Patient Compliance With Follow-Up After Open Reduction and Internal Fixation for Treating Malleolar Ankle Fractures: A Retrospective Review

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ABSTRACT

Background: Compliance with follow-up after orthopaedic procedures is variable and does not always occur as recommended. Various factors such as medical, financial, cultural, and logistical reasons may contribute to this lack of compliance. The purpose of this study was to determine follow-up compliance of patients who had undergone open reduction and internal fixation (ORIF) for treating closed malleolar ankle fractures.

Methods: Medical records of patients who underwent ORIF for treating closed malleolar ankle fractures by the senior author (RAM) were reviewed to evaluate compliance with postoperative follow-up (n = 267). Inclusion criteria were patients with isolated, acute, closed fractures (n = 229). Patients were considered to have followed up appropriately if they returned to clinic after a removable cast boot was issued at 4 to 8 weeks postoperatively. A 2-tailed *t* test was performed to analyze age and visual analogue scale score at the time of obtaining the removable cast boot. Chi-square testing was performed to analyze the other variables studied.

Results: Of the 229 patients included, a total of 183 complied with follow-up whereas 46 did not. Younger age, male sex, and living greater than 160.9 km (100 mi) from the hospital were statistically significant variables associated with decreased compliance with follow-up.

Conclusions: In our patient population, 80% of patients followed up in clinic as scheduled. The remaining 20% did not adhere with scheduled follow-up either before or after obtaining a removable cast boot. Younger age, male sex, and living greater than 100 miles from the hospital were associated with decreased compliance. Consideration should be paid to these factors when treating patients with ankle fractures.

Keywords: Follow-Up Care, Ankle Fracture, Surgical Cast

INTRODUCTION

After undergoing orthopaedic procedures, patients do not always follow-up as recommended.[1] Reasons for loss to follow-up can be multifactorial, potentially including medical, financial, cultural, social, and logistical variables.[2] In addition to potential problems with treatment outcomes, loss to follow-up may introduce bias in clinical studies. This is because the patients lost to follow-up may have a different outcome than those who returned.[3,4]

In the current study, we reviewed patient compliance with follow-up to clinic appointments after surgical treatment of closed malleolar ankle fractures. These patients underwent open reduction and internal fixation (ORIF) between 2012 through 2016. Medical records were evaluated to determine follow-up length; furthermore, we analyzed factors that might be associated with failure to return for follow-up. We hypothesized that there would be variables associated with noncompliance.

METHODS

After obtaining approval from our Human Research Review Committee (HRRC #18-362), we reviewed medical records of patients who underwent ORIF for treating closed malleolar ankle fractures. The procedures were performed by a single surgeon, the senior author (RAM), from 2012 through 2016. A total of 267 patients were initially identified. Inclusion criteria were patients with isolated, acute, closed fractures. Patients with open fractures, other fractures in their body, and treated initially using an external fixator were excluded. In total, 229 patients were included in the study.

The recorded variables were as follows: age, sex, number of anatomical locations internally fixed, inpatient or outpatient surgical procedure, primary language, clinic of follow-up, distance to hospital from city of residence, week obtained removable cast boot, visual

analogue scale (VAS) score at time of obtaining the removable cast boot, and week of final follow-up visit.

After undergoing ORIF, patients were placed in a splint. The splint was exchanged for a cast when the staples were removed at 2 to 3 weeks postoperatively. Patients remained non-weight bearing and used crutches until 4 to 8 weeks postoperatively. At that time, they received a removable cast boot and began progressive weight bearing and ankle motion. Patients were given monthly follow-up appointments to assess radiographic healing and functional recovery. Compliance with follow-up was noted when patients returned for a clinic visit after receiving a removable cast boot. Noncompliance was considered when patients did not return for the clinic appointment before or after receiving the removable cast boot.

Statistical analysis was performed on the recorded variables to determine any significant association with loss to follow-up. A 2-tailed *t* test was performed to analyze age and VAS score at the time of obtaining the removable cast boot. The other variables were analyzed using the chi-square test.

RESULTS

Of the 229 patients included, 183 (80%) complied with follow-up and 46 (20%) did not. A total of 181 patients in the follow-up group had a minimum of 10 weeks postoperative follow-up. Two patients had less than 10 weeks postoperative follow-up but were placed in the compliant group because they returned after receiving the removable cast boot and were discharged from clinic on their final visit.

For those that did not comply with follow-up (n = 46), two patients did not return at all post-operatively. Nine patients did not return after staple removal at 2 weeks postoperatively, although they were placed in a cast. The remaining 35 patients did not return after receiving the removable cast boot at 4 to 8 weeks postoperatively. Of the patients who received the removable cast boot 4 to 8 weeks postoperatively, a total of 16% had no further follow-up (Table 1).

As shown in Table 1, variables such as younger age, male sex, and living greater than 160.9 km (100 mi) from the hospital were statistical predictors for noncompliance with follow-up. The number of anatomical parts treated surgically, whether performed as inpatient or outpatient, and the primary language of the patient were not statistically significant. The VAS score at the time of obtaining the removable cast boot and living less than 160.9 km (100 mi) from the hospital were also not significantly different between the two groups.

DISCUSSION

In the current study, we examined variables affecting follow-up rates in patients who underwent surgical treatment of malleolar ankle fractures. Patients who were younger, male, and living greater than 160.9 km (100 mi) from the hospital were statistically less likely to comply with follow-up. Overall, a total of 20% of patients did not comply with follow-up. Of those that followed up enough times to obtain a removable cast boot, a total of 16% did not return for another clinic appointment. Several studies have examined compliance with follow-up in patients with orthopaedic-related traumatic injuries, with results similar to our own findings.[1,2,5-7]

Stone et al[1] reviewed 1818 trauma patients who were discharged from a level I trauma center. This study included patients with and without orthopaedic-related injuries. Only 31% of patients complied with follow-up within 4 weeks from discharge. In a smaller population size, Zelle et al[2] studied 307 patients who underwent surgical treatment of orthopaedic-related injuries at a level I trauma center. Of those, only 215 attended at least one of their follow-up appointments between hospital discharge and the 6-month follow-up. In this study, patients who were male, uninsured or had government insurance, and smoked were statistically more likely to be noncompliant with the 6-month follow-up. Illicit drug abuse was significantly associated with noncompliance to any of the follow-up appointments during the 6-month period. In another level I trauma center study, a total of 33.1% of 2165 patients were not compliant with attending their first clinic appointment after undergoing orthopaedic treatment.[5] Patients who used tobacco, lived more than 160.9 km (100 mi) from the clinic, did not have private insurance, or had a fracture of the hip or pelvis were significantly less likely to follow-up. In this study, the variables of age, sex, and race were not significantly associated with failure to follow-up.

Other variables associated with noncompliance have been evaluated, including homelessness and country. Kay et al[6] studied 63 uninsured homeless patients with orthopaedic-related injuries and compared their compliance with follow-up to that of 63 non-homeless patients. The homeless patients returned to fewer orthopaedic follow-up appointments than did the non-homeless patients after their initial visit to the emergency department. Somerson et al[7] reviewed randomized controlled trials associated with orthopaedic surgery from 2008 to 2011. There were no significantly different follow-up rates between the subspecialties; however, studies with at least 3 years of follow-up had significantly higher rates of loss to follow-up than those of studies with less than 3 years. In addition, studies performed in the United States had significantly higher rates of loss to follow-up than those of other countries.

Our study has several limitations. It is a retrospective review, and no intervention was performed in an attempt to improve the rate of follow-up. We only reviewed patients who underwent operative fixation of isolated, closed malleolar ankle fractures and did not examine other orthopaedic-related injuries or patients with multiple injuries. Furthermore, it is possible that patients lost to follow-up were seen outside of our hospital system.

Table 1. *Variables of the patients who followed up and of those that did not (n = 229) after operative treatment of closed malleolar ankle fractures*

Patient variable	Follow-up group (n = 183)	Non–follow-up group (n = 46)	*P* value
Mean age, y (range)	38 (18-75)	31.8 (18-56)	0.0008
Sex			0.029
Male	103	34	
Female	80	12	
Number of anatomical parts treated			0.81
1	70	20	
2	100	23	
3	13	3	
4	0	0	
Hospital setting			0.8
Inpatient	29	8	
Outpatient	154	38	
Primary Language			0.43
English	169	44	
Spanish	14	2	
Clinic			0.67
General orthopaedic clinic	137	37	
Faculty orthopaedic clinic	19	3	
Both	27	6	
VAS score when obtained RCR (range)[a]	1.88 (0-10)	2.19 (0-9)	0.52
Distance of city of residence from hospital:	148	33	--
Same city	16	4	0.85
< 80.5 km (50 mi)	9	1	0.51
< 80.5-160.9 km (50-100 mi)	10	8	0.0087
> 160.9 km (100 mi)			

--, not applicable; VAS, visual analogue scale; RCR, removable cast boot.
[a]A total of 177 VAS scores were available from the follow-up group, and 41 VAS numbers were available from the non–follow-up group. Patients received a removable cast boot between 4 to 8 weeks postoperatively.

In conclusion, our study was unique by only evaluating patients with isolated, closed malleolar ankle fractures. The significant variables associated with lack of follow-up (ie, age, male sex, and distance to hospital) should be kept in mind when treating patients with ankle fractures. It is not known what type of intervention might improve the follow-up rate in this patient population. Results of future prospective multicenter studies may help determine effective, individualized methods to consistently follow-up with patients after operative treatment of malleolar ankle fractures.

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