

Outcomes Following Open Reduction Internal Fixation of Ankle Fractures (ORIF)

Kaiser Permanente
Research

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Objective:

The primary aim is to identify the incidence of complications and outcomes (unplanned readmission within 30 days postoperative, surgical site infection, postoperative venous thromboembolism (blood clot in leg), unplanned return to OR (Operating Room), fracture malalignment, fracture delayed or nonunion) following Open Reduction Internal Fixation of Ankle Fractures (ORIF) of malleolar ankle fractures performed by a podiatry provider (DPM-Doctor of Podiatric Medicine) at 30 days and 1 year postoperative. We will compare our findings to the orthopedic literature results to see if there is a statistically significant difference. We predict that there will be no difference.

Background:

To our knowledge there are no studies that specifically look at outcomes after ankle open reduction internal fixation (ORIF) performed by DPMs. There was one abstract comparing orthopedic surgeon's outcomes and podiatrists outcomes by Chan et. Al that was published in Foot and Ankle orthopedics in 2017 that looked at complication rate following ankle fracture fixation by Orthopedic Surgeons vs Podiatrists¹ However, this study involved gross group N bias. The orthopedic surgical group involved over 14,000 cases where as the Podiatry group only involved 800. The Kaiser system provides a very large platform to be able to get a large sample size to look at how our outcomes compare to the standard that is published in the orthopedic literature. To our knowledge there is no large study that looks at DPMs complication rates following ankle open reduction internal fixation within the Podiatric literature, and more specifically there is no large study in Podiatric literature comparing our results to the results that are published in the Orthopedic literature. Within the orthopedic literature the standard rate of malunion, infection, DVT and repeat surgery with irrigation and debridement varies. However, the average rate for malunion, infection, DVT, and repeat surgery is 4.26%, 4.37%, 2.41%, and 7.97% respectively^{2,3,4}. We hypothesize that our results will be no different than the results involving post-operative DVT, post-operative infection, malunion, or repeat surgeries involving irrigation and debridement, that have been published in the orthopedic literature.



Methods:

Overall, we retrospectively identified N=9467 patients with ORIF of malleolar ankle fractures performed by DPM at all KPNC facility from year 2010 to 2018.

Inclusion criteria:

- Patients who had ORIF of malleolar ankle fractures performed by DPM during calendar year 2010 to 2018
- Age \geq 18 years old
- Participant has a diagnosis unilateral ankle malleolar fracture diagnosed clinically and radiographically.
- Participant has an intact cutaneous barrier, with or without the presence of infection

Exclusion Criteria:

- Exclude people who carry diagnosis of chronic pain, fibromyalgia, or opioid agreement, etc.
- Carries any diagnosis of neuropathy for example;
- Carries diagnosis of bone tumor or previous history of ankle fracture on same side
- Candidate has had previous ipsilateral ankle malleolar or talus fracture or surgery;
- Candidate carries diagnosis of pilon fracture, open fracture,.
- Pregnant females

Results:

We will describe subject demographics, clinical characteristics and surgical outcomes. We will report the mean, standard deviation for normally distributed and the median, range and quartiles for non-normally distributed continuous variables. We will report proportions for categorical variables. We will evaluate age, sex, smoking status, BMI, Charlson comorbidity index, ASA scores, length of surgery, surgical complications, smoking status, diabetes, hypertension and other comorbidities.

Comparisons involving categorical variables will be performed using Chi-square or Fisher's exact test. Normally distributed continuous variables will be compared using Student's T-test and comparisons of non-normally distributed continuous variables will be conducted using the Wilcoxon rank-sum test or Kruskal-Wallis test. For each group we will report the mean, standard deviation for normally distributed and the median, range and quartiles for non-normally distributed continuous variables and proportions for categorical variables. We will also report p-values for the comparisons.

We will compare the KPNC major complication rate to the published literature rates using the binomial test of proportions. We will report p-values and 95% confidence intervals for the proportions.

We will perform a multivariable logistic regression to examine the predictors of complications and outcomes. Risk factors we will consider include age, sex, race, BMI, diagnosis of diabetes and ASA scores. We will report odds ratios with 95% confidence intervals and the odds ratio p-values.

All analyses will be performed using SAS software version 9.4 (SAS institute Inc., Cary NC), and a 2-sided p-value of less than .05 will be considered significant.

Discussion:

Our goal is to compare complication rates of Open Reduction Internal Fixation of Ankle Fractures (ORIF) of malleolar ankle fractures performed by a podiatry provider (DPM-Doctor of Podiatric Medicine) at 30 days and 1 year postoperative with a large sample size. Previous literature has been published however, sample sizes between podiatrist and orthopedic surgeons have been skewed, Our study will identify complication rates of Ankle ORIF by a large sample size of podiatric providers to be compared to the complication rates of orthopedic literature.

References

1. Chan, Jeremy, et al. "Lower Complication Rate Following Ankle Fracture Fixation by Orthopaedic Surgeons Versus Podiatrists." *Foot & Ankle Orthopaedics* 2.3 (2017): 2473011417S000031.
2. Leyes, et. Al. "Complications of open reduction and internal fixation of ankle fractures." *Foot and Ankle Clinics*. 2003
3. Gertrud, Kjell, et. Al "Unsatisfactory outcome following surgical intervention of ankle fractures." *Foot and Ankle Surgery*. 2004
4. Macera, et. Al "Postoperative complications and reoperation rates following open reduction and internal fixation of ankle fractures." *Joints*. 2018

