

Outcomes of Pantalar Dislocations: A Systematic Review

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STATEMENT OF PURPOSE

Limited literature is available on outcomes in pantalar dislocations. The purpose of this systematic review was to evaluate the literature on treatment options, outcomes and complications for pantalar dislocations.

INTRODUCTION

Pantalar dislocation refers to the simultaneous dislocation of the tibiotalar, subtalar, and talonavicular joints. These injuries are one of the most disabling and rare injuries to the foot and ankle. Treatment ranges from closed reduction to talectomy.¹⁻¹⁵ Potential complications include arthritis, osteonecrosis, and surgical site infection.^{1, 4-5, 7-8, 10, 12} Literature is scant on the outcomes of pantalar dislocations, with most studies consisting of small case studies or series, owing to the rarity of this condition. No studies have performed an extensive literature review on open and closed pantalar dislocations.

METHODOLGY

A systematic review of studies published in PubMed, Medline, Cochrane, and OVID databases between January 2003-April 2023 was performed. Publications evaluating outcomes following open and/or closed pantalar dislocations were identified. Standard Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines were followed.

The inclusion criteria were as follows:

- Discuss management of open and/or closed pantalar dislocations
- Report outcome measures
- Report complications including osteonecrosis, arthrosis, infection, and need for a secondary operation
- Article published in English
- Patients 18 years or older
- Minimum of 1 year follow-up
- Case studies and case series were included for analysis

203 articles were initially identified. 15 articles met the inclusion criteria, for a total of 62 pantalar dislocations (Figure 1). All studies were level 4 evidence.

Demographic, injury description, and treatment data were compiled (Table 1). The mean complication rate, secondary operation rate, and outcome scores were calculated based on the included articles (Table 2 & 3).

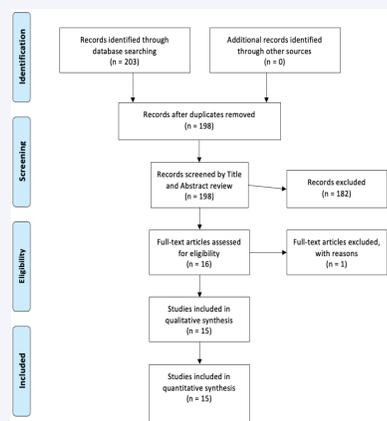


Figure 1: Systematic review methodology according to PRISMA guidelines. PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses

RESULTS

Article	Patients	Mean Age	Gender (M:F)	Mechanism of Injury	Open:Closed	Direction of Dislocation	Treatment	Follow-Up (Months)
Boden et al ¹	19	39.6	10:9	Pedestrian vs car (1), MVC (16), Fall height (2)	14:5	N/A	CR(2), ORPP (4), OREF (9), ORPP + Ex fix (3), OR (2), BKA (1)	45.1
Ruatti et al ²	1	51	1 (M)	Fall from height	Open	N/A	I&D, Cement spacer	24
Eda et al ³	1	20	1 (M)	Soccer	Closed	Lateral	CR	18
Severyns et al ⁴	5	47.4	5 (M)	Fall height (2), MVC (3)	3:2	Medial (2), Lateral (3)	ORPP (3), CRPP (1), ORPP, ORIF (1)	60
Dumbre et al ⁵	1	60	1 (M)	MVC	Open	Lateral	ORPP	36
Zhao et al ⁶	1	23	1 (M)	Pedestrian vs car	Closed	Lateral	CR	20
Karampinas et al ⁷	9	31.7	7:2	MVC (6), Fall from height (3)	Open (9)	Anterolateral (9)	ORPP + Ex fix (9)	21.1
Kwak et al ⁸	1	55	1 (M)	Blunt trauma	Open	Anterolateral	ORPP + Ex fix	72
Gopisankar et al ⁹	1	35	1 (M)	Fall from height	Closed	Lateral	CRPP	12
Genena et al ¹⁰	1	46	1 (M)	MVC	Open	Lateral	ORPP	12
Naranje et al ¹¹	1	35	1 (F)	Unknown – chronic injury	Closed	Lateral	Talectomy	24
Graef et al ¹²	18	30	13:5	Bicycle (2), MVC (1), Fall from height (7), Fall stairs (2), Sports (5)	7:11	Lateral (14), Anterior (3), Posterior (1)	CR (4), OREF (1), CREF (1), CRPP (5), CRPP + Ex fix (5)	48.25
Calabrò et al ¹³	1	44	1 (M)	MVC	Open	Medial	ORPP	24
Benson et al ¹⁴	1	51	1 (F)	Fall height	Open	N/A	Talectomy	192
Metcalfe et al ¹⁵	1	81	1 (F)	MVC	Open	Medial	Triple arthrodesis	18
Total	62	37.3	43:19	MVC (31), Fall height (17), Sports (6), Ped vs car (2), Fall stairs (2), Bicycle (2), Blunt trauma (1), Unknown (1)	40:22	Lateral (23), Anterolateral (10), Medial (4), Anterior (3), Posterior (1)	ORPP + Ex fix (13), OREF (10), ORPP (12), CR (8), CRPP (7), CRPP + Ex fix (5), Talectomy (2), OR (2), BKA (1), Cement spacer (1), CREF (1), Triple arthrodesis (1)	43.02

Table 1: Demographic data, injury description and treatment for the included articles. Abbreviations: BKA, below knee amputation; CR, closed reduction; CREF, closed reduction, external fixation; CRPP, closed reduction, percutaneous pinning; I&D, incision and drainage; MVC, motor vehicle crash; OR, open reduction; OREF, open reduction, external fixation; ORIF, open reduction, internal fixation; ORPP, open reduction, percutaneous pinning.

Article	AOFAS	FFI
Boden et al	N/A	25.3
Ruatti et al	11 (pre), 77 (post)	N/A
Eda et al	79 (post)	N/A
Severyns et al	66.7 (post)	N/A
Dumbre et al	83 (post)	N/A
Zhao et al	100 (post)	N/A
Karampinas et al	82.5 (post)	N/A
Kwak et al	85 (post)	N/A
Gopisankar et al	78 (post)	N/A
Genena et al	75 (post)	N/A
Naranje et al	78 (post)	N/A
Graef et al	N/A	45
Total	75.8 (post) in 19 patients	37.5 in 29 patients

Table 2: AOFAS and FFI outcome scores. Other outcomes were excluded due to lack of consistency between studies. Abbreviations: AOFAS = American Orthopaedic Foot and Ankle Society; FFI = Foot Function Index.

Article	Osteonecrosis	Arthrosis	Infection	Secondary Operation
Boden et al	14	7	Superficial (3)	Debridement (2)
Ruatti et al	None	None	None	Total talus
Eda et al	None	None	None	N/A
Severyns et al	2	None	None	TTC nail (1), Ankle fusion (1)
Dumbre et al	None	Ankle and STJ (1)	None	N/A
Zhao et al	None	None	None	N/A
Karampinas et al	1	STJ (1)	Deep (1), Pin track (3)	Arthrodesis (2)
Kwak et al	1	None	None	I&D
Gopisankar et al	None	None	None	N/A
Genena et al	1	None	None	I&D
Naranje et al	None	None	None	N/A
Graef et al	None	STJ (2)	None	STJ fusion (2)
Calabrò et al	None	None	None	N/A
Benson et al	None	None	None	TAA
Metcalfe et al	None	None	None	N/A
Total	19/62 (30.6%)	11/62 (17.7%)	7/62 (11.3%)	12/62 (19.4%)

Table 3: Summary of complications. Complications included 30.6% (19/62) osteonecrosis, 17.7% (11/62) arthritis, and 11.3% (7/62) infections. 19.4% (12/62) required a secondary operation. Abbreviations: STJ = subtalar joint. TAA = total ankle arthroplasty. TTC = tibiotalocalcaneal.

ANALYSIS & DISCUSSION

This study improves on a previous literature review by Vosoughi et al, which only evaluated outcomes of closed pantalar dislocations.¹⁶ We performed a systematic review and pulled literature from not only closed pantalar dislocation cases, but we also evaluated data on open pantalar dislocations. We found open dislocations to be more common than closed, at a rate of 40/62 (64.5%), which is congruous with previous literature.¹⁷ We additionally found that pantalar dislocations more commonly occur in males (43/62; 69.4%), with MVC being the most frequent mechanism of injury (40/62; 64.5%).

Due to the high velocity trauma mechanism in these injuries, it is common to have severe soft tissue damage and wound contamination. Complication rates are relatively high. Previous literature has found osteonecrosis to be the most prevalent complication, with rates between 30.6% and 83.3%.¹⁷⁻¹⁹ Our findings are consistent, noting osteonecrosis occurring in 30.6% of cases. Fortunately, this complication can typically be treated conservatively with extended nonweightbearing periods in 50% of patients.²⁰ In their systematic review, Weston et al found that 16.2% of patients will develop arthritis.¹⁷ This is similarly reflected in our findings, with 11/62 (17.7%) of patients developing arthritis. Although complication rates are common with pantalar dislocations, it is important to note that our findings show a reoperation rate of 12/62 (19.4%).

Treatment options are variable depending on a multitude of factors, including the soft tissue envelope, direction of dislocation, and concomitant fractures. Closed injuries can often be treated effectively with closed reduction, with a success rate of 68.5%.¹⁶ Surgical options range from percutaneous pinning to below knee amputation. We found the most common surgical treatment option to be a combination of open reduction percutaneous pinning with external fixation application (13/62; 21%).

To our knowledge, no previous systematic reviews have evaluated patient outcome scores. 10 studies, involving a total of 19 patients, evaluated AOFAS scores. We found a pooled mean postoperative AOFAS score of 75.8 in these studies. Additionally, 2 studies, involving a total of 37 patients, evaluated FFI scores. We found a pooled mean postoperative FFI score of 37.5. No other outcome measures were consistently reported and were therefore not included in our review.

CONCLUSION

Pantalar dislocations are rare traumatic injuries that can be debilitating for patients. Various treatment options are available. High complication rates can be expected. However, functional outcomes are acceptable at short term follow-up.

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