SAS Journal of Surgery
Abbreviated Key Title: SAS J Surg
ISSN 2454-5104
Journal homepage: https://www.saspublishers.com

OPEN ACCESS

Clinical Status and Complications in Children Treated by Cannulated Cancellous Screw for Femoral Neck Fracture

Dr. Md. Shihab Uddin[1*], Dr. Md. Khademul Islam[2], Dr. Md. Rafiqul islam Jahid[3], Dr. Sudip Kumar halder[4], Dr. Md. Mazharul Islam[5]

[1]Assistant Professor, Department of Ortho-Surgery, Sher--e-Bangla Medical College Hospital Barisal, Bangladesh
[2]Assistant Professor, Department of Ortho-Surgery, Sher-e-Bangla medical College hospital, Barisal, Bangladesh
[3]Assistant Professor, Department of Ortho-Surgery, Sher-e-Bangla medical College hospital, Barisal, Bangladesh
[4]Junior Consultant, Department of Ortho-Surgery, Sher-e-Bangla medical College hospital, Barisal, Bangladesh
[5]Registrar, Department of Ortho-Surgery, Sher-e-Bangla medical College hospital, Barisal, Bangladesh

DOI: 10.36347/sasjs.2021.v07i09.013 | **Received:** 14.08.2021 | **Accepted:** 18.09.2021 | **Published:** 25.09.2021

***Corresponding author:** Dr. Md. Shihab Uddin

Abstract **Original Research Article**

Background: Cannulated screw fixation (CSF) is a widely used surgical procedure for the management of fractures of the neck of femur. Although the frequencies of such occurrence are not so high among children in every year surgeons use this fixation methods in treating children in a good number. We have very few research-based data regarding the outcomes and complications in children treated by cannulated cancellous screw for femoral neck fracture. ***Aim of the study:*** The aim of the present study was to assess the outcomes and complications in children treated by cannulated cancellous screw for femoral neck fracture. ***Methods:*** This prospective observational study was conducted in the Rahat Anwar Hospital, Rayal City Hospital, Arif Memorial Hospital, Barisal and in the Orthopedics surgery department of Sher-e-Bangla Medical College (SBMC) Hospital, Barisal, Bangladesh during the period from January 2016 to December 2020. In total 27 children with femoral neck fracture selected for cannulated screw fixation were enrolled as the study subjects. Only cases with displaced intracapsular hip fractures (Garden type 3–4) were included, Data were processed, analyzed and disseminated by MS Word and SPSS programs as per need. ***Results*:** In this study finally the mean (±SD) length of follow-up period was 22.13 ± 3.77 months. As post-operative status, according to the mean Garden's alignment index, anteroposterior and lateral scores were 167.86 ± 5.12 and 172.14 ± 6.13 degree respectively. Postoperative mean Harris Hip Scores at 6 weeks, 3 months, 6 months and 1 year after surgery were found 58.77 ± 4.45, 79.06 ± 3.65, 89.61 ± 5.66 and 93.27 ± 5.81 respectively. At the post-operative period, the mean vertical femoral neck shortening was found 5.11 ± 1.88 mm and the mean horizontal femoral neck shortening was found 5.06 ± 1.79 mm. In this study, as complications non-union and avascular necrosis were found in 1 and 2 patients respectively. Besides these, for 1 patient, 2nd time operation was in needed. ***Conclusion:*** Considering low blood loss, prompt healing and less vertical as well as horizontal femoral neck shortening cannulated screw fixation (CSF) method may be considered as the method of choice for treating children with femoral neck fractures.

Keywords: Clinical status, Complications, Children, Cannulated cancellous screw, Femoral neck fracture.

1. INTRODUCTION

Cannulated screw fixation is a very widely used surgical method for the treatment of fractures of the neck of femur. Although the frequencies of such occurrence are not so high among children in every year surgeons use this fixation methods in treating children in a good number. Cannulated screw fixation is a widely accepted surgical method for management of fractures of the neck of femur especially in patients with poor premorbid conditions, minimally displaced fractures and those from a younger age group [1]. Several options exist for internal fixation of the hip, including a sliding hip screw/side plate device and multiple cannulated parallel lag screws [2]. However, even with the use of these treatment methods, the incidence of early postoperative complications such as non-union and failure of fixation is high [3, 4]. The use of multiple cancellous screws can lead to dynamic compression at the fracture site during axial loading, resulting in a shortened femoral neck [5]. A shortened femoral neck or an offset can cause abductor muscle weakness as a result of a decreased lever arm as well as overall limb shortening, which has been shown to be associated with significantly lower Physical

Functioning and Role Physical SF-36 sub-scores [6, 7]. A study8 has shown that compared to three other kinds of internal fixation devices, cannulated screws, DHS, and dynamic condylar screw (DCS), fixed-angle proximal femoral locking plate (PFLP) has the best biomechanical properties, with the highest axial stiffness. We hypothesized that the use of the CSLP in the treatment of displaced intracapsular hip fractures in young adults could reduce the rates of early postoperative nonunion and failure of fixation [5].

2. OBJECTIVE

General Objective

- To assess the outcomes and complications in children treated by cannulated cancellous screw for femoral neck fracture.

Specific Objective

- To determine the preoperative clinical status of the participants.
- To determine the postoperative clinical status of the participants.

3. METHODS

This prospective observational study was conducted in the Rahat Anwar pvt Hospital, Rayal CT pvt Hospital, Arif Memorial pvt Hospital, Barisal and in the Orthopedics surgery department of Sher-e-Bangla Medical College (SBMC) Hospital, Barisal, Bangladesh during the period from January 2016 to December 2020. In total 27 children with femoral neck fracture selected for cannulated screw fixation were enrolled as the study subjects. Only cases with displaced intracapsular hip fractures (Garden type 3–4) were included, proper written consents were taken in favor of all the participants before data collection. Data were processed, analyzed and disseminated by MS Word and SPSS programs as per need.

Inclusion Criteria:

- Age between 18 and 50 years,
- Intracapsular hip fractures, recent intracapsular hip fractures of < 48 h, displaced intracapsular hip fractures (Garden type 3–4), and
- Surgical approaches of closed/open reduction.

Exclusion Criteria

- Pathological and/or old fractures (Injury time > 3 weeks),
- Un-displaced intracapsular hip fractures (Garden type 1–2),
- Severe blood and immune system diseases, severe multiple traumas or history of ipsilateral hip or femur surgery,
- Conditions like osteoarthritis and/or post-dysplastic deformities, follow-up time < 1 year. A Watson-Jones approach[11] was used, and the fracture was opened by performing an inverted T-shaped incision in the capsule.

4. RESULTS

In this study, among total 27 child participants, 56% (n=15) were male whereas the rest 44% (n=12) were female. So, male patients were dominating in number and the male-female ratio was 1.25:1. The mean (±SD) age of all the participants was 7.14 ± 3.26 years. The mean (±SD) Harris Hip Score of the participants was found 12.16 ± 2.22. In the highest number of patients, 'road traffic accident' was found as the mode of injury which was in 48% patients. As per the Garden classification, type III and type IV fractures were 70.37% and 29.63% respectively. In this study finally the mean (±SD) length of follow-up period was 22.13 ± 3.77 months. As post-operative status, according to the mean Garden's alignment index, anteroposterior and lateral scores were 167.86 ± 5.12 and 172.14 ± 6.13 degree respectively. Postoperative mean Harris Hip Scores at 6 weeks, 3 months, 6 months and 1 year after surgery were found 58.77 ± 4.45, 79.06 ± 3.65, 89.61 ± 5.66 and 93.27 ± 5.81 respectively. At the post-operative period, the mean vertical femoral neck shortening was found 5.11 ± 1.88 mm and the mean horizontal femoral neck shortening was found 5.06 ± 1.79 mm. In this study, as complications non-union and avascular necrosis were found in 1 and 2 patients respectively. Besides these, for 1 patient, 2nd time operation was in needed.

Table 1: Preoperative clinical status of participants (N=27)

Characteristics	n	%
Gender		
Male	15	55.56
Female	12	44.44
Age (Year)	7.14 ± 3.26	
Harris Hip Score	12.16 ± 2.22	
Mode of injuries		
Sport injuries	9	33.33
Road traffic accidents	13	48.15
Falls	5	18.52
Garden classification		
Type 3	19	70.37
Type 4	8	29.63

OTA classification

Preoperative clinical status shows that 55.56% male and 44.44% female participants attended in the study where Sport injuries 33.33%, Road traffic accidents 48.15% and falls 18.52%

Table 2: Postoperative findings among participants (N=27)

Characteristics	n	%
Mean follow-up (Month)	22.13 ± 3.77	
Mean Garden's alignment index		
Anteroposterior (degree)	167.86 ± 5.12	
Lateral (degree)	172.14 ± 6.13	
Mean Harris Hip Score		
6 weeks after surgery	58.77 ± 4.45	
3 months after surgery	79.06 ± 3.65	
6 months after surgery	89.61 ± 5.66	
1 year after surgery	93.27 ± 5.81	
Femoral neck shortening (Vertical)		
Mean decrease (mm)	5.11 ± 1.88	
No/mild (0–4.9)	20	74.07
Moderate (5–9.9)	6	22.22
Severe (≥10)	1	3.70
Femoral neck shortening (Horizontal))		
Mean decrease (mm)	5.06 ± 1.79	
No/mild (0–4.9)	19	70.37
Moderate (5–9.9)	7	25.93
Severe (≥10)	1	3.70

According to the Table 2 Postoperative findings among participants Mean follow-up (Month) 22.13 ± 3.77%, Mean decrease (mm) for femoral neck shortening (Vertical) is 5.11 ± 1.88% and Mean decrease (mm) for Femoral neck shortening (Horizontal) 5.06 ± 1.79%

Table 3: Complications among the participants (N=27)

Complications	n	%
Non-union	1	3.70
Avascular necrosis	2	7.41
Second operation	1	3.70

In table shows Complications among the participants that are Non-union 3.70%, Avascular necrosis 7.41 and Second operation 3.70%

5. DISCUSSION

The aim of the present study was to assess the outcomes and complications in children treated by cannulated cancellous screw for femoral neck fracture. Although various types of implants have been introduced and developed for internal fixation of femoral neck fractures for healing of the femoral neck by stable fixation without shortening continues to be challenging, in this study we have concentrated on cannulated cancellous screw only. In our study, occurrence of non-union was found in one case only which proved the satisfactory effectiveness of cannulated cancellous screw method. Such success might no possible by some other methods like multiple cancellous screw method for lake of rotating options. In a study, they stated, 'Another limitation of the MCS method is the inability to control the rotation [12]. Bio-mechanical experiments showed, compared with MCS (Multiple cancellous screw), a fixed-angle device can increase the resistance to shear forces and reduce micromotion [8] that seems to impair the total healing process. Another controlled trial [13] found higher failure rates for the displaced femoral neck fractures while sliding hip screws were applied in a 'dynamic compression mode' compared to 'static locking' (33% vs. 18%) [14]. Compared Targon FN and MCS (Multiple cancellous screw) in a study and reported non-union rates of 3.2% and 46.8%, respectively. Besides non-union, there were found very limited complications in our study. In our study, as complications non-union and avascular necrosis were found in 1 and 2 patients respectively. Besides these, for 1st patient, 2nd time operation was in needed. Even in some study in some other methods very wider ranges of failure were observed. As for example [15] stated their experience with the Posterolateral Femoral Locking Plate (PFLP), reporting a 63.6% rate of 'catastrophic failure' in displaced fractures. There is a common consensus that, 'shortening of the femoral neck' is a very common issue after screw fixation of femoral neck fractures [7]. In our study, at the post-operative period, the mean vertical femoral neck shortening was found 5.11 ± 1.88 mm and the mean horizontal femoral neck shortening was found 5.06 ± 1.79 mm. In a study the data for femoral neck fractures treated by multiple cannulated screws (MCS) indicate a shortening rate of

27 to 31% [8]. Some scholars claimed, MCS (Multiple cannulated screws) cannot ensure enough resistance in shortening as it is based only on 'friction of the bone' or unthreaded portion of the screw interface [16].

Limitation of the study

This was a single centred study with a small sized sample. So, findings of this study may not reflect the exact scenario of the whole country.

6. CONCLUSION

Cannulated cancellous screw method may be considered as an effective method for treating femoral neck fractures in children. Considering low blood loss, prompt healing and less vertical as well as horizontal femoral neck shortening cannulated screw fixation (CSF) method may be considered as the method of choice for treating children with femoral neck fractures.

7. RECOMMENDATION

For getting more specific information regarding this issue we would like to recommend for conducting more studies in several places with larger sized samples.

REFERENCES

1. Khoo, C. C. H., Haseeb, A., & Singh, V. A. (2014). Cannulated screw fixation for femoral neck fractures: A 5-year experience in a single institution. *Malaysian orthopaedic journal*, 8(2), 14.
2. Parker, M. J., & Blundell, C. (1998). Choice of implant for internal fixation of femoral neck fractures: meta-analysis of 25 randomised trials including 4,925 patients. *Acta Orthopaedica Scandinavica*, *69*(2), 138-143.
3. Swiontkowski, M. F. (1994). Intracapsular fractures of the hip. *J Bone Joint Surg Am*, 76, 129-138.
4. Estrada, L. S., Volgas, D. A., Stannard, J. P., & Alonso, J. E. (2002). Fixation failure in femoral neck fractures. *Clinical Orthopaedics and Related Research®*, *399*, 110-118.
5. Wang, Z., Yin, Y., Li, Q., Sun, G., Peng, X., Yin, H., & Ye, Y. (2018). Comparison of early complications between the use of a cannulated screw locking plate and multiple cancellous screws in the treatment of displaced intracapsular hip fractures in young adults: a randomized controlled clinical trial. *Journal of orthopaedic surgery and research*, *13*(1), 1-10.
6. Charles, M. N., Bourne, R. B., Davey, J. R., Greenwald, A. S., Morrey, B. F., & Rorabeck, C. H. (2005). Soft-tissue balancing of the hip: the role of femoral offset restoration. *Instructional course lectures*, *54*, 131-141.
7. Zlowodzki, M., Jönsson, A., Paulke, R., Kregor, P. J., & Bhandari, M. (2007). Shortening after femoral neck fracture fixation: is there a solution?. *Clinical Orthopaedics and Related Research®*, *461*, 213-218.
8. Aminian, A., Gao, F., Fedoriw, W. W., Zhang, L. Q., Kalainov, D. M., & Merk, B. R. (2007). Vertically oriented femoral neck fractures: mechanical analysis of four fixation techniques. *Journal of orthopaedic trauma*, *21*(8), 544-548.
9. Söderman, P., & Malchau, H. (2001). Is the Harris hip score system useful to study the outcome of total hip replacement?. *Clinical Orthopaedics and Related Research (1976-2007)*, *384*, 189-197.
10. Yue, L. I. U., Zi Sheng, A. I., & Jin SHAO, T. Y. (2013). Femoral neck shortening after internal fixation. *Acta Orthop Traumatol Turc*, *47*(6), 400-404.
11. Nakai, T., Liu, N., Fudo, K., Mohri, T., & Kakiuchi, M. (2014). Early complications of primary total hip arthroplasty in the supine position with a modified Watson-Jones anterolateral approach. *journal of orthopaedics*, *11*(4), 166-169.
12. Ly, T. V., & Swiontkowski, M. F. (2008). Management of femoral neck fractures in young adults. *Indian journal of orthopaedics*, *42*(1), 3-12.
13. Frandsen, P. A., Andersen, P. E., Christoffersen, H., & Thomsen, P. B. (1984). Osteosynthesis of femoral neck fracture: the sliding-screw-plate with or without compression. *Acta Orthopaedica Scandinavica*, *55*(6), 620-623.
14. Thein, R., Herman, A., Kedem, P., Chechik, A., & Shazar, N. (2014). Osteosynthesis of unstable intracapsular femoral neck fracture by dynamic locking plate or screw fixation: early results. *Journal of orthopaedic trauma*, *28*(2), 70-76.
15. Berkes, M. B., Little, M. T., Lazaro, L. E., Cymerman, R. M., Helfet, D. L., & Lorich, D. G. (2012). Catastrophic failure after open reduction internal fixation of femoral neck fractures with a novel locking plate implant. *Journal of orthopaedic trauma*, *26*(10), e170-e176.
16. Alves, T., Neal, J. W., & Dahners, L. E. (2010). Biomechanical comparison of 3 possible fixation strategies to resist femoral neck shortening after fracture. *Orthopedics (Online)*, *33*(4), 1-5.