

**OUTCOMES OF PROXIMAL FEMORAL NAIL IN SUBTROCHANTERIC FEMUR FRACTURES"- A
case series**

ABSTARCT

Background: Fractures of the femur are commonly encountered in Orthopaedic practice. Of all femur fractures, 7% - 34% occur in the subtrochanteric region. Subtrochanteric fractures are defined as those occurring below the lesser trochanter and extend distally up to 5 cm in the shaft of the femur. Here we present a study evaluating the results of subtrochanteric femur fractures treated with proximal femur nail.

AIMS: To Assess the Functional outcome in patients having closed subtrochanteric fracture femur treated with PFN as per Harris Hip Scoring system.

Study design: This is a prospective observational type of study

Place and duration of study: The present study consist of the patients admitted in orthopaedics unit of VS General hospital Ahmedabad from June 2013 till August 2017 .

METHODOLOGY:The study consists of 35 adult patients of subtrochanteric femur fractures satisfying the inclusion criteria, who are treated with proximal femur nail.

RESULTS: Most commonly seen fractures pattern in this study is Seinschmer's type III A. In our study 74.28% (26) patients did not require any support for walking and 5(14.28%) patients required canes for long walks and only one patient was mobilising with the help of crutch. Squatting was possible in 15(42.85%) patients with ease and with difficulty in 06 (17.14%) patients. 14 patients were unable to squat. In this study sitting cross legged with ease is possible in 18 (51.42%) patients. 10(28.57%)patients were able to sit cross legged but with difficulty.07 (17.14%) patients were unable to sit cross legged.

CONCLUSION: Proximal Femoral Nail is a good implant for the treatment of unstable subtrochanteric fractures of femur when there is loss of medial cortex provided optimal reduction of the fracture and good positioning of the nail and screws are achieved.

Key-words:Proximal femur nail, subtrochnateric fractures,stresses,muscle forces

1.INTRODUCTION:

Fractures of the femur are commonly encountered in Orthopaedic practice. Of all femur fractures, 7% - 34% occur in the subtrochanteric region^[1] Subtrochanteric fractures are defined as those occurring below the lesser trochanter and extend distally up to 5 cm in the shaft of the femur. Management of this fracture is difficult because this zone of femur is subjected to maximum amount of mechanical stresses. Tensile and compressive stresses exceed several

31 multiples of body weight (causing failure of implants), cortical bone (slow healing), and associated comminution,
32 short proximal fragments which are deformed by hip flexors and abductors makes reduction of fracture difficult.
33 Earlier treatment of these fractures was open reduction and internal fixation leading to fragment becoming avascular
34 due to excessive dissection which lead to high rate of non-union and implant failure. This have been overcome by
35 intramedullary nailing procedure which has the advantage of insertion using a closed technique retaining the fracture
36 hematoma, lesser soft tissue damage additionally providing firm fixation of the femur thus reducing the time for
37 union. Due to high rate of non-union and implant failure related to the internal fixation devices and availability of
38 improved and better implants like gamma nail and proximal femur nail allowed for these fractures to be treated
39 successfully.

40 So here we present a study evaluating the results of subtrochanteric femur fractures treated with proximal femur nail.

41 **2.MATERIALS AND METHODOLOGY**

42 The present study consist of the patients admitted in orthopaedics unit of VS General hospital Ahmedabad from
43 June 2013 till August 2017 .The study consists of 35 adult patients of subtrochanteric femur fractures satisfying the
44 inclusion criteria, who are treated with proximal femur nail.All adult patients of subtrochanteric femur fractures
45 operated with proximal femur nail were included in the study.Patients <18 years,All open grade 3 Fractures as per
46 Gustilo and Anderson classification,associated vascular injury or Compartment Syndrome,Pathological
47 Fracture,Patients who are not willing for follow up and lost to follow up were excluded from the study

48 **2.1 PRE-OP PREPARATION AND ASSESSMENT:**

49 The patients were received in trauma ward. On admission, patient was first examined thoroughly in Primary survey
50 for vital data and other major associated injuries in head, thorax, abdomen or spine along with local appendicular
51 injuries. At our institute the following treatment protocol for Proximal femur fracture is followed

52 Initial assessment of the patient

- 53 • General condition and vital parameters were checked.
- 54 • Airway, Breathing, & circulation (ABC) was secured.
- 55 • Associated injuries like
 - 56 o Head injury
 - 57 o Chest injury
 - 58 o Abdomen injuries were checked for.

59 Distal neurovascular status:

- 60 • Distal pulsations & distal movements were checked.

61 Primary Management

- 62 • Patients were admitted in trauma ward.
- 63 • Ankle Traction with countertraction was given.
- 64 • The wounds, if any, were washed with H₂O₂, betadine and then saline under aseptic precautions and sterile dressing kept.
- 66 • I.V. antibiotics were given in case of open wounds.
- 67 • Inj. Tetanus toxoid was given as and when needed
- 68 • I.V. analgesics was given.

69 **2.1.1 OPERATIVE TECHNIQUE**

70 Move the patient to the Albees fracture table after anaesthesia A supine position or lateral position with bilateral foot
71 traction with knees in extension with legs scissored is the optimal position This position allows manipulation for
72 traction and good roentgenographic control. A 3-4 cm linear incision put 3cm proximal to Greater trochanter in the
73 line of shaft of femur. Entry point taken with awl/guide pin over a protector sleeve. It should be on the tip of the
74 greater trochanter in AP, and lateral position Guide wire: 2.8mm guide wire is inserted in to the femoral shaft and
75 across the fracture site in 6° of valgus. Its position is checked in the C-arm. and the entry is widened with the awl
76 Reaming of the proximal femur is done upto the proximal part of the nail to be introduced. Nail is fixed on the jig and
77 the alignment is checked. Then the nail is inserted into the femur. The position of the holes for the hip screws is
78 checked in the C-arm for the depth of the nail. Guide wires for the screws are inserted via the jig and the drill sleeve.
79 The ideal position of the guide wires is parallel and in the lower half of the neck in AP views, in a single line in the
80 centre of the neck in the lateral views. The guide pins are inserted up to 5 mm from the articular surface of the
81 femoral head and size of the lag screw determined, reaming and tapping for lag screw done .Insertion of the screw:
82 First the 8mm hip screw is inserted after reaming over the distal wire and then the 6mm cervical screw. The hip
83 screw should be 5mm away from the sub-chondral bone. Distal screws: one or two static or dynamic 4.9mm
84 interlocking bolts are inserted in to the distal part of the nail. Out of which one is a static and another is a dynamic
85 hole. It should be done after removing the traction along with the tightening of the proximal screws. It is done free
86 hand with the help of IITV and the jig is removed.

87 **2.1.1.1 Post operative care:**

88 Operated limb was elevated for a day, Broad spectrum antibiotics were given for 5 days and than shifted to oral
89 antibiotics. Iv fluids were given till the patient started orally. Static quadriceps exercises were begun on 2nd
90 postoperative day. Active quadriceps exercises and hip flexion exercises were started on 4th postoperative

91 day. Sutures were removed on 12th day(alternate) and complete suture removal was done on 14th postoperative
92 day. Partial weight bearing was started after reviewing clinically and radiographically 6 weeks postoperatively Full
93 weight bearing allowed after confirmation of clinical and radiological union.

94 Patients were discharged 5 days postoperatively

95 **2.1.1.1 FOLLOW UP**

96 All the patients were followed up every month. On follow up following points were noted xray with both hip AP-view
97 and lateral view of operated hip were looked for

- 98 • Signs of union
- 99 • Neck shaft angle
- 100 • Failure of fixation
- 101 • Failure of implant

102 **FUNCTIONAL RESULTS OF SURGERY**

103 Assessed based following hip scoring system adopted(Table no 1)

104

105 **3. OBSERVATIONS AND RESULTS:**

106 In the present series 69.23% (18) males sustained this injury because of high velocity injury. Where as in females
107 they are most often caused by low velocity injury compared to their counter parts. In this study 66.66%(06) females
108 sustained injury because of low velocity injury.(graph no1) Most commonly seen fractures pattern in this study is
109 Seinschmer's type III A.(graph no 2) Average time to union is 3.58 + 0.54 months

110 Majority of the patients in this study had either no pain or slight pain which did not affect their activities. Only one
111 patient had severe pain. 14.28%(05) patients had mild pain which was relieved with analgesics(table no 2) In the
112 current study majority of the patients had no or slight limp that did not affect their activities.4 patients(11.42%) had
113 moderate limp.(Table no 3) In our study 74.28% (26) patients did not require any support for walking and 5(14.28%)
114 patients required canes for long walks and only one patient was mobilising with the help of crutch.(Table no 4) In this
115 series 34.28%(12) patients could climb stairs without any support and 51.42%(18) patients required the support of
116 railing.(Table no 5) Squatting was possible in 15(42.85%) patients with ease and with difficulty in 06 (17.14%)
117 patients. 14 patients were unable to squat.(Table no 6) In this study sitting cross legged with ease is possible in 18
118 (51.42%) patients. 10(28.57%)patients were able to sit cross legged but with difficulty.07 (17.14%) patients were
119 unable to sit cross legged.(Table no 7)

120 Overall results based on Harris hip score(graph no 3)

121 In this study all the patients in younger age groups has excellent and good results and older age group patients has
122 good and fair outcomes.(Graph no 4)

123

124 4. Discussion:

125 Classically, subtrochanteric fractures have been treated with open reduction and osteosynthesis with fixed-angle
126 blade plates and condylar screw/plate systems, with the aim of achieving anatomic reduction of the fragments. This
127 may result in a large amount of periosteal stripping resulting in devascularization that all too often leads to nonunion
128 and implant failure⁴⁶. Osteosynthesis through intramedullary nailing, less surgically aggressive and superior from a
129 biomechanical point of view, is currently the most widely used treatment of these fractures and provides better
130 functional results than previous approaches^[49].

131 The benefit of minimal surgical exposure, more efficient load transfer through calcar femorale and decreased tensile
132 strain on the implant because of its shorter lever arm makes proximal Femoral Nail a good choice of implant for
133 subtrochanteric fractures of the femur^[49].

134 Most of our patients were of the elderly age group, the average age being 44.48 years. This is significantly lower
135 compared to that quoted by other authors in literature, I.B.SCHIPPER SERIES^[47] 82.2 years. Male preponderance
136 of 74.28% was noted in our patients. In contrast to female preponderance reported by BOLDIN ET AL⁵¹ (70%) and
137 I.B.SCHIPPER^[47] (82%). 54.282% of the subtrochanteric fractures involved the right femur in this series as
138 compared to 52% in I.B.SCHIPPER series^[47]. In 40% of patients fracture is a result of trivial fall and majority of them
139 are elderly age group patients especially females. High velocity injuries like road traffic accidents and fall from
140 heights accounted for 57.14% of these fractures and most of them were males. Fractures were classified according
141 to Seinsheimer's classification and type III A fracture pattern constituted the highest percentage 42.85% (9) of all
142 fracture patterns. SEINSHEIMER^[3] in his original study also noted high incidence of type III A fracture pattern.

143 Admission – operation interval in our study varied from 1- 3 days in majority (85.71%) of patients when compared to
144 I.B.SCHIPPER's series^[47] where it was 2 days. Most of the patients with delayed injury – operation interval had pre
145 existing uncontrolled medical problems. These medical co morbidities especially in elderly age group patients with
146 associated degenerative joint disease of the knee significantly affected their final functional outcome.

147 Intra operatively fracture reduction was achieved by closed means in 78% (27) of patients and 08 patient with
148 delayed injury – operation interval required open reduction. The result of the reduction was considered good in 71%
149 (26) of the patients and acceptable in 11.4%(4) of patients. Poor reduction was noted in 14.30% (5) of patients and it
150 was associated with poor outcome. In I.B.SCHIPPER's series^[47] reduction was good to acceptable in 96.2% of their
151 patients and poor reduction was seen only in 2.9% of their patient.

152 Patients who were obese were taken in lateral position which facilitated reduction as well as made the entry point
153 easier.

154 Post operatively 2 patient in this study had superficial infection (5.71%) and 5.71% (02) patients had deeper infections
155 and this settled with parenteral antibiotics and debridement. I.B.Schipper noted 4.1% superficial infections and 2.5%

156 deep infections. Breakage of hip screw was noted in 1 patient (4.76%) and it was following a fall in the post operative
157 period. 6% of patients in I.B.SCHIPPER's series had this problem.

158 The average time for radiological union was 3.58 ± 0.54 months in the present study whereas in I.B.Schipper series it
159 was approximately 4 months.

160 72% (25) of the patients in our series had no or slight pain that did not affect their activities. Only 1 patient had
161 severe pain that restricted her activity significantly. 88.56% (31) of these patients had no or slight limp. 74.28% (28)
162 of the patients mobilized without any walking aids. Cane was required for long walks in 14.28% (5) of patients and
163 most of the time in 8.57% (03) of patients. Only one patient required crutch for mobilization. 7 Patients were unable
164 to sit cross legged and 14 patients were unable to squat. Most of these patients were of geriatric age group who had
165 associated degenerative disease of the knee.

166 Limb length discrepancy was noted in 14 patients of which 1 of them had shortening of more than 2.5 cms. They
167 were patients with Seinsheimer's type IV and type V fracture patterns.

168 Final outcome was excellent to good in 77.14% (27) of patients. It was fair in 14.28% (05) of patients and poor in
169 8.57% (03) of patients. Younger age group patients irrespective of their fracture pattern had excellent outcome in our
170 series. Most of the poor results were seen in the elderly age group patients with associated Osteoarthritis of the
171 knee. The mean Harris Hip score was in our series was 87.88 ± 4.81 which was higher than I.B.Schipper series^[48]
172 where the mean was 77.6.

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270 Tables

271 Table no 1

Score	Rating
90-100	Excellent
80-90	Good
70-79	Fair
<70	Poor

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273 Table no 2

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Quality of pain	No of patients	Percentage
None or ignores	16	45.71
Slight occasional	09	25.71
Mild	05	14.28
Moderate	04	11.42
Totally disabled	01	2.85

275 Table no 3

Limp	No of patients	Percentage
none	20	57.14
slight	11	31.42
moderate	04	11.42
severe	00	00

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283 Table no 4

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Walking ability	No of patients	Percentage
None	26	74.28
Cane for long walks	05	14.28
Cane most of the time	03	8.57
Crutch	01	2.85
Not able to walk	00	00

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286 Table no 5

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Stair climbing	No of patients	Percentage
Without using a railing	12	34.28
Using a railing	18	51.42
In any manner	03	8.57
unable	02	5.71

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291 Table no 6

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squatting	No of patients	percentage
With ease	15	42.85
With difficulty	06	17.14
uable	14	40.00

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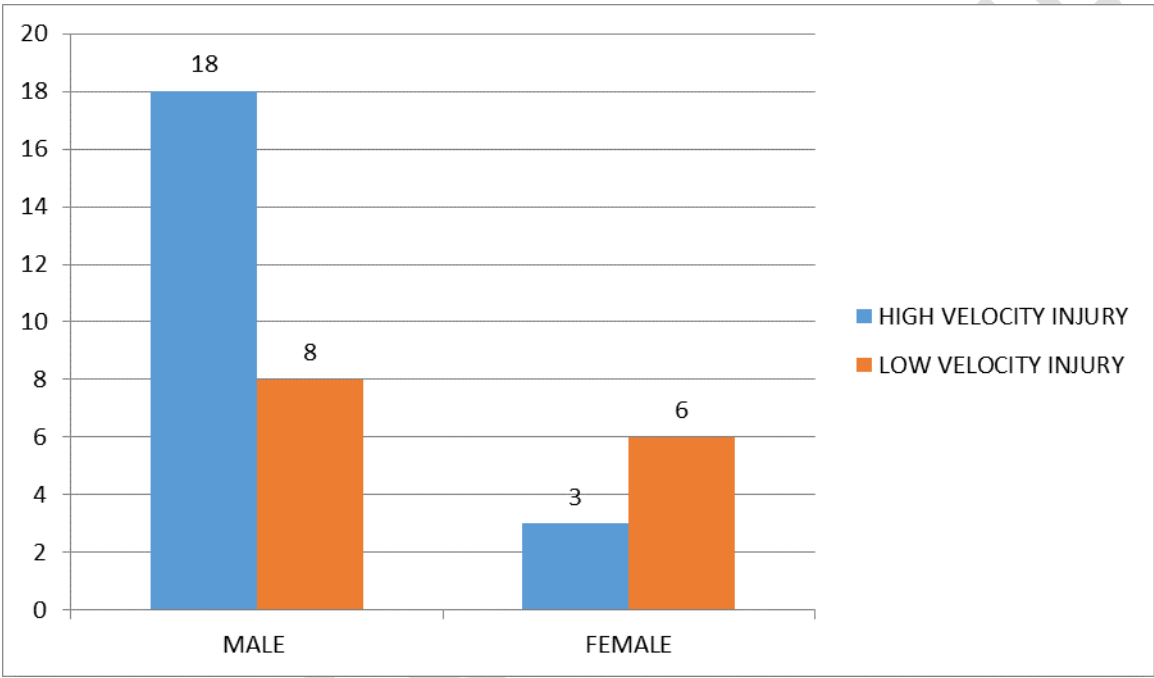
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Sitting cross legged	No of patients	percwntage
With ease	18	51.42
With difficulty	10	28.57
unable	07	20.00

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298 Graph no 1



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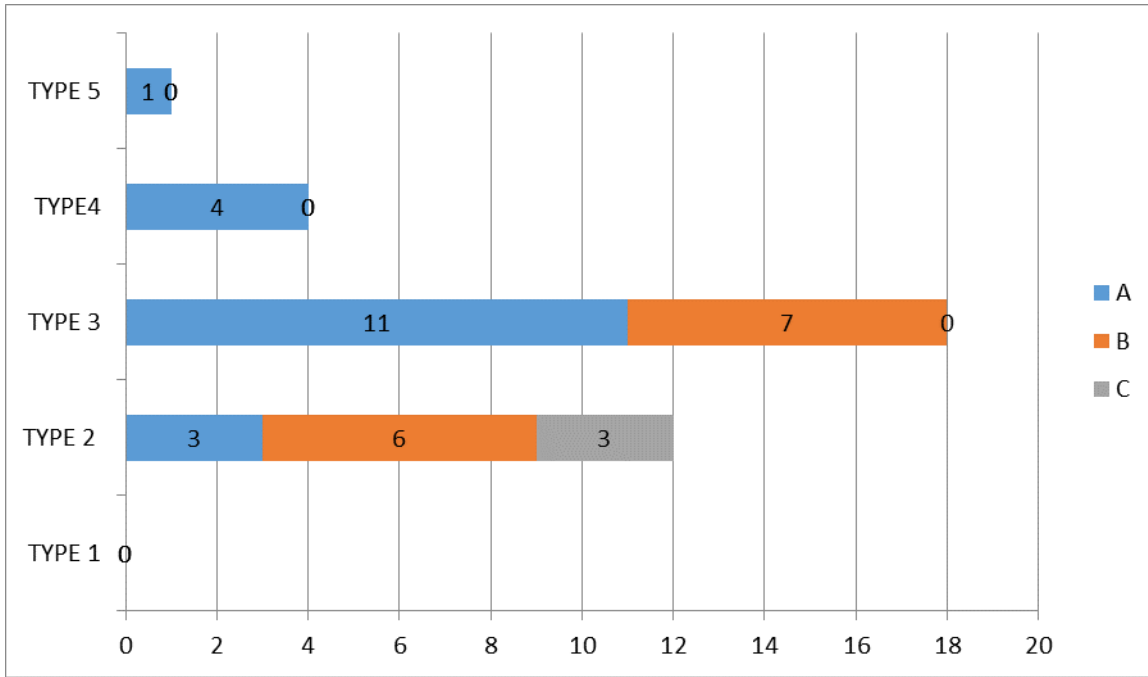
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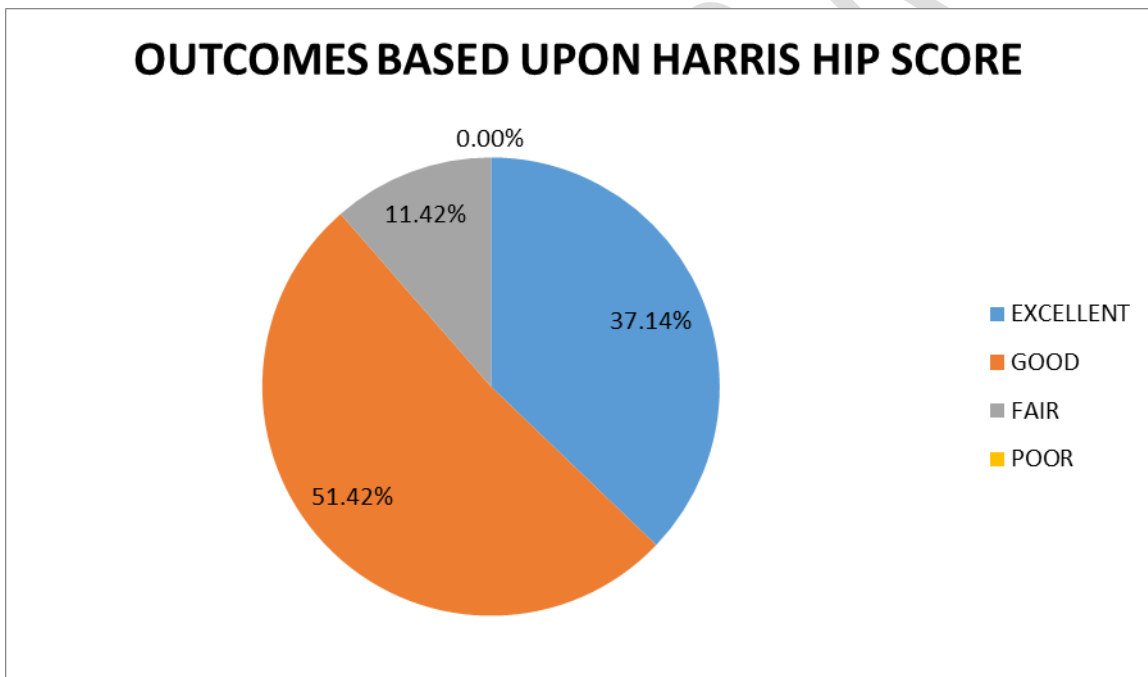
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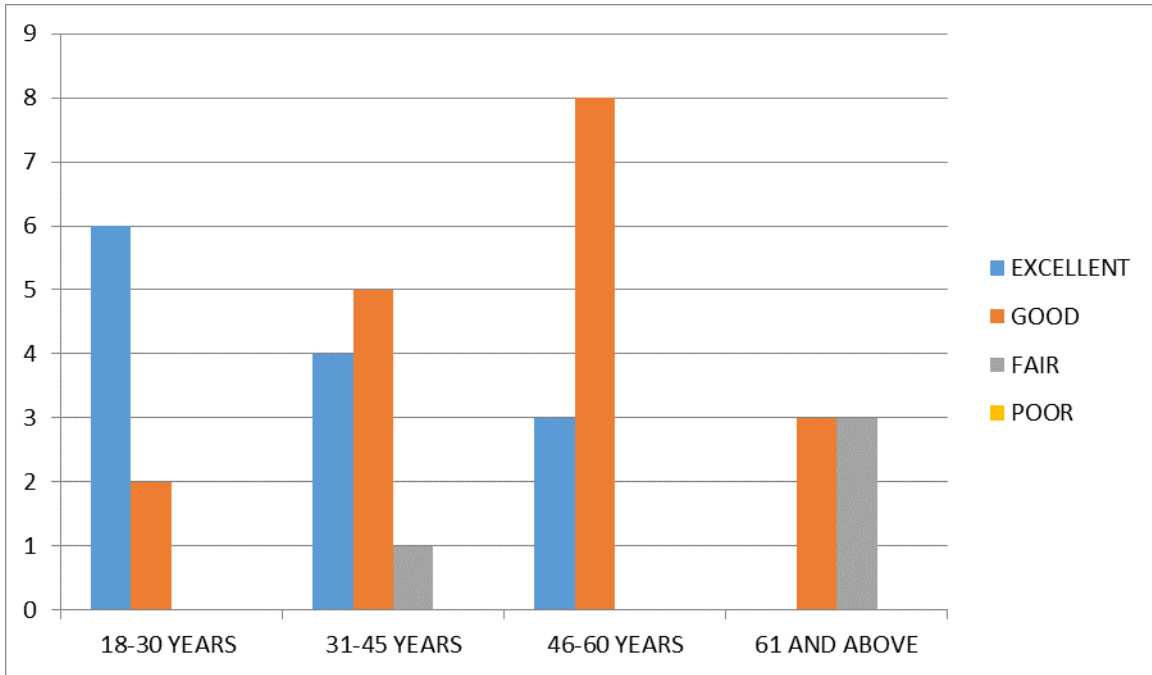
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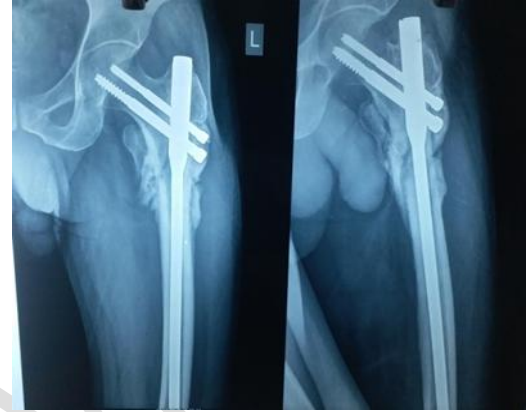
Figures



Preoperative xray



postoperative xray



6 months ollowup xray



1 year followup xray



Squatting



Cross legged sitting

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Preoperative xray



postoperative xray



6 months followup xray



1 year follow up xray



Squatting



Cross legged sitting