

Role of Cast Wedging in Conservative Management of Both Bone Leg Fracture

Dr. Shekhar Gupta¹, Dr. Anshuman Dutta², Dr. Vikash Agarwala³, Dr. Tridip Bharali⁴

¹Junior Resident, Department of Orthopaedics, Silchar Medical College & Hospital, Silchar, Assam, India
Corresponding Author's Email: [drshekhar2703\[at\]gmail.com](mailto:drshekhar2703[at]gmail.com)

²Professor & Head of Department, Department of Orthopaedics, Silchar Medical College & Hospital, Silchar, Assam, India

³Associate Professor, Department of Orthopaedics, Silchar Medical College & Hospital, Silchar, Assam, India

⁴Assistant Professor, Department of Orthopaedics, Silchar Medical College & Hospital, Silchar, Assam, India

Abstract: ***Introduction:** Both bone leg fracture is one of the most frequent fracture in adults. The goal of any treatment is to restore length, rotation and axis of the bone to recover full function. Often these injuries can be treated with closed reduction, cast immobilization and clinical or radiological follow up. Wedging of plaster casts is a method of manipulating mal-aligned long bone fracture that are being treated non-operatively. It is simple and non-invasive treatment procedure for secondary displaced long bone fracture. **Method:** We performed prospective chart reviews of patient with both bone leg fracture which was managed with cast. Inclusion criteria included closed fracture, loss of acceptable reduction, and availability of clinical and radiological data from injury to cast removal. Reduction was performed and patient were called for follow up. Initially within 5 to 10 days post injury and weekly visits for 2 weeks thereafter. If alignment were deemed unacceptable within 3 weeks of injury, cast wedging was done. **Result:** Cast wedge failures occurred in 4 of 36 patients out of which 1 patient required surgical fixation & 3 patients ended up with healed deformity. **Conclusion:** Cast wedging is a simple, safe, non invasive and effective method for correction of angulation in conservative managed both bone leg fracture.*

Keywords: Cast wedging, Reduction, Manipulation, Conservative management.

1. Introduction

Both bone leg fracture is one of the most frequent fracture in adults. The goal of any treatment is to restore length, rotation and axis of the bone to recover full function. Often these injuries can be treated with closed reduction, cast immobilization and clinical or radiological follow up. Wedging of plaster casts is a method of manipulating malaligned long bone fracture that are being treated non-operatively. It is simple and non-invasive treatment procedure for secondary displaced long bone fracture.

The use of wedging¹ casts seems to be declining. With recent advances in external fixation and closed nailing, many tibial fractures that were traditionally well managed in casts are now being treated by surgical fixation and the failure to achieve an acceptable position in a cast is rectified by operation rather than by correction within the plaster. Indeed the loss of alignment during cast immobilisation of a fracture is often seen as an indication for operative fixation. Three methods of cast wedging have been described: the opening wedge,² the closing wedge³, and the combined opening—closing wedge⁴.

2. Materials and Methods

This study was approved by the institutional ethical committee. All the participants gave written informed consent to participate in the study.

Inclusion criteria included closed fracture, loss of acceptable reduction and availability of clinical and radiological data from injury to cast removal.

Exclusion criteria include compartment syndrome, compound fracture.

Reduction were performed under sedation in minor OT and patient were called for follow up.

3. Study Population

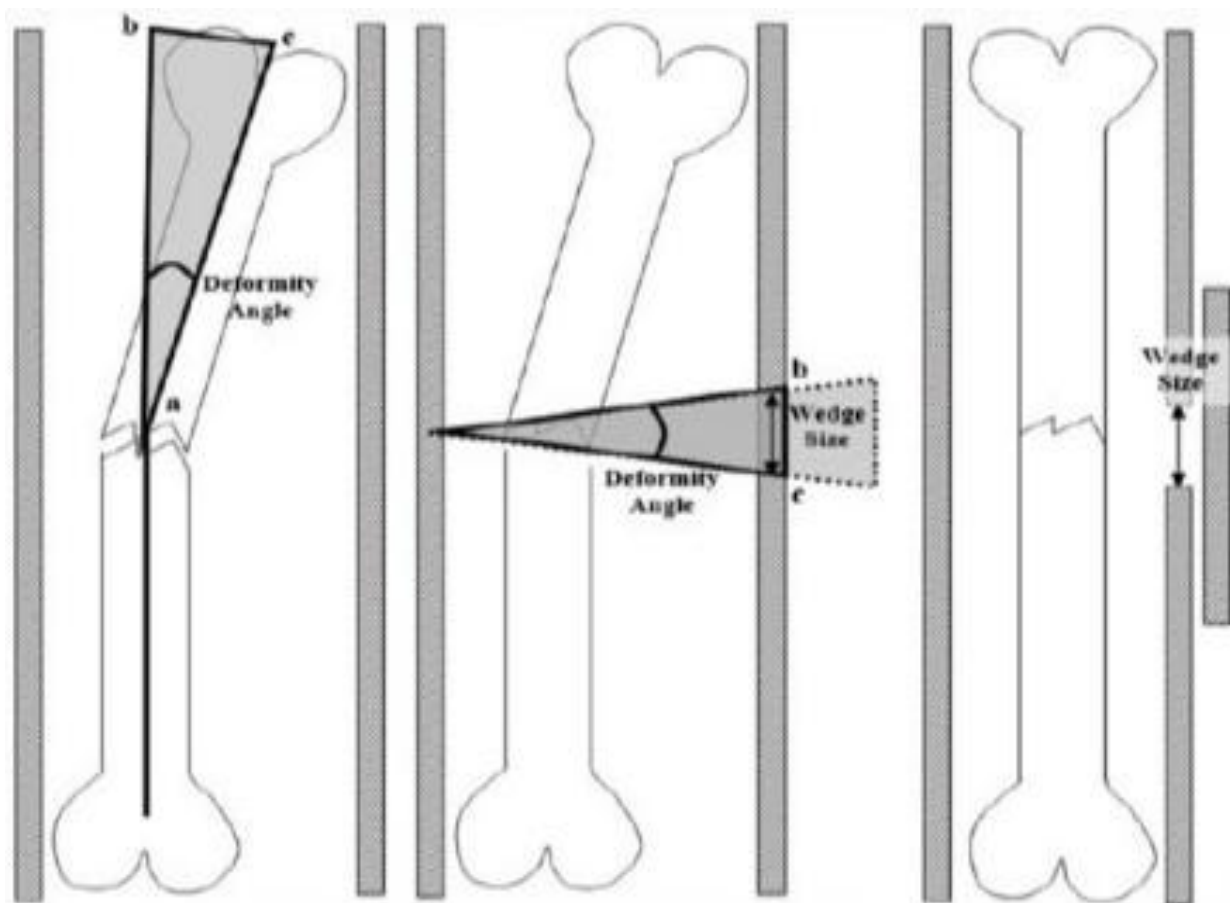
This prospective study was carried out from December 2020 to May 2022 on patients diagnosed clinically and radiologically with both bone leg fracture who were managed conservatively with cast attending the Department of Orthopaedic Surgery, SMCH. In 36 patients of both bone leg fracture cast wedging was done. Approximately 1 week after the initial assessment, new clinical and radiological evaluations were performed, with the aim of assessing fracture alignment. In general, the decision to wedge the cast was made if, during the initial follow-up appointment, radiographs showed more than 5° of angulation in any plane.

4. Procedure

- 1) On the anteroposterior (AP) or lateral radiograph lines are draw along the long axes of the major fracture fragments (proximal and distal) allowing measurement of the deformity angle and formation of triangle a-b-c.
- 2) Triangle a-b-c is then rotated placing apex "a" at the level of the cast on the convex side of the fracture. This point will act as the hinge during wedging.
- 3) Once apex "a" has been recreated at the level of the cast on the convex side of the fracture; the base (b-c) of triangle a-b-c can be translated along triangle limbs a-b

and a-c coincides with the cast on the concave side of the fracture. This is where the wedge will be opened.

- 4) The length of b-c at the level of cast on the concave side of the fracture represents the width to which the wedge must be opened to correct the deformity angle to zero.
 - 5) Lines are then drawn on the cast at the level of the fracture to outline the level/position at which the wedge will be cut. It is important to leave a quarter of the circumference of the cast intact on the convex side that correlates with apex 'a', to act as hinge during wedging.
 - 6) A cast saw is used to cut along the outline drawn on the cast; and, a cast spreader is used to then open the wedge
- 7) With the wedge in place repeat x-rays are performed to confirm proper correction of fracture alignment.
 - 8) Once proper alignment is established sufficient padding in the area of the opening wedge is confirmed and the opening wedge is stabilized by over wrapping the area with additional casting material (plaster or fiberglass). Final images are obtained.
 - 9) Patients were followed up for 18 weeks.



Wedges can be wood blocks or staked tongue depressors, pieces of cork or prefabricated plastic wedges but we commonly uses POP plastics.



Figure 2: Prefabricated Plastic Cast Wedges of Various Sizes.

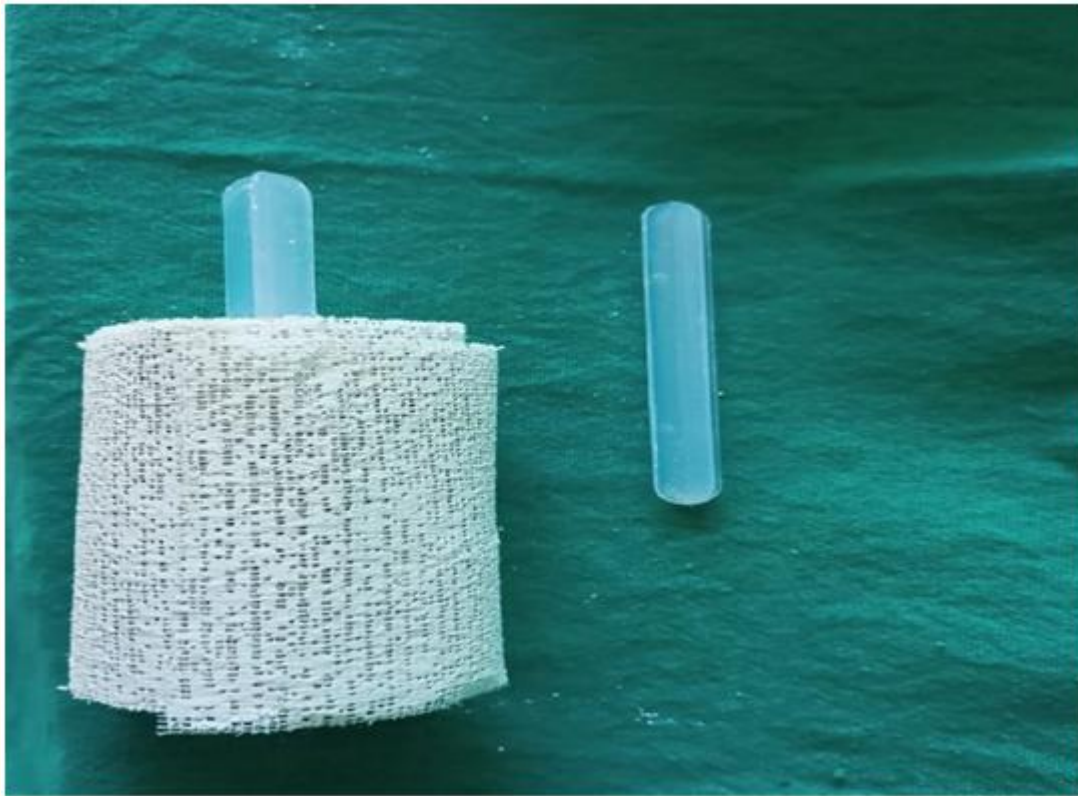


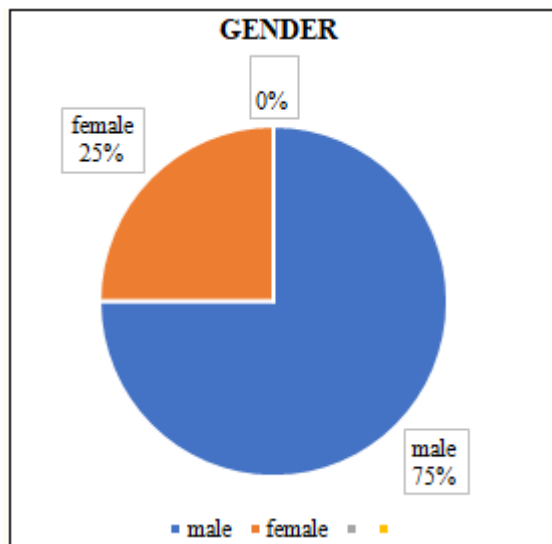
Figure 3: POP plastics



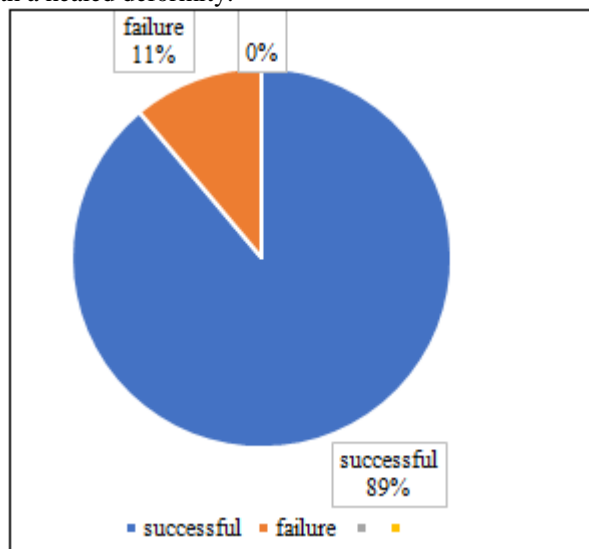
Pre Wedging and Post Wedging X- ray

5. Results

1) Out of 36 patients 27 (75%) were male and 9 (25%) were female.



2) Cast wedge failure occurred in 4 of 36 patients. Of these one patient needed surgical fixation and 3 patients ended up with a healed deformity.



6. Discussion

Our study aimed to analyse the results of cast wedging in angulated both bone leg fractures, using the final fracture alignment, range of motion, and presence of complication as outcome measures. The results of this study demonstrate that cast wedging is a simple and effective tool when considering the non-operative technique.

In the current series, cast wedging was utilised in the presence of redisplacement of a previously manipulated fracture, a mean improvement of close 5 degree in corona alignment was observed, with similar improvements in sagittal alignment.

It is important to take into account that fracture alignment is not a static process and changes in alignment can occur over

time once tissue swelling decreases, especially if the position of immobilization is not correct or modified.

Given its simplicity, safety and effectiveness, cast wedging should be taken into consideration in the treatment process of fracture both bone leg.

7. Results

This technique is easy to learn, simple and effective.

Cast wedging has allowed the outpatient management of many patients who might otherwise have needed admission for operative reduction and fixation.

Reference

- [1] Apley AG, Rowley DI. Editorial: Fixation is fun. *J Bone Joint Surg [Br]* 1992; 74-B: 485-6.
- [2] Bohler, L. *The treatment of fractures*. 5th ed. New York: Grune and Stratton; 1958. p.1725, 1732, 1733.
- [3] Charnley, J. *The closed treatment of common fractures*. 4th ed. Cambridge: Colt Books; 1999. p.231.
- [4] Brown PW, Urban JG. Early weight-bearing treatment of open fractures of the tibia. *J Bone Joint Surg* 1969; 51-A: 59