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ORIGINAL RESEARCH

Study of evaluation of functional outcome of subtrochanteric femur fracture treated with different surgical modalities

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ABSTRACT

Background: This study is aimed to prospectively evaluate the clinical and functional outcomes of subtrochanteric fractures of femur treated with Long Proximal femoral nailing (PFN),Dynamic condylar screws(DCS)/Dynamic hip screws (DHS),Contralateral DFLP and to asses the complications associated with these procedures. **Methods:** 30 patients with subtrochanteric femur fracture were included in the study. Long PFN was done in 10 patients,DHS/DCS was done in 10 patients(5 DHS,5 DCS) 10 patients with direct Contralateral DFLP.Check X-rays were taken for evaluating Harris hip score. **Results:** Out of 10 patients treated with long PFN 7 had good recovery,1 had non-union, 1 had infection and 1 lost for follow up.Among 10 patients operated with contralateral DFLP 5 had good outcome, 2 had implant failure, 1 hadinfection,1 had varus collapse and 1 had lost to follow up. Among 10 patients operated with DHS/DCS7 had good outcome, 2 had implant failure, 1 had infection. **Conclusions:** Excellent to good results would be seen insubtrochanteric femur fractures, treated with a Long Proximal femoral nail than in Dynamic hip screws/dynamic condylar screwsor Contralateral DFLP. This definitely has effect on the speed of recovery, early mobilisation, lower incidence of infection and wound complications.

Key words: Subtrochanteric femur fracture, Proximal femoral nail (PFN), Dynamic hip screw (DHS), Functional outcome evaluation, Surgical complications

INTRODUCTION

Subtrochanteric area is described as the region from the lesser trochanter to 5cm distal of proximal femur. It is one of the most challenging fractures for the orthopaedic surgeons. The cause of frequent comminution is that these fractures occur at the junction of trabecular bone and cortical bone where the mechanical stress is highest. Conservative management of subtrochanteric femur fractures poses difficulties in obtaining and maintaining a reduction, making operative management the preferred treatment.This study is aimed to prospectively evaluate the clinical and functional outcomes of subtrochanteric fractures of femur treated with Long Proximal femoral nailing, Dynamic condylar screws/Dynamic hip screws and Contralateral DFLP and to asses the complications associated with these

MATERIALS AND METHODS

SOURCE OF DATA

- The present study was conducted on all patients came to OPD/CASUALTY and admitted in IPD with SUBTROCHANTERIC FRACTURES OF FEMUR in KARNATAKA INSTITUTE OF MEDICAL SCIENCES,HUBLI from April 2023-May 2025.

Sample size =30.

INCLUSION CRITERIA

- All patients with Subtrochanteric femur fracture.
- All skeletal mature patient (>18years).
- Pathological fractures

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EXCLUSION CRITERIA

- Open fractures.
- Segmental fractures of femur.
- Patients with neurovascular deficit.
- Pre-existing deformity in the same hip.
- Patients with other bone fractures of lower.
- Communited femur fractures.

ASSESSMENT TOOLS

Fractures were classified according to the sensheimer classification system.

RADIOGRAPH of PELVIS WITH BILATERAL HIP, HIP WITH THIGH, THIGH WITH KNEE and ASSESD WITH HARRIS HIP SCORE.

Clinical assessment also done using ROM, ability to weight bear and other daily activity paparameters.

SURGICAL TECHNIQUES

Before doing fractures of proximal femur patient is put on traction table and try to reduce the fractures.In case of extramedullary fixation some surgeons may also preffer the use of lateral position.

PROXIMAL FEMORAL NAILING

Proximal femoral nail (PFN) fixation is a surgical procedure and a closed intramedullary fixation method for the treatment of proximal femoral fractures with a specially designed osteosynthetic implant, the proximal femoral nail.

CONTRALATERAL DFLP

“Contralateral DFLP” refers to using a distal femoral locking plate (DFLP) designed for one side of the body (the distal femur) to fixate a fracture on the opposite side (contralateral) of the body, often in the proximal femur or subtrochanteric region.

DISCUSSION

It has been a great challenge for orthopaedic surgeons to achieve Satisfactory results in case of subtrochanteric fractures since ages. It Still remains a controversial topic as to which is the best implant. The Main system of implants widely used now are the intramedullary Interlocking nails and the plate screw systems each with its own Advantages and disadvantages. Intramedullary fixation has advantages Over extramedullary implants as it is more of a biological fixation with Less devascularization, less bleeding, less surgical duration and early Functional recovery.

There is general consensus that intramedullary devices are more appropriate than extramedullary devices for these unstable fractures. However, malreduction can result in failure regardless of whether a plate or a nail was used. The risk of complications such as abduction deformity, splitting of proximal fragment, and nonunion correlate with the lack of good reduction, especially the perfect entry point. To achieve a successful outcome and minimize the risk of complications, the key point is to master the surgical techniques, and to respect the principles of biological osteosynthesis following the concept of minimally invasive surgery.

Patients treated with long PFN demonstrated the best overall outcomes, with the least intraoperative blood loss (190 ml), shortest surgery duration (1.08 hours), and the highest hip flexion (100.33° at 1 year). It also had fewer complications, with lower rates of nonunion, delayed union, and hardware failure.

Patients treated with Contralateral DFLPhad the poorest outcomes, with significantly higher blood loss (400 ml), longer surgery duration (1.79 hours), and lower hip function scores (62.00° hip flexion at 1 year). It also had the highest rate of complications, including nonunion/malunion (30%) and hardware failure (20%).

Patients treated with DHS/DCS showed moderate results, with better hip functionbut higher intraoperative blood loss (470 ml)and a longer surgery duration (1.92 hours). Hip flexion improved significantly (78.8° at 1 year).

Radiological union improved in all groups over time,but patients treated with Long PFN showed fast union rates than compared with other modalities.

Table 1: Comparison of Group A, Group B and Group C with mean hip flexion ROM (degrees) at different treatment time points by one way ANOVA

Time points	Group A		Group B		Group C		F-value	p-value	Pairs comparisons byTuekeysposthoc		
	Mean	SD	Mean	SD	Mean	SD			A vs B	A vs C	B vs C
3weeks	31.10	4.33	28.89	6.35	32.40	4.25	1.1776	0.3239	0.6085	0.8323	0.2968
3months	50.70	9.41	42.22	12.70	52.90	7.53	2.9718	0.0688	0.1748	0.8757	0.0699
6months	63.67	12.44	48.11	20.58	63.20	22.53	1.9479	0.1636	0.2174	0.9985	0.2205
1year	100.33	8.92	62.00	34.55	78.80	36.18	3.7831	0.0367*	0.0290*	0.2723	0.4452

*p<0.05

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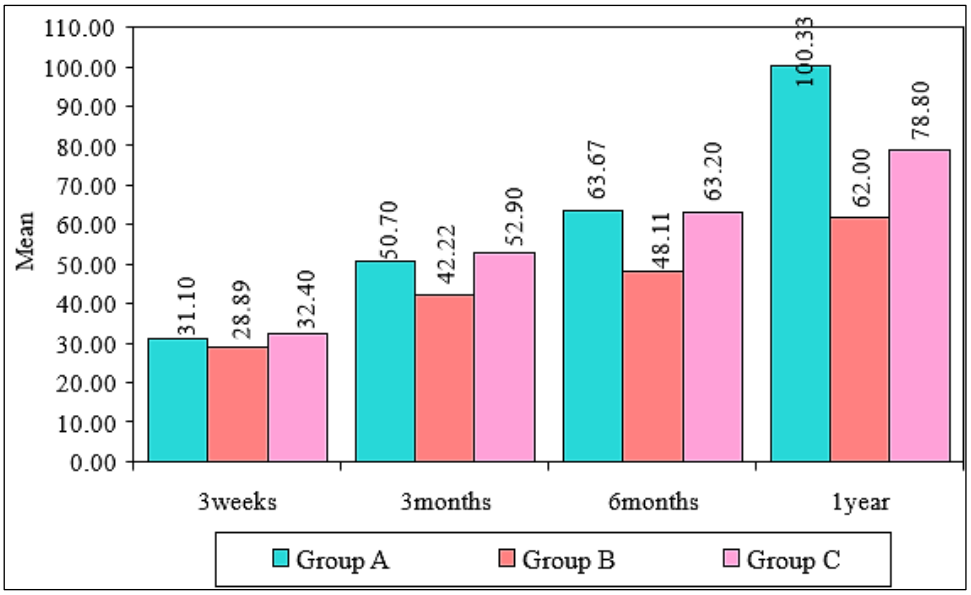

Figure 1: Comparison of Group A, Group B and Group C with mean hip flexion ROM (degrees) at different treatment time points

Table 2: Comparison of different treatment time points with mean hip flexion ROM (degrees) inGroup A, Group B and Group C by paired t test

Groups	Changes from	Mean change	% of effect	t-value	p-value
Group A	3 weeks to 3 month	19.60	63.02	6.3838	0.0001*
	3 weeks to 6 month	32.57	104.72	9.1224	0.0001*
	3 weeks to 1year	69.23	222.62	23.6991	0.0001*
Group B	3 weeks to 3 month	13.33	46.15	5.1006	0.0009*
	3 weeks to 6 month	19.22	66.54	2.7171	0.0264*
	3 weeks to 1year	33.11	114.62	2.7804	0.0239*
Group C	3 weeks to 3 month	20.50	63.27	7.3168	0.0001*
	3 weeks to 6 month	30.80	95.06	4.0789	0.0028*
	3 weeks to 1year	46.40	143.21	3.9149	0.0035*

*p<0.05

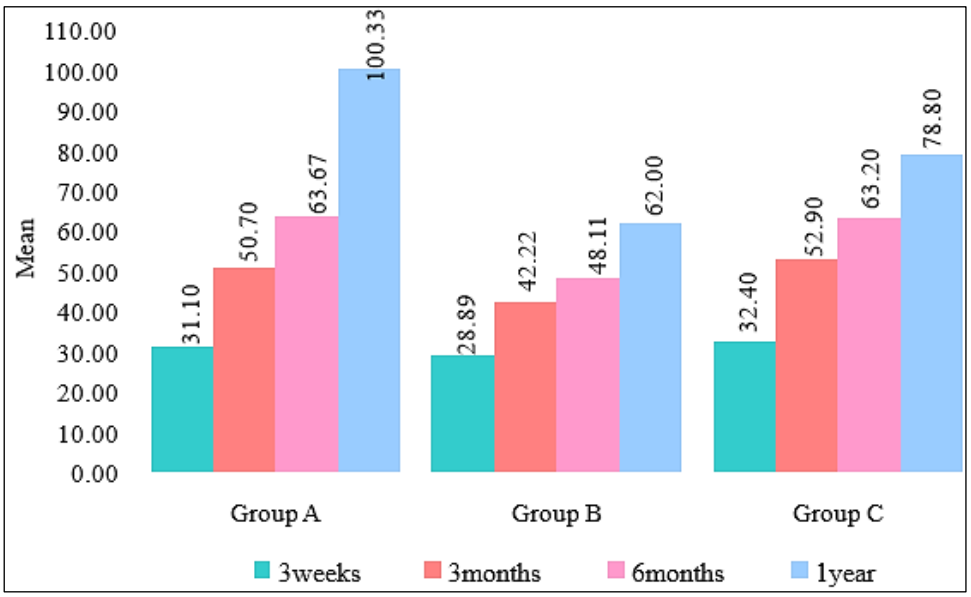

Figure 2: Comparison of different treatment time points with mean hip flexion ROM (degrees) in Group A, Group B and Group C

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Table 3: Comparison of Group A, Group B and Group C with mean HARRIS HIP scores at different treatment time points by one way ANOVA

Time points	Group A		Group B		Group C		F-value	p-value	Pairs comparisons byTuekeysposthoc		
	Mean	SD	Mean	SD	Mean	SD			A vs B	A vs C	B vs C
3weeks	47.90	11.88	38.33	3.46	43.00	9.09	2.6753	0.0878	0.0721	0.4547	0.5064
3months	64.80	14.51	53.89	7.98	60.80	11.86	2.0292	0.1517	0.1327	0.7347	0.4266
6months	78.33	14.87	58.33	28.13	65.90	28.33	1.4991	0.2427	0.2201	0.5273	0.7857
1year	91.33	8.94	66.56	34.31	74.20	34.69	1.7401	0.1961	0.1843	0.4138	0.8343

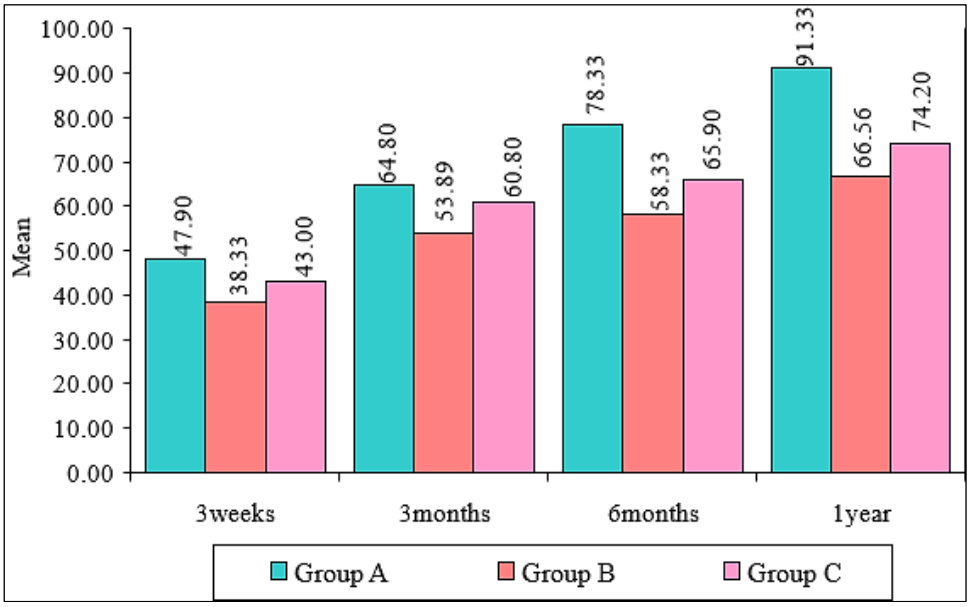

Figure 3: Comparison of Group A, Group B and Group C with mean HARRIS HIP scores at different treatment time points

Table 4: Comparison of different treatment time points with mean HARRIS HIP scores in GroupA, Group B and Group C by paired t test

Groups	Changes from	Mean change	% of effect	t-value	p-value
Group A	3 Weeks to 3 Month	16.90	35.28	6.2554	0.0001*
	3 Weeks to 6 Month	30.43	63.54	9.0569	0.0001*
	3 Weeks to 1 Year	43.43	90.68	14.3704	0.0001*
Group B	3 Weeks to 3 Month	15.56	40.58	7.6951	0.0001*
	3 Weeks to 6 Month	20.00	52.17	2.0535	0.0741
	3 Weeks to 1 Year	28.22	73.62	2.3787	0.0446*
Group C	3 Weeks to 3 Month	17.80	41.40	7.0508	0.0001*
	3 Weeks to 6 Month	22.90	53.26	3.0388	0.0140*
	3 Weeks to 1 Year	31.20	72.56	3.2215	0.0105*

*p<0.05

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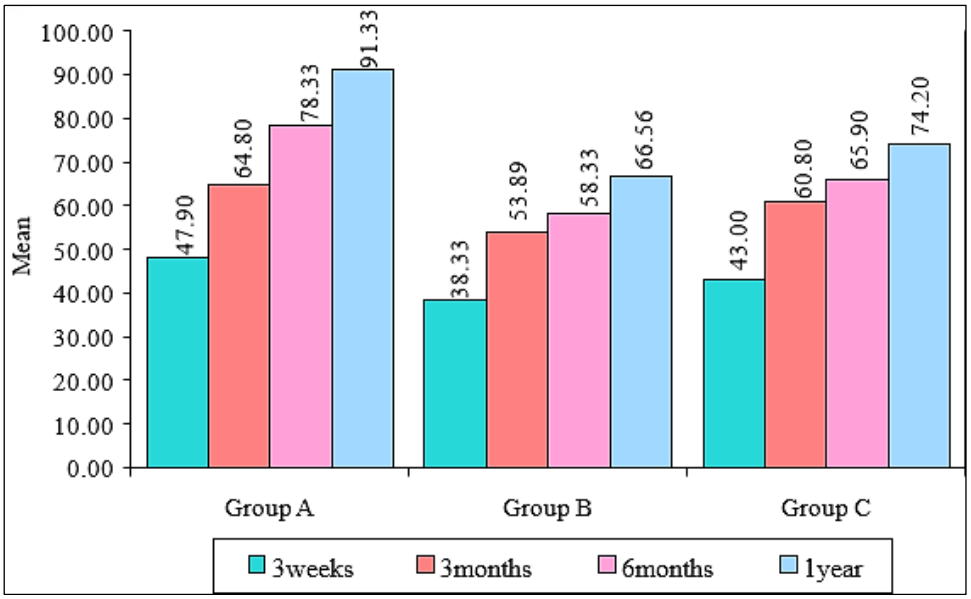

Figure 4: Comparison of different treatment time points with mean HARRIS HIP scores in Group A, Group B and Group C

Table 5: Comparison of Group A, Group B and Group C with status of weight bearing at different treatment time points

Groups	Present status of weight bearing							
	3weeks	%	3months	%	6months	%	1Year	%
Group A	8	80.00	10	100.00	9	90.00	9	90.00
Group B	6	60.00	7	70.00	7	70.00	7	70.00
Group C	9	90.00	10	100.00	8	80.00	8	80.00
Chi-square	1.5760		4.7740		2.2300		2.2300	
p-value	0.4550		0.0920		0.3280		0.3280	

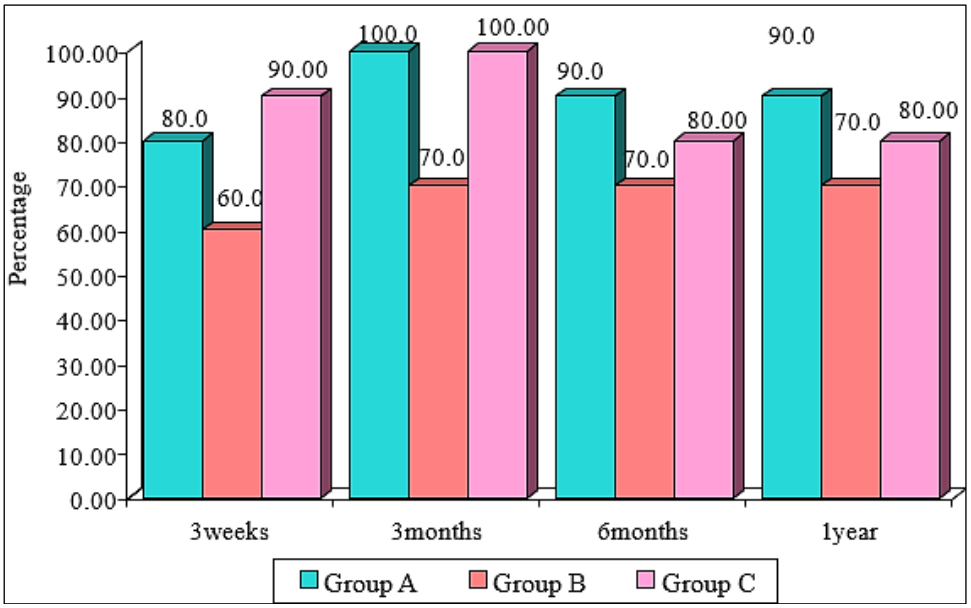

Figure 5: Comparison of Group A, Group B and Group C with status of weight bearing at different treatment time points

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Table 6: Comparison of Group A, Group B and Group C with mean Radiological union scores at different treatment time points by one way ANOVA

Time points	Group A		Group B		Group C		F-value	p-value	Pairs comparisons byTuekeysposthoc		
	Mean	SD	Mean	SD	Mean	SD			A vs B	A vs C	B vs C
3weeks	0.80	0.42	0.67	0.50	0.90	0.32	0.7471	0.4836	0.7671	0.8538	0.4520
3months	1.60	0.52	1.11	0.60	1.50	0.53	2.0790	0.1454	0.1467	0.9125	0.2866
6months	2.40	0.97	1.56	1.13	1.90	1.10	1.5162	0.2383	0.2153	0.5534	0.7637
1year	3.10	1.37	2.11	1.45	2.40	1.51	1.1956	0.3186	0.3117	0.5322	0.9012

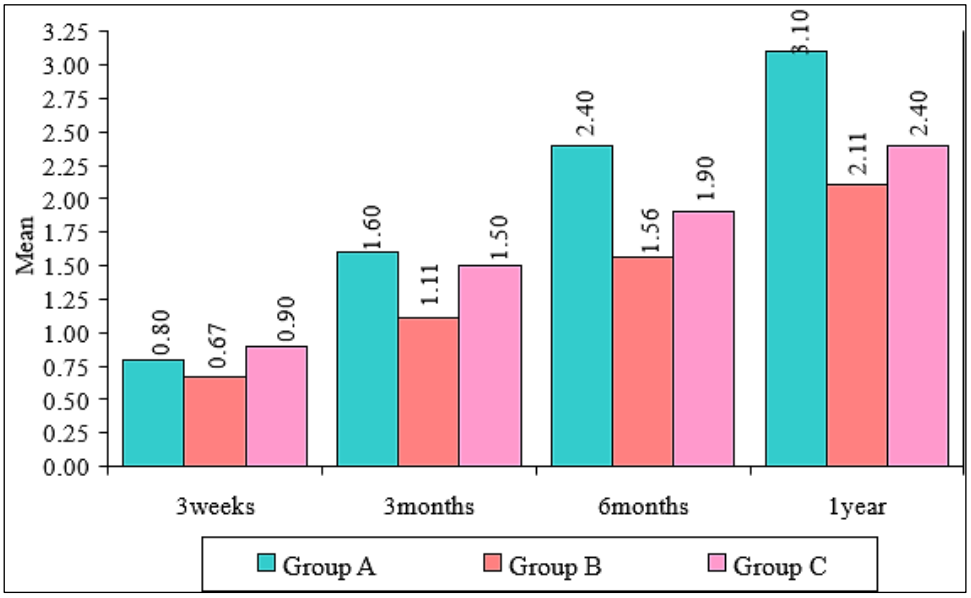

Figure 6: Comparison of Group A, Group B and Group C with mean Radiological union scores at different treatment time points

Table 7: Comparison of different treatment time points with mean Radiological union scores inGroup A, Group B and Group C by paired t test

Groups	Changes from	Mean change	% of effect	t-value	p-value
Group A	3 weeks to 3 month	0.80	100.00	6.0000	0.0002*
	3 weeks to 6 month	1.60	200.00	5.2372	0.0005*
	3 weeks to 1year	2.30	287.50	5.4380	0.0004*
Group B	3 weeks to 3 month	0.44	66.67	2.5298	0.0353*
	3 weeks to 6 month	0.89	133.33	2.2857	0.0516
	3 weeks to 1year	1.44	216.67	2.8712	0.0208*
Group C	3 weeks to 3 month	0.60	66.67	3.6742	0.0051*
	3 weeks to 6 month	1.00	111.11	2.7386	0.0229*
	3 weeks to 1year	1.50	166.67	3.1429	0.0119*

*p<0.05

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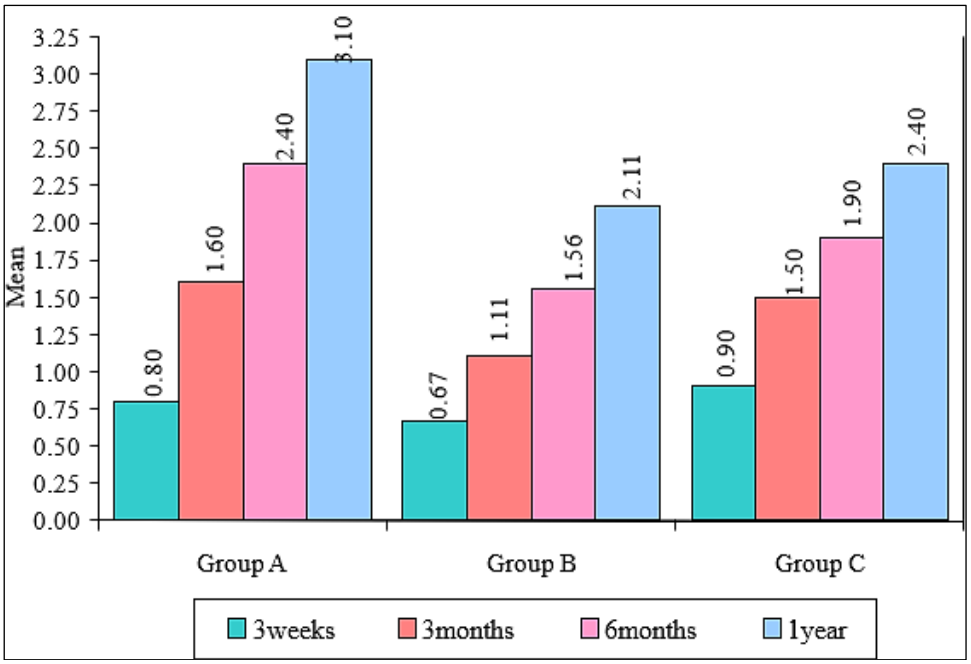

Table 8: Comparison of Group A, Group B and Group C with Presence of various complications

Groups			Presence of various complications							
	Nonunion/ malunion	%	Delayed union	%	Varuscollapse	%	Hardware failure	%	Infection	%
Group A	1	10.00	2	20.00	0	0.00	0	0.00	1	10.00
Group B	3	30.00	1	10.00	2	20.00	2	20.00	1	10.00
Group C	2	20.00	1	10.00	1	10.00	2	20.00	1	10.00
Chi-square	1.3390		0.6870		2.3310		2.2300		0.0080	
p-value	0.5120		0.7090		0.3120		0.3280		0.9960	

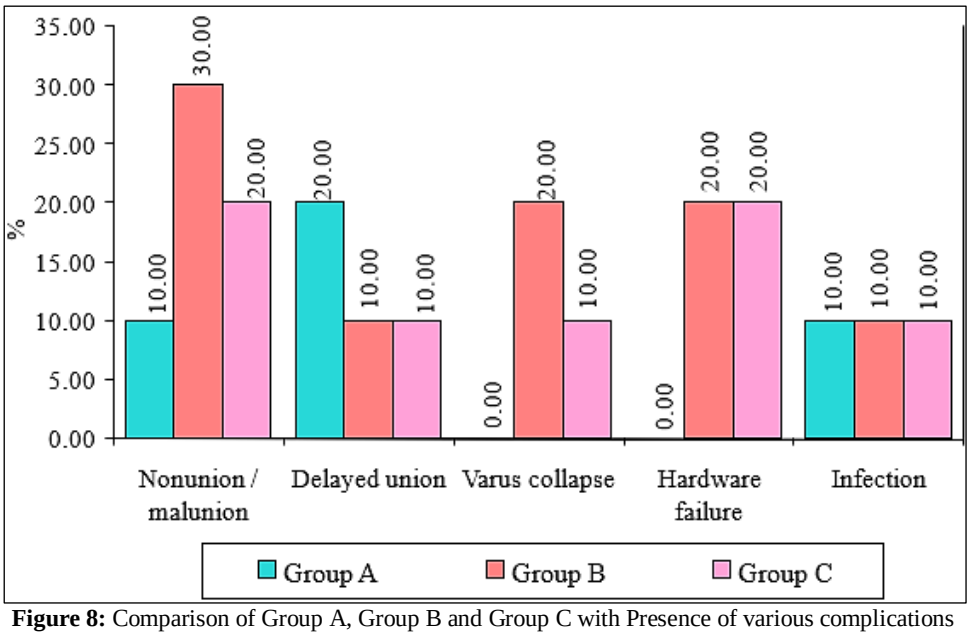

Figure 8: Comparison of Group A, Group B and Group C with Presence of various complications

CONCLUSION

Patients treated with long PFN showed the best overall outcomes with less blood loss, shorter surgery duration, faster weight-bearing, and better ROM at 1 year, whereas patients treated with DHS/DCS performed moderately well but had longer surgeries and higher blood loss. Patients treated with contralateral DFLP had the most complications and slower recovery. Significant differences were noted in blood loss, surgery duration, and ROM at 1 year.

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