

## PROSPECTIVE STUDY OF MANAGEMENT OF FRACTURE PROXIMAL TIBIA BY DIFFERENT MODALITIES

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### Abstract

Increased incidence of proximal tibia fracture is observed in recent years due to increased vehicular trauma and sports related injuries. These fractures are difficult to treat and have high energy mechanism of injury, extensive soft tissue trauma, comminution, intra articular extension presenting with difficulty in reduction and maintenance of reduction. There can be collapse of fracture site, malunion and secondary osteoarthritis. Different treatment modalities are available and multiple studies have been done, but no common consensus

has yet been reached. This study was undertaken to study different available modalities of treatment and observe the functional outcome after its implication. 27 patients with proximal tibia fracture satisfying the inclusion criteria were included in the study. Out of 27 intra-articular fracture 5 were treated with closed reduction and cast (CR CAST), 9 were treated with closed reduction and cannulated cancellous fixation (CR CC) and 13 were treated with open reduction and internal fixation with buttress plate (ORIF BP). Functional outcome for CR CAST is highly unsatisfactory with high unacceptability

rate, ORIF BP / BP+BG is moderately satisfactory with unacceptability rate, CR CC is satisfactory with a high acceptability rate, ORIF BP is satisfactory with acceptability rate.

**Key words:** Management of fractures, tibia, functional outcome, type of fractures

## Introduction

The knee joint is complex joint and is also commonly injured joint because of increased vehicular trauma and sports related injuries. Being superficial joint and more exposed to external forces, this joint easily gets injured.<sup>1</sup> The knee joint is one of the three major weight bearing joint in the lower extremity.<sup>2</sup> Fractures that involve proximal tibia affect knee function and stability.<sup>3,4</sup>

Intra-articular fractures of proximal tibia are difficult to treat. Age, skin conditions, osteoporosis further increase the obstacles in the healing process. Various modalities of treatment are available but no ideal treatment has yet evolved.<sup>5,6</sup> At the Chicago Orthopedic society in 1956 Manson Hole has rightly mentioned that “these fractures are tough”. Complex kinematics of its weight bearing position and complex ligamentous stability and articular

congruency are the main reason why these fractures are of concern to surgeon and cause disability to the patients.<sup>7</sup> The mobility and stability of the lower limbs mostly depends upon a stable and functional knee joint.

Various studies have been carried out and different treatment modalities have been advised, consensus has not been reached.<sup>8</sup> Emphasizing on good functional outcome being most satisfying for the patient, we started our study with an aim to study different available modalities for treatment of intraarticular proximal tibia fracture and observe functional outcome after their implication.

## Materials and methods:

This is a prospective study, conducted with 27 cases of proximal tibia fractures. Cases treated in SMBT Institute of Medical Sciences and Research Centre were included in the study. Criterion for selection was radiologically demonstrable fracture of proximal tibia and satisfaction of inclusion criterion.

### Inclusion criteria:

- 1) Patients of age group 18 to 65 years of both sexes with fracture of proximal tibia.

**Exclusion criteria:**

- 1) Children with less than 18 years of age.
- 2) Pathological fracture.
- 3) Associated neurovascular injuries.
- 4) Compound fractures.
- 5) Ipsilateral lower femur or lower tibia fracture.
- 6) Closed fractures with significant soft tissue trauma.( AO types IC 3,4,5, MT 3,4,5, NV 2,3,4,5)

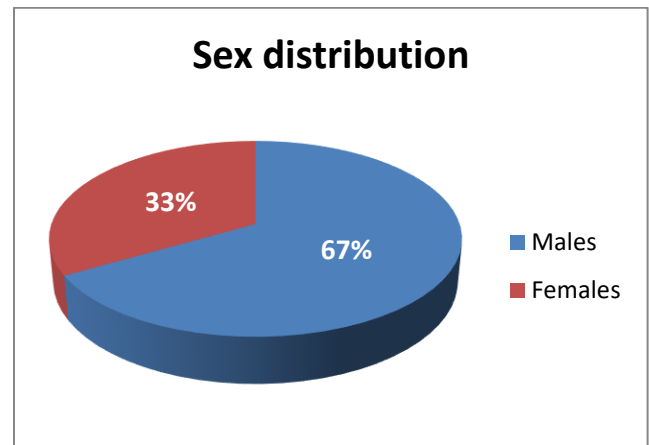
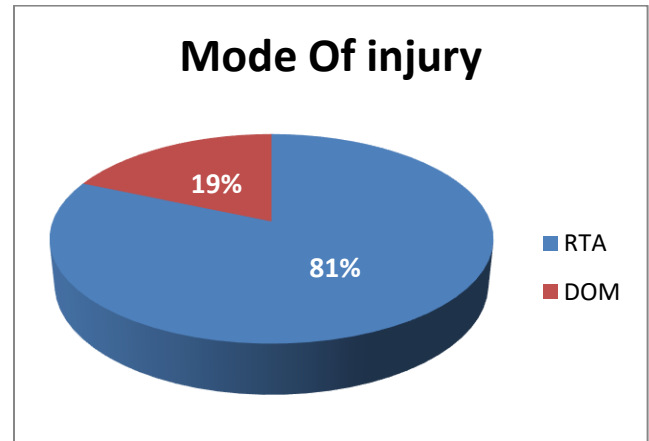
Intraarticular fractures were classified using Schatzkers classification. All the clinical details of patient selected for study were noted in a proforma prepared for the study. Informed and written consent was taken from all cases before initiation of the study.

**Results:**

Minimum age is 20 years, maximum age is 60 years, and average age is 34.22 years. Maximum patients are in age group 31 – 45 years, minimum patients are in age group 46 – 65 years (Table -1).

Males predominated females. There are 18 males, 9 females with intra-articular fractures (Figure-1). Road traffic accident (RTA) is the most common mode of injury. Total 22 patients has proximal fractures of tibia with road traffic accident as mode of

injury. Among 27 intraarticular fractures 16 on right side and 11 on left side (Figure-2).

**Figure-1: Sex distribution****Figure- 2: Mode of Injury**

The maximum incidences of fractures are Type I and Type II i.e. 7, while minimum incidence of fractures is Type VI i.e. 2 ( Table -2).

Five Intra articular fractures are treated with CR CAST of which 2 are type I, 1 type II and 2 type IV. 9 fractures are treated with CR CC of which 4 type I, 2 type II, 1 type III, 1 type IV and 1 type V. 9 fractures are treated with ORIF BP of which 1 type I, 2 type II, 2 type IV, 2 type V and 2 type VI. 4 fractures are treated with ORIF BP+BG of which 2 type II and 2 type III ( Table -3).

**Table 1: Age distribution**

Age Distribution	18-30 Years	31-45 Years	46-65 Years	Total
No of patients	9	16	2	27

The maximum average range of motion (ROM) is 118.22° in patients treated with CR CC and minimum average ROM is 105 ° in patients treated with CR CAST ( Table -4). Out of 27 patients treated, 13 had excellent, 8 good, 5 fair and 1 poor functional outcomes ( Table -5).

**Table 2: Incidence of fracture**

Fracture Type	Type I	Type II	Type III	Type IV	Type V	Type VI	Total
No.	7	7	3	5	3	2	27

**Table 3: Type of Modality**

Type of modality	CR CAST	CR CC	ORIF BP	ORIF BP+BG	TOTAL
No	5	9	9	4	27

**Table 4: Range of movements**

Range of Motion	CR CAST	CR CC	ORIF BP	ORIF BP + BG
<90 Degree	1	0	1	0
90 –120 Degree	3	4	4	0
>120 Degree	1	5	4	4
Average(Degrees)	105	118.22	105.44	114.25

**Table 5: Functional Outcome**

Functional Outcome	CR CAST	CRCC	ORIF BP	ORIF BP+BG
Excellent	1	5	4	3
Good	2	3	2	1
Fair	2	1	2	0
Poor	0	0	1	0

**Table 6: Pooled Functional Outcome**

Modality	CR CAST	CR CC	ORIF BP ± BG
Acceptable	60%	88.88%	76.92%
Unacceptable	40%	11.12%	23.08%

Functional result is acceptable in 60% and unacceptable in 40% patients treated with CR CAST, 88.88% acceptable and 11.12% unacceptable in CR CC, 76.92% acceptable and 23.08% unacceptable in ORIF BP ± BG treated patients ( Table -6).

## DISCUSSION

The majority of the patients, are from middle age group (31 – 45 years). This constitutes the active age group of the population which is involved in more outdoor activities and has more prevalence of travelling on road by vehicles so prone for road traffic accidents. Mean age is 33.55 years. Avinash Jain et al in their study noted

that the mean age to be around 42.12 years and Ramesh Meena et al in whose study reported mean age to be around 37.50 years.<sup>9</sup>

In the present study, males predominated females. There are 66.66% of males and 33.33% of females had intraarticular fractures. Avinash Jain et al in their study reported 78% males and 22% females.<sup>10</sup> Ramesh Meena et al in their study noted 72.72% males and 27.28% females. Less prevalence in males in our study as compared to other studies may be because we excluded compound fractures and

fractures with severe soft tissue injuries which are more prevalent in males.

In the present study, 82.60% of fractures are due to road traffic accident. 17.40% of fractures are due to domestic reasons as fall or assault. Avinash et al in their study noted 68% of RTA and 32% of DOM.<sup>10</sup> The present study has higher incidence of road traffic accident than study by Avinash et al. this may be due to higher incidence of patients in middle age group who are more involved in vehicular transit and hence road traffic accident.

In the present study, intra-articular fractures are of 25.92% type I, 25.92% type II, 11.11% type III, 18.51% type IV, 11.11% type V, 7.40% type VI. Avinash et al in their study had 10% type I, 36% type II, 16% type III, 10% type IV, 20% type V, 8% type VI fractures. Our study had higher incidence of type I fracture than study by Avinash et al. Both studies have type II as fracture type with highest incidence.

Our study had lower combined incidence of high energy fractures (Type V, Type VI) than Avinash et al. This may be due to our exclusion of compound fractures and fractures with significant soft tissue injury which constitute a majority of Type V and Type VI fractures. In the present study,

union time was less for closed modalities of treatment (CR CAST, CR CC), higher for open surgeries. Union time for CR CAST is 16.66 weeks, 16.66 weeks for CR CC and 19.23 weeks for ORIF BP/ BP + BG. Avinash et al in their study has reported that 12.89 weeks for CR CC and 17.01 weeks for ORIF BP + BG. Present study union time for CR CC and ORIF BP + BG is higher than study done by Avinash et al. This may be because we considered union time as time required for full weight bearing whereas Avinash et al considered it as time required for complete radiological and clinical union.

The present study had maximum average ROM for CR CC and minimum for CR CAST (105<sup>0</sup>) with intraarticular fractures. In the study done by Decoster et al the ROM for CR CC was 117<sup>0</sup>. ROM in CR CAST in our study was less than study by Decoster et al. Reason may be duration of noting ROM which was one year in our study and 10 years in study by Decoster et al.

CR CAST is done for minimally displaced fractures, hence low energy and with less soft tissue injury. There is no soft tissue mal-handling or stripping. But there is prolonged immobilization for 6-8 weeks

which causes wasting of muscles around the joint, stiffness of joint. Also due to cast, no dynamic exercises possible, hence inadequate physiotherapy. All these may contribute to decreased ROM seen in CR CAST.

CR CC is also done for minimally displaced fractures hence low energy and less soft tissue injury. This is a closed procedure, hence no soft tissue stripping / mal-handling. Also range of motion exercises are started immediately as tolerated, hence appropriate physiotherapy could be given. Less immobilization, less complications all contributed to better ROM in CR CC.

ORIF BP/BP+BG are high energy displaced fractures, hence with significant soft tissue injury. It's an open procedure hence better reduction and fixation possible. There is significant soft tissue stripping/ malhandling during the operative procedure. Also there are increased chances of infection. There is however less immobilization which allows range of motion exercises which are still less tolerated early on due to pain from extensive operative procedure.

CR CAST is used as modality of treatment for the intra-articular fractures.

The proximal tibial articular surface tolerates small to modest articular displacements and, in properly selected fractures, non operative treatment results in predictably excellent outcomes despite articular irregularities.<sup>11</sup> The functional result is acceptable in 60% and unacceptable in 40% patients treated with CR CAST. Decoster et al in their study noted that 61% acceptable and 39% unacceptable.

In the present study, the functional result is acceptable in 76.92% and unacceptable in 23.08% patients treated with ORIF BP/BP+BG. Avinash et al in their study reported that 67.55% acceptable and 32.45% unacceptable. Our functional results are better than that of Avinash et al. This may be because of the exclusion of cases with compound fracture and those with significant soft tissue trauma. Also we gave special attention to postoperative physiotherapy. Both these enhanced the functional result.

In the present study, the functional result is acceptable in 88.88% and unacceptable in 11.12% patients treated with CR CC. Avinash et al in their study reported that 84.56% acceptable and 15.44% unacceptable. By our study CR CC seems to be a very efficient modality of treatment

with high union rates and minimum of complications though proper selection of cases is important pre requisite.

## CONCLUSION

Functional outcome for CR CAST is highly unsatisfactory with high unacceptability rate, ORIF BP / BP+BG is moderately satisfactory with unacceptability rate, CR CC is satisfactory with a high acceptability rate. ORIF BP is satisfactory with acceptability rate.

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