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RESEARCH ARTICLE

ROLE OF HIP ARTHROPLASTY IN TROCHANTERIC FRACTURES IN ELDERLY POPULATION

Dr. Ronak Patel¹, Dr. Yogesh Pethapara², Dr. Vishwajeet Singh³

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Abstract

Introduction: Trochanteric fracture incidence has increased due to increased life expectancy and osteoporosis. Management of these fractures in elderly is challenging due to difficult anatomical reduction, poor bone quality and osteoporosis. Internal fixation in these cases usually involves prolonged bed rest to prevent implant failure which leads higher complication such as deep vein thrombosis, pneumonia, pulmonary embolism, bed sores, increased morbidity.

Materials and Methods: We had done a clinical, observational and prospective type study in 34 cases of trochanteric fracture of femur where 12 cases were operated with uncemented bipolar hemiarthroplasty, 11 cases were treated with cemented bipolar hemiarthroplasty and 11 cases were treated with total hip arthroplasty.

Results: Patients were followed up for minimum 6 months duration. Out of which, 14 patients died within 6 months of their fractures because of associated systemic comorbidities. According to Harris hip Score, out of 20 cases, 3 cases (15%) had excellent outcome, 5 cases (25%) had good outcome, 6 cases (30%) had satisfactory outcome and 6 cases (30%) had unsatisfactory outcome. Cases treated with uncemented bipolar hemiarthroplasty had satisfactory to unsatisfactory outcome. Cases treated with cemented bipolar hemiarthroplasty had good outcome and cases treated with total hip arthroplasty had excellent to good outcome.

Conclusion: Total hip arthroplasty and Cemented bipolar hemiarthroplasty both are reliable treatment methods for unstable trochanteric fractures in elderly osteoporotic patients. Hip arthroplasty offers the potential for early ambulation with little risk of mechanical failure, avoid the risks often associated with internal fixation and prolonged immobilization, and enable patients to maintain a good level of function immediately after surgery. However, as our study group is small, so further large randomized trial required before reaching conclusion.

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Introduction:-

Trochanteric fracture is common fracture in elderly people. Their incidence has increased due to the increased life expectancy and osteoporosis¹. Earlier, these fractures were managed conservatively by traction or external splinting which resulted in higher morbidity and complication². Hence, trends for operative intervention increased with time^{3,4,5}. Stable trochanteric fractures can be easily treated by osteosynthesis with predictable good result^{6,7} whereas the

Corresponding Author:-Dr. Ronak Patel

management of unstable trochanteric fracture are challenging because of poor bone quality, osteoporosis, and other underlying diseases^{8,9}.

In past, fixed nail plate devices used for the fixation of these fracture, had high rates of cut-out and fracture displacement^{10,11}, subsequently, a sliding hip screw was used with much success and became the predominant method of fixation of these fractures^{12,13,14}. Intramedullary interlocking devices have shown reduced tendency for cut-outs in osteoporotic bone¹⁵ and also have better results in cases of unstable trochanteric fractures^{15,16}. Complications such as head perforations, excessive sliding leading to shortening, plate pull-out, and plate breakage continued to be a problem^{17,18}. Osteoporosis and instability are most important factors leading to unsatisfactory results^{19,20}. In internal fixation, a period of restricted mobilization is suggested²¹, which may lead complications such as atelectasis, bed sores, pneumonia, and deep vein thrombosis.

Despite advances in internal fixation techniques, the failure rate of the dynamic hip screw is 6.8% to 9.8% while failure rate of the proximal femoral nail is between 7.1% and 12.5% in unstable fractures. There have been various reports of successful outcomes after the use of hemiarthroplasty and total hip arthroplasty²². Endoprosthetic replacements have also been shown to achieve early rehabilitation of the patient and good long-term result. Many author reported that primary cemented endoprosthesis brought better results than compression hip screw in trochanteric fractures in elderly osteoporotic patients who were eligible for early mobilization²³. In failed trochanteric treatment cases, two main treatment options are available, either revision of internal fixation or salvage treatment with hip arthroplasty²⁴⁻²⁷. Revisions of internal fixation for nonunited fractures have been reported to have good results in younger patients with good bone stock while in older patients with poor bone quality and degenerative acetabular changes; hip arthroplasty has been advocated as a salvage procedure. However, an ideal treatment method is still rather controversial.

Hence, the purpose of our study is to study the role of hip arthroplasty in trochanteric fracture in elderly population.

Procedure

Materials And Methods:-

The present study was a clinical, observational and prospective type of study conducted at GMERS medical college, gandhinagar, gujarat. It included 34 cases, all operated with hip arthroplasty for trochanteric fracture of femur after obtaining informed consent, clinical and radiological examination during a period of 24 months from May 2014 to April 2016.

Inclusion Criteria:

1. Trochanteric fractures in elderly (>60 years)
2. Elderly patients with non united trochanteric fractures
3. Patients with failed internal fixation of trochanteric fractures
4. All patients giving consent to be part of the study.

Exclusion criteria:

1. Patients <60 years.
2. Patient medically unfit for surgery
3. Patient not willing for surgery

As soon as the patient was brought to casualty, detailed history was taken. Plain radiographs of pelvis with both hip joints AP view were done to know the location, extent and type of fracture. The fractures were classified according to Boyd and Griffin classification. Routine investigations were done for all patients. Meticulous preoperative planning was done and patients were operated once the general condition of the patient was stable and patient was fit for surgery.

Operative Technique:

All cases were operated with total hip arthroplasty or hemiarthroplasty via posterolateral Modified Gibson's approach under spinal anesthesia. Patient firmly anchored in the straight lateral position. Make a slightly curved incision centered over the greater trochanter. Divide the subcutaneous tissues and fascia in line with the skin wound over the center of the greater trochanter. A plane is made between the tensor fascia lata and gluteus maximus. Expose greater trochanter, short external rotators and the posterior edge of the gluteus medius. Palpate the sciatic nerve.

Divide the short external rotators and the entire exposed portion of the capsule immediately adjacent to its femoral attachment. Dislocate the hip posteriorly by flexing, adducting, and gently internally rotating the hip. Remove the femoral head segment with a corkscrew after excising ligamentum Teres. Size of head is measured with a caliper. Prepare the acetabular component. Expose the bony margins of the rim of the Acetabulum to facilitate proper placement of the acetabular component. The procedure for reaming of the acetabulum is similar for cementless and cemented acetabular components. Trial acetabular components are used before final implant selection. Prepare the femoral component. The medullary cavity is reamed using the rectangular chisel and the rasp. Trial femoral components are used before final implant selection.

Now, Proceed with implantation of either a cementless or cemented component. Then, femoral component is hammered in medullary cavity of femur and it is reduced into the acetabular cup. The movements at the hip joint are tested and stability is noted. Capsule and external rotators are restitched. The wound is then closed in layers after achieving complete haemostasis and putting a suction drain.

Closed adductor tenotomy is done whenever required. Hemiarthroplasty with bipolar prosthesis was done via same posterolateral approach. All patients underwent a routine postoperative protocol, starting from first postoperative day.

Follow up:

Post-operatively all cases were followed up for a minimum of four follow ups (2 weeks, 6 weeks, 3 months, 6 months) following management and patients were evaluated clinically and radiologically using Harris Hip score.

Results:-

In present study, total 34 patients with trochanteric fractures were treated with hip arthroplasty. Out of which, 12 patients were treated with uncemented bipolar hemiarthroplasty, 11 patients were treated with cemented bipolar hemiarthroplasty and 11 patients were treated with total hip arthroplasty. Out of which, 14 patients died within 6 months of their fractures because of associated systemic comorbidities.

34 patients with trochanteric fractures ranged 61-100 years of age with mean age of 78.94 years. Total 26 out of 34 patients were in the eighth and ninth decade of life comprising of 76.46% of total patients.

There were 8 (23.52%) male and 26 (76.47%) female patients in this series.

In the present study, trivial trauma was the only mode of injury accounting for 34 cases (100%). According to Boyd & Griffin classification, type 2 fracture was more common than other type which was seen in 28 cases (82.35%).

According to Harris hip Score, out of 20 cases, 3 cases (15%) had excellent outcome, 5 cases (25%) had good outcome, 6 cases (30%) had satisfactory outcome and 6 cases (30%) had unsatisfactory outcome [Table 1].

In the present study, the association between final outcome and type of treatment modality used was statistically highly significant (p value <0.001). In 12 cases treated with uncemented bipolar hemiarthroplasty, 6 cases had satisfactory outcome and 6 cases had unsatisfactory outcome. 3 cases treated with cemented bipolar hemiarthroplasty had good outcome. In 5 cases treated with total hip arthroplasty, 3 cases had excellent outcome and 2 cases had good outcome. This association showed that fractures treated with total hip arthroplasty and cemented bipolar hemiarthroplasty had better outcome.

Table 1:- Functional outcome (on basis of HHS).

Outcome according to HHS	Number of Patients	Percentage of Patients
Excellent	3	15%
Good	5	25%
Satisfactory	6	30%
Unsatisfactory	6	30%
HHS – Harris hip score		

Mean hospital stay was 10 days and mean time for gradual weight bearing was 6 days for all patients. For patients treated with hemiarthroplasty, mean operative time was 45 min (35-60 min) and mean intraoperative blood loss was 215 ml (110-350 ml). For patients treated with total hip arthroplasty, mean operative time was 72 min (55-85 min) and mean intraoperative blood loss was 510 ml (320-690 ml) [Table 2].

Table 2:- Demographic and perioperative data.

THA	Number of patient	11
	Mean intraoperative blood loss(ml)	510 ml(320-690 ml)
	Mean operative time(min)	72 min(55-85 min)
	Mean Harris hip score	92.2
BA	Number of patient	23
	Mean intraoperative blood loss(ml)	215 ml(110-350 ml)
	Mean operative time(min)	45 min(35-60 min)
	Mean Harris hip score	65.53
Mean hospital stay(days)		10 days(6-13 days)
Mean time for gradual weight bearing(days)		6 days(4-7 days)

THA-total hip arthroplasty, BA-bipolar arthroplasty

Total 29 patients (85.29%) out of 34, could be able to walk prior to discharge. Delayed weight bearing was due to associated medical illness and comminution of fracture.

Mean harris hip score was 92.2 in cases treated with THA, 81.33 in cases treated with cemented bipolar hemiarthroplasty and 61.58 in cases treated with uncemented bipolar hemiarthroplasty.

In our study, no other complications were seen except bedsores, dislocation and superficial infection. 3 patients (8.82%) developed bedsores because of lack of ambulation which were treated with daily aseptic dressing and changing of posture. In 4 patients (11.76%), prosthesis was dislocated which was treated with close reduction. 1 patient (2.94%) developed superficial infection and none of patient developed deep infection. Complication rate was 23.52%.

Discussion:-

Hip fracture injuries are one of the most serious health care problems affecting elderly patients. There were an estimated 1.66 million hip fractures world-wide in 1990, this worldwide annual number will rise to 6.26 million by the year 2050^{28,29}. In elderly the coexistence of unstable comminuted fracture with osteoporosis worsen the prognosis^{30,31}, which is attributed to presence of various comorbid conditions, which are exacerbated by immobility, bed rest and delayed weight bearing. In osteoporotic fractures, maintenance of reduction can be a major problem. Unsatisfactory surgical outcome is common in elderly patients with trochanteric fractures; medical illness, osteoporosis, and fracture instability are contributing factors.

The orthopaedic literature concerning the treatment and results of comminuted trochanteric fractures of the hip by Massie (1962)³², Holt (1963)³³ and Dimon (1973)³⁴ have shown outstanding work in an attempt to change an unstable fracture to a stable one and fix it with a specific device until it heals.

Hip arthroplasty has been advocated in elderly patients with a view to make the rehabilitation early and to lessen the incidence of complications of prolonged immobilization which are frequently encountered in the treatment with various forms of internal fixation devices e.g. venous thrombosis, pulmonary embolism, atelectasis and allied complications. In addition, acute prosthetic replacement eliminates the possibility of excessive collapse compromising walking function, mal-union, as well as the uncommon problems of non-union and avascular necrosis. Likewise, hip arthroplasty is an effective salvage procedure after the failed internal fixation of an trochanteric fracture in an older patient³⁵. The earliest comparison of internal fixation and hemiarthroplasty was done by Haentjens *et al*³⁶ showing a significant reduction in the incidence of pneumonia and pressure sores in those undergoing prosthetic replacement. Grimsrud *et al*³⁷ studied 39 consecutive patients of unstable trochanteric fractures treated with a cemented bipolar hip arthroplasty. They concluded that these fractures can be treated with a standard femoral stem and cerclage cabling of

the trochanters. The technique allows safe and early weight bearing on the injured hip and had a relatively low rate of complications.

Davis et al³⁸, in 1990, studied the causes of mechanical failure in a series of 230 trochanteric fractures which had been internally fixed with either sliding hip screw or Kuntscher y-nail. The overall rate of mechanical failure was 16.5%. Kyle et al (1979)³⁹ reporting on a series of 74 unstable trochanteric fractures, had a post nailing complication rate of 6% to 8% and they could not ambulate their patients as late as four to six weeks due to the unstable nature of the implant bone construct. Kim et al (2001)⁴⁰ reviewed 178 trochanteric fractures treated by dynamic hip screw (DHS) fixation followed for a minimum of one year. Unstable fractures with osteoporosis had a failure rate of more than 50%. They concluded in such cases, DHS should not be the first choice for treatment.

Reoperation rates have been reported as high as 8-16% with internal fixation in trochanteric fractures^{41,42}. Furthermore, repeat surgery in these patients carries with it a high incidence of medical complications and post operative dislocation of the prosthesis has also been shown to be somewhat more common⁴³.

The rate of dislocation, as reported in the literature, has varied widely aggravated by many factors⁴⁴. In the study of Woo and Morrey⁴⁵ for total hip arthroplasty, there was an increased rate of dislocation of the hip due to abductor weakness and/or trochanteric non-union. It was 3.2%. In the study of Won Sik Choy⁴⁶ for uncemented hemiarthroplasty, rate of dislocation was zero. In our study, in 4 patients (11.76%), prosthesis was dislocated.

Kesmezacareet al⁴⁷ reported postoperative mortality in 34.2% after a mean of 13 months and in 48.8% after a mean of 6 months in patients treated with internal fixation and endoprosthesis, respectively. Other studies have shown no differences in postoperative mortality in two groups.^{36,48,49} In present study, 14 patients (41.17%) out of the 34 died within 6 months of surgery due to unrelated causes secondary to systemic comorbidities.

Harwin et al⁵⁰ reported on fifty-eight elderly patients with osteoporosis in whom a comminuted trochanteric femoral fracture had been treated with a bipolar Bateman-Leinbach prosthesis and who were followed for an average of twenty-eight months. The average patient age was seventy-eight years, and 91% walked prior to discharge. There were no deep infections, dislocations, acetabular erosions, or cases of stem loosening. In our study, total 29 patients (85.29%) walked prior to discharge.

In present study, for total hip arthroplasty, mean operative time was 72 min and mean intraoperative blood loss was 510 ml. For bipolar hemiarthroplasty, mean operative time was 45 min and mean intraoperative blood loss was 215 ml. These results were compared with a study by KhaldounSinno MD⁵¹. In this study, there was no significant difference between two forms of arthroplasty (bipolar hemiarthroplasty or total hip arthroplasty) in terms of hospital stay and time period required for gradual weight bearing but total hip arthroplasty appears to provide better results regarding mobility. Mean Harris hip score in cases treated with total hip arthroplasty after minimum 6 month duration followup was excellent to good in comparison to Harris hip score in cases treated with bipolar hemiarthroplasty.

From the above review of literature, it is evident that although the use of internal fixation has decreased the mortality rate, the rate of complication still ranges from 4-50%⁵² and walking with full weight bearing before the fracture has healed is often impossible.

There is no doubt that the general consensus would be to use internal fixation devices in stable trochanteric fractures in younger patients as they can tolerate immobilization and if needed, reoperation, quite well. However this is not so in elderly, debilitated patients who sustain an unstable trochanteric fracture.

Conclusion:-

Hip arthroplasty offers the potential for early ambulation with little risk of mechanical failure, avoid the risks often associated with internal fixation and prolonged immobilization, and enable patients to maintain a good level of function immediately after surgery. So from this study, we conclude that both Total hip arthroplasty and Cemented hemiarthroplasty are reliable treatment methods for unstable trochanteric fractures in elderly osteoporotic patients.

Limitations of our study are small number of cases and short follow-up periods, so a larger prospective randomized study with large number of cases and larger follow-up periods are needed further.

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