

# Comparison of Frequency of Complications of Paediatric Femoral Shaft Fractures Treated with Hip Spicca Versus Flexible Nails.

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## Authorship and contribution Declaration:

Each author of this article fulfilled ALL 04 Criteria of Authorship:

1. Conception and design of or acquisition of data or analysis and interpretation of data.
2. Drafting the manuscript or revising it critically for important intellectual content.
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## ABSTRACT

**Objective:** To compare the frequency of complications of Paediatric femoral shaft fractures treated with hip spicca versus flexible nails.

**Methods:** This retrospective cross sectional study was conducted in Orthopedics and Traumatology division of Lady Reading Hospital Peshawar. The medical records of all children with femoral shaft fractures fulfilling the inclusion criteria and who were treated with hip spicca or titanium flexible nails in time period extending from 24<sup>th</sup> July 2019 to 23<sup>rd</sup> January 2022 were reviewed. Patients were divided into Spicca group(S) and Flexible nail group(F). Complications in both groups were documented and compared.

**Results:** The record of 480 children was reviewed. The spicca group(S) and Flexible nails group(F) had 240 children each. The mean age of S group was 5.32±2.2 years and F group was 7.77±1.6 years. Both the S group and F group had 180(75%) and 141(58.75%) male children respectively. Right femoral fractures were present in 132(55%) children in S group and 141(58.75%) in F group. Union was achieved in both groups. The average union time was 6.2±3.2 weeks in S group and 5.32±1 weeks in F group. Overall 64(26.66%) children in the S group and 42(17.5%) children in the F group had complications. The frequency of knee stiffness, malunion and shortening was significantly more in S group than in F group. (p<0.05)

**Conclusion:** Paediatric femoral shaft fractures treated with hip spicca casting had higher complications than flexible nails.

**Keywords:** Flexible Nail, Hip Spicca, Malunion, Shortening, Stiffness

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## INTRODUCTION

Pediatric femoral shaft fractures occur in less than 2% of all children fractures but usually require hospital admission.<sup>1</sup> Various treatment options for paediatric femoral shaft fractures are hip spicca, flexible nailing, plating and external fixators. The optimum method however depends upon age of the child, weight of the child, fracture type and presence or absence of associated injuries.<sup>2</sup> Hip spicca casting is the most widely used method for treating pediatric diaphyseal femur fractures.<sup>3</sup> In the last ten years however the benefits of fixation and early mobilization have gained much recognition. The use of elastic stable intramedullary nailing for paediatric femoral shaft fractures provides enhance recovery to

independent ambulation and full activities.<sup>4-6</sup> Both hip spicca and flexible nailing are not without complications. Studies have reported complication rate of 7.6% and 16.3% in children treated with hip spicca and flexible nailing respectively.<sup>7</sup>

The objective of our study was to compare the frequency of complications of Paediatric femoral shaft fractures treated with hip spicca versus flexible nails.

## METHODS

We conducted this retrospective cross sectional study in Orthopedics and Traumatology division of Lady Reading Hospital Peshawar. The medical records of all the children with femoral shaft fractures who were treated with hip spicca or retrograde closed titanium

flexible nails in time period extending from 24<sup>th</sup> July 2019 to 23<sup>rd</sup> January 2022 were reviewed. All children with closed fractures with complete clinical and radiographic records and follow up notes were included. Pathological fractures, floating knee, bilateral femoral fractures and polytrauma children were excluded. The study protocol was approved by the Ethical Committee of our hospital. Patients were divided into Spicca group(S) and Flexible nail group(F). Seven complications(Repeat spicca-cast, conversion to flexible nailing, nail entry site infection, skin wounds due to spicca, knee stiffness, malunion, shortening and non union) in both groups were documented and compared.

We used SPSS version 23 for data entry and analysis. Descriptive statistics were applied to calculate frequency and percentages for categorical variables such as gender and complications. Mean and standard deviation was calculated for numerical data such as age.

The complication rate both groups were compared using chi-squared test to find out whether there is any significant difference in complication rates. P value < 0.05 was considered significant. Data was presented in tables where necessary.

## RESULTS

We reviewed the record of 480 children who were treated with hip spicca and Flexible nails. Each group

had 240 children. The mean age of Spicca group (S) was 5.32±2.2 years and Flexible nail group (F) was 7.77±1.6 years. Male children were 180(75%) in S group and 141(58.75%) in F group. Female children were 60(25%) in S group and 99(41.25%) in F group. Right femoral shaft fractures were present in 132(55%) and 141(58.75%) children in S and F group respectively while left femur fractures were noted in 108(45%) children in S group and 99(41.25%) in F group. The fractures were located in the middle of third of femur in 176(73.33%) children in F group and 115(47.91%) children in S group. Majority( 61.25%,n=147) of fractures in the S group were spiral while majority(86.25%,n=207) fractures in the F group were transverse.(table I)

Union was achieved in both groups. The average union time was 6.2±3.2 weeks in S group and 5.32±1 weeks in F group. Seven complications (repeat spicca-cast, Conversion to flexible nailing, Nail entry site infection, Skin wounds due to spicca, Knee stiffness, Malunion, Shortening and non union) in both groups were documented and compared. (table II)

Overall 64(26.66%) children in S group and 42(17.5%) children in F group had complications. The frequency of knee stiffness, malunion and shortening was significantly more in S group than in F group. (p<0.05).Non union was not reported in any group.

**Table I:** Comparison of location and types of femoral fracture in both groups.

Types of Fractures	Spicca Group(S)			Flexible Nail group(F)		
	Location of fractures			Location of fractures		
	Proximal 1/3 of Femur shaft	Middle 1/3 of Femur shaft	Distal 1/3 of Femur shaft	Proximal 1/3 of Femur shaft	Middle 1/3 of Femur shaft	Distal 1/3 of Femur shaft
<b>Transverse fractures</b>	13(5.41%)	16(6.66%)	32(13.33%)	52(21.66%)	143(59.58%)	12(5%)
<b>Spiral fractures</b>	34(14.16%)	90(37.5%)	23(9.58%)	00	11(4.58%)	00
<b>Comminuted fractures</b>	11(4.58%)	09(3.75%)	12(5%)	00	22(9.16%)	00

**Table II:** Comparison of complications in both groups.

S. No	Types of Complication	Spicca (S) Group (n=240)	Flexible Nail (F) group (n=240)	P value
1	Repeat spicca-cast	11(4.58%)	00	0.001
2	Conversion to flexible nailing	05(2.08%)	00	0.002
3	Nail entry site infection	00	27(11.25%)	0.001
4	Skin wounds due to spicca	09(3.75%)	00	0.001
5	Knee stiffness	11(4.58%)	9(3.75%)	0.004
5	Malunion	12(5%)	02(0.8%)	0.01
6	Shortening	16(6.66%)	04(1.66%)	0.002
7	Non union	00	00	--

## DISCUSSION

In our sample size of 480 children of femoral shaft fractures the overall complication rate was 26.66% (n=46) in spicca group and 17.5% (n=42) in flexible nail group. The frequency of knee stiffness, malunion and shortening was significantly more in spicca group than in flexible nail group. ( $p < 0.05$ ). Sela and colleagues<sup>9</sup> studied 212 children and noted that out of 151 children in the spicca cast group 1.3% suffered from local wound infection while in intramedullary nail group 8.3% suffered from wound infection. Manipulation of casting was done in 6.9% patients, casting was changed to nail in 0.66% patients while removal of nail was done in 9.5% patients. One local study reported that wound infection was found in 2.7% in patients in nailing group while no patients in cast group develop wound infection. Early nail removal however was done in 11% patients in intramedullary nailing group.<sup>10</sup> Imam<sup>11</sup> conducted a systematic review and meta-analysis in 2018 and documented that titanium elastic nails are better than spicca for the treatment of femoral shaft fractures in children younger than 16 years. Imam was the view that there is less chance of malalignment as well as early weight bearing in elastic nailing than spicca casting. Yaokreh et al<sup>12</sup> noted major complication in 03 cases in patients treated with open nailing and 17 patients in spicca group in his series. These authors concluded that open reduction and nailing is better than spicca casting. Khaffaf<sup>13</sup> treated 30 patients with nailing and 30 with spicca and noted malunion in 10 cases in spicca group and 2 cases in nailing group. Wound infection and pin site irritation was noted in 4 cases each in nailing group. Weight bearing was started earlier in nailing group than in spicca group. This author concluded that nailing had better outcome than spicca. Soleimanpour and Ganjpour<sup>14</sup> treated 60 children of femoral shaft fracture with spicca and 60 with elastic nailing. They documented that after one year follow up angulation in AP view was present in 12(20%) in spicca and 4(6.7%) in nailing, Varus-valgus angulation was noted in 16(26.6%) in spicca and 8(13.3%) patients in nailing group. Post surgical wound complications were present in 4(6.7%) patients of nailing. These authors advocated the use of titanium elastic nailing for treating femoral shaft fractures in children ages between 6 to 12 years old. Ahmed and colleagues<sup>15</sup> treated 30 children of femoral shaft fractures with spicca and 30 with nailing and noted infection in 2(4%) patients in spicca and 5(10%) patients in nailing group. Malalignment was noted in 5(10%)

patients in spicca and none in nailing group. These authors concluded that nailing is safe and cost effective alternative to spicca casting in children of 4 to 5 years old. Verma<sup>16</sup> treated 45 patients of paediatric femoral fractures with hip spicca and 45 with nailing. Malunion was noted in 10(22.22%) patients treated with spicca and 3(6.66%) patients in nailing group. Verma<sup>16</sup> concluded that results of nailing was superior than spicca and with low complication rate. Duffy<sup>17</sup> proposed that paediatric femoral shaft fracture should be treated according to age and body weight of the child.

The retrospective design of our study and lack of validated tool for measuring the functional outcome of our study participants were the limitations of our study. Further studies are recommended to address these limitations.

## CONCLUSION

Paediatric femoral shaft fractures treated with hip spicca casting had higher complications than flexible nails. The treating surgeon should consider age and weight of the patient, fracture type and location of the fracture while deciding for treating femoral fractures in children

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