ORIGINAL RESEARCH PAPER

Volume-8 | Issue-3 | March-2019 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

INTRACAPUSULAR NECK OF FEMUR FRACTURE TREATED WITH DYNAMIC HIP SCREW AND ANTIROTATION SCREW: A RETROSPECTIVE ANALYSIS

Orthopaedics

Dr. Sujay Kumar Das Clinical Tutor, Department Of Orthopaedics, College Of Medicine And Jnm Hospital, Kalyani, Nadia

Anirudhya Das* Assistant Prof, Department Of Orthopaedics, College Of Medicine And Jnm Hospital, Kalyani, Nadia *Corresponding Author

Dr. Suvrojyoti Sil Senior Resident, Department Of Orthopaedics, College Of Medicine And Jnm Hospital, Kalyani, Nadia

ABSTRACT

Background: Internal fixation is the primary treatment choice in younger age group suffering from fracture neck femur. But rate of failure of internal fixation in neck of femur fractures is high despite all measures. Fixation can be done by using three cannulated hip screws or by dynamic hip screw with or without a derotation screw. The outcomes of fracture neck of femur in young patients treated with Dyanamic Hip Screw (DHS) with a de-rotation were analyzed.

Materials and methods: The study was conducted on 54 patients were selected based on pre-determined eligibility criteria. The dynamic hip screw was inserted with a standard technique by means of a straight lateral incision on the lateral aspect of the thigh and hip.

Result: shows effect of dynamic hip screw with derotation screw is good.

Conclusion : Osteosynthesis of intra-capsular femoral neck fracture with dynamic hip screw with derotation screw is good.

KEYWORDS

Fracture neck femur, Dynamic Hip Screw , Antirotation Screw

INTRODUCTION:

Fracture of neck of femur has always been a challenging problem for orthopedic surgeons. Its behavior is so variable that the outcome of this fracture has been beyond control of surgeon even with the best available treatment and hence it is still termed as unsolved fracture[1,2,3]. Owing to urbanization and industrialization the incidence of these fractures are increasing every day. Works on its treatment has been collected into volumes. Replacement arthoplasty is the answer for older age group but in the young patient internal fixation is the primary treatment choice[4]. However the rate of failure of internal fixation in neck of femur fractures continues to be high despite all measures.Accurate anatomical reduction and rigid internal fixation are the key words during internal fixation. But no surgeons however, capable in his operative techniques, has been able to predict success with surety[2].

Fixation can be done by using three cannulated hip screws or by dynamic hip screw[5] with or without a derotation screw. In our study we retrospectively analyzed the outcomes of fracture neck of femur in young patients treated with Dyanamic Hip Screw (DHS) with a de-rotation screw and the details of the merits and demerits of the procedure were noted.

MATERIALS AND METHODS:

We did a retrospective study on patients admitted in college of medicine and JNM Hospital at Kalyani, Nadia through the ER or OPD between June 2016 to August 2018. The study was conducted on 54 patients. The patients were selected based on pre-determined inclusion and exclusion criteria. :

Inclusion criteria:

Patients with Post traumatic neck of femur fractures who were Aged between 18 to 55 years Had No other fracture apart from neck of femur fracture were selected for the study

Exclusion criteria for patients were: -

1. Fracture > 3 weeks
2. Patient less than 18 years and more than 55 years of age
3. Open injuries
4. Pathological fractures
5. Polytrauma patients including head / chest / abdominal injuries
6. Patients with medical co-morbidities like uncontrolled diabetes and chronic renal disease.

After admission the patients were stabilized and resuscitated where necessary, routine hematocrit and appropriate x-rays and other blood test including blood group and Rh types done.

OPERATIVE TECHNIQUE:

All the surgeries were performed under spinal anesthesia.

The patients were positioned supine on the fracture table. .Out of 54 hip operated in 45 cases we performed a closed reduction .Most of the fractures were reduced in neutral or slight internal rotation. Careful adjustment of the traction to obtain as near anatomic reduction and anteversion was done. The reduction was checked by anterior posterior and lateral views on image intensifier[6], paying, special attention to cortical contact medially and posteriorly. Reduction of the fracture on the AP radiograph was assessed by measurement of Garden alignment index. The optimum angle, slight valgus of 165 to 170^0 was tried in all cases. An angle between 160^0 and 180^0 was acceptable.. In the lateral view the reduction alignment angle was measured and kept to 180 with the femoral head, neck, trochanteric region and shaft in a straight line.

The surgical part was routinely scrubbed with antiseptic solution and aseptic sterile drapes were used. The dynamic hip screw was inserted with a standard technique by means of a straight lateral incision on the lateral aspect of the thigh and hip. The four hole DHS was routinely used. The barrel of the plate was 135^0 angle in each patient and the lag screw was placed in the head and neck to have the maximum purchase depending on the fracture configuration within (5-10)mm of subchondral bone after tapping the entire screw path. The placement of lag screw was aimed slightly inferior to the centre-centre positions to have space for the derotation screw. To prevent the rotation of the proximal fragment a guide wire was passed parallel and cranial to the main guide wire prior to tapping. This wire was later replaced by a 6.5 mm cancellous cannulated screw. We routinely used compression screw in all the cases and the final position of the screw was assessed radiologically[7].We routinely drained the fracture hematomas to reduce the intra capsular tamponade and decrease the incidence of avsacular necrosis[8].

RESULTS AND ANALYSIS

In our series 54 intra-capsular patients with femoral neck fractures were assessed. Among the patients 33 were male and 29 were females. Patients selected were between the age group 20- 55 years. The patients admitted with fracture neck femur from the OPD or emergency of College of medicine and JNM Hospital, Kalyani were selected based on the pre-determined inclusion and exclusion criteria's as noted above. Our study was conducted from June 2016 to July 2018.

In our series 24 cases were due to road traffic accidents and 30 cases

were due to domestic fall.

We classified the fractures using the Gardens Classification and the results were as shown below:

Sl. No	Type of fracture	No of patients	Percentage
1	I	12	22.2%
2	II	12	22.2%
3	III	18	33.3%
4	IV	12	22.2%

In 9 patients an open reduction were requires because satisfactory reduction could not be obtained by closed techniques. In all patients requiring open reduction the Watson Jones approach was preferred.

Type of reduction	No of patients
Closed reduction	45
Open reduction	9

Radiological evidence of union was defined as presence of bridging callus and haziness of the fracture like on antero posterior and lateral radiographic. Clinical and radiological assessment was performed before and after the operation and at the time of follow up. The mean time of radiological union in my study group was 17.31 weeks.

Three of the patients went into non union. These patients did not have evidence of union in X-Rays. In all the cases going for non union muscle pedicle bone graft was done as a secondary procedure at 6 to 9 months follow up.

Avascular Necrosis occurred in three patients. These patients were consideration as failed cases and were observed with non weight bearing crutch walking.

We evaluated the patients based on the Harris Hip Score. This scoring system is a comprehensive review of the patient's final outcome and it comprises of the following parameters as described below:

Pain score	No pain	Slight occasional pain, no compromise in activity	Mild pain, no effect on average activities	Moderate pain	Marked pain	Totally disabled
Score	44	40	30	20	10	0
No of patient	21	15	0	18	0	0

Function- Limp	None	Slight	Moderate	Severe or unable to walk
Score	11	8	5	0
No of patients	30	6	18	0

Function - Support	None	Case for long walks	Case most of the times	One crutch	Two crutch	Two crutches or unable to walk
Score	11	7	5	3	2	0
No of patients	30	6	18	0	0	0

Function: Distance Walked	Unlimited	Six blocks	Two or three blocks	Bed and chair only
Score	11	8	5	0
No of patients	21	15	15	3

Function: Activity Stairs	Normally without banister	Normally with banister	In any manner	Unable to do stairs
Score	4	2	1	0
No of patients	39	12	3	0

Function Activity: Shoes and socks	With ease	With difficulty	Unable to fitortie
Score	4	2	0
No of patients	36	18	0

Function :Sitting	Ordinary chair for one hour	High chair for one hour	Unable to sit in any chair
Score	5	3	0
No of patients	42	12	0

Function : Transportation	Able to use transportation (bus)	Unable to use transportation
Score	1	0
No of patients	36	18

Function: total range of motion	210 to 300 degree	160 to 209 degree	100 to 159 degree	30to39 degree	30to59 degree	0to29 degree
Score	5	4	3	2	1	0
No of patients	33	3	18	0	0	0

Function: deformity(D1)	Flexion contractures less than 30 degree	Flexion contracture 30 degrees or more
Score	1	0
No of patients	54	0

Function: deformity(D2)	Flexion abduction less than 10 degrees	Flexion abduction 10 degrees or more
Score	1	0
No of patients	42	12

Function: Deformity(D3)	Flexion internal rotation less than 10 degrees	Flexion internal rotation 10 degrees or more
Score	1	0
No of patients	39	15

Function:Deformity(D4)	Leg length discrepancy less than 1.25 inches	Leg length discrepancy greater than 1.25 inches
Score	1	0
No of patients	54	0

Total Harris Hip Score	Excellent	Good	Fair	Poor	Failed
Score	90+100	80+89	70+79	60+69	Below 60
No of patients	30	6	0	0	18

The Mean Harris Hip Score was 79.07.

CASE EXAMPLES

Fig 1. Radiograph of a young male with displaced (Garden III) Neck of femur fracture

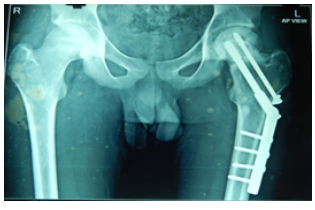

Fig 2: Radiograph showing evidences of union in the same patient.

CASE 2

Fig 3 : patient with Garden type II NOF #

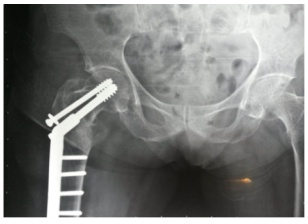

Fig 4: union evident after 5 months

Fig 5: a patient with signs of AVN AP view

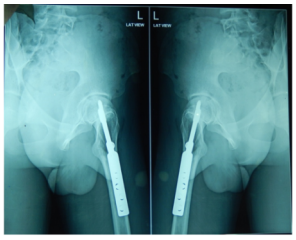

Fig 6: same patient with lateral view

DISCUSSION:

Hip fractures remain major source morbidity and mortality in the elderly and their incidence is increasing as the population ages. Surgical management followed by early mobilization is the treatment of choice for most patients with fractures around hip[9].

The goal of our study is to analysis the result of dynamic hip screw with derotation screw in the management of these fractures[10].

In our study of 54 cases of intra capsular neck femur fractures the mean age ± SD in my study group was 38.83 ± 7.73 years,ranging from 20-55 years.Skala-Rosenbaum in 2005 in their study had an average age of 56 years ranging from 17 to 86 years. Stanly E (1994)Asnis in his study of 141 patients had median age of patients 68 yrs (range 24 to 95 yrs).

Hegge HG et al (1989) performed DHS forintracapsular neck fractures in 48 patients with mean age of 58 years. In the preliminary reports of Dr. S.S.Babulkar (1987) the younger age group was the main sufferer. In his series of 2.2 intracapsular fracture neck femur, 6 were in between 1-30 years and 16 were between 31 to 50 years. The difference might be due to the fact that in European countries life expectancy is more, so osteosynthesis is carried out even at later ages than for ages in our subcontinent.

In our series there were 33 (61.1%) males and 21 (38.9%) females. This was comparable with the study by Skala Rosenbaum Dzupa V, Bartonicek J in 2005, of 47 patients 21 women and 26 men. Disparity with some series might b due to the fact that, in our country females are more confined to in doors and lead a less active life.

In our series there were 18 right sided fractures and 36 left sided fractures. S.E Asnis et al. in his series of 101 intracapcular fracture neck femur had 66 in right hip and 75 in left hip. Most of other series have not considered the side involved as preoperative variable and we also did not find any significant difference.

In our series of 54 cases, 30 (55.6%) were results of road traffic accidents (RTA), of which 70% were in male. 24 (44.4%) fractures occurred due to domestic fall due to domestic fracture of which 62.5% were in males. This can be explained by the fact that younger generation especially the males are more prone to accidents as they are involved in outdoor activities. We have notresorted to fixing the fractures in patients above the age of 55 years and so they are not included in this series [11].

The fractures included in our series were all intracapsular fracture neck of femur, classified under Garden classification – Type I and II (undisplaced), Type III and IV (displaced), were subjected to fixation with dynamic hip screw and derotation screw. 24 (44.4%) were undisplaced fractures majority occurred due to domestic fall, and the complication rates were les in these case. Rest 55.5% cases are displaced variety, mostly caused by road traffic accident and the complication rates are more. Shala-Rosenbaun, Dzupa-V, Bartonieek in 2005 in their follow up of 40 patients had 21 cases of Garden I and II and 19 cases of Garden III and IV. S.E Asnijet et al in his series of 141 intracapsular fracture neck femur had 50 non displaced stage I or II and 91 displaced, stage III or IV[12,13].

Nine (16.67%) patients out of 54 in our series needed open reduction, rest had closed reduction and fixation under image control. Cleveland M (1942) reported that upto 50% fractures were treated by open reduction actually became displaced during the process of fixation. Cave EF (1960) expressed hesitancy in performing an open reduction for fear of damage to the remaining blood supply. Banks HH (1974) demonstrated that open reduction was associated with a decreased incidence of both non union and aseptic necrosis when compared to inadequate closed reduction.

All our patients were operated within 80 hrs of admission. The mean is 45.89. Renz N et al (1993) in his series of 40 patients treated with DHS did all operations within 6.2 hrs if injury. Swiontkowski MF (1994) in one of his series of patients under 50 years did all operations within 8 hrs of injury.

In our series we took almost comparable time in doing procedure,the mean being 66.11±16.05. SE Anis and L WanekSgaglione (1994) had duration of operation from creation of incision to closure of wound of approximately forty five minutes. The difference could be due to expertise of the surgeon. The 24 hours post operative hemoglobin ranged from 9.8 mg/dl to 13.9 mg/dl. Inour series the mean postoperative hemoglobin was 11.06 to 1.03 (mg/dl).

The patients were followed up at 2 weekly intervals till the first 6 months then at 9 months and 1 years. At each review the clinical status of the fracture, ROM of hip, presence of any complication, radiological status of fracture and implant along with the variables of the scoring system (Harris Hip Score) which takes into account the status of gait, limp, distance walked, functional activities and range of motion were noted at one year follow up or at the time secondary intervention. The minimum follow up period in our series was 12 months.

The average time of union was 16.71±3.16 weeks.The union depends on the exact reduction of the fracture and a correct position of implants. We had postoperative infection superficial infection. It was treated by antibiotics. Infections following internal fixation are uncommon. Rodriguez J (1987) had both superficial and deep infection of 5%. Stromqvist B (1987) in his series of 300 cases of internal fixation had no deep infection[14].

Three non union occurred in our series. Only three AVN occurred in our series. Sectoral necrosis occurred in 12 cases (22.22%) out of 54 cases. Skala et al suggested that the occurrence of AVN does not depend on the interval between injury and surgery[15,16,17].

The incidence of avascular necrosis in non-displaced fractures is 11% (Garden RS, 1971). This incidence of AVN increases on the fracture becomes more displaced. The distinction between total avascular necrosis and partial or segmental avascular necrosis is under much debate. Catto found evidence of partial or total AVN in 66% in patients with displaced femoral neck fractures. Sevitt indicates that 84% of patients with femoral neck fractures have partial or total avascular necrosis. Swiontkowski MF (1994) in one of his series of displaced fractures in patient less than 50 years had non union rate of 0 and AVN was 20%. The difference could be due to the fact that all his patient was operated within 8 hrs of injury and surgery[18,19].

In our series the Mean Harris Hip Score was 79.67.
The result in our series is comparable to previous studies which are very few. Dynamic hip screw with derotation screw in case of fracture neck femur gives good result (66.67%) of cases.

Thus we would like to state that osteosynthesis of intra-capsular femoral neck fracture with dynamic hip screw with derotation screw is good. Results were depends upon the time of operation from injury, initial displacement of fracture and proper reductions and fixation and duration of surgery.

Limitations of the study:

Our study was limited by small sample size and short duration of follow up.

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