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Comparative Study on Evaluation of Results of DHS/PFN in Management of Intertrochanteric Fracture of Femur

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ABSTRACT

Introduction: 38–50% of all femur fractures and 5–20% of fractures in their entirety are intertrochanteric fractures. The prevalence of these fractures is 180/10000, making them prevalent in the senior population. While intramedullary devices like PFN are thought to be superior implants for unstable intertrochanteric fractures, dynamic hip screws are still the gold standard for managing intertrochanteric fractures. Their function in treating these fractures remains questionable.

Materials and Methods: The study was conducted on 100 patients with intertrochanteric fracture of femur attending the outpatient and emergency department of National Institute of Traumatology & Orthopedic Rehabilitation (NITOR), Dhaka between May 2019 to April 2020. Following a clinical and radiological evaluation, the patients were split into two groups at random, A and B. Patients in group A received treatment by ORIF using a dynamic hip screw, whereas patients in group B received treatment via closed/open reduction and internal fixation with PFN. The working proforma below contains the following

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information of the patient: personal information, clinical findings, radiological findings, and follow-up findings. The outcomes were assessed and contrasted.

Results: The mean age in both the groups was 58.88 ± 15.76 years, In DHS group, there were 8(16%) females and 42(84%) males. In PFN group, there were 15(30%) females and 35(70%) males. There was a male preponderance in both the groups in comparison to the females. In PFN group, there were 24(48%) patients who injured because of fall, while 26(52%) were injured due to RTA. In PFN group, higher number of fall patients were there, while in DHS group, higher number of RTA patients were there. The comparison of mean blood loss in both the groups showed a statistically significant difference ($P < 0.0001$), with a higher mean blood loss in DHS group in comparison to PFN group. In DHS group, 48(96%) patients had no complications, 2(4%) had DVT and 1(2%) had cut out of screw, 3(6%) had infection. In PFN group, 2(4%) had infection, 48(96%) shows no complication. The difference in mean union time was significant ($P < 0.0001$) with a higher union time in DHS group in comparison to PFN group. DHS group functional outcome assessment by Harris Hip score, there were 22(44%) patients had Excellent and the PFN group functional outcome assessment by Harris Hip score, there were 26(52%) patients had Excellent.

Conclusion: PFN provides stability and aids in biological reduction. Excessive collapse and limb shortening are avoided by PFN. As a result, it aids in obtaining a positive functional outcome overall. PFN is a load-bearing implant that provides stability to the fracture area both proximally and distally. As such, it is a more biomechanically sound implant option for fixing peri-trochanteric femoral fractures. When it comes to bleeding during surgery and the early stages of recovery, PFN is a superior implant option than DHS. Consequently, we support the use of PFN rather than DHS in intertrochanteric fractures, with the exception of fractured trochanteric entry points for the PFN.

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INTRODUCTION

38–50% of all femur fractures and 5–20% of fractures in their entirety are intertrochanteric fractures. Although fractures of this kind can occur at any age, the elderly population is more likely to experience them than younger people (180%/10000). Bangladesh's life expectancy has nearly doubled from 53 years at independence to 66.4 years in 2034, thanks to modern medical advancements and good lifestyle choices. This has contributed to a significant rise in the country's senior population. There are a lot more high-speed vehicles on the road now, which has led to a significant rise in both these fractures and traffic accidents. While intramedullary devices like PFN are seen to be superior implants, dynamic hip screws are still the gold standard for managing intertrochanteric fractures. However, their usefulness in treating unstable intertrochanteric fractures is questionable.

The intramedullary device, or PFN, is a load-sharing tool that offers greater biomechanical strength than DHS, enables early mobilization, is minimally invasive, can

be used in closed procedures without endangering the soft tissue envelope and vascularity, and improves rotational stability even in elderly patients' osteoprosed bones. Dynamic hip screws, on the other hand, are load-sparing devices that require extensive soft tissue stripping, further jeopardizing the periosteum's and bone's vascularity. However, their biomechanical qualities—such as their short liver arm, increased implant strength, additional anti-rotation screw in the femoral neck, and potential for anatomical reduction—as well as their advantages make them the gold standard for the treatment of intertrochanteric fractures.

METHODOLOGY

The study was conducted on 100 patients with intertrochanteric fracture femur attending the outpatient and Orthopaedic Department of National Institute of Traumatology & Orthopaedic Rehabilitation (NITOR), Dhaka, between May 2019 to April 2020. The patients were assessed clinically and radiologically and were divided randomly in two groups A and B, patients of group A were treated by-ORIF with Dynamic hip screw and of group B were treated by closed /open reduction internal fixation with long PFN. Patients' personal information, clinical findings, radiological findings and follow-up findings were recorded in the working proforma as below. The results were evaluated and compared. Inclusion Criteria were all intertrochanteric fractures of <3 weeks old. Exclusion Criteria were open fracture, Pathological fracture, neglected fracture of more than 3 weeks old, associated fractures in same limb and patient not giving consent for any of these modalities of treatment.

Follow up Protocol: Patients were called for follow up every month, on each follow up following aspects were noted Complaints of pain if any. Range of hip and knee movements. Shortening. Whether the patient assumes his/ her occupation to previous injury state. Able to sit cross-legged, squat. Walking ability with or without support.

RESULTS

In our study in DHS group, there were 5(10%) females and 45(90%) males. In PFN group, there were 13(26%) females and 37(74%) males. There was a male preponderance in both the groups in comparison to the females In DHS group, there were 34(68%) patients who injured because of RTA, while 16(32%) were injured due to fall in PFN group, we used long PFN rather than conventional PFN, because conventional PFN has disadvantages of mid-thigh pain and stress fracture. In PFN group, there were 30(60%) patients who injured because of fall, while 20 (40%) were injured due to RTA. In PFN group, higher number of fall patients were there, while in DHS group, higher number of RTA patients were there. The comparison of mean blood loss in both the groups showed a statistically significant difference ($P < 0.0001$), with a higher mean blood loss in DHS group in comparison to PFN group. In DHS group, there were 4 (8%) patients who had blood loss between 50-100 ml, in 6(12%) the blood loss was between 101-200 ml, in 16(32%) patients it was between 201-300 ml, in 16(32%) patients it was between 301-40 ml and in 8(16%) patients it was more than 400 ml. In PFN group, there were 44(88%) patients who had blood loss between 50-100 ml, in 6(12%) the blood loss was between 101-200 ml and none of the patients had a blood loss of more than 200 ml. In DHS group, 46 (92%) patients had no complications, 1(2%) had DVT and 1(2%) had cut out of screw, 2(4%) had infection. In PFN group, 1(2%) had infection, 49(98%) shows no complication. In DHS group, in 2(4%) patient the union time was 2-3 months, in 26(52%) it was 3-4 months and in 22(44%) it was more than 4 months. The mean time for union in DHS group was 4.16 ± 0.47 months. In PFN group, in 26 (52%) patients the union time was 1-2 months, in 22(44%) patient the union time

was 2-3 months and in 2(4%) it was 3-4 months. The mean time for union in PFN group was 2.20 ± 0.50 months. The difference in mean union time was significant (P < 0.0001) with a higher union time in DHS group in comparison to PFN group. In our study in DHS group functional outcome assessment by Harris Hip score, there were 22(44%) patients had Excellent, 14(28%) were good, 4(8%) patients were fair and 10(20%) patients were poor. On the other hand, this study in PFN group functional outcome assessment by Harris Hip score, there were 26(52%) patients had Excellent, 16(32%) were good, 6(12%) patients were fair and 2(4%) patients were poor.

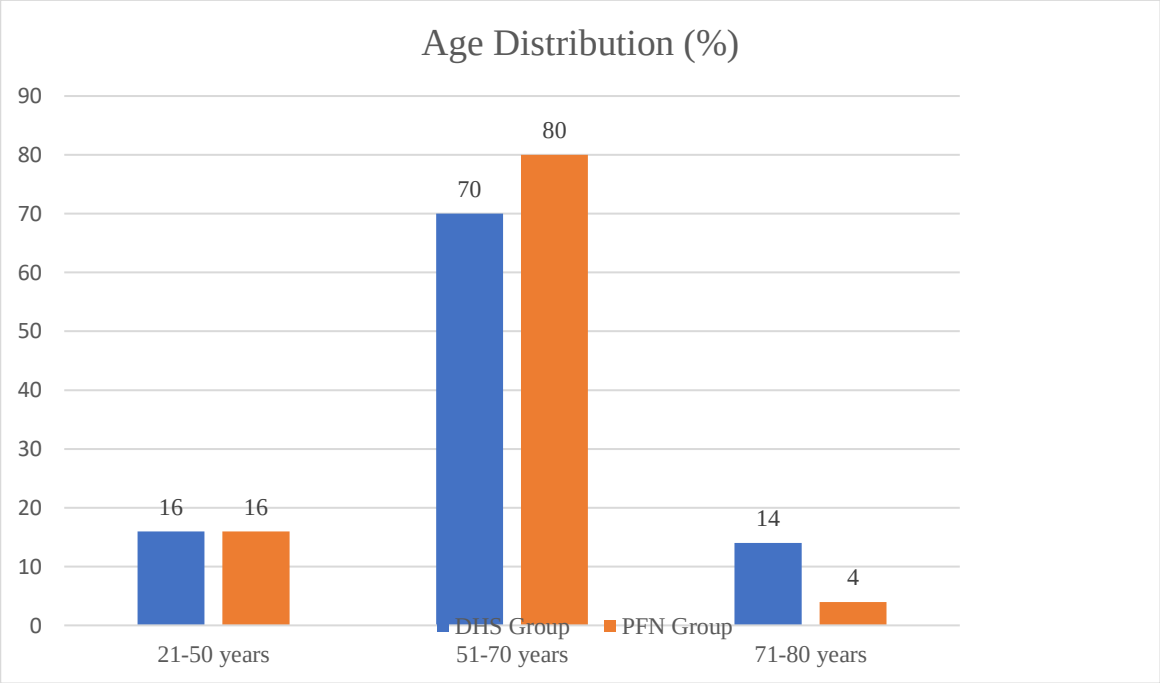

Figure 1: Distribution of the patient according to age in the both group (n=100)

Table 1: Distribution of patients according to type of fixation (n=100)

Types of Fixations	Number	Percentage
DHS	50	50
PFN	50	50
Total	**100**	**100**

Table 2: Distribution of patients according to mode of injury and surgery in both the groups(n=100)

	DHS Group (n=50)		PFN Group (n=50)	
	No.	%	No	%
Mode of injury				
RTA	38	76	26	52
Fall	12	24	24	48
Total	**50**	**100**	**50**	**100**
Duration of surgery				
<= 60 min	43	86	21	42

61-120 min	07	14	29	58
>120 min	00	00	00	00
Total	50	100	50	50
Mean ± SD	52.33 ± 8.33		72.55 ± 15.45	
P Value	0.0001			

Table 3: Distribution of patients according to blood loss in both the groups (n=100)

Blood loss	DHS Group (n=50)		PFN Group (n=50)	
	No.	**%**	**No.**	**%**
50-100 ml	5	10	46	92
101- 200 ml	7	14	4	8
201- 300 ml	15	30	0	0
301-400 ml	15	30	0	0
>400 ml	8	16	0	0
Total	50	100	50	100
Mean ± SD (ml)	258 ± 90.55		68.68 ± 16.83	
P-Value	0.0001			

Table 4: Distribution of patients according to complications in both the groups (n=100)

Complication	DHS Group (n=50)		PFN Group (n=50)	
Nil	44	88	48	96
Infection	3	6	2	4
DVT	2	4	0	0
Cut out of screw	1	2	0	0
Cut-out of stabilizing screw	0	0	0	0

Table 5: Functional outcome assessment by Harris Hip Scoring

Harris Hip Score	DHS Group (n=50)		PFN Group (n=50)	
			n=50	%
Excellent (90-100)	22	44.0	26	52
Good (80-89)	14	28.0	16	32
Fair (70-79)	4	8.0	6	12
Poor (<70)	10	20.0	2	4
Total	50	100.0	50	100

Figure 2: Pre-operative X-ray by DHS

Figure 3: Immediate post operative X-ray by DHS

Figure 4: Pre-operative X-ray by PFN

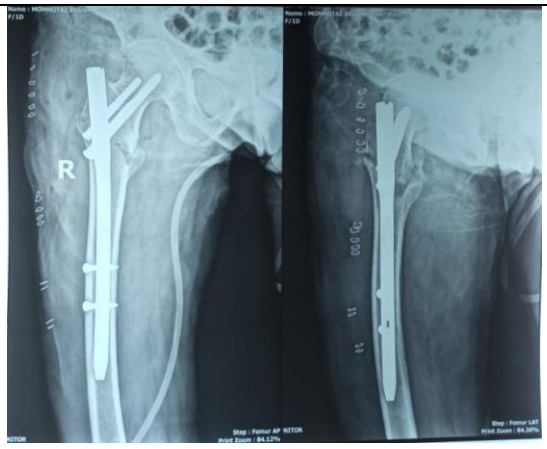

Figure 5: Immediate post operative X-ray by PFN

DISCUSSION

Unstable per-trochanteric hip fractures have the worst prognosis, and they continue to be a significant orthopedic concern. Functional results are often unsatisfactory even if union rates are high in intertrochanteric hip fractures. The worst prognosis and instability are associated with AO type 31-A2.2–A3.3 peri-trochanteric fractures. The severely unstable fracture causes a significant and protracted period of impairment following surgery. One of the postoperative problems linked to these fractures is fracture collapse. Every orthopedic surgeon has a responsibility to help patients get out of bed as quickly and painlessly as possible while minimizing surgical trauma to patients who are already traumatized. Of the patients in the DHS group, 16 (32%) were wounded in a fall, and 34 (68%) were injured in an RTA. We employed long PFN in the PFN group instead of conventional PFN because the latter has drawbacks such as stress fracture and mid-thigh soreness.

In PFN group, there were 24(48%) patients who injured because of fall, while 26(52%) were injured due to RTA. In PFN group, higher number of fall patients were there, while in DHS group, higher number of RTA patients were there. The comparison of mean blood loss in both the groups showed a statistically significant difference ($P < 0.0001$),

with a higher mean blood loss in DHS group in comparison to PFN group.

In DHS group, there were 5(10%) patients who had blood loss between 50-100 ml, in 7(14%) the blood loss was between 101-200 ml, in 15(30%) patients it was between 201-300 ml, in 15(30%) patients it was between 301-40 ml and in 8(16%) patients it was more than 400 ml. In PFN group, there were 46(92%) patients who had blood loss between 50-100 ml, in 4(8%) the blood loss was between 101-200 ml and none of the patients had a blood loss of more than 200 ml. In DHS group, 44(88%) patients had no complications, 2(4%) had DVT and 1(2%) had cut out of screw, 3(6%) had infection. In PFN group, 1(2%) had infection, 49(98%) shows no complication. Average screw impaction (Fracture collapse) was 6mm. Jacobs et al reported that the average fracture settling in stable patterns was 5.3 mm and in unstable patterns was 15.7 mm. Sliding of more than 15mm leads to a higher prevalence of fixation failure. Rha et al reported that excessive sliding was the major factor causing fixation failure in unstable fracture patterns. Average limb length discrepancy was 6 mm. Gross et al. found no noticeable functional or cosmetic problems in a study of seventy-four adults who had less than 2 cm of discrepancy103 and thirty-five marathon runners who had as much as 2.5 cm of discrepancy 104.

Normal healing time of a fracture is about 12 weeks. Intertrochanteric non-union should be suspected in patients with persistent hip pain that have x-rays revealing a persistent radiolucency at the fracture site 4 to 7 months after fracture fixation. Progressive loss of alignment strongly suggests non-union, although union may occur after an initial change in alignment, particularly if fragment contact is improved. Average healing time in the study was 12 weeks. In DHS group, in 2(4%) patient the union time was 2-3 months, in 26(52%) it was 3-4 months and in 22(44%) it was more than 4 months. The mean time for union in DHS group was 4.16 ± 0.47 months. In PFN group, in 26(52%) patients the union time was 1-2 months, in 22(44%) patient the union time was 2-3 months and in 2(4%) it was 3-4 months. The mean time for union in PFN group was 2.20 ± 0.50 months. The difference in mean union time was significant ($P < 0.0001$) with a higher union time in DHS group in comparison to PFN group. In DHS group functional outcome assessment by Harris Hip score, there were 22(44%) patients had Excellent and the PFN group functional outcome assessment by Harris Hip score, there were 26(52%) patients had Excellent.

Limitations of the study

Because of budget and scheduling constraints, the current study was completed in a very short amount of time. Another drawback of the current investigation was the tiny sample size.

CONCLUSION

PFN provides stability and aids in biological reduction. Excessive collapse and limb shortening are avoided by PFN. As a result, it aids in obtaining a positive functional outcome overall. PFN is a load-bearing implant that provides stability to the fracture area both proximally and distally. As such, it is a more biomechanically sound implant option for fixing peri-trochanteric femoral fractures. When it comes to bleeding during surgery and the early stages of recovery, PFN is a superior implant option than DHS. Thus, we recommend PFN over DHS for femur intertrochanteric fractures, with the exception of fractured trochanteric entry points for PFN.

RECOMMENDATION

This study can act as a test run for much larger studies including several centers that will be able to validate the regression models suggested here for use in the future, provide a picture of the country, and highlight areas that need to be improved in terms of management and adherence.

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