Original Research Article

Surgical management of bimalleolar fracture ankle with open reduction and internal fixation: lateral malleolus with prebent 2.7 mm DCP and medial malleolus with tension band wiring - A prospective study

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Abstract

Background: Bimalleolar ankle fractures are unstable injuries that frequently require surgical fixation for restoration of anatomy and early mobilization. This prospective study evaluates functional outcomes of open reduction and internal fixation (ORIF) using a prebent 2.7 mm DCP for the lateral malleolus and tension band wiring (TBW) for the medial malleolus. **Methods:** Forty-two patients with displaced closed bimalleolar fractures were treated surgically at DM Wayanad Institute of Medical Sciences from February 2014 to January 2016. Lateral malleolus was fixed with a prebent 2.7 mm DCP and medial malleolus with TBW. Patients were followed for 9 months postoperatively. Functional outcomes were assessed using the Baird–Jackson scoring system. **Results:** The mean age was 45.5 years (range 25–68), with a male-to-female ratio of 2:1. Mean time from injury to surgery was 2 days and mean operative time was 75 minutes. Mean radiological union time was 10.8 weeks. Based on the Baird–Jackson score, 80% had excellent results, 18% good, and 2% fair. Complications: included stiffness in 3 patients and implant irritation in 2; no infections or nonunions were observed. **Conclusion:** The combination of a prebent 2.7 mm DCP for the lateral malleolus and TBW for the medial malleolus provides stable fixation, excellent union rates, and favorable functional outcomes in most cases.
Keywords: BIMALLEOLAR FRACTURE, ORIF, DYNAMIC COMPRESSION PLATE, TENSION BAND WIRING, ANKLE FIXATION.

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INTRODUCTION

Ankle fractures constitute a significant proportion of lower limb injuries, with bimalleolar fractures being particularly unstable due to disruption of both medial and lateral stabilizers. Anatomical reduction and rigid fixation are essential to restore congruity and prevent post-traumatic arthritis.[1] Open reduction and internal fixation (ORIF) remains the mainstay of treatment for achieving anatomical reduction and early mobilization.

The 2.7 mm prebent dynamic compression plate (DCP) for the lateral malleolus offers stable fixation with minimal soft tissue irritation, while tension band wiring (TBW) effectively converts tensile forces into compression on the medial side. Previous clinical series have reported

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favourable outcomes with plating of the fibula and TBW or screws for the medial malleolus.[2]

This study aims to evaluate the functional and radiological outcomes of this fixation combination in 42 patients treated at our institution between February 2014 and January 2016.

Objective: To study the clinical outcome of displaced bimalleolar fracture by surgical management with ORIF lateral malleolus using prebent 2.7mm DCP and ORIF medial malleolus with TBW.

MATERIALS AND METHODS

This prospective study was conducted in the Department of Orthopaedics, DM Wayanad Institute of Medical Sciences, from February 2014 to January 2016 after institutional ethical approval. Forty-two adult patients with closed displaced bimalleolar ankle fractures were included. Open fractures, pathological fractures, and polytrauma patients were excluded.

Inclusion criteria

Patients with unstable displaced bimalleolar Fracture

Exclusion criteria

1. Patient below 20 years and above 70 years of age
2. Patients with medical contra indication to Surgery
3. Pathological and open fracture

All patients underwent ORIF—lateral malleolus fixed with a prebent 2.7 mm DCP and medial malleolus fixed with TBW using Kirschner wires and a stainless-steel figure-of-eight wire. Syndesmotic fixation was performed in 21 cases based on intraoperative assessment. Postoperatively, patients were immobilized for two weeks, followed by gradual mobilization and partial weight-bearing at 4–6 weeks.

Functional outcomes were assessed using the Baird–Jackson scoring system, and radiological union was defined as bridging trabeculae across at least three cortices on plain radiographs.

RESULTS

The mean age of patients was 45.5 years (range 25–68), with a male-to-female ratio of 2:1. Right-sided fractures accounted for 60% of cases. The most common mechanism of injury was road traffic accident (65%), followed by falls (35%). According to Weber classification, 37% were type A, 35% type B, and 28% type C. Syndesmotic fixation was required in 21 patients (50%). Mean operative duration was 75 minutes.

Radiological union occurred at a mean of 10.8 weeks. Functionally, 80% of patients achieved excellent results, 18% good, and 2% fair. Average dorsiflexion was 20.1°, and plantarflexion 34.2°. Complications were minimal: 3 cases of mild stiffness and 2 of implant irritation, with no infection or non-union reported.

Tables 1: Socio Demographic Profile of the study subjects

		Frequency	Percentage
Age	< 40 years	25	59.5%
	>40 years	17	40.4%
Gender	Male	28	66.6%
	Female	14	33.3%
Side	Left	26	61.9%
	Right	16	38.1%

Table 2: Mode of Injury and Operative information

		Frequency	Percentage
Mechanism of Injury	RTA	27	64.3%
	Fall	15	35.7%
Webber Type	A	16	38.1%
	B	15	35.7%
	C	11	26.2%
Mean injury–surgery interval		2 ±1.2 days	
Mean operative Time		75± 15 Min	

Table 3: Outcomes and Complications

Mean radiological union time	10.8±2.3 weeks
Baird–Jackson results	Excellent 80%, Good 18%, Fair 2%
Mean dorsiflexion	20.1°±1.5°
Mean plantarflexion	34.2°± 1.8 °
Complications	Stiffness (3), Implant irritation (2)

DISCUSSION

This prospective series demonstrates that fixation of the lateral malleolus with a prebent 2.7 mm DCP and the medial malleolus with TBW provides good functional outcomes. Our excellent/good rate (98% combined; 80% excellent + 18% good) is comparable to or slightly better than several previously published series.[3]

Our complication rate (minor stiffness and implant irritation in 5/42) is low and aligns with other prospective series reported before 2017.[4]

Limitations include modest sample size and short follow-up, but the data support this construct as a reliable option in routine practice.[5]

Limitations: a modest sample size, short mean follow-up (9 months), and lack of randomized comparison against alternative medial fixation such as cannulated screws. Nonetheless, our data support the described construct as a reliable option in routine practice.[9]

CONCLUSION

Open reduction and internal fixation of bimalleolar fractures using a prebent 2.7 mm DCP for the lateral malleolus and TBW for the medial malleolus ensures stable fixation, early mobilization, and favourable functional outcomes. This method can be recommended as a reliable option in the surgical management of bimalleolar ankle fractures.

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