International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2023; 9(2): 01-15

https://www.orthopaper.com
Received: 01-01-2023
Accepted: 16-02-2023

Dr. D Ravikumar
Junior Resident, Department of Orthopaedics, AJ Institute of Medical Sciences, Mangalore, Karnataka, India

Dr. Ujwal George
Junior Resident, Department of Orthopaedics, AJ Institute of Medical Sciences, Mangalore, Karnataka, India

Dr. Suraj Shetty
Assistant Professor, Department of Orthopaedics, AJ Institute of Medical Sciences, Mangalore, Karnataka, India

Corresponding Author:
Dr. Ujwal George
Junior Resident, Department of Orthopaedics, AJ Institute of Medical Sciences, Mangalore, Karnataka, India

A comparative study of functional outcome between DHS and PFN in Basicervical femur fracture

Dr. D Ravikumar, Dr. Ujwal George and Dr Suraj Shetty

DOI: https://doi.org/10.22271/ortho.2023.v9.i2a.3347

Abstract
Objective: To study and compare the functional outcome of Dynamic Hip Screw vs. Proximal Femoral Nail in basicervical fracture of femur.
Materials and Methods: A prospective randomized and comparative study of 18 months duration was conducted on 28 patients admitted in the Department of Orthopaedics in our hospital with Basicervical femur fracture. These patients were randomly treated by a Dynamic hip screw or Proximal femoral nail. The parameters studied were functional outcome in terms of Harris hip score at 4 and 12 weeks, total duration of operation, length of incision and amount of blood loss during surgery. These values were statistically evaluated and two tailed p-values were calculated and both groups were statistically compared.
Results: The average age of our patient in DHS group is 53.642±12.923 years and in PFN group is 67.285±11.424 years. The average blood loss was 115 ml and 192 ml in PFN and DHS group, respectively. The average operating time for the patients treated with PFN was 73 min as compared to 101 min in patients treated with DHS. The average HHS at 4 weeks was 53.071±12.639 and 48.428±9.120 in DHS and PFN group respectively. The average HHS at 12 weeks was 69.571±9.928 and 68.928±8.080 in DHS and PFN group respectively. Both the implants had almost similar functional outcomes.
Conclusion: In our study we have found that the PFN group has less blood loss, smaller incision and less operating time compared to DHS group. In both DHS and PFN group patients have similar HHS at 4 weeks and 12 weeks. There is no significant difference in functional outcome in terms of HHS.

Keywords: Intraarticular fractures, plating, calcaneum, internal fixation

Introduction
Fractures of the proximal femur are significant cause of morbidity and mortality worldwide, especially in patients over the age of 50 [1]. Overall, hip fractures in older adults are common, with femoral neck fractures accounting for 3.6% of all fractures [2, 3]. The treatment of a subset of these fractures, basicervical femoral neck fractures, is still controversial due to challenges in classification and limited evidence regarding treatment outcomes.
Basicervical femur fractures are relatively rare compared to other femoral neck fractures, accounting for only 1.8% of all hip fractures [3]. There exists some heterogeneity in how Basicervical fracture are defined, but some common definitions are fractures of the base of the femoral neck that occur medially from the intertrochanteric line above the lesser trochanter [4]. Parker *et al*. defined it as a fracture in which the fracture line runs along the line of the anterior attachment of the capsule. Blair *et al*. specified it as a proximal femoral fracture through the base of the femoral neck at its junction with the intertrochanteric region. Due to this anatomical location, basicervical fracture represents an intermediate form between femoral neck and intertrochanteric fractures. There is currently limited evidence regarding optimal implant choice for basicervical fractures. Implant choice has been proposed to depend on the extent of displacement, fracture configuration, physiological age and bone quality (3). Arthroplasty procedures are favored for older adults, as it may allow for earlier weight-bearing [5]. Plates and screws or cephalomedullary devices have been proposed to maintain the native hip joint, but studies have commented on an increased mortality and failure rate when these methods are used to treat basicervical fractures, suggesting biomechanical instability and an increased rate of implant-related complications in this fracture subtype [6, 7].

Patient-reported outcomes following basicervical neck fracture treatment have also been reported to lag behind those of either more proximal femoral neck fractures or intertrochanteric fractures [8, 9].

The studies that have been done in the past have endorsed that when choosing the plan of management it has to be treated in a similar way to the intertrochanteric fracture (IT#), because both occur in nearly the same region.

The problems faced in treating the basicervical fractures (BC#), compared to the IT fractures is that, the proximal segment of the BC# has no muscular attachment and the region of the fractures have a lack of cancellous bone. Both the above contribute to make the fracture site more unstable than the IT#.

With the recent improvements in the understanding the physiology of fractures and their pathology in disease, proximal femoral nails (PFNs) have become a very popular choice in the management of IT#. Hu *et al*. suggested that BC # managed with Cephalomedullary hip nails have satisfactory results with negligible complications.

But PFN have been shown to be much less useful in the management of BC# by studies like that of Watson *et al*. who suggested that dynamic hip screws (DHS) have an edge over the PFN in the management of BC#.

To determine the best surgical treatment strategy for basicervical fracture, we need to investigate the treatment methods and results of previous studies. However, even the same implant was used, different studies may reach different conclusions, which makes it difficult to ascertain the choice of treatment option for these fractures. Also, the radiographs presented in some studies did not appear to match the definition of this fracture.

Also, Dynamic Hip Screw fixation is currently considered as a standard treatment for pre-trochanteric fractures. However, due to the long-term hospitalization and other complications, researchers have proposed Cephalomedullary nailing as the alternative surgical treatment.

The present study aims to compare and examine the consequences and functional outcome of using DHS vs PFN in Basicervical femur fracture and to reach a conclusion regarding the usefulness of these implants.

Therefore, the purpose of this study is to assess previous studies that used surgical treatment of basicervical femoral fractures to review the definition of a basicervical fracture, the type of treatment implants and clinical results of Dynamic Hip Screw and Proximal Femoral Nail.

Methodology

Source of Data

Data for the study will be collected from the inpatients and out-patients in A J Institute of Medical Sciences and Research Centre, Mangalore.

Method of the Collection of the Data:

Study Design: Hospital based Comparative Observational study. Study period: 18 months, October 2019 to April 2021

Place of study: A.J Institute of medical sciences, Mangalore.

Sample size: Based on study conducted by author Anmol Sharma, AnishaSethi and Shardaindu Sharma assuming difference in the functional outcome by 40%, with 95% confidence interval, 80% power, sample estimated is 12 in each group further considering 10% nonresponse rate, the total sample size to be considered for the study is 28 individual to meet the inclusion criteria.

$$N = [Z(1-\alpha/2) + Z(1-\beta)]2\ [p1q1 + p2q2\ (P1 - P2)2$$

Sampling method: Simple Random Sampling will be used to select the cases for the study.

Data collection:

Patients with Basicervical femur fracture, operated at AJIMS&RC using DHS or PFN will be evaluated during hospital stay, and the functional results will be assessed.

The cases presented with pain and swelling in hip and inability to move and walk. All the patients will be evaluated with X-ray of Pelvis with both hips AP view and X-ray Femur AP and lateral views along with CT scan (in selected patients).

Necessary radiological investigations and haematological investigations will be done on admission.

Type of surgery and details will be noted. The post-operative functional assessment will be done with the help of Harris Hip Score. All the cases will be evaluated again clinically at 4 weeks and12weeks.

Harris Hip Score (HHS)

Patient Name: _____

Date: _____

Affected Hip: R L (Circle One)

Pain

☐ None or ignores it	+44
☐ Slight, occasional, no compromise in activities	+40
☐ Mild pain, no effect on average activities, rarely moderate pain with unusual activity; may take aspirin	+30
☐ Moderate pain, tolerable but makes concession to pain. Some limitation of ordinary activity or work. May Require occasional pain medication stronger than aspirin	+20
☐ Marked pain, serious limitation of activities	+10
☐ Totally disabled, crippled, pain in bed, bedridden	+0

Sitting

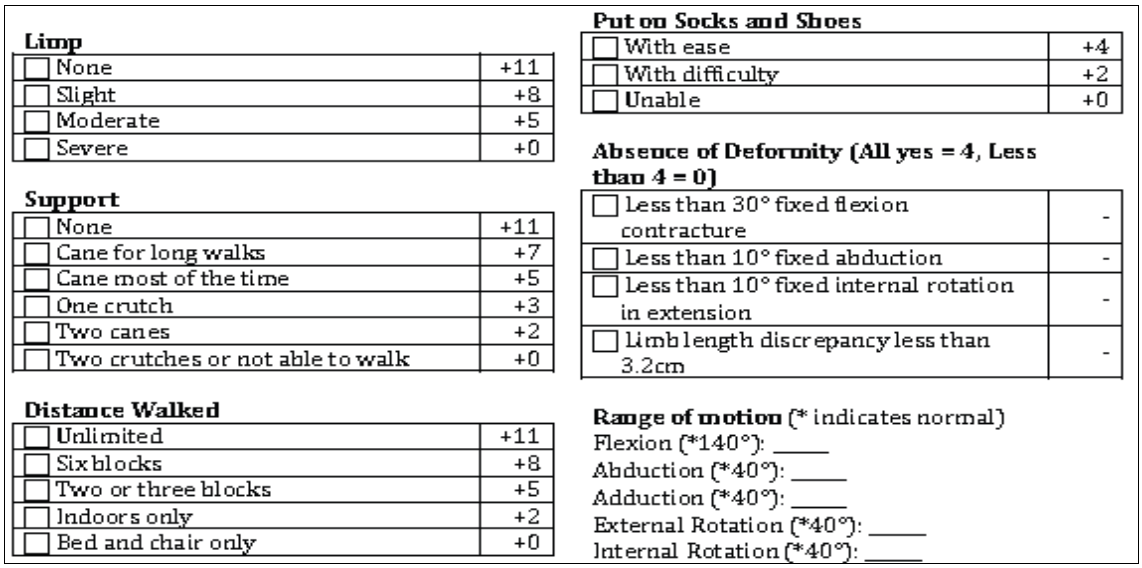
☐ Comfortably in ordinary chair for one hour	+5
☐ On a high chair for 30 minutes	+3
☐ Unable to sit comfortably in any chair	+0

Enter public transportation

☐ Yes	+1
☐ No	+0

Stairs

☐ Normally without using a railing	+4
☐ Normally using a railing	+2
☐ In any manner	+1
☐ Unable to do stairs	+0



Limp

None	+11
Slight	+8
Moderate	+5
Severe	+0

Support

None	+11
Cane for long walks	+7
Cane most of the time	+5
One crutch	+3
Two canes	+2
Two crutches or not able to walk	+0

Distance Walked

Unlimited	+11
Six blocks	+8
Two or three blocks	+5
Indoors only	+2
Bed and chair only	+0

Put on Socks and Shoes

With ease	+4
With difficulty	+2
Unable	+0

Absence of Deformity (All yes = 4, Less than 4 = 0)

Less than 30° fixed flexion contracture	-
Less than 10° fixed abduction	-
Less than 10° fixed internal rotation in extension	-
Limb length discrepancy less than 3.2cm	-

Range of motion (* indicates normal)
Flexion (*140°): _____
Abduction (*40°): _____
Adduction (*40°): _____
External Rotation (*40°): _____
Internal Rotation (*40°): _____

Fig 1: Harris hip score

Inclusion criteria

1. A total of 28 patients who are in-patients of AJ Institute of Medical Sciences and Hospital & Research Centre, Mangalore.
2. Informed written consent to participate in the study.
3. Patients confirmed to have basicervical femur fracture.

Exclusion criteria

1. Patients who do not wish to provide consent for the participation in the study.
2. Patient with other types of femur neck fracture or inter-trochanteric fractures.

Statistical analysis

Statistical analysis of the data was done by using the software SPSS23.0. Descriptive statistics were calculated and summarized. Which includes frequency, percentage, Mean, standard deviation. Inferential statistics had been carried out in the present study. Pre post comparison was done by paired t test and between groups comparison was done by unpaired t test. Chi-square test was used to find association. Level of significance was set at 5%.

Results

The present study was a Hospital based Comparative Observational study conducted in the department of orthopedics of a tertiary care hospital after obtaining permission from institutional ethics committee and department of orthopedics. In this study 28 patients with Basicervical femur fractures treated with DHS or PFN were evaluated to determine their functional outcome.
Group A-DHS group
Group B-PFN group

Table 1: Showing Gender distribution of samples

	GROUP		Total
	Group A	Group B	
Female	5	9	14
	35.7%	64.3%	50.0%
Male	9	5	14
	64.3%	35.7%	50.0%
Total	14	14	28
	100.0%	100.0%	100.0%

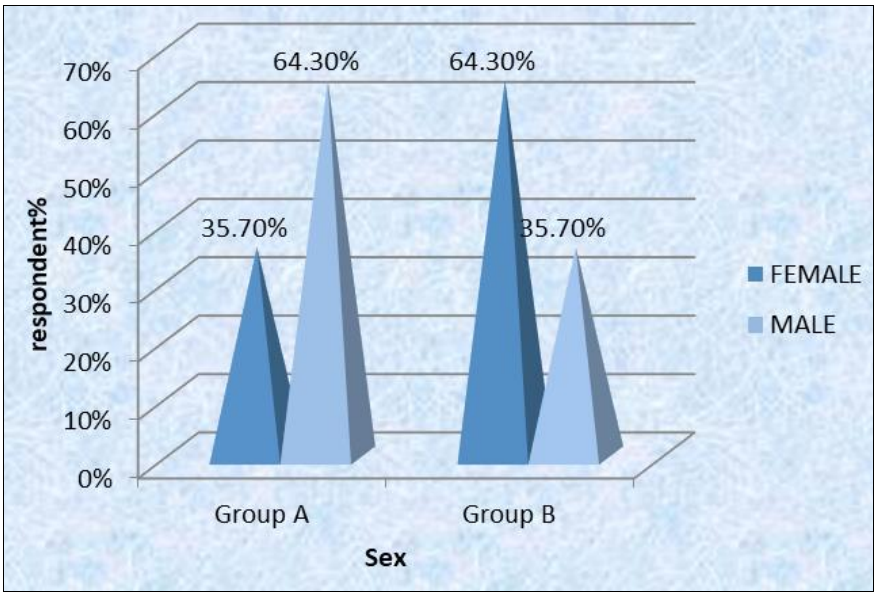


Fig 2: Showing Gender distribution of samples

The table depicts, in group A there were 5(35.7%) females and 9(64.3%) males; in group B there were 9(64.3%) females and 5(35.7%) males.

Table 2: Showing Mechanism of injury of the samples

	GROUP		Total
	Group A	Group B	
RTA	5	4	9
	35.7%	28.6%	32.1%
TF	9	10	19
	64.3%	71.4%	67.9%
Total	14	14	28
	100.0%	100.0%	100.0%

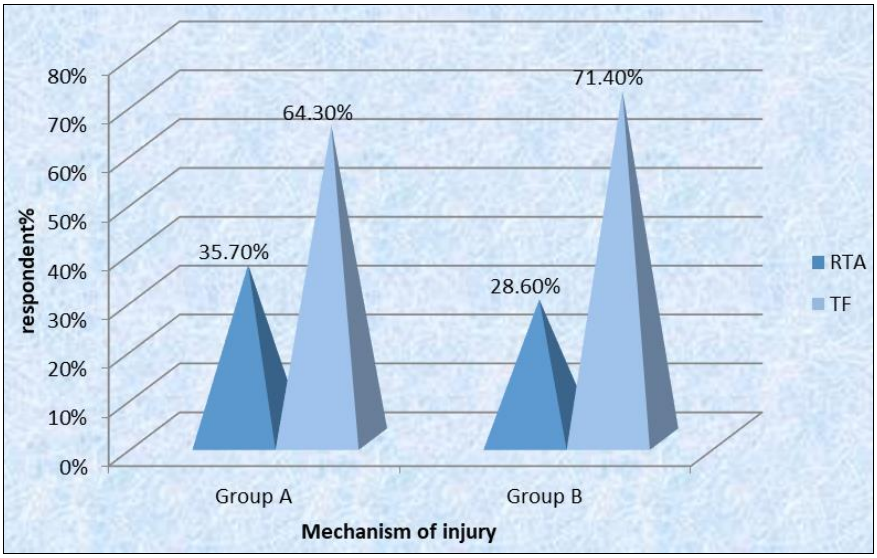


Fig 3: Showing Mechanism of injury of the samples

Out of 28 samples in total in mechanism of injury, 5(35.7%) were RTA and 9(64.3%) were TF in group A; 4(28.6%) were RTA and 10(71.4%) were TF in group B.

Table 3: Showing Side of samples

	GROUP		Total
	Group A	Group B	
LEFT	7	7	14
	50.0%	50.0%	50.0%
RIGHT	7	7	14
	50.0%	50.0%	50.0%
Total	14	14	28
	100.0%	100.0%	100.0%

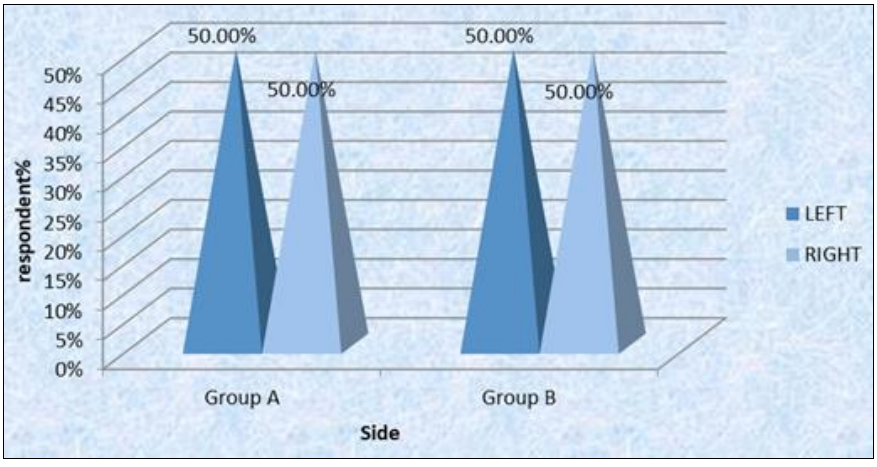


Fig 4: Showing Side of samples

The study on side shows, of 14 patients in group A 7(50%) were with left side fractured and 7(50%) were right side; of 14 patients in group B 7(50%) were left side fractures and 7(50%) were right.

Table 4: Showing Associated disease/ injury of samples

	Group		Total
	Group A	Group B	
NO	6	6	12
	42.9%	42.9%	42.9%
COPD	1	1	2
	7.1%	7.1%	7.1%
DM	2	2	4
	14.3%	14.3%	14.3%
DM, HTN	1	2	3
	7.1%	14.3%	10.7%
DM, HTN, COPD	1	0	1
	7.1%	0.0%	3.6%
HTN	2	2	4
	14.3%	14.3%	14.3%
HTN, ASTHMA	0	1	1
	0.0%	7.1%	3.6%
HTN, COPD	1	0	1
	7.1%	0.0%	3.6%
Total	14	14	28
	100.0%	100.0%	100.0%

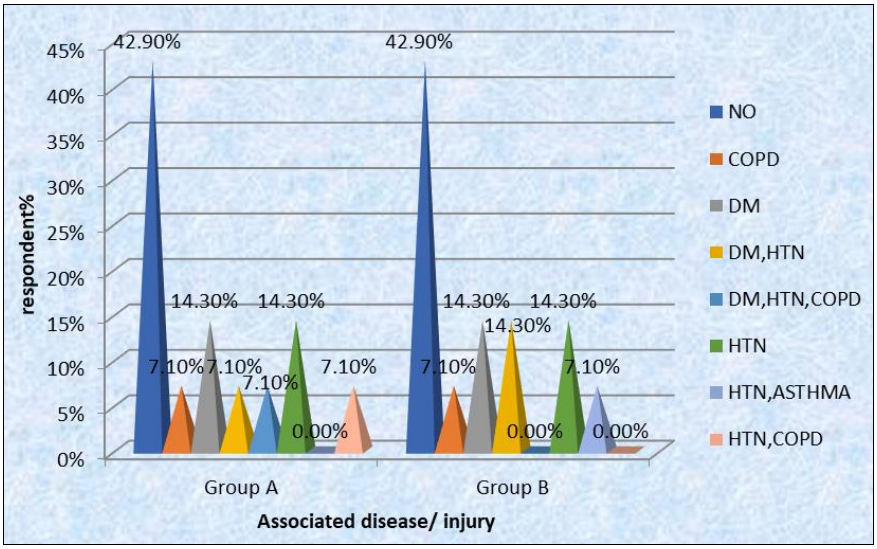


Fig 5: Showing Associated disease/ injury of samples

The history of associated disease/ injury, in group A 6(42.9%) had no associated disease/ injury, 1(7.1%) had COPD, 2(14.3%) had DM, 1(7.1%) had DM, HTN, 1(7.1%) had DM, HTN, COPD, 2(14.3%) had HTN, 0(0%) had HTN, ASTHAMA, 1(7.1%) had HTN, COPD; in group B 6(42.9%) had no disease/ injury, 1(7.1%) had COPD, 2(14.3%) had DM, 2(14.3%) had DM, HTN, 0(0%) had DM, HTN, COPD, 2(14.3%) had HTN, 1(7.1%) had HTN, ASTHAMA, 0(0%) had HTN, COPD

Table 5: Showing Singh index of samples

	Group		Total
	Group A	Group B	
4	4	8	12
	28.6%	57.1%	42.9%
5	5	4	9
	35.7%	28.6%	32.1%
6	5	2	7
	35.7%	14.3%	25.0%
Total	14	14	28
	100.0%	100.0%	100.0%

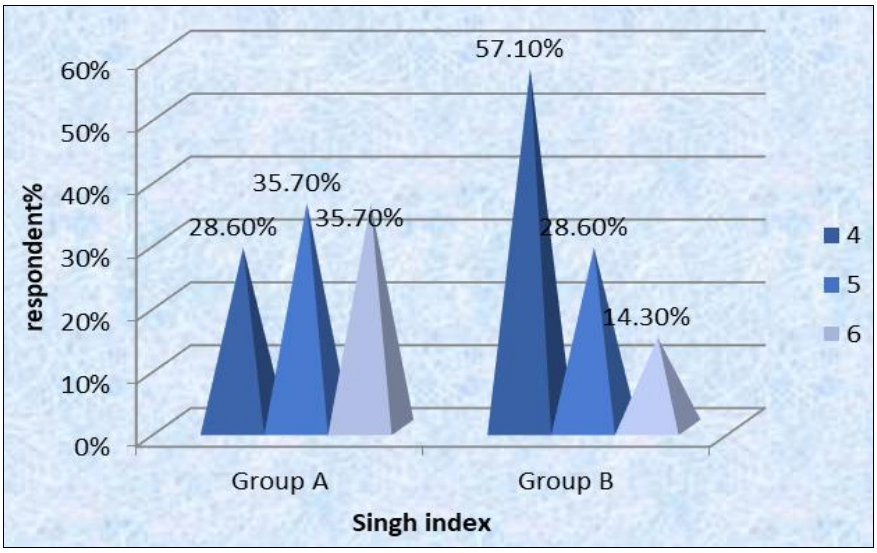


Fig 5: Showing Singh index of samples

On the basis of Singh index, among 14 samples in group A, 4(28.6%) had Singh index 4, 5(35.7%) had Singh index 5 and 5(35.7%) had Singh index 6; among 14 samples in group B 8(57.1%) had Singh index 4, 4(28.6%) had Singh index 5 and 2(14.3%) had Singh index 6. It can be seen that majority in group A had Singh index 5 or more and in group B had less than 5.

Table 6: Showing Procedure of samples

	GROUP		Total
	Group A	Group B	
Left DHS	7	0	7
	50.0%	0.0%	25.0%
Left PFN	0	7	7
	0.0%	50.0%	25.0%
Right DHS	6	0	6
	42.9%	0.0%	21.4%
Right DHS with CC screw	1	0	1
	7.1%	0.0%	3.6%
Right PFN	0	7	7
	0.0%	50.0%	25.0%
Total	14	14	28
	100.0%	100.0%	100.0%

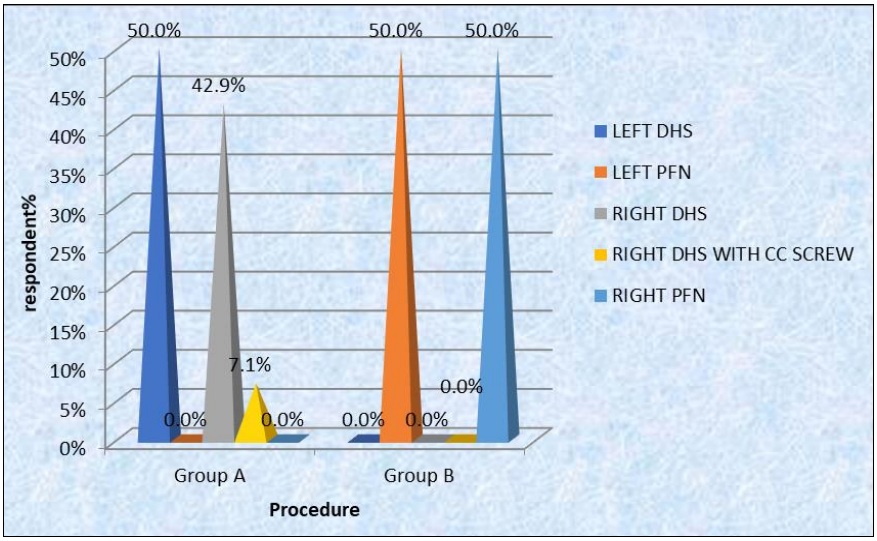


Fig 6: Showing Procedure of samples

In the study of procedure, 7(50%) were of LEFT DHS, 0(0%) were of LEFT PFN, 6(42.9%) were of RIGHT DHS, 1(7.1%) were of RIGHT DHS WITH CC and 0(0%) were of RIGHT PFN in group A; while 0(0%) were of LEFT DHS, 7(50%) were of LEFT PFN, 0(0%) were of RIGHT DHS, 0(0%) were of RIGHT DHS WITH CC and 7(50%) were of RIGHT PFN in group B.

Table 7: Showing Infection of samples

	Group		Total
	Group A	**Group B**	
No	12	13	25
	85.7%	92.9%	89.3%
Deep infection.	1	0	1
	7.1%	0.0%	3.6%
Superfecial infection	1	1	2
	7.1%	7.1%	7.1%
Total	14	14	28
	100.0%	100.0%	100.0%

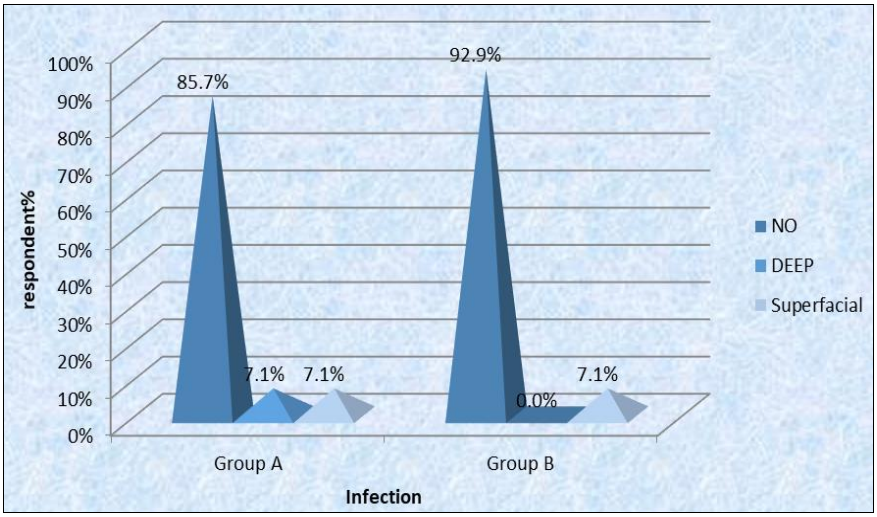


Fig 7: Showing Infection of samples

It is seen that in infection among 28 samples, of 14 samples in group A, 12(85.7%) had no infection 1 (7.1%) had deep infection and 1(7.1%) had superficial infection; of 14 samples in group B, 13 (92.9%) had no infection, 0% had deep infection and 1(7.1%) had superficial infection.

Table 8: Showing Day of discharge of samples

	Group		Total
	Group A	**Group B**	
10	0	7	7
	0.0%	50.0%	25.0%
11	0	2	2
	0.0%	14.3%	7.1%
12	10	2	12
	71.4%	14.3%	42.9%
14	2	2	4
	14.3%	14.3%	14.3%
16	1	1	2
	7.1%	7.1%	7.1%
20	1	0	1
	7.1%	0.0%	3.6%
Total	14	14	28
	100.0%	100.0%	100.0%

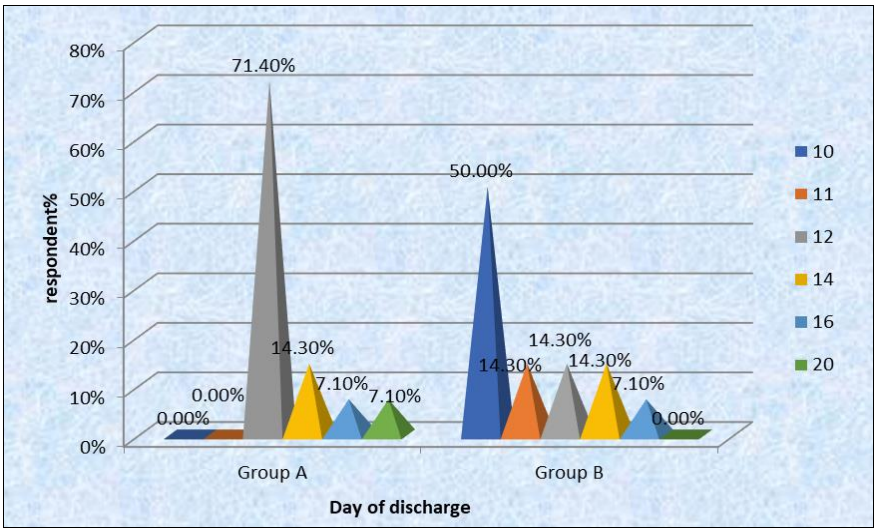


Fig 8: Showing Day of discharge of samples

The study of day of discharge depicts, 0(0%) patients were discharged after 10 days, 0(0%) were discharged after 11 days, 10(71.4%) were discharged after 12 days, 2(14.3%) were discharged after 14 days, 1(7.1%) were discharged after 16 days and 1(7.1%) were discharged after 20 days among samples of group A; whereas 7(50%) patients were discharged after 10 days, 2(14.3%) were discharged after 11 days, 2(14.3%) were discharged after 12 days, 2(14.3%) were discharged after 14 days, 1(7.1%) were discharged after 16 days and 0(0%) were discharged after 20 days among samples of group B.

Table 9: Showing mean and standard deviation of age of samples

Group	N	Mean	Std. Deviation	t value	p value
Group A	14	53.642	12.92349	2.959	0.006
Group B	14	67.285	11.42486		

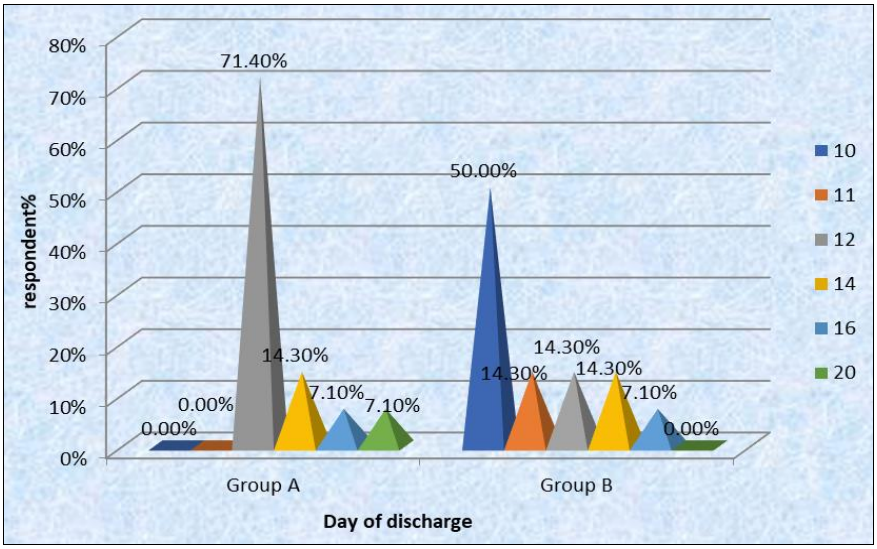


Fig 9: Showing mean of age of the samples

The table shows, average age in group A is 53.642±12.923 years and group B is 67.285±11.424 years. Comparison of age between group A and group B shows, p value < 0.05 which shows there is significant difference between age in group A and group B. Age of group B is significantly higher than group A.

Table 10: Showing comparison of length of incision between group A and group B

Group	N	Mean	Std. Deviation	t value	p value
Group A	14	16.428	1.650	5.810	0.000
Group B	14	12.071	2.269		

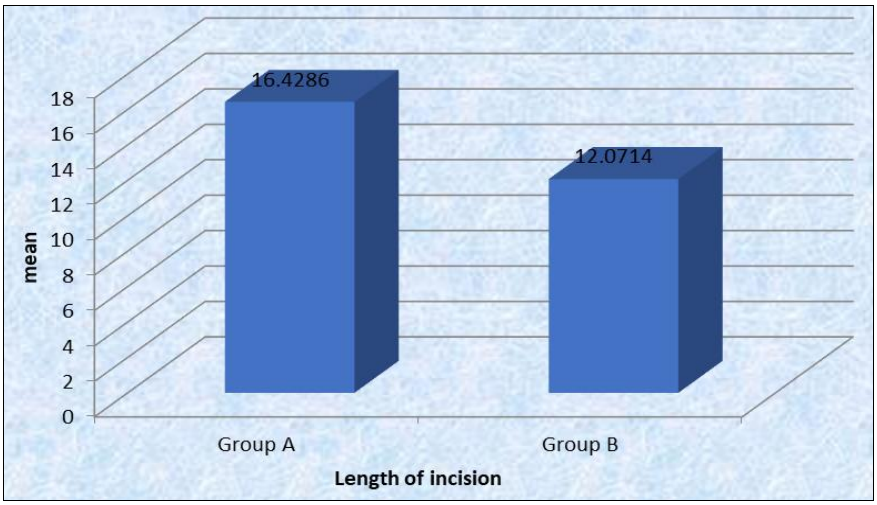


Fig 10: Showing mean of length of incision of the samples

The table shows, average length of incision in group A is 16.428±1.650 cm and group B is 12.071±2.269 cm. Comparison of length of incision between group A and group B shows, p value < 0.05 which shows there is significant difference between length of incision in group A and group B. Length of incision of group A is significantly more than that of group B.

Table 11: Showing comparison of duration of surgery between group A and group B

Group	N	Mean	Std. Deviation	.t value	P value
Group A	14	101.4286	5.61200	10.965	P<0.05
Group B	14	73.6429	7.64206		

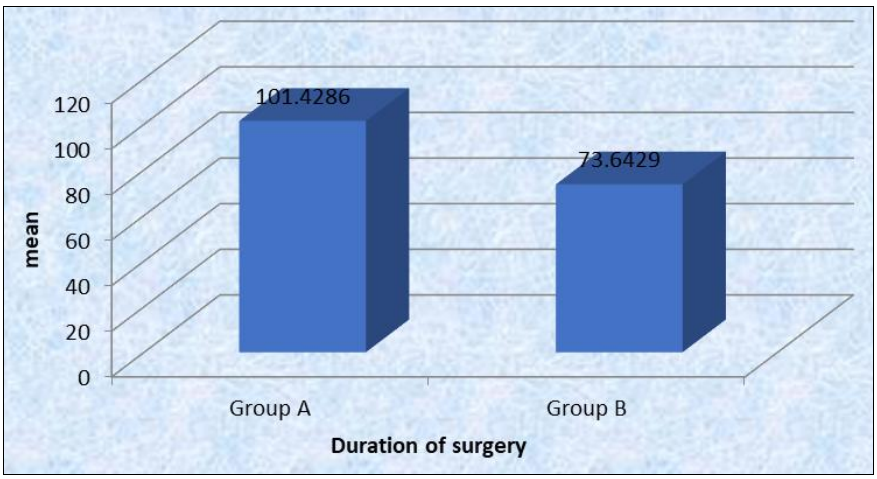


Fig 11: Showing mean of duration of surgery of the samples

The table shows, average duration of surgery in group A is 101.428±5.612 minutes and group B is 73.642±7.642 minutes. Comparison of duration of surgery between group A and group B gives p value < 0.05 which shows there is significant difference between duration of surgery in group A and group B. Duration of surgery of group A is significantly higher than group B.

Table 12: Showing mean and standard deviation of intra operative blood loss of samples

Group	N	Mean	Std. Deviation	.t value	P value
Group A	14	192.714	12.662	8.091	P<0.05
Group B	14	115.642	14.259		

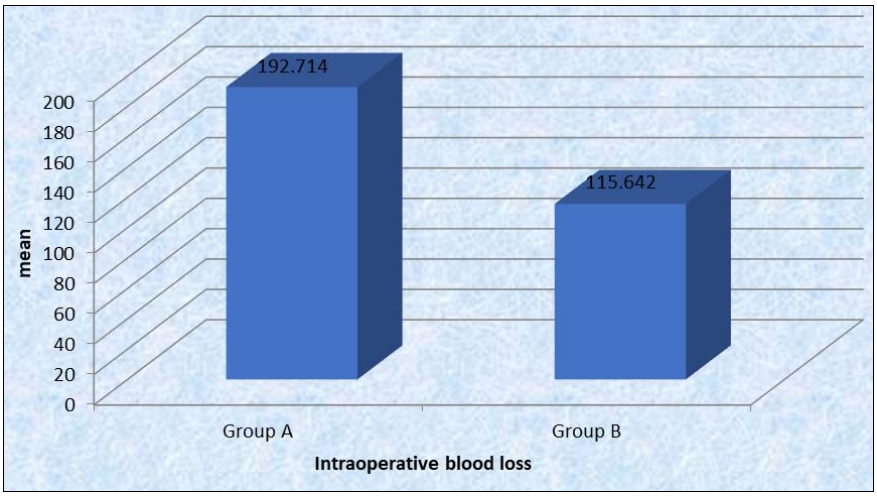


Fig 12: Showing mean of intraoperative loss of blood of the samples

The table shows, average intra operative loss of blood in group A is 192.714±12.662 ml and group B is 115.642±14.259 ml. Comparison of intra operative blood loss between group A and group B gives, p value < 0.05 which shows there is significant difference between intra operative blood loss in group A and group B. Blood loss in group A is significantly more than that of group B

Table 13: showing comparison of HHS in group A and group B

		Mean	SD	t value	P value
HHS4	Group A	53.071	12.639	1.115	P>0.05
	Group B	48.428	9.120		
HHS12	Group A	69.571	9.928	0.188	P>0.05
	Group B	68.928	8.080		

The table shows, average HHS in group A in the fourth week was 53.071±12.639 and in group B 48.428±9.120. The comparison shows p>0.05.Which indicates that there is no significant difference in group A and B. In the Twelfth week group A had HHS 69.571±9.928 and in group B HHS was 68.928±8.080 with p value >0.05. Comparison of group A and group B shows there is no significant difference between them.

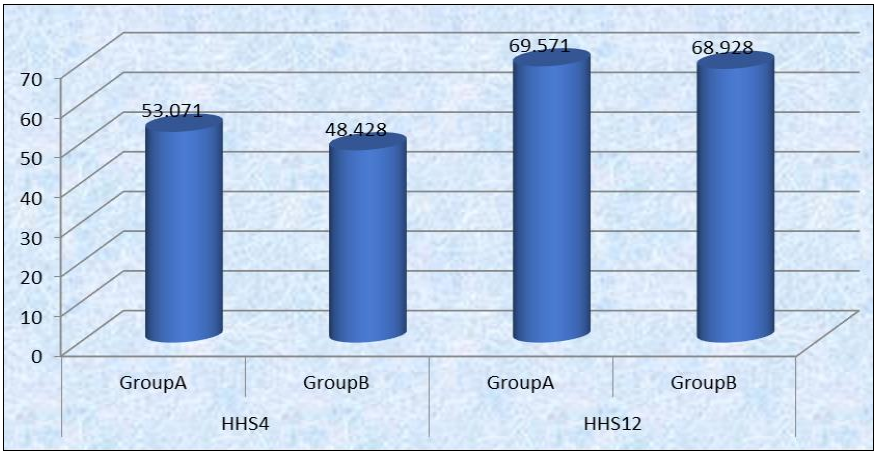


Fig 13: Showing comparison of HHS in group A and group B

Discussion

Basicervical fractures of femur are relatively rare injuries which account for only 1.8-7.6% of hip fractures [18, 46]. Due to their anatomical location, they represent an intermediate form between femoral neck and intertrochanteric fractures. With no clear cut guidelines as to the precise location that marks the basicervical region, many authors consider it to be an extracapsular fracture and others believe it to be an intracapsular fracture [47-49]. Traditionally, most intracapsular femur neck fractures in young adults have been treated with Cancellous Cannulated screws (CCS) whereas intertrochanteric (extracapsular) fractures have been managed well in the past with the Dynamic Hip Screw (DHS). But since the basicervical fractures are an intermediate between them, so a controversy exists whether to use CCS or DHS for stabilization of these fractures. Moreover, these fractures have long been considered to be inherently unstable which makes the ideal choice of implant for their fixation more difficult [6, 16, 17, 19, 50]. The recent surge in use of intramedullary devices for fixation of proximal femoral fractures has led some authors to investigate the use of cephalomedullary nails like the Proximal Femoral Nail (PFN) also in basicervical fractures [4, 14, 15]. There have been only a few published reports focusing on the result of surgical management of basicervical fractures in young adults as a separate entity. The mechanism of injury in young patients is usually high energy

trauma as compared to low energy in older patients. Moreover, poor bone stock in older patients makes the management and outcome of basicervical fractures in their age group a completely different scenario. The present study attempts to fill the void in the literature and help to arrive at a conclusion regarding the usefulness of these implants in these fractures. In the present study, the incidence of basicervical fractures is having equal sexual distribution and DHS group having mean age of 53.642±12.923 years and PFN group having mean age of 67.285±11.424 years. Age of PFN group is significantly higher than DHS group with common mode of injury being trivial fall. This was contrast to the findings of Sharma A, *et al*. [42] and Hu *et al*. [15] where patients were of young age with mode of injury being road traffic accidents. Our study is similar to most of the other studies as they have included basicervical fractures in the elderly in their studies for which treatment modality and epidemiology pattern is different from adult basicervical fractures. In present study patients treated with DHS, the duration of surgery was more than those treated with PFN, the size of incision was larger and dissection was more with loss of blood more than the latter, these findings are in concordance with the study by Sharma *et al*. [42]. None of the complications such as varus collapse, screw backout, superior screw cut out were noted in either of the DHS and PFN groups. These findings were in concordance with the findings of Imren *et al*. [43]. Blair *et al*. [13] and Deneka *et al*. [51], who concluded that fixation strength was higher in DHS and PFN as compared to CCS. 1 case of Superficial infection is noted in each group probably due to elevated sugar level. One patient had deep infection in DHS group and was probably due to elevated sugar level with longer incision. Both superficial infections resolved with daily dressings and oral antibiotics in 7 days. Patient with deep infection was managed with wound debridement and intravenous antibiotics. Mean HHS at 4 weeks in DHS group is 53.071±12.639 and in PFN group is 48.428±9.120 which is statistically insignificant. Mean HHS at 12 weeks follow up in DHS group is 69.571±9.928 and in PFN group is 68.928±8.080 which is statistically not significant showing that the outcome is similar in these two implants.

A probable limitation of our study was the small sample size of the study. A higher number of cases in each group is required for effective comparison and analysis of results.

Conclusion

Basicervical fractures appear to behave as an unstable extra-capsular fracture rather than an intracapsular fracture neck femur. There was a significant difference noted in the size of incision, duration of surgery and intraoperative blood loss, all of which were more in DHS group. Both implants had similar functional outcomes at 4 and 12 weeks. However, it is difficult to draw generalizable conclusions from such a small sample size. A larger patient population is probably needed to identify the optimal treatment method for these fractures.

Summary

This study is conducted in AJIMS from October 2019 to April 2021.During this period a total of 28 patients confirmed to have basicervical femur fracture were admitted. Patients with Basicervical femur fracture, operated at AJ hospital using DHS or PFN were evaluated during hospital stay, and the functional results were assessed. The cases presented with pain and swelling in hip and inability to move and walk. All the patients were evaluated with X-ray of Pelvis with both hips AP view and X-ray Femur AP and lateral views along with CT scan (in selected patients). Necessary radiological investigations and haematological investigations were done on admission. Type of surgery and details was noted. The post-operative functional assessment was done with the help of Harris Hip Score. All the cases were evaluated again clinically at 4 weeks and 12 weeks.

In our study, the incidence of basicervical fractures is having equal sexual distribution and DHS group having mean age of 53.642±12.923 years and PFN group having mean age of 67.285±11.424 years. Age of PFN group is significantly higher than DHS group with common mode of injury being trivial fall. In the study patients treated with DHS, the duration of surgery was more than those treated with PFN, the size of incision was larger and dissection was more with loss of blood more than the latter. None of the complications such as varus collapse, screw backout, superior screw cut out were noted in either of the DHS and PFN groups.

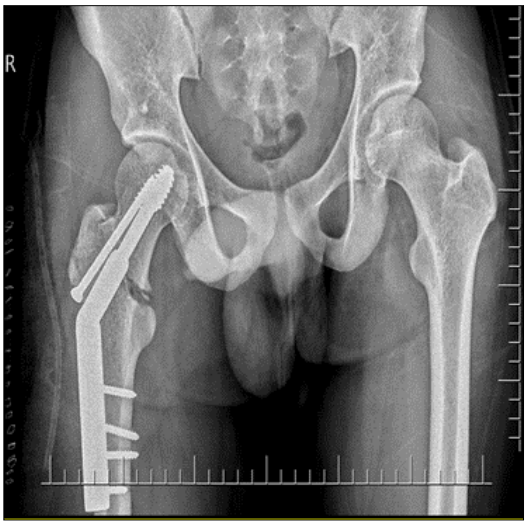
Mean HHS at 4 weeks in DHS group is 53.071±12.639 and in PFN group is 48.428±9.120 which is statistically insignificant. Mean HHS at 12 weeks follow up in DHS group is 69.571±9.928 and in PFN group is 68.928±8.080 which is statistically not significant showing that the outcome is similar in these two implants.

Hence we concluded that there was a significant difference noted in the size of incision, duration of surgery and intraoperative blood loss, all of which were more in DHS group. Both implants had similar functional outcomes at 4 and 12 weeks. However, it is difficult to draw generalizable conclusions from such a small sample size.

Annexure IV

Case - Basicervical femur fracture with DHS

Pre Op

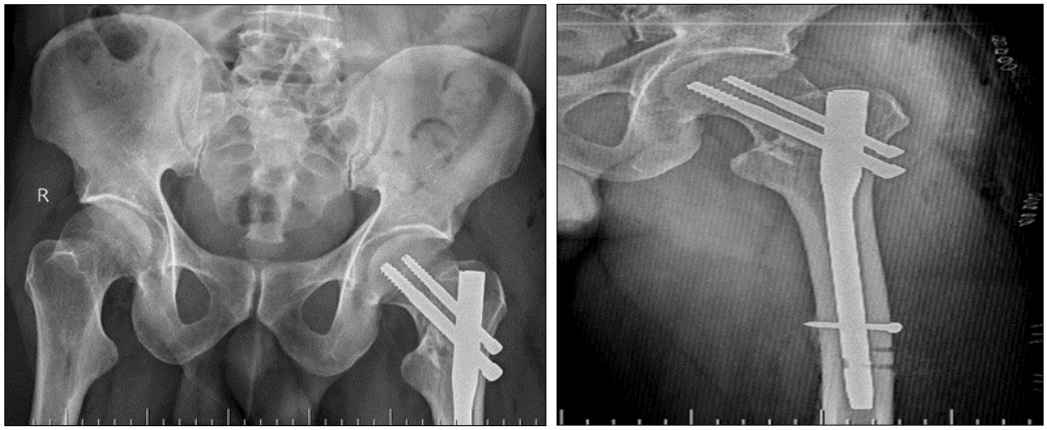


Post Op- 4 Weeks

Post Op-12 Weeks

Case Basicervical femur fracture with PFN

Pre Op



Post Op - 4 Weeks

Post Op - 12 Weeks

Conflict of Interest
Not available

Financial Support
Not available

Reference

1. Johnell O, Kanis JA. An estimate of the worldwide prevalence, mortality and disability associated with hip fracture. Osteoporos Int. 2004;15:897-902.
2. Papadimitriou N, Tsilidis KK, Orfanos P, *et al.* Burden of

hip fracture using disability-adjusted life-years: a pooled analysis of prospective cohorts in the CHANCES consortium. Lancet Public Health. 2017;2(5):e239-e246.
3. Guo J, Dong W, Jin L, *et al.* Treatment of basicervical femoral neck fractures with proximal femoral nail antirotation. J IntMed Res. 2019;47(9):4333-4343.
4. Watson ST, Schaller TM, Tanner SL, *et al*. Outcomes of low energy basicervical proximal femoral fractures treated with cephalomedullary fixation. J Bone Joint Surg Am. 2016;98(13):1097-1102.
5. Su EP, Su SL. Treatment options for displaced femoral neck fractures in the <60-year-old, active patient. Semin Arthroplasty. 2016;27:55-59
6. Su BW, Heyworth BE, Protopsaltis TS, *et al.* Basicervical versus intertrochanteric fractures: an analysis of radiographic and functional outcomes. Orthopedics. 2006;29(10):919-925.
7. Wang Q, Gu X-H, Li X, *et al.* Management of low-energy basicervical proximal femoral fractures by proximal femoral nail anti-rotation. Orthop Surg. 2019;11(6):1173-1179.
8. Chapman T, Zmistowski B, Krieg J, *et al.* Helical blade versus screw fixation in the treatment of hip fractures with cephalomedullary devices: incidence of failure and atypical 'medial cutout'. J Orthop Trauma 2018;32(8):397-402.
9. Ciufo DJ, Zaruta DA, Lipof JS, *et al.* Risk factors associated with cephalomedullary nail cutout in the treatment of trochanteric hip fractures. J Orthop Trauma. 2017;31(11):583-588.
10. Singh M, Nagrath AR, Maini PS. Changes in trabecular pattern of the upper end of femur as an index of osteoporosis. J Bone Joint Surg. 1970;52A(3):457-67.
11. Gitajn I, Rodriguez E. Biomechanics of Musculoskeletal Injury. Biomechanics in Applications; c2011. p. 3-27.
12. Parkkari J, Kannus P, Palvanen M, Natri A, Vainio J, Aho H, *et al.* Majority of hip fractures occur as a result of a fall and impact on the greater trochanter of the femur: a prospective controlled hip fracture study with 206 consecutive patients. Calcified Tissue International. 1999;65:183-187.
13. Blair B, Koval KJ, Kummer F, *et al.* Basicervical fractures of the proximal femur. A biomechanical study of 3 internal fixation techniques. Clin Orthop Relat Res. 1994;306:256-263.
14. Tasyıkan L, Ugutmen E, Sanel S, *et al.* Short-term results of surgical treatment with cephalomedullary nails for basicervical proximal femoral fractures. Acta Orthop Belg; c2015. p. 81.
15. Hu SJ, Yu GR, Zhang SM. Surgical treatment of basicervical intertrochanteric fractures of the proximal femur with cephalomeduallary hip nails. Orthop Surg. 2013;5(2):124-129.
16. Massoud EI. Fixation of basicervical and related fractures. Int Orthop. 2010;34(4):577-582.
17. Chen CY, Chiu FY, Chen CM, Huang CK, Chen WM, Chen TH. Surgical treatment of basicervical fractures of femur--a prospective evaluation of 269 patients. J Trauma. 2008;64(2):427-429.
18. Saarenpää I, Partanen J, Jalovaara P. Basicervical fracture--a rare type of hip fracture. Arch Orthop Trauma Surg. 2002;122:69-72.
19. Kuokkanen HO. Treatment options for basicervical fractures of the femoral neck. A clinical follow-up. Acta Orthop Belg. 1991;57(2):162-168.
20. Davis TR, Sher JL, Horsman A, Simpson M, Porter BB, Checketts RG. Intertrochanteric femoral fractures. Mechanical failure after internal fixation. J Bone Joint Surg Br. 1990;72(1):26-31.
21. Kweon SH, Lee SH, Kook SH, Choi YC. Outcomes of cephalomedullary nailing in basicervical fracture. Hip Pelvis. 2017;29(4):270-276.
22. Lee YK, Yoon BH, Hwang JS, Cha YH, Kim KC, Koo KH. Risk factors of fixation failure in basicervical femoral neck fracture: which device is optimal for fixation? Injury. 2018;49(3):691-696.
23. Guo J, Dong W, Jin L, *et al.* Treatment of basicervical femoral neck fractures with proximal femoral nail antirotation. J Int Med. Res. 2019;47(9):4333-4343.
24. Wang Q, Gu XH, Li X, *et al.* Management of low-energy basicervical proximal femoral fractures by proximal femoral nail anti-rotation. Orthop Surg. 2019;11(6):1173-1179.
25. Kim JT, Ha YC, Park CH, Yoo JI, Kim TY. Single screw type of lag screw results higher reoperation rate in the osteosynthesis of basicervical hip fracture. J Orthop Sci. 2020;25(1):152-155.
26. Yoo J, Kim S, Choi J, Hwang J. Gamma 3 U-Blade lag screws in patients with trochanteric femur fractures: are rotation control lag screws better than others? J Orthop Surg Res. 2019;14(1):440.
27. Koval KJ, Cantu RV. Intertrochanteric fractures. In: Rockwood CA, Bucholz RW, Heckman JD, Court-Brown CM, Koval KJ, Tornetta P, *et al*., Editors. Rockwood and green's fractures in adults. Philadelphia, PA: Lippincott Williams & Wilkins; c2006. p. 1793-825.
28. Bergman GD, Winquist RA, Mayo KA, Hansen ST Jr. Subtrochanteric fracture of the femur. Fixation using the Zickel nail. J Bone Joint Surg Am. 1987;69(7):1032-40.
29. Loch DA, Kyle RF, Bechtold JE, Kane M, Anderson K, Sherman RE. Forces required to initiate sliding in second-generation intramedullary nails. JBJS. 1998 Nov 1;80(11):1626-31.
30. Kyle RF, Wright TM, Burstein AH. Biomechanical analysis of the sliding characteristics of compression hip screw. J Bone Joint Surg Am. 1980;62(8):1308-1314.
31. Gundle R, Gargan MF, Simpson AHRW. How to minimize failures of fixation of unstable intertrochantêric fractures. Injury. 1995;26(9):611-614.
32. Spivak JM, Zuckennan JD, Kumme FJ. Fatigue failure of sliding hip screw in hip fractures a report of three cases. J Orthop Trauma. 1991;5(3):325-31.
33. Ely L Steinberg, Nehemia Blumberg, Shmuel Dekel. The fixation of proximal femur nailing system: biomechanical properties of the nail and a cadaveric study.of Biomechanics. 2005;38(1):63-68.
34. Muller ME, Allgower M, SchneiderR, Willenegger H. Manual of internal fixation techniques recommended by the AO/ASIF group. 3 ed. Berlin: Springer-Verlag; c1991.
35. Baumgaertner MR, Curtin SL, Lindskog DM, Keggi J. The value of the tip-apex distance in predicting failure of fixation of peritrochanteric fractures of the hip. J Bone Joint Surg Am. 1995;77:1058-64,
36. Rosenblum SF, Zuckerman JD, Kummer FJ, Tam bs. A biomechanical evaluation of the gamma nail. J Bone Joint Surg Br. 1992;74:352-57.
37. Kulambi VS, Satish AS, Rangaraja P. Surgical management of basicervical fracture neck of femur with dynamic hip screw and derotation screw: A prospective

study. Int J Res Orthop. 2019;5:712-717.
38. Mohan Lal Nitharwal, Sudhir Kumar, Raj Kumar Harshwal, MP Jain, AK Mehra. A Prospective comparative study of outcome of surgical management of basicervical fractures of femur with dynamic hip screw (DHS) with derotation screw and multiple cannulated cancellous (CC) screw. International Journal of Contemporary Medical Research. 2016;3(7):2119-2122.
39. Borgohain M, Rajan AD, Gogoi A, *et al*. Multiple cannulated cancellous screws and dynamic hip screw with derotation screw for fixation of basicervical femoral neck fracture in young adults- a prospective comparative study. J. Evid. Based Med. Healthc. 2020;7(6):292-296. DOI: 10.18410/jebmh/2020/62
40. Mousapour A, Mardanpour K, Hojabrian A, Saeb M, Khabiri SS, Safari- Faramani R, *et al*. A Comparison of Bipolar Hemiarthroplasty versus Dynamic Hip Screw Fixation of Basicervical Femoral Neck Fractures. J Orthop Spine Trauma. 2019;5(1):25-8.
41. Kang L, Liu H, Ding Z, Ding Y, Hu W, Wu J. Ipsilateral proximal and shaft femoral fractures treated with bridge-link type combined fixation system. Journal of Orthopaedic Surgery and Research. 2020 Dec;15(1):1-10.
42. Sharma A, *et al*. Comparative analysis of treatment of basicervical femur fractures in young adults with CCS, DHS, and PFN. Rev Bras Ortop; c2018. https://doi.org/10.1016/j.rboe.2017.08.022
43. Imren Y, Gurkan V, Bilsel K, Desteli E, Tuna M, Gurcan C, *et al*. Biomechanical comparison of dynamic hip screw, proximal 5femoral nail, cannulated screw and monoaxial externalfixation in the treatment of basicervical femoral neckfractures. Acta Chir Orthop Traumatol Cech. 2015;82(2):140-144.
44. PFN: A definite advantage over the DHS: A comparative meta-Analysis by Dr. Vivian Roshan D' Almeida. DOI: http://dx.doi.org/10.22271/ortho.2017.v3.i3b.18
45. Parker MJ. Sliding hip screw versus intramedullary nail for trochanteric hip fractures; a randomised trial of 1000 patients with presentation of results related to fracture stability. Injury. 2017;48(12):2762-2767. https://doi.org/10.1016/j.injur y.2017.10.029
46. Lee JC. Fractures and dislocations of the hip. In: Rockwood CA, Green DP, editors. Fractures in adults. Philadelphia: JB Lippincott; c1991. p. 1491.3.
47. Russel TA. Fractures of hip and pelvis. In: Crenshaw AH, editor. Campbell's operative orthopaedics. St. Louis: Mosby; c1992. p. 895-987.
48. Stambough JL. Extracapsular hip fractures: classification schemes. In: Balderston RA, Rothman RH, Booth RE, Hozack WJ, editors. The hip. Philadelphia: Lea & Febiger; c1992. p. 229-30.
49. Wilson JN. Injuries of the hip. In: Watson-Jones JN, editor. Fractures and joint injuries. Edinburgh: Churchill Livingstone. 1982;935:957-958.
50. Levy RN, Siegel M, Sedlin ED, Siffert RS. Complications of Ender-pin fixation in basicervical, intertrochanteric, and subtrochanteric fractures of the hip. J Bone Joint Surg Am. 1983;65(1):66-69.
51. Deneka DA, Simonian PT, Stankewich CJ, Eckert D, ChapmanJR, Tencer AF. Biomechanical comparison of internal fixation techniques for the treatment of unstable basicervical femoral neck fractures. J Orthop Trauma. 1997;11(5):337-43.
52. The distribution and anastomoses of arteries supplying the head and neck of the femur S Sevitt, R G Thompson Pmid: 14341080.
53. Avascular necrosis of the femoral head. An anatomical study T j claffey pmid: 14448717. Doi: 10.1302/0301-620x.42b4.802
54. The role of joint architecture in the etiology of arthritis Peter G Bullough 1 Affiliations expand PMID: 14698635. DOI: 10.1016/j.joca.2003.09.010
55. Dorne HL, Lander PH. Spontaneous stress fractures of the femoral neck. AJR Am J Roentgenol. 1985 Feb;144(2):343-7. Doi: 10.2214/ajr.144.2.343. PMID: 3871282.
56. Martin RB, Gibson VA, Stover SM, Gibeling JC, Griffin LV. Residual strength of equine bone is not reduced by intense fatigue loading: implications for stress fracture. J Biomech. 1997 Feb;30(2):109-14. Doi: 10.1016/s0021-9290(96)00113-3. PMID: 9001930.
57. Todd RC, Freeman MA, Pirie CJ. Isolated trabecular fatigue fractures in the femoral head. J Bone Joint Surg Br. 1972 Nov;54(4):723-8. PMID: 4639446.

How to Cite This Article
Ravikumar D, George U, Shetty S. A comparative study of functional outcome between DHS and PFN in Basicervical femur fracture. International Journal of Orthopaedics Sciences. 2023;9(2):01-15.