

Functional Outcome of Primary Cemented Hemiarthroplasty for Comminuted Unstable Pertrochanteric Femoral Fractures (AO/OTA Type 31 A2.3) in Elderly Osteoporotic Patients

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Abstract

Introduction: Most intertrochanteric fractures occur in elderly people (above 65 years) with reported mortality rates ranging from 15% to 30%.

Materials and Methods: They Operated 50 elderly osteoporotic patients with a mean age of 65.5 years who sustained comminuted intertrochanteric femur fracture treated with cemented bipolar hemiarthroplasty and tension band wiring for greater trochanter through transtrochanteric approach.

Results: In case series, we came across some serious complications such as infection, dislocation, osteolysis, non-union greater trochanter, protusio, and implant breakage, but no fatalities were reported. 5 of our patient underwent repeat surgery in the form of total hip replacement and one excision arthroplasty.

Conclusion: From study, would like to suggest that cemented bipolar hemiarthroplasty is a viable technique for elderly osteoporotic patients with comminuted intertrochanteric femur fracture using transtrochanteric approach with no trauma to abductors or external rotators of hip and sciatic nerve as we approach the hip through the fracture site itself and not posteriorly as in Southern Moore's approach. It also helps in faster rehabilitation and recovery in elderly osteoporotic patients.

Keywords: Cemented bipolar, Comminuted, Elderly osteoporotic, Hemiarthroplasty, Intertrochanteric fractures, Unstable

INTRODUCTION

Most intertrochanteric fractures occur in elderly people (above 65 years) with reported mortality rates ranging from 15% to 30%.^[1] Problems with osteoporotic bone fractures are geometry (grossly comminuted), high instability, and difficult to treat. The primary treatment goal is stable fixation and immediate full-weight-bearing mobilization.^[2] Intertrochanteric fractures occur in the transitional bone between the femoral neck and the femoral shaft.^[3] Transitional bone is composed of cortical and trabecular bone. These bone types form the calcar femorale posteromedially, which provides the strength

to distribute the stresses of weight bearing. Consequently, the stability of intertrochanteric fractures depends on the preservation of the posteromedial cortical buttress.^[4] The physiological factors such as age, osteoporosis, medical diseases, and instability of fractures as components of these fractures are always overlooked.^[5] Conservative treatment in such patients demands prolonged immobilization and lands up with complications of hypostatic pneumonia, pulmonary embolism, bed sores, senile psychosis, and finally, fatality.^[6] These fractures should be classified as stable and unstable.^[7] Various classifications for intertrochanteric fractures are mentioned in the literature, but none of them dictates the implant to be used in a specific fracture type. The most commonly used classification is the Jensen classification, which is a modification of the Evans classification, divides the fractures into stable and unstable, but it does not guide the surgeon to which implant to be used. Hence, we propose to divide the patients with intertrochanteric fractures into three groups as stated below and use the prosthesis accordingly.

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- Calcar and lesser trochanter intact, no comminution bipolar prosthesis AMP type.
- Calcar is fractured or less-bipolar-Thompson's type.
- Instability of posteromedial wall with lesser trochanter, calcar, and greater trochanter fractured-modular type of bipolar prosthesis with reconstruction of greater trochanter and calcar reconstruction.

In elderly osteoporotic patients, the metaphysis is broad with the thin cortex, and hence, for greater stability, prosthesis with broad metaphyseal end and long stem was used in all cases.

Furthermore, as mentioned earlier, integrity of the posteromedial buttress mainly decides the stability, and hence, we suggest the different methods of reconstructing greater trochanter, lesser trochanter, and calcar. Follow-up studies of internal fixation of such fractures with DHS show high percentage of failure like bending/break/cutout of implants.^[8] Studies comparing bipolar hemiarthroplasty versus internal fixation have also concluded that arthroplasty group had easier and faster rehabilitation.^[9] After implant failure, if revision osteosynthesis is planned, then it becomes technically extremely difficult and further immobilization adds up to the complications.

MATERIALS AND METHODS

The patients with proximal femoral fractures in elderly people with severe osteoporosis were admitted through OPD or casualty. They were screened clinically and radiologically preoperatively for knowing the anatomy of fracture and any associated disease such as hypertension, diabetes, and ischemic heart disease.

Inclusion Criteria

The following criteria were included in the study:

- Pre-injury status was ambulatory.
- Cooperative for physiotherapy.
- Severe osteoporosis.
- Elderly (age more than 65 years).

We included only the extracapsular fractures in the group of proximal femoral fractures.

Exclusion Criteria

The following criteria were excluded from the study:

- Pre-injury status non-ambulatory.
- Open fractures.
- Severely moribund patients.
- Uncontrolled diabetes mellitus.

We divided these fractures into three groups, and the type of prosthesis was used accordingly.

- Calcar and lesser trochanter intact, no comminution bipolar prosthesis AMP type.

- Calcar is fractured or less-bipolar-Thompson's type.
- Instability of posteromedial wall with lesser trochanter and calcar shattered-modular type of bipolar prosthesis with the reconstruction of greater trochanter and calcar reconstruction.

Operative Technique

With the patient in lateral position, incision was taken on the lateral aspect of hip, centered on proximal aspect of greater trochanter. Proximally, incision was curved posteriorly toward posterior-superior iliac spine. Tensor Fascia Lata was cut in the direction of skin incision. Proximally fibers of gluteus maximus were dissected along skin incision to expose fracture site. Now, we carefully dissected fracture site and retracted fracture fragments of greater trochanter so as to reach base of femur neck. We extracted femur head and the attached neck through this transtrochanteric window. After extraction of femoral neck and head, acetabulum was inspected and cleared of any of remaining bone pieces. Then, we started femoral canal preparation using reamer and serial broach's. After preparing femoral canal, we drilled two holes on lateral aspect of proximal femur 5 cm below vastus ridge. Two holes were placed 2 cm away from each other. A stainless steel wire was passed from outside through one hole in the medullary canal and then taken out from another hole. Now, the two free ends of the wire are lying on the lateral aspect of the femur. The implant placement is now started with special emphasis on

1. Anteversion which is decided using long axis of the leg as guide.
2. Length of the implant to be inserted in the femur is decided by carefully judging soft tissue tension. Furthermore, tension is checked with help of shuck test showing <2–3 mm of displacement, no dislocation of the trial implant with 10° of extension, 50° of abduction, 40° of adduction external rotation of 30° and flexion 90–100°, and internal rotation of 40–50°. Furthermore, limb length was aimed to maintain almost the same as that of other limb and the amount of stem to be sunk in was carefully observed and marked both on trial and final implant before cementing, and then, cementing was done.
3. No excess cement should spread on fracture site as it interferes with the union of the fracture. We had reconstructed all the calcar with the help of cement. Once the final implant of adequate size is inserted, the hip is reduced. The fractured pieces of GT are now approximated to each other. A wire passer is passed above the tip of the trochanter deep inside the abductors. Previously, passed wire is now crossed over and passed through the wire passer, so as to complete figure of 8 which is now tightened. This achieves compression across the fracture site and restores the abductor mechanism of the hip. Closure is done in layers carefully over a negative suction drain.

Post-operative and Rehabilitation Protocol

All patients were kept under analgesic effect with the help of epidural catheter till 2 days post-operative. All the patients operated, except for those who had landed with few immediate complications, were started with physiotherapy. All patients were treated with quadriceps strengthening exercises immediately post-operative and full-weight-bearing walk next day with the help of walker for first 6 weeks post-operative. Thereafter, patients started full weight bearing with the support of a stick. Patients were instructed to use only Western Style commode for Toilet activity, strictly avoid Indian style commode, avoid activities involving squatting and cross-legged sitting for the rest of their life as a precautionary measure to avoid dislocation of the bipolar hemiarthroplasty. Patients were followed up regularly at 2 weeks, 4 weeks, 3 months post-operatively, and then yearly once.

Ethical Issue

Informed, valid, and willful consent was obtained from all patients before operation. The patients were treated with skeletal traction with Denham's pin, while the patients were treated for associated problems, if any. All the patients were graded for osteoporosis according to Singh index.^[10,11] All were either grade 2 or grade 3. All the patients were given 4 injections decadurabolin fort nightly and calcium with Vitamin D3 once daily preoperatively and postoperatively. Pre-operative anesthetic evaluation for anesthetic fitness was carried out. After fitness, patient was taken for surgery and cemented hemiarthroplasty was done using appropriate type of prosthesis modular, Thompson's type or Austin Moore type [Figure 1] was used according to the fracture pattern as mentioned before. All prosthesis were specially designed with broad metaphyseal end and long stem.

We exposed the neck of femur through the fracture site by lateral approach [Figure 2] approximately 5 cm incision and removed only the head and the neck [Figure 3] leaving the greater trochanter intact with rotators. Reconstruction of greater trochanter was done with tension band technique/purse-string sutures with 5-0 Ethibond [Figures 4-6]. Lesser trochanter and calcar were reconstructed with encircage/bone graft (fashioned from removed head and neck)/collar of cement at the site of calcar during insertion of prosthesis. [Figures 7a and b and 8-10]. Post-operatively, patient was treated with non-weight-bearing exercise of the hip and knee from day 1, bedside sitting and knee bending exercises from day 3, standing with support by the side of bed from day 5, and from day 7 onward patient was made to walk with walker. The sutures were removed on day 12, and the patient was discharged with advice to walk with walker, sit in chair, use western toilet, report to doctor in any suspicion of infection like UTI/URTI/local, not to squat or sit cross-legged, and to avoid uneven ground and busy roads. Subsequently, they



Figure 1

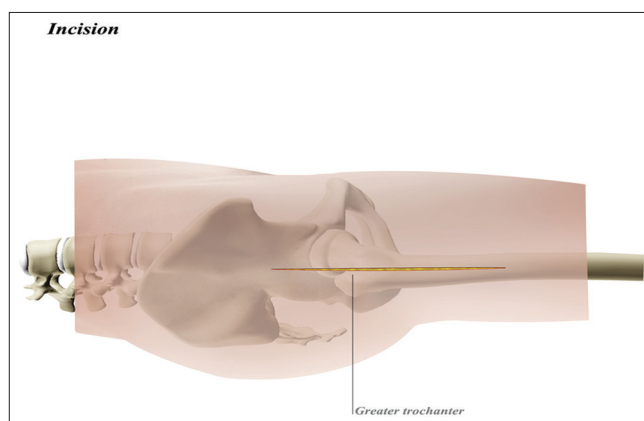


Figure 2

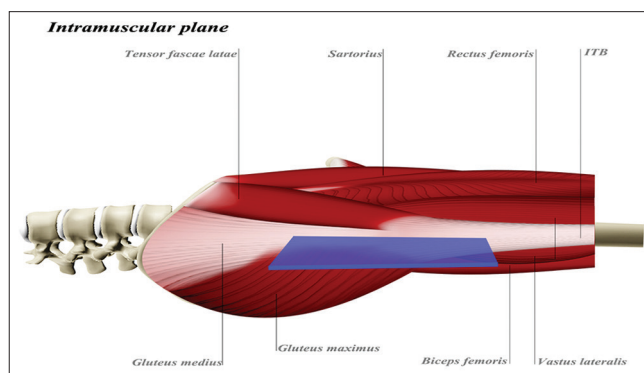


Figure 3

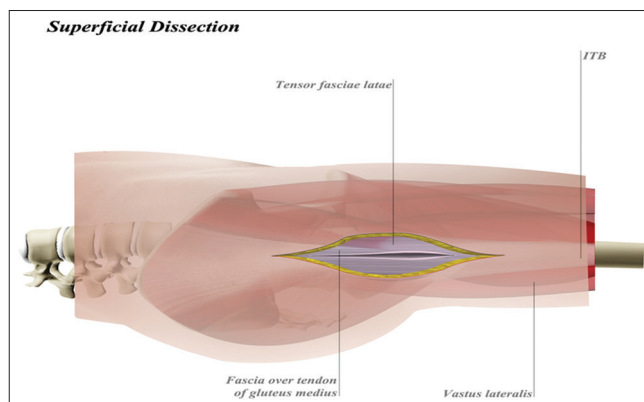


Figure 4

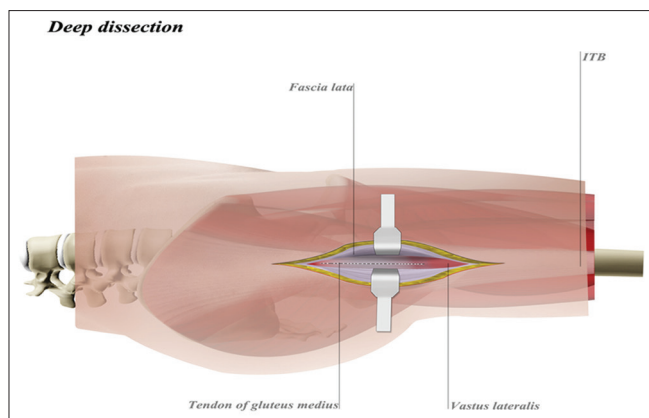


Figure 5

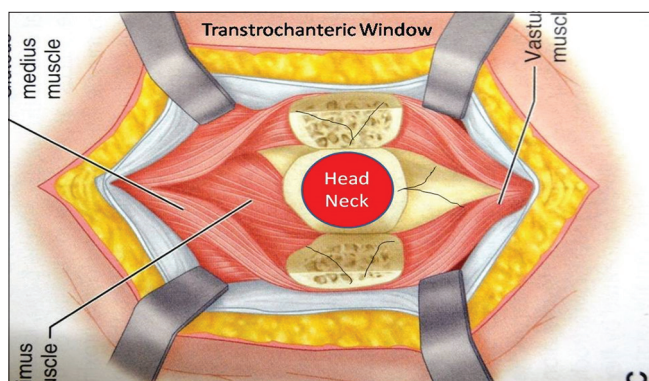


Figure 6

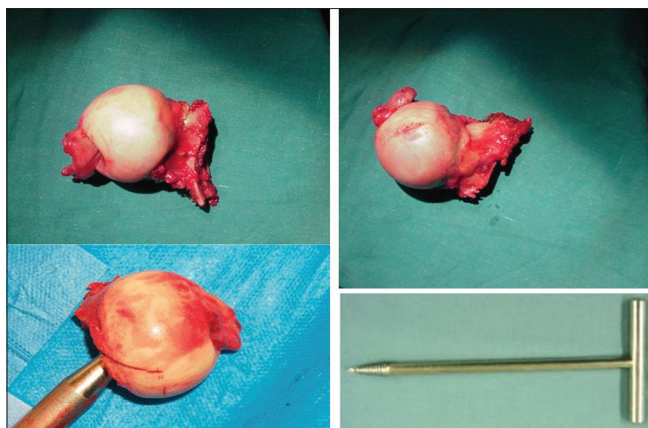


Figure 7

were followed up in OPD at monthly, 3 month, and 6 month and yearly intervals. After 3 months, walking with cane in opposite hand is advised till the end of 1 year.

Observations

From 23. 03. 07, we have done 50 cases of cemented hemiarthroplasty for proximal femoral fractures in elderly people with severe osteoporosis. Mean follow-up was of 29 months. Case - 1 [Figure 11a and b], Case - 2 [Figure 12a and b], and Case -3 [Figures 13-24].

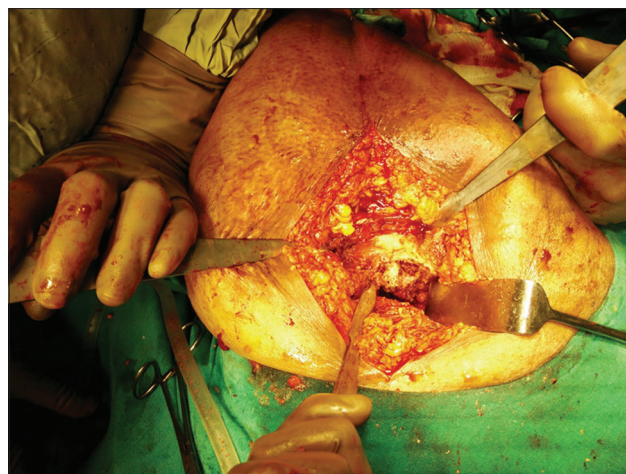


Figure 8



Figure 9



Figure 10

RESULTS

This prospective study was done at the INDEX Medical College, Hospital and Research Centre, Indore, Madhya Pradesh.

From January 2016 to June 2017, 50 patients of intertrochanteric fracture femur were treated with cemented hemiarthroplasty. On the follow-up of 1 month

to 1 year, 2 patients died (due to co-morbid conditions) and 2 patients did not come for follow-up.

Detailed patient evaluation on the basis of history, clinical, and radiological examination was done, and data were



Figure 11

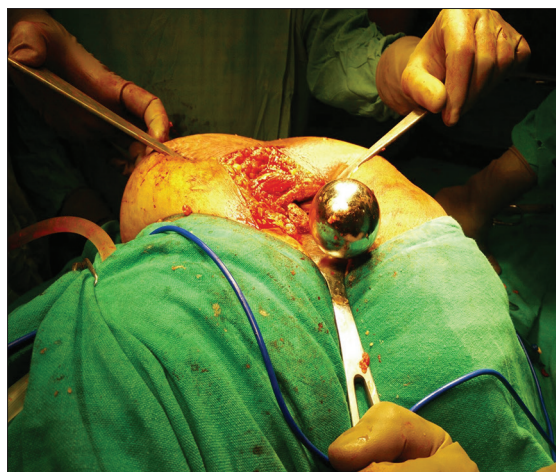


Figure 12



Figure 13

collected accordingly. The post-operative evaluation was also done according to the above criteria. All patients were followed regularly.

Out of 50 cases, 50 patients were available for 1 month of follow-up, 48 patients were available for 6 months of follow-up, and 46 patients were available for the final follow-up at 1 year. The Harris hip scores were recorded at each follow-up.

Table 1 shows age distribution pattern of the patients. Average age - 79.5 years, youngest patient - 70 years, and oldest - 90 years [Figure 1].

Most of the patients were women [Table 2].

- 58% females (29/50)
- 42% males (21/50).

Right side affected in 56% of patients [Table 3].

66% of patients had unstable intertrochanteric fracture of Evans type 5, and AO type 31-A2.3. Rest 34% (17 patients) had Evans type 4, AO type 31-A2. 2 types of unstable intertrochanteric fracture are summarized in Table 4.

84% of patients had a trivial fall which resulted in unstable intertrochanteric fracture femur. Rest 8 patients had road traffic accidents [Table 5].

Table 1: Age distribution

Patients age in years (range)	Number of patients (%)
70-75	17 (34)
76-80	11 (22)
81-85	13 (26)
86-90	9 (18)

Table 2: Sex distribution

Sex (M/F)	Number of patients (%)
Male	21 (42)
Female	29 (58)

Table 3: Side distribution

Laterality (L/R)	Number of patients (%)
Left	22 (44)
Right	28 (56)

Table 4: Classification of fracture

Evans classification	Number of patients	AO classification (%)
Type 4	17	31-A2.2 (34)
Type 5	33	31-A2.3 (66)

Trivial fall included fall due to slip, fall on stairs, and fall while getting from bed.

Of 50 patients, 15 patients stayed for a week in the hospital [Table 6].

13 patients were admitted for maximum 10 days, and 1 patient stayed only 5 days in the hospital.

Most commonly used prosthesis was of size 45 mm, followed by 47 mm, 43 mm, 49 mm, and 41 mm [Table 7].

Maximum time taken for surgery - 100 min, least time - 70 min. 85 min was more often taken in the surgery, in 12 patients.

Average time taken in the surgery - 84.9 min [Table 8].

- Minimum blood loss in surgery - 150 ml [Table 9].
- Maximum blood loss - 500 ml
- Average blood loss - 204 ml.

Table 10 depicts hypotension occurred in two patients for which they were kept in medical I.C.U for observation. Superficial infection in the form of wound dehiscence was seen in three patients who were diabetic. They were managed by adequate control of diabetic status and use of appropriate parenteral antibiotics based on culture-sensitivity results. We encountered difficulty in reduction in two patients but got satisfactory results thereafter.

Two patients developed limb shortening <2 cm post-operatively due to technical errors in the form of the prosthesis not sitting properly over calcar due to large posteromedial defect.

SS wire breakage seen in two patients which was wired around the abductors and the shaft of femur. Patient is comfortably walking without any pain. One patient had develop aseptic loosening of prosthesis, but did not revert back on follow-up.

Graph 13 shows increase in average Harris hip score at 1 month, after 6 months, and after 1 year follow-up [Table 11].

In our study of 50 cases, 15 patients got excellent results, 24 patients got good results, 5 patients got fair results, and 2 patients got poor results [Table 12].

Four patients did not revert back on the final follow-up after 1 year.

Results of our study are comparable to other studies mentioned above [Table 13, Graphs 1-12, 14 and 15].

Table 5: Mode of injury

Number of patients	Mode of injury (%)
42	Trivial fall (84)
8	RTA (16)

Table 6: Hospitalization days

Number of patients	Hospitalization days (%)
1	5 (2)
3	6 (6)
15	7 (30)
12	8 (24)
6	9 (12)
13	10 (26)

Table 7: Size of prosthesis

Size of prosthesis (mm)	Number of patients (%)
41	3 (6)
43	10 (20)
45	22 (44)
47	12 (24)
49	3 (6)

Table 8: Duration of surgery

Duration of surgery	Number of patients (%)
1 h 10 min	4 (8)
1 h 15 min	7 (14)
1 h 20 min	9 (18)
1 h 25 min	12 (24)
1 h 30 min	7 (14)
1 h 35 min	6 (12)
1 h 40 min	5 (10)

Table 9: Blood loss in surgery

Blood loss (ml)	Number of patients (%)
<200	38 (76)
200-400	10 (20)
>400	2 (4)

Table 10: Complications

Immediate complication	Number of patients (%)
Superficial infection	3 (6)
Difficulty in reduction	2 (4)
Hypotension	1 (2)
Early complication	
Limb shortening	2 (4)
Delayed complication	
Wire breakage	2 (4)
Aseptic loosening of implant	1 (2)

Complications

There were four cases who died due to medical complications earliest being 3-months post-operative period and late being

Table 11: Harris hip score progression

Parameter	At 1 month	After 6 months	After 1 year
Average HHS	62.42	80	85.15

Table 12: Final Harris hip score

Harris hip score after 1-year follow-up	Number of patients	Results	Percentage %
91–100	15	Excellent	30
81–90	24	Good	48
71–80	5	Fair	10
<70	2	Poor	4

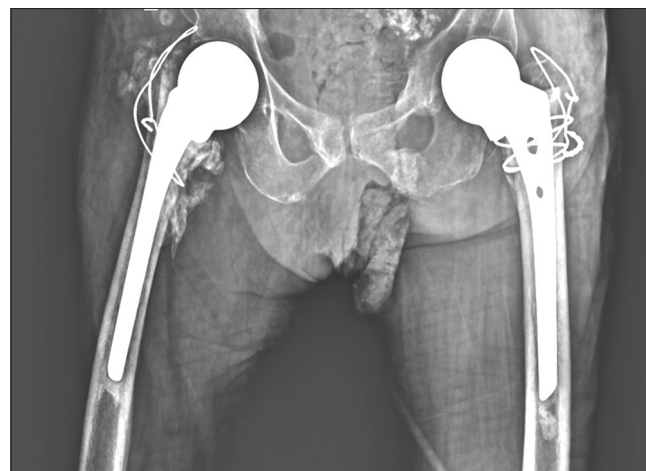
Table 13: Comparison with other studies

Study by	Number of cases	Excellent	Good	Fair	Poor	Death
Chan <i>et al.</i>	55	19	8	0	0	12
Haentjen <i>et al.</i>	37	7	11	7	5	3
Sancheti <i>et al.</i>	37	8	16	6	3	0
Our study	50	15	24	5	2	2

18 months. There were four cases of superficial operative site infection which were treated with a short course of oral antibiotics. There was no case of loosening of the prosthesis, break in the cement, or sinking of prosthesis. At follow-up progress and complications, if any, were noted and treated accordingly.

DISCUSSION

It is beyond doubt that implants such as dynamic hip screw, gamma nail, and other intra-medullary devices are the mainstay of treatment of intertrochanteric fractures.^[12,13] However, complications such as screw cutout, plate breakage, Z-effect, and reverse Z-effect are some of the implant-related complication encountered in unstable comminuted intertrochanteric femur fractures, mainly in osteoporotic and elderly patients.^[14,15] Maintenance of fracture reduction which should be anatomical or near anatomical, proper positioning of the implant, and monitored weight bearing are the pre-requisites to achieve good functional outcomes. However, in osteoporotic elderly patients with intertrochanteric comminuted fracture femur, the bone quality is poor, cut-out rates of implant are high, and loss of reduction is an known fact which leads to poor functional results. Furthermore, ambulation is prevented in elderly patients with fear of such complications, which in elderly patients causes other complications such as aspiration pneumonitis, bed sores, deep vein thrombosis, and atelectasis which gets further complicated with existing comorbidities.^[16] Hip fractures, hence, are most serious health-care problems affecting elderly patients. There were

**Figure 14****Figure 15****Figure 16**

an estimated 1.66 million hip fractures worldwide in 1990, this worldwide annual number will rise to 6.26 million by the year 2050.^[15,16] Failure rates between 6% and 32% have been reported for internal fixation of both stable

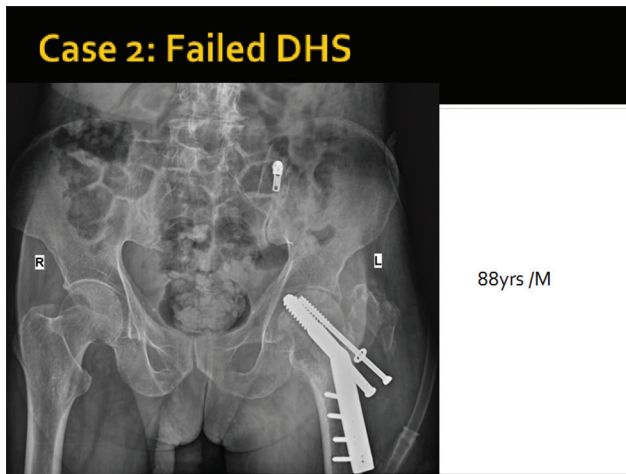


Figure 17



Figure 20



Figure 18

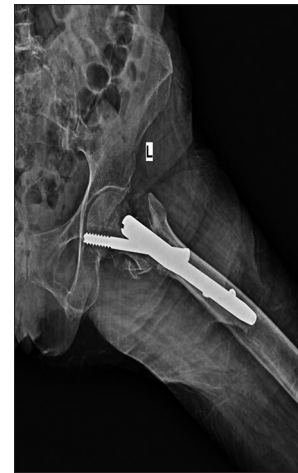


Figure 21



Figure 19



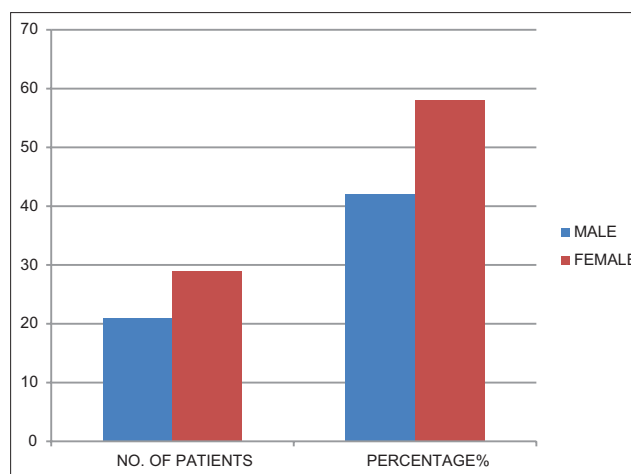
Figure 22

and unstable intertrochanteric hip.^[17,18] In our series, we had very few implant-related complication. Furthermore, we had no patients with complications such as bed sore, aspiration pneumonitis, or atelectasis as all the patients

were immediately mobilized on the next day of operation. Several studies in the literature have shown that results with cemented bipolar hemiarthroplasty are good. It helps in early mobilization of a patient with good and



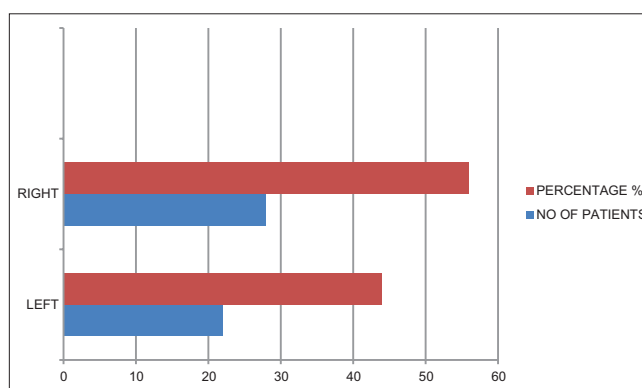
Figure 23



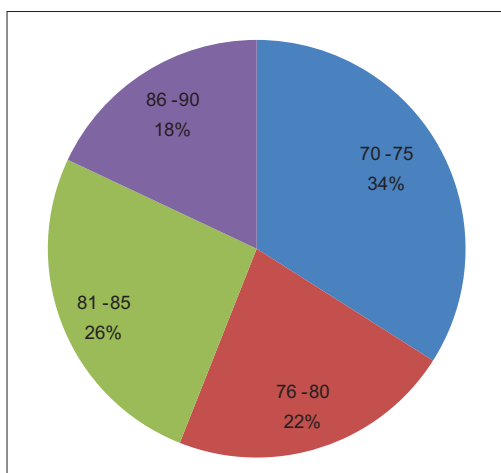
Graph 2: Sex distribution



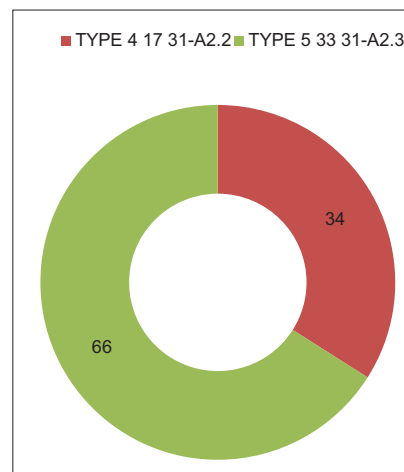
Figure 24



Graph 3: Side distribution



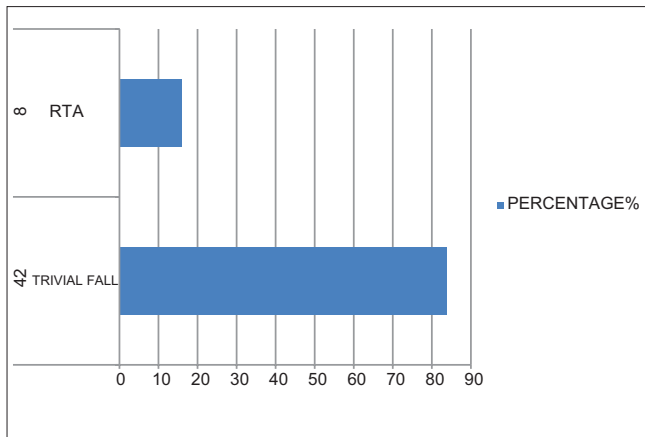
Graph 1: Number of patients



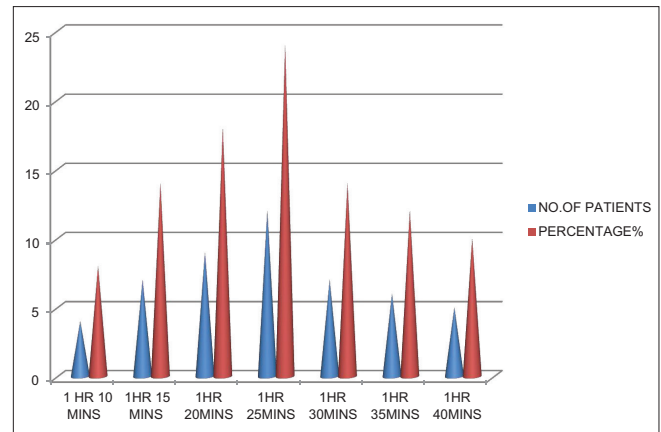
Graph 4: Classification of fracture

fast improvement in Harris hip score. Complications such as pressure sores, aspiration, and pneumonitis are very rare with this surgery. Cemented bipolar hemiarthroplasty has given constant good results in

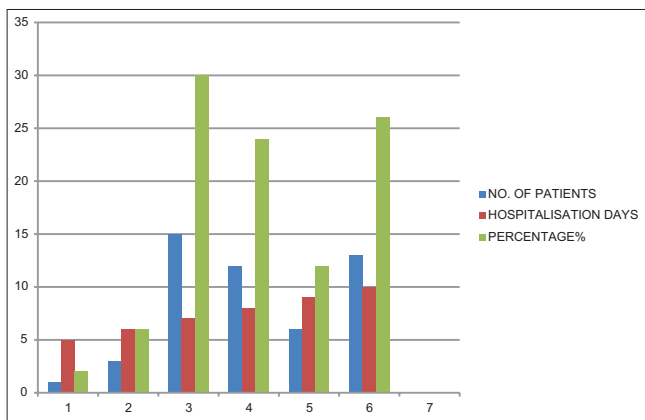
terms of early ambulation and good mid-term survival rates in comminuted unstable intertrochanteric fractures, and results are constant as compared to variable results given by osteosynthesis.^[19-21] Even our results were synchronous to the above studies in terms of early mobilization, less implant-related complications, and faster overall rehabilitation.



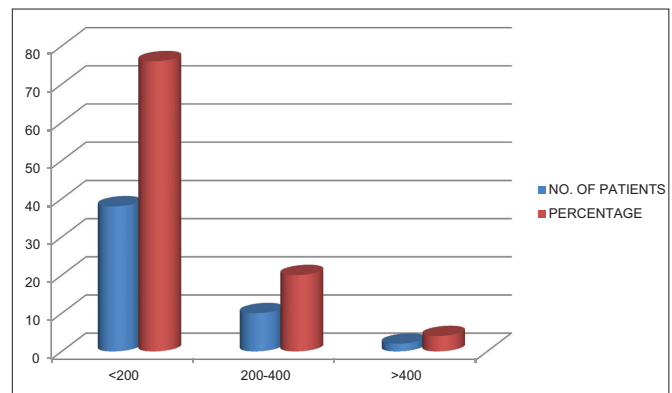
Graph 5: Mode of injury



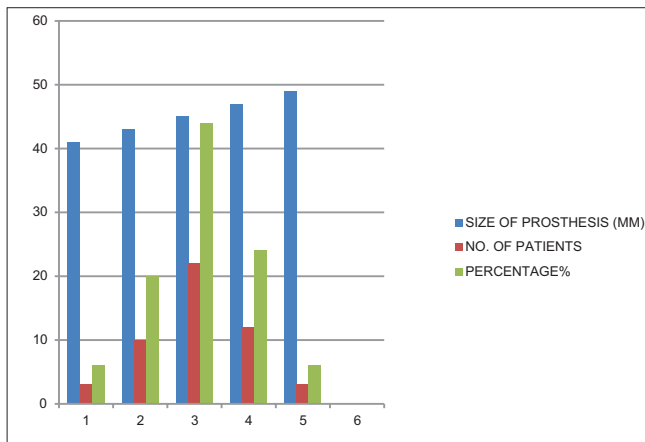
Graph 8: Duration of surgery



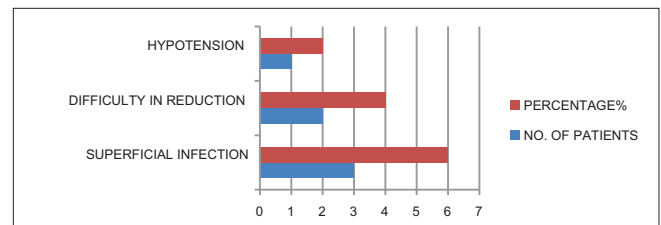
Graph 6: Hospitalization days



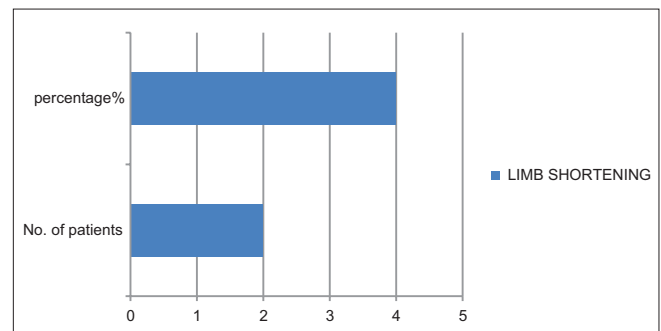
Graph 9: Blood loss in surgery



Graph 7: Size of prosthesis



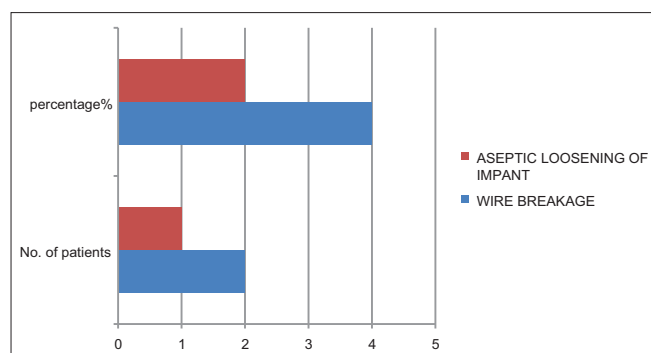
Graph 10: Complications



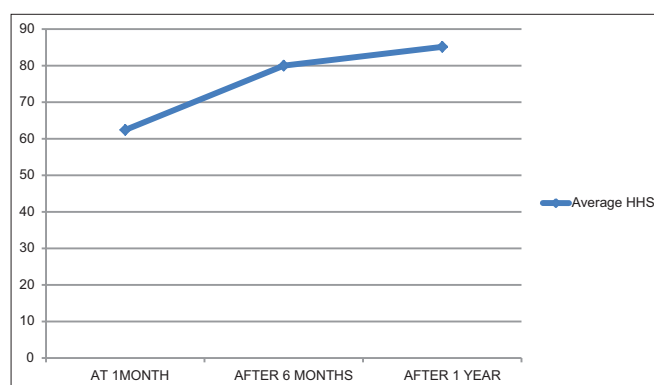
Graph 11: Limb shortening

There have been many case series and comparative studies which have compared results of osteosynthesis and cemented bipolar hemiarthroplasty for similar unstable intertrochanteric fractures. They have proved that final outcome in both the groups was more or less comparable except for the fact that there was early ambulation in hemiarthroplasty group. They have also stated that blood loss and need for transfusion

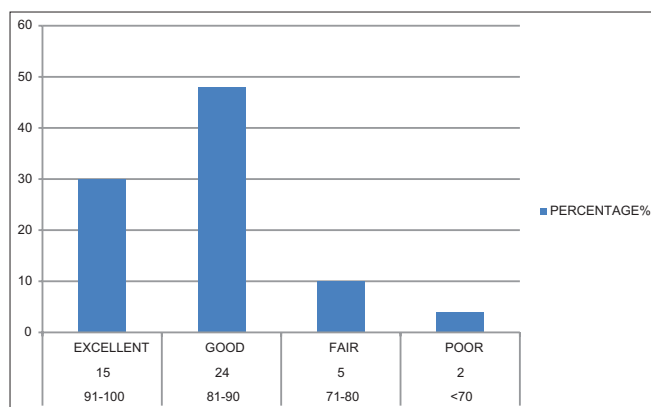
were more in hemiarthroplasty group as compared to osteosynthesis.^[22,23] We do agree that blood loss and need for blood transfusion are more in this surgery. We had



Graph 12



Graph 13: Harris hip score progression



Graph 14: Final Harris hip score

mean blood loss of 321 ml with minimum of 200 ml and maximum of 800 ml.

The rate of repeat operation in case series with osteosynthesis in elderly patients has been reported to be as high as 8–16%. Repeat surgeries in elderly patients with other comorbidities have shown more medical complications and implant-related complications.^[24,25] Our series had revision surgery 4.8% which is less than the osteosynthesis group.

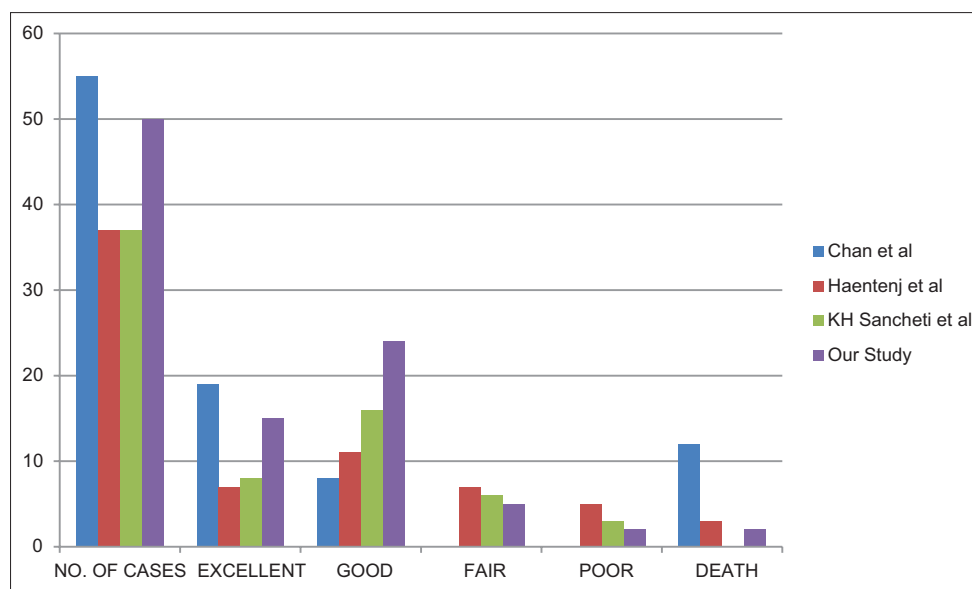
We had used standard tension band wiring technique for fixation of greater trochanter as shown in case series

by Zhang *et al.*^[26] In our series, we had encountered two delayed non-union of greater trochanter which was treated with repeat open reduction and fixation with circlage wire and bone grafting. Both patients presented clinically with pain at greater trochanter and decrease active abduction at follow-up of 4–5 months post-operatively.

Haentjens *et al.*^[27] and Geiger *et al.*^[28] in their case series showed dislocation rate in the patient group who underwent total hip arthroplasty was significantly higher (12–44.5%) than those who had bipolar arthroplasty (0–3.3%). We too had two (1.5%) patients who had got dislocated post-operatively. One of them was treated with closed relocation under anesthesia, and the other had to be treated with revision surgery in the form of total hip arthroplasty.

A study by George *et al.*^[29] has shown 10-year survivorship of cemented bipolar hemiarthroplasty in intertrochanteric fracture femur free of reoperation for any reason was 93.6%. We in our series have shown a good early to mid-term survivorship at our mean follow-up of 2.9 years with a minimum of 1 year and a maximum of 6 years.

The literature supports that all three approaches have comparable dislocation rates when using the posterior approach augmented with soft tissue repair and it is apparent an adequate soft tissue repair when performing the posterior approach greatly reduces the relative risk of dislocation. However, certain studies have also shown that there are higher rates of dislocation with posterior approach when compared with transtrochanteric and anterolateral approach. Studies have also shown that former has less rate of ectopic ossification as compared to the latter two. Furthermore, there is higher rate of non-union with transtrochanteric approach, thus affecting the abductor lever arm, and can lead to Lurching gait.^[30] We in our case series had implemented a novel transtrochanteric approach. We had selected all patients with comminuted intertrochanteric fracture femur which has greater trochanter as a separate fragment. We had to repair greater trochanter with tension band wiring irrespective of the approach used. Hence, we did not use Southern Moore's approach. As the greater trochanter fragment was elevated superoposteriorly, we saw the fracture neck and the head through the fracture site. Hence, there was neither need to cut external rotators which causes bleeding nor we had to split gluteus maximum or any of the abductors. Since we were constantly on lateral aspect, nerve was always safe posteriorly. Abovementioned were the advantages of this approach in comminuted intertrochanteric fractures. There were two cases of dislocation and two cases of non-union greater trochanter. We postulated that dislocation may be most probably due to inadequate version and possible



Graph 15: Comparison with other studies

non-union due to either cementing technique or inadequate fixation. However, the exact cause could not be ascertained.

Complexity of intertrochanteric fractures in elderly osteoporotic patients poses challenging problems with added risk of increased morbidity and mortality. Internal fixation of such fractures although may reduce the morbidity of pain, it does not permits early mobilization with fear of failure of fixation and thus indirectly the morbidity of fracture disease remains same. There are limitations of the use of internal fixation and their obvious complications in special cases where the patient is the elderly, bones are severely osteoporotic, and the fracture is unstable. The incidence of the fixation failure is reported to be as high as 20% in unstable fracture patterns.^[31] Both, stability and early ambulation are only possible with cemented hemiarthroplasty.^[32] In proximal femoral fractures with severe osteoporosis and poor bone stock, there is 100% risk of failure of fixation of any type.^[31] Rate of failed fixation of compression hip screw is around 9.7%. There is a significant difference in osteoporosis grad between the failed and successful compression hip screw.^[31] Kim *et al.*^[33] reviewed 178 intertrochanteric fractures treated by DHS fixation. They used Singh's index for the degree of osteoporosis and Evans classification for the stability of fracture. They found the failure of fixation in the form of varus angulation $>100^\circ$, perforation of the femoral head, more than 20 mm of extrusion of a lag screw or metal failure, in 49 (27%) cases. In these 2 fractures were stable, and 47 were unstable. Thus, the conclusion was unstable fractures with osteoporosis had a failure rate of $>50\%$, and in such cases, dynamic hip screw should not be the first choice of, if hip screw should not be the first choice of treatment.^[33] Primary hemiarthroplasty offers a modality of treatment that provides adequate fixation and

early mobilization in these patients, thus preventing post-operative complications such as pressure sores, pneumonia, atelectasis, and pseudoarthrosis.^[32] As observed by the senior author and colleagues, cemented hemiarthroplasty with posterior approach, cutting the rotators, and increases the degree of posteromedial instability, with shattered greater trochanter, increases the risk of dislocation of the hip joint. Hence, approach was modified through the fracture site (lateral approach) removing the head and neck only, leaving the greater trochanter (shattered/intact) with rotators *in situ*, after reconstruction of greater trochanter (if shattered), maintains the posteromedial stability, and hence, obviates the risk of dislocation. Reconstruction of greater trochanter and calcar is an important step of surgery to maintain the stability of hip joint and to promote early ambulation with hip movements on D1 and walking with walker D7. Early mobilization is very essential particularly in patients with other medical comorbidities and to prevent postoperative complications.

In the short term, unipolar or bipolar hemiarthroplasty seems to give better results than open reduction and internal fixation in the treatment of unstable intertrochanteric hip fractures in terms of mortality and morbidity rates, complications, early rehabilitation and returning to daily living activities. Long-term problems such as loosening, protrusion, stem failure, late infections, and late dislocations have been prevalent. Since life expectancy increases in all countries, long-term disadvantages of the hemiarthroplasty may outweigh its short-term advantages.^[34-38] Our series too have shown such complications and long-term survivorship of this implant would always be questionable despite its advantages.

LIMITATIONS

This study has several limitations such as: (1) No osteodensitometry scan was performed in our patients to assess bone density, and patients were deemed osteopenic on the basis of standard radiographs, (2) the Austin-Moore hemi-prosthesis that was used in patients over 85 years old was a bit old fashioned (comparing to bipolar hemi-prosthesis that were used in those under 85 years old), but our decision was mainly influenced by economic reasons and the low cost that Austin-Moore hemi-prosthesis presents (comparing to their counter-part); and (3) there was no control group of patients operated on with an osteosynthesis technique to make a proper comparison.

CONCLUSION

The proximal femoral fractures should be classified as stable and unstable, and the fracture should be graded according to the degree of osteoporosis. The proximal femoral fractures should be grouped according to fracture geometry so that correct choice of prosthesis can be used. The treatment of proximal femoral fractures in elderly patients with severe osteoporosis differs from the treatment of other proximal femoral fractures. These fractures are better treated with cemented hemiarthroplasty.

In the present study, primary hemiarthroplasty for the treatment of unstable pertrochanteric femoral fractures (AO/OTA type 31 A2.3) in elderly osteoporotic patients seems to be a secure and effective procedure, while showing an earlier ability to bear full body weight, a faster recovery rate, and an improved quality of life. This approach offered a suitable improved quality of life in terms of FIM and HHS. Early mobilization is advantageous in preventing pulmonary complications, venous thrombosis, pressure sores, and generalized deconditioning.

The treatment of these fractures with cemented hemiarthroplasty has the advantage of early ambulation and less hospital stay. The cemented hemiarthroplasty also provides stable, and mobile hip and revision surgery is hardly needed in these elderly patients. Implant should preferably have broad metaphyseal end, an long stem to enhance the stability. Cement (methyl-methacrylate) is a better fitting agent, and it improves the stability of hip. Thompson's prosthesis is a better choice when there is fractured calcar or in case when calcar reconstruction is not possible by anyway. The modular type of bipolar prosthesis is a better choice when there is comminution of posteromedial wall with lesser trochanter and calcar fracture. The post-operative physiotherapy is very essential

for earlier functional recovery. The weight bearing can be started earlier than in other methods of treatment.

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