

Introduction

ESIN is an established method for treatment of unstable forearm shaft fractures in children. Two entry points for retrograde intramedullary nailing of the radius are described: proximal to the growth plate in line with the styloid process or to second at the Lister's tubercle (Fig 1). The latter is commonly chosen for metaphyseal distal fractures. A lesion of the EPL tendon as a complication after ESIN is reported at a rate of 1.5% to 1.9%. As the tendon passes ulnar to the Lister's tubercle it is prone for lesion as it has direct contact with the ESIN (Fig 2).

Methods

We report 4 cases operated from February 2019 to October 2019 of children aged 11 years and 1 month and 14 years and 3 month (mean 12.8 years) who underwent reduction and stabilization of forearm fractures with ESIN where the entry point of the nail was chosen at the Lister's tubercle, who subsequently developed an EPL lesion in zone 7. The lesions were diagnosed before hardware removal and in one case intraoperatively during hardware removal thus 12 to 32 weeks after osteosynthesis on average 22.8 weeks. In three patients a 100% tendon rupture was present and in one case a 90% lesion. We suppose the lesions to be caused by friction, as the nails were introduced by an open approach (Fig 3-4). One EPL was reconstructed by extensor indicis-transfer and one with a palmaris longus transplant. The incomplete EPL lesion was sutured and reinforced with an extensor carpi radialis brevis graft. The fourth patient demonstrated some active retropulsion and extension at the interphalangeal joint. An ultrasonography showed adhesions between the ruptured EPL and the intact extensor pollicis brevis. This explains the remaining function of the thumb. As the patient was not bothered he denied revision together with his parents. During the same period, a total of 24 children underwent operative stabilization with ESIN of the radius at Lister's tubercle.

Results

Over a period of 10 months there was a significant number of EPL tendon lesions in our department of 16,7% as the entry point for the ESIN was chosen at the Lister's tubercle.

Conclusion

Using a slightly ulnar approach to the Lister's tubercle may present with significant percentage of patients with a complete or partial EPL tendon injury, which may required tendon reconstruction or tendon suture, followed by intensive re-education in occupational therapy.

Therefore we think that entry point ulnar to the Lister's tubercle for ESIN in osteosynthesis of diaphyseal radial fractures in children must be avoided in order to prevent laceration of the EPL tendon.

References

- Laurent Audigé, Theddy Slongo, Nicolas Lutz, Andrea Blumenthal & Alexander Joeris (2017) The AO Pediatric Comprehensive Classification of Long Bone Fractures (PCCF), Acta Orthopaedica, 88:2, 133-139
- Martus, Jeffrey E. MD; Preston, Ryan K. BA; Schoenecker, Jonathan G. MD, PhD; Lovejoy, Steven A. MD; Green, Neil E. MD; Mencia, Gregory A. MD Complications and Outcomes of Diaphyseal Forearm Fracture Intramedullary Nailing, Journal of Pediatric Orthopaedics: September 2013 - Volume 33 - Issue 6 - p 598-607
- Murphy, Hamadi A.; Jain, Viral V.; Parikh, Shital N.; Wall, Eric J.; Cornwall, Roger; Mehlman, Charles T. 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, Journal of Pediatric Orthopaedics, Volume 39, Number 4, April 2019, pp. 163-168(6)
- Lee SM, Ha DH, Han SH (2018) Differential sonographic features of the extensor pollicis longus tendon rupture and other finger tendons rupture in the setting of hand and wrist trauma. PLoS ONE 13(10): e0205111
- Lyman, Amanda; Wenger, Daniel; Landin, Lennart; Pediatric diaphyseal forearm fractures: epidemiology and treatment in an urban population during a 10-year period, with special attention to titanium elastic nailing and its complications, Journal of Pediatric Orthopaedics B, Volume 25, Number 5, September 2016, pp. 439-446(8)
- Slongo TF. Complications and failures of the ESIN technique. Injury. 2005 Feb;36 Suppl 1:A78-85. DOI: 10.1016/j.injury.2004.12.017.

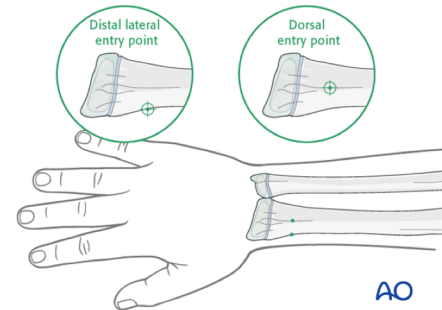


Fig. 1 - Entry points:
a) proximal to the growth plate at the radial styloid
b) at the Lister's tubercle

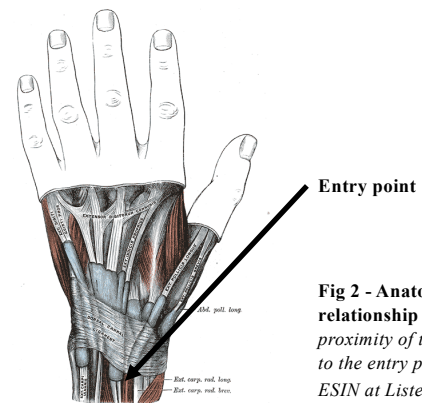


Fig 2 - Anatomical relationship
proximity of the tendons to the entry point of ESIN at Lister's tubercle



Fig 3 - Frontal X-ray:
positioning of the nail on Lister's tubercle.



Fig 4 - Profile X-ray:
even bending the nail tip does not protect the EPL tendon.