



Original Research Article

Entry point decision in intramedullary fixation of radial shaft fractures in paediatric population- Should we care?

Ankit Singh^{1,*}, Akram Jawed¹, Vikas Gupta¹¹Unit of Hand and Upper Extremity Surgery, Dept. of Orthopaedic Surgery, Max Smart Hospital, Saket, New Delhi, India

ARTICLE INFO

Article history:

Received 21-12-2022

Accepted 03-01-2023

Available online 14-03-2023

Keywords:

Both bone forearm fractures

ESIN

Lister's tubercle

Lateral entry

Paediatric

Radial shaft fractures

ABSTRACT

Introduction: Children and adolescents are prone to diaphyseal both bone forearm or radial shaft fractures. The use of ESIN (Elastic stable intramedullary nailing) for intramedullary fixation is recommended in such fractures with significant angulation/malrotation. Comparative study of complications resulted by the two most common entry points: Lister's entry point and lateral entry was done.

Materials and Methods: We report a prospective one-year comparative study of seventeen patients who were operated with ESIN (Lister's entry/Lateral entry) and complications were ascertained of either entry points using CHOP parameters.

Results: All seventeen patients underwent surgical intervention. Two out of eight cases with lister's entry developed EI (Extensor indicis) and EPL injury respectively whereas none of the patients with lateral entry showed any long term complications. No complications of infections, malunion or non-union was seen.

Conclusion: We recommend using a lateral entry point based on our findings. Dorsal entry/Lister's entry point complicating in extensor tendon injury often results in long term complications prolonging period of rehabilitation.

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprint@ipinnovative.com

1. Introduction

Conservative management with closed reduction and immobilisation in slab or cast often complicates in malunion, compartment syndrome and stiffness in cases of paediatric both bone forearm fractures or isolated radial or ulna shaft fractures with significant angulation or malrotation.¹ Such cases typically require elastic stable intramedullary nailing (ESIN). Unlike indubitable ulna entry points there is no consensus for radial approaches. Standard approaches include Lister's tubercle entry or lateral entry.² Biomechanically acting as internal splints, ESIN gives axial, translational, flexural and rotational stability.³ The aim of this study was to determine whether lister's tubercle entry for radial shaft fractures is associated

with more significant complications than lateral entry.

2. Methods

Skeletally immature patients with radius shaft fracture or both bone forearm fractures with significant malrotation/angulation treated with ESIN were included in this prospective comparative study of 1 year at the same institution. The choice of approach rested with surgeon. The CHOP parameters were used to assess functional results and document complications.

3. Results

Study included seventeen patients (Mean age: 8.3 years, range: < 12 years) with closed injuries and intact neurovascular status treated with ESIN. Lister's tubercle entry was taken in 8 patients and 9 patients were subjected

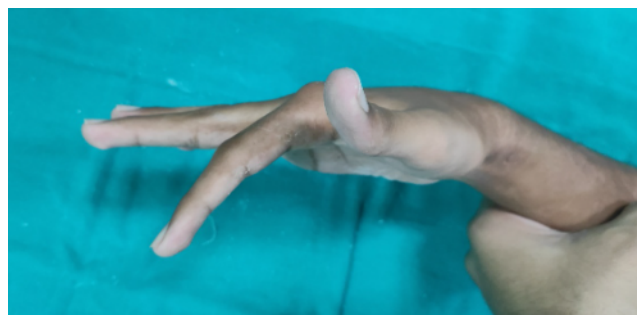
* Corresponding author.

E-mail address: ankitrobin2915@gmail.com (A. Singh).

Table 1: Complications for Lister's tubercle (Group I) and lateral entry (Group II)

	Group I (n)	Group II (n)
EI/EDC rupture	1	0
EPL rupture	1	0
Numbness of dorsum of hand	0	1
Decreased wrist motion	0	0
Superficial infection	0	0
Delayed union/nonunion	0	0
Growth disturbance	0	0

to lateral entry. Fracture union was seen in mean time:44.5 days. Of the lister's tubercle entry cases, one developed loss of index finger extension (Figure 1) which gradually worsened 6 weeks postoperatively and the other depicted thumb extension weakness 8 weeks post surgery. Both were diagnosed with extensor indicis (EI) (Figure 2) and extensor pollicis longus (EPL) tear respectively and were treated with tendon repair subsequently. They could get back to normalcy only after 12-16 weeks of the second surgery. One in 9 cases of lateral entry group suggested numbness over dorsal of hand post-operatively which resolved eventually. Study by Brooker et al. and Murphy et al. also concluded that EPL (Extensor pollicis longus) injury being most common tendon injury after Lister's tubercle entry.^{4,5} No non-union, superficial infections or reduced wrist movements were documented unlike that seen in study conducted by Ali et al. and Parajuli et al.^{6,7} (Table 1)

**Fig. 1:** Index finger drop after dorsal entry ESIN**Fig. 2:** Exploration with extensor indicis tear (forceps holding the distal end) with elastic nail

4. Conclusions

Attritional tendon tear post lister's tubercle entry is alarming if cautious and accurate placement of cut nail-end outside the tendon compartment is not ensured. The subsequent management for complications renders patient incapable in reverting back to normal activities for a prolonged duration. Furthermore, lateral entry complication was devoid of functional or structural deformity.

5. Source of Funding

None.

6. Conflict of Interest

None.

References

1. Flynn JM, Waters PM, Skaggs DL. Rockwood and Wilkins Fractures in Children. 8th ed. Philadelphia: Wolters Kluwer; 2015. p. 413–72.
2. Metaizeau JP, Ligier JN. Surgical treatment of fractures of long bones in children: Interference between osteosynthesis and physiological process of consolidations: Therapeutic indications. *J Chir (Paris)*. 1984;121(8-9):527–37.
3. Johnson CW, Carmichael KD, Morris RP, Gilmer B. Biomechanical study of flexible intramedullary nails. *J Pediatr Orthop*. 2009;29(1):44–8.
4. Murphy HA, Jain VV, Parikh SN, Wall EJ, Cornwall R, Mehlman CT. Extensor Tendon Injury Associated With Dorsal Entry Flexible Nailing of Radial Shaft Fractures in Children: A Report of 5 New Cases and Review of the Literature. *J Pediatr Orthop*. 2019;39(4):163–168.
5. Brooker B, Harris PC, Donnan LT, Graham HK. Rupture of the extensor pollicis longus tendon following dorsal entry flexible nailing of radial shaft fractures in children. *J Child Orthop*. 2014;8(4):353–7.
6. Ali AM, Abdelaziz M, El-Lakanney MR. Intramedullary nailing for diaphyseal forearm fractures in children after failed conservative treatment. *J Orthop Surg (Hong Kong)*. 2010;18(3):328–31.
7. Parajuli NP, Shrestha D, Dhoju D, Dhakal GR, Shrestha R, Sharma V. Intramedullary nailing for paediatric diaphyseal forearm bone fracture. *Kathmandu Univ Med J (KUMJ)*. 2011;9(35):198–202.

Author biography

Ankit Singh, Fellow

Akram Jawed, Senior Consultant

Vikas Gupta, Senior Consultant, Director and Head

Cite this article: Singh A, Jawed A, Gupta V. Entry point decision in intramedullary fixation of radial shaft fractures in paediatric population- Should we care?. *Indian J Orthop Surg* 2023;9(1):27-28.