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RESEARCH ARTICLE

A COMPARITIVE & PROSPECTIVE ANALYSIS OF UNSTABLE INTERTROCHANTERIC FRACTURES FIXED WITH PFN AND PFN A2

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Abstract

Intertrochanteric fractures occur predominantly in elderly patients with osteoporosis, less commonly in young patients which is associated with high energy trauma. Fixation of such fractures help in early mobilization of patient in order to prevent complications of prolonged bedrest. Fifty patients were included in our studyconducted in our institute from July 2020 to June 2022. Twenty five patients were treated with PFN and remaining with PFN A2. Age, sex, time taken for surgery, intra operative blood loss and time taken for union were recorded. We found that fractures fixed withPFN A2 had faster union rate and less surgical time but similar functional outcome compared to PFN.

Introduction:-

Intertrochanteric fractures include the fractures in the region extending from the extracapsular basilar neck to the lesser trochanter of femur. Usually occurs in the elderly age group due to low energy trauma like accidental fall because of poor bone quality and osteoporosis however high velocity trauma may cause similar fracture in young individuals.[1] Epidemiological reports (Gill JB, 2007) stated a life-time risk of hip fractures at 50 years of age as 5.6% for men and 20% for women. Intertrochanteric fractures constitute around 34% of all hip fractures.[2] In 1990, 26% of all intertrochanteric fractures were reported in Asia, this figure is estimated to rise to 32% in 2025 and 38% in 2050.[3] The goal for treating such injuries is to reduce displacement and stabilize with implants to allow early mobilization and weight bearing during fracture healing.[4]

Extensive reports have been published regarding extramedullary vs intramedullary implant.[4,5] Intramedullary implant has better biomechanical properties and more resistant to failure.[6] The helical blade of Proximal Femoral Nailanti-rotation Asian (PFN A2) compacts cancellous bone in femoral head when it is driven inside. This compaction improves femoral head strength and increases stability in cervico-cephalic direction. A single helical blade PFNA2 is technically better for small size femur in Asian population. Biomechanically, helical blade in PFNA2 has better cut-out resistance levels than screws.[7]In this study, wecompare the functional and radiological outcome of patients with unstable intertrochanteric fractures managed with proximal femoral nailing anti-rotation Asian(PFN A2) against proximal femoral nailing(PFN).

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Materials and Method:-

This is a prospective hospital based study conducted in Jawaharlal Nehru Institute of Medical Sciences (JNIMS), Imphal for a period of 2 years (Jul 2020 to Jun 2022) including50 cases of closed unstable(AO 31.A2 and 31.A3) intertrochanteric fractures.Twenty five cases each were operated by PFN and PFNA2 implant.

Preoperative planning:

Detailed history was taken including particulars of patient, date and time of injury, involved side, associated injuries, comorbidities, activity level of patient**.**

Surgical procedure:

Surgery is performed under general or spinal anesthesia,patient is positioned on traction table. Closed reduction is achieved and checked fluroscopically with Anteroposterior(AP) and lateral views. In one case fracture site was opened for reduction, encerclage wiring of fracture site was done. Incision was made over the lateral aspect of the proximal thigh over the greater trochanter. Subcutaneous layer, fascia, gluteus muscles are split apart. Superior and medial aspect of greater trochanter were palpated using a finger. In PFN A2entry was made directly over the center of superior aspect of greater trochanter, in PFN entry was made over the medial border of the greater trochanter using an awl. Guide wire was inserted and adjusted using X-ray AP and lateral views until guide wire is lined up with the intramedullary canal on both the views. Reaming is done using a reamer and then Nail (either PFN or PFN A2) was inserted. Difference between PFN A2 and PFN is that a single helical blade screw was used in PFN A2 and 2 screws (1 head screw & 1 derotation screw) were used in the latter. Distal locking was done by free hand technique.Fascia and subcutaneous tissue were repaired with plain sutures and skin closure done with skin stapler. Intraoperative findings of time taken for surgery, blood loss were recorded.

Postoperative protocol:

In all the patients, static quadriceps, knee and ankle mobilisation exercises were started at the earliest after the operation,mobilization was started from second postoperative day depending upon the physical condition of the patient. All drains were removed by 48 hrs. The wounds were inspected on the 2nd postoperative day. Stitches were removed between 10^{th}-14^{th}day. Functional assessment was done with Harris hip score (HHS) and radiological assessment with X-ray hip AP and lateral views was done at 2 weeks, 4 weeks, 8 weeks, 3 months, 6 months and 1 year.

Results:-

The mean age was 58.2 years in PFN group and 60 years in PFN A2 group. Most common mode of injury was fall in both groups (65% in PFN and 62% in PFN A2) followed by RTA (35% in PFN and 38% in PFN A2).Intraoperative blood loss was less in PFN A2 (avg. 237ml) than PFN(avg. 290ml) group. Average time taken for surgery was less in PFN A2(63.5 min) than PFN (86.5 min)group. There were no longterm postoperative complication in PFN A2 group, two patients in PFN group had screw pull out and four patients had anterior and lateral thigh pain. Partial weight bearing within 1 month was seen in 64% patients treated with PFN A2 and in 49% patients treated with PFN. The mean HHS in patients in the PFN group was 82.32 ± 12.96 while that of those treated with PFN A2 was 85.36 ± 11.57.

Discussion:-

Patients with intertrochanteric fracture have high morbidity and multiple complications due to prolonged bed rest (bed sores, pulmonary infections). Early fixation and mobilization has been the treatment of choice.[8]Earlier implants like Dynamic hip screw worked on principle of controlled collapse. These were extramedullary implants which had high failure rates in lateral wall fractures and reverse oblique fracture pattern. Intramedullary implants proved to have biomechanical advantages.[9]

Loo et al[7] in a study with 62 patients of Intertrochanteric and Subtrochanteric femur fractures reported 3 cases having lateral protrusion of sliding blade. In our study, there were no cases of sliding blade protrusion.

Bajpai[10] in his study of 77 cases found that both implants (PFN vs PFN A2) were similar with respect to time of surgery, functional assessment, duration of hospitalization and blood loss but our study shows less operative time, less intraoperative blood loss with PFN A2.

Our findings are similar with that of study done by Harshwardhan et al[11], which shows less operative time, less blood loss, less union time in cases operated using Helical blade PFNA2 implant.

Functional outcome at 1 year assessed using Harris hip scoring system is comparable in both groups which is similar to findings of Shashikant et al.[12]

Optimal position and length of femoral screw or helical blade are still the most important factors for successful outcome of these surgeries.[13]

The limitation of our study is that cases were done by multiple surgeons, causing surgeon bias.

Conclusion:-

With the findings of lesser surgical time, less blood loss, less complications and faster union rate, we can conclude that PFN A2 is better implant than PFN, although both have comparable functional outcome.

Table 1:- Comparison of baseline parameters.

	PFN A2	PFN
Mean age	60 years	58.2 years
Gender	Males-11 Females-14	Males-10 Females-15
Mode of injury	Fall(62%)	Fall(65%)

p value of <0.05 was considered significant

Table 2:- Comparison of outcome measures between the groups.

	PFN A2	**PFN**
Average intraoperative blood loss	237ml	290ml
Average time taken for surgery	63.5 min	86 min
Mean HHS at 1 year	85.36 ± 11.57	82.32 ± 12.96
Average time for radiological union	11.6 weeks	14.5 weeks

p value of <0.05 was considered significant

Figure1:- Pre and post operative x-ray of PFN.

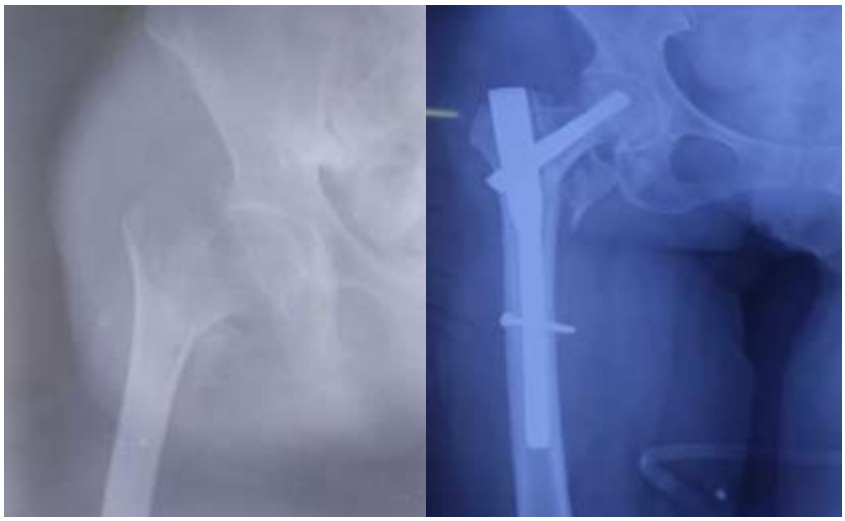

Figure 2:- Pre and post operative x-ray of PFN A2.

Figure 3:- Lateral migration of head screw and medial migration of derotation screw.

Figure 4:- Cerclage wiring with PFN A2.

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