003). Thus in terms of injury patterns, the two groups are different with the elderly population having more complex fracture types. The initial pilot data obtained in this study points to the fact that a prospective randomized trial comparing these two patient populations after ankle surgery is needed in the future.

CONCLUSION

In general, among patients who were chosen as operative candidates for ankle fracture surgery based on joint incongruity, long term operative outcomes were similar. Low rates of nonunion and malunion were seen in both the younger and older patients, suggesting that the potential benefit of operative management in restoring ankle joint congruity is independent of patient age. Surgeons are correct in assuming that elderly patients carry higher risk. In our study, the perioperative complication rate was 40%. However, despite this higher risk, self-reported long-term functional outcomes are similar when compared with a younger, lower risk population. We can use the information from this study to anticipate and counsel our elderly patients undergoing ankle fracture surgery. While they may have an increased risk of complications acutely and higher likelihood of placement in a rehabilitation or short-term nursing facility, their long-term functional outcomes may be similar to younger patients. This information may be very useful to both patients and surgeons in making a well-informed decision regarding the management of the elderly ankle fracture.

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