

Response to comment on O'Shaughnessy et al: 'Management of paediatric humeral shaft fractures and associated nerve palsy'

Maureen A. O'Shaughnessy¹
Joshua A. Parry²
Huan Huan Liu³
Anthony A. Stans⁴
A. Noelle Larson⁴
Todd A. Milbrandt⁴

Dear Colleagues,

We wish to respond to the Letter to the Editors regarding our recent manuscript 'Management of paediatric humeral shaft fractures and associated nerve palsy'.¹

Thank you for your interest in our article. You have caught an error in our text that we would like to bring to everyone's attention. In the results section of the manuscript it states that surgical stabilization occurred in patients with a mean age of 16 years (15 to 17). This is incorrect. The mean age of these patients was 13 years old and ranged from three years to 17 years old. Details for each of the 15 patients that underwent surgery can be found in Table 3 of the original article.¹

We agree with the authors' comments that not all humeral shaft fractures are alike in the paediatric population. There is significant variability and remodelling potential by age group as you mentioned. Please refer to the newly provided figure and table, which give a breakdown of number of fractures by age group and their mode of fracture treatment (Fig. 1, Table 1). We chose to use the age breakdown as used by the referenced article by Cheng et al.²

As can be seen, the majority of fractures were in the oldest age group (12 years to 16 years; n = 15; 54%). In our series this was attributed to more high-energy injuries sustained in this age group such as those sustained by all terrain vehicle riding, trampolining, motocross, cycling, etc. This group also had the highest rate of surgical intervention (n = 11; 26%). In our study this also correlates with the group with the highest amount of fracture angulation and translation. However, we cannot exclude treating surgeon bias that older children have less remodelling potential, which may have biased surgeons to treat the fracture operatively in the older child.

We also concur with the authors' comments that expectations of perfect results, family preference for faster outcomes and avoiding repeated clinic visits are also likely to come into play when making treatment decisions. The authors are correct that we may continue to see increased rates of operative management. A significant limitation to studying this fracture pattern is that humeral shaft fractures are relatively rare in the paediatric population. As mentioned, our study spanned a 20-year time period (1996 to 2016) at a single Level 1 trauma centre and only identified 96 fractures, of which only 80 were suitable for analysis. Multi-centre trials would be a valuable means to increase the numbers to allow meaningful analysis of trends and outcomes for this fracture subset among children.

In our review of the literature, no study to date has published the incidence of paediatric radial nerve palsy in humeral shaft fractures. Radial nerve injuries in the paediatric population are exceedingly rare and this paper serves to describe the incidence and outcomes in our experience, in addition to a review of relevant literature on management. We agree that five nerve palsies is too small a number to draw any significant conclusions or make any conclusive management recommendations. However, we felt it was essential to publish this information. Our study found a radial nerve palsy rate of 4% and any nerve palsy rate of 6%. To further describe this population in detail as requested we have created an additional table for your review (Table 2). Again, multi-centre trials would be beneficial to further elucidate incidence and management of nerve injuries in paediatric humeral shaft fractures.

Yours faithfully,
The Authors

¹ Department of Orthopaedic Surgery, University of Kentucky, Lexington, Kentucky, USA

² Department of Orthopedic Surgery, Denver Health Medical Center, University of Colorado School of Medicine, Denver, Colorado, USA

³ Department of Pediatric Orthopedics, Luoyang Orthopedic Hospital, Luoyang, Henan Province, China

⁴ Department of Orthopedic Surgery, Mayo Clinic, Rochester, Minnesota USA

Correspondence should be sent to Dr. Maureen O'Shaughnessy, Department of Orthopaedic Surgery, University of Kentucky 740 S Limestone, K401 Lexington KY 40536-0284
E-mail: maureen.oshaughnessy@uky.edu

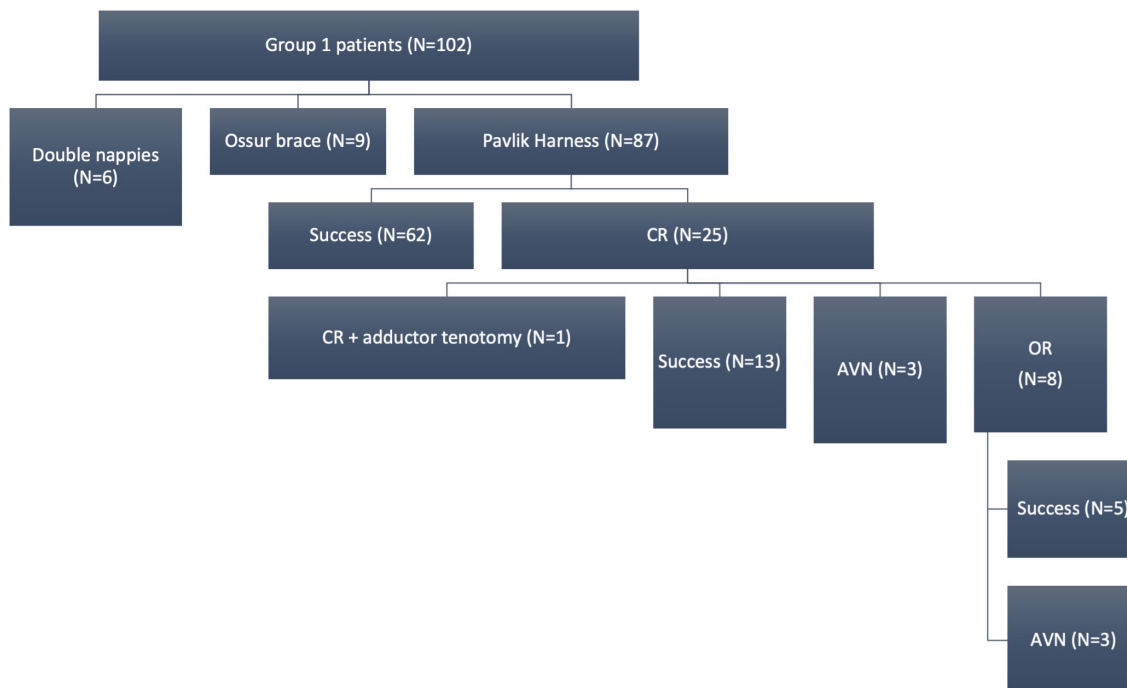


Fig. 1 Fracture distribution and management by age group

Table 1 Fracture distribution and management by age group

Age range, yrs	0 to 3	4 to 7	8 to 11	12 to 16	Total, n
Number, n (% total study population)	11 (14)	9 (11)	17 (21)	43 (54)	80
Nonoperative treatment, n (%)	9 (82)	9 (100)	15 (88)	32 (74)	65
Operative treatment, n (%)	2 (18)	0 (0)	2 (12)	11 (26)	15

Table 2 Details of paediatric humerus shaft fractures presenting with nerve palsy

Age, yrs	Sex	Mechanism	Associated injuries	Fixation type	Nerve palsy	Nerve recovery	AO classification	Angulation, °	Shortening, mm	Translation, mm	Follow-up, mths
14	M	Motocross	Radius/ulna fracture, pulmonary contusion, rib fractures, splenic laceration	FN	Ulnar nerve – motor and sensory	Resolved by 48 hrs	12A3	10	1.6	2.3	12
13	M	Go-cart	-	FN	Median nerve – motor and sensory	Resolved by day 4	12A3	7	0	0	49
13	M	Unknown	-	-	Radial nerve – motor and sensory	Resolved at 2 mths	12A3	17	0.9	2.2	55
10	F	Unknown	-	-	Radial, ulnar, and median nerve – motor and sensory	Median and ulnar nerve palsy resolved by day 3. Radial nerve injury resolved by 22 wks	12A3	21	0	0	54
12	F	Twisting mechanism	-	-	Radial nerve – motor and sensory	Resolved by 5 mths	12A2	21	1	2	41

AO, Arbeitsgemeinschaft für Osteosynthesefragen; FN, flexible intramedullary nails

Received 20 January 2021; accepted 29 March 2021.

FUNDING STATEMENT

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

OA LICENCE TEXT

This article is distributed under the terms of the Creative Commons Attribution-Non Commercial 4.0 International (CC BY-NC 4.0) licence (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed.

ICMJE CONFLICT OF INTEREST STATEMENT

All authors declare that they have no conflict of interest.

AUTHOR CONTRIBUTIONS

MO'S: Manuscript composition and review

JP: Manuscript composition and review

HL: Manuscript review

AS: Manuscript review

ANL: Manuscript review

TM: Manuscript review

REFERENCES

1. **O'Shaughnessy MA, Parry JA, Liu H, Stans AA, Larson AN, Milbrandt TA.** Management of paediatric humeral shaft fractures and associated nerve palsy. *J Child Orthop.* 2019;13:508-515.
2. **Cheng JCY, Ng BKW, Ying SY, Lam PKW.** A 10-year study of the changes in the pattern and treatment of 6,493 fractures. *J Pediatr Orthop* 1999;19:344-350.

Cite this article: O'Shaughnessy MA, Parry JA, Liu H, Stans AA, Larson AN, Milbrandt TA Response to comment on O'Shaughnessy et al: 'Management of paediatric humeral shaft fractures and associated nerve palsy'. *J Child Orthop* 2021;15:306-308. DOI: 10.1302/1863-2548.15.200243