

Not just another nursemaid's: an enigmatic paediatric humeral fracture.

Brandon Cope

Michael Tracy MD

Follow this and additional works at: <https://scholarlyworks.lvhn.org/surgery>



Part of the [Medicine and Health Sciences Commons](#)

This Article is brought to you for free and open access by LVHN Scholarly Works. It has been accepted for inclusion in LVHN Scholarly Works by an authorized administrator. For more information, please contact LibraryServices@lvhn.org.

Not just another nursemaid's: an enigmatic paediatric humeral fracture

Brandon Cope and Michael Tracy

Abstract

In the medical literature, the discussion of radial head subluxation (RHS) and nursemaid's elbow may highlight the ability to diagnose and treat the injured patient without obtaining imaging studies. This case reiterates the importance of a thorough physical examination and the use of appropriate imaging when point tenderness is exposed in the injured limb. With point tenderness to the arm, a child with a presumed RHS, otherwise known as nursemaid's elbow, should be evaluated using radiographic imaging to prevent additional potentially destructive physical manipulation of the patient's upper extremity.

Keywords: trauma, orthopaedics, child abuse, radiology

Background

Medicine is both an art and a science, limiting unnecessary costs is where this dichotomy is particularly evident. Physicians of time past relied exclusively on their ability to elicit the history of present illness and incorporate physical findings in order to deduce diagnoses. Before the discovery of X-ray examination and other imaging modalities, a nursemaid's elbow was an example of an injury that did not 'need' imaging studies. With the history and physical examination, physicians were able to treat a relatively debilitating injury in 15 minutes or less. This case is important because in spite of this historically significant injury and well-documented reduction techniques, a physician must avoid the inevitable temptation to throw out pertinent physical examination techniques and differential diagnoses.

Case presentation

A 4-year-old boy presented to the emergency room after an injury to his left upper extremity. The patient fell while playing on the monkey bars at the park. On presentation, the patient refused to use the arm and held his arm in a pronated position with slight flexion at the elbow.

A presumptive diagnosis of radial head subluxation (RHS) was made. However, extensive manipulation of the elbow resulted in no symptomatic or functional relief. Imaging was ordered after the fifth unsuccessful attempt to reduce the elbow, revealing a proximal humeral shaft fracture. The patient was discharged from the emergency department and instructed to follow-up in the orthopaedic clinic (figure 1). Plain radiographs were taken in the orthopaedic clinic. The radial head was found to be concentrically reduced. A humeral shaft fracture was identified and treated non-surgically. The fracture was followed with serial radiographs. By 6 months postinjury, the fracture was well healed radiographically, and the patient had returned to all activities without pain or limitation. A good clinical outcome was achieved by applying the principles of management of proximal humeral shaft fractures with limited (<20%) valgus angulation.



Figure 1
Left proximal humeral shaft fracture suffered by the patient in the case.

Differential diagnosis

A detailed history and physical examination should be done to think about a differential diagnosis. Practitioners should consider imaging of the elbow if the history consists of falling from a high place or tumbling, or if the precise history is unclear, and there are abnormal physical examination findings.

Treatment

Immobilisation and casting.

Outcome and follow-up

In the current climate of cost cutting, financial awareness and an unstable healthcare system, the ordering of plain radiographs requires justification. Classically, the nursemaid's elbow is one such injury in which good history taking, observational skills and clinical examination and experience avoid the need for imaging studies. However, this case serves as a warning against premature diagnosis without the development of a robust differential and exclusionary physical examination. Additionally, it highlights some sober consequences to oversight in the case of a humeral fracture. Fortunately, in this case, a good clinical outcome was achieved by applying the principles of management of proximal humeral shaft fractures with limited (<20%) valgus angulation.

Both the institutional review board committees (IRBC) study and this case highlight the need to consider humeral shaft fractures within the differential diagnosis.

Discussion

Clinical diagnosis of RHS can be problematic for several reasons. The classic presentation of elbow pain in a child after a traction injury to the elbow in extension and pronation is not the only possible mechanism of injury.¹⁻⁵ The classic traction injury may account for only 60% of cases.^{2,4} Additionally, a history obtained from a young child may be incomplete. Finally, because RHS can occur in the setting of abuse, the caregiver's account of the injury may be unclear as well.⁶

Pain localisation from a child with RHS can range from the wrist to shoulder areas.⁷ Whether this is due to the age of the patient, fear of the child, traumatic experience or true, actual localised pain to these regions is unclear. A cooperative child with an isolated, closed arm injury experiencing pain with movement and acceptable alignment of the bones could describe either a closed humeral shaft fracture or RHS. These are factors that may contribute to misdiagnosis and put the patient's health at risk.

Misdiagnosing a humeral shaft fracture could have severe consequences such as secondary deep vein injuries, deep brachial artery injury or radial nerve damage. These injuries are frequently caused by a fractured segment of bone and not the direct trauma; iatrogenic manipulation could provoke such damage. Vascular injuries secondary to manipulation require surgery.⁸ In a study by Niver and Ilyas, to look at the prevalence of secondary nerve damage, as many as 31% of cases of humeral fractures had accompanying radial nerve damage. Of these patients, 40% lost function in the affected arm, which can ultimately affect a patient's daily life and livelihood.^{9,10} Morbidity secondary to RHS misdiagnosis and mismanagement is identified in many case studies in the literature. A study conducted by Cohen-Rosenblum and Bielski¹¹ warned about misdiagnosis leading to displacement of a fracture and the need for possible surgical intervention. They recommend that patients with elbow pain lacking the typical history of abrupt longitudinal traction should undergo elbow imaging prior to any attempts at reduction. The authors emphasised that it is a 'common clinical mistake to treat all paediatric elbow injuries as a nursemaid's elbow'.

In the orthopaedic community, there is a lack of consensus over the decision to send a patient for a diagnostic X-ray. Some authors suggest diagnostic X-ray,^{5,12,13} while others argue for a clinical diagnosis of RHS and reduction without imaging.^{4,14,15} Those arguing against radiographic evaluation suggest that this streamlines patient care. Some studies have encouraged reduction attempts spaced 15 min apart, until the patient is asymptomatic.¹⁶

An attempt to answer this question led to a study by the IRBC to look at the prevalence of missed fractures in children with a presumed diagnosis of RHS.¹⁶ This has been the only study to attempt to describe the prevalence of fractures, or the risk of a fracture, as it relates to young children presenting with the classic flexed elbow/pronated upper extremity.

The study analysed all upper extremity injuries over the course of a year in children less than 6 years of age who presented in the clinical RHS posture (n=136). In the study, exclusions were made for patients with point tenderness, ecchymosis, erythema and oedema. Despite these exclusions, the study identified one patient presenting with an underlying humeral shaft fracture. Three other upper extremity fractures were also misdiagnosed. This is very significant in regards to the finding of our case. Our patient fit into this category exactly. Two of the patients with upper extremity fractures that mimicked RHS in their presentation had point tenderness that was dismissed due to how much the general presentation of the patient indicated a RHS. In other words, the study underscored how important point tenderness may be in cases of occult extremity fractures even when there is evidence of a possible diagnosis of RHS.

The IRBC proposed that a larger series of children is needed to delineate some of the study's significance. They concluded that it was necessary to conduct a study that includes all upper extremity injuries in children under age six presenting with point tenderness, ecchymosis, erythema and oedema. These cases could provide valuable information surrounding diagnosis criteria and evaluation methods including any inadequacies in eliciting point tenderness.

Patient's perspective

“Upon evaluation at the ED it was almost as if the doctor was hesitant to X-ray his arm. Even with their hesitancy to do an X-ray I was not willing to leave the ED without the X-ray knowing my son and his normal reaction to an injury/fall. I do appreciate your work in this matter as I feel it is important to educate providers from a specialty standpoint in regards to treatment in an emergency setting.”

-Mother of the boy

Learning points

- Review the role of imaging in traction injuries to the elbow in children.
- Examine risk factors for missed diagnosis of humeral shaft fractures.
- The importance of thorough examination of point tenderness in a child (0–6 years) with presumed radial head subluxation.
- Stress the importance of good clinical skills in addition to an analysis of prudent usage of radiographic imaging.

Footnotes

Contributors: The patient was seen by MT. MT is a partner at Coordinated Health Scranton Orthopedics and specialises in the treatment of shoulder and elbow arthritis, rheumatoid conditions and sports and traumatic injuries. This includes joint replacement surgery, arthroscopic rotator cuff repair, elbow ligament reconstruction and operative fixation of fractures of the clavicle, shoulder and elbow. He completed his orthopedic residency at Wake Forest University and a fellowship in shoulder and elbow surgery at the Rothman Institute at Thomas Jefferson University. MT edited the paper and served as an adviser in its development. BC is a fourth year medical student at Geisinger Commonwealth School of Medicine in Scranton, PA. Brandon completed undergraduate education at Colgate University in May 2015. BC wrote the paper, processed it for editing, and submitted it to BMJ cases.

Funding: The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests: None declared.

Patient consent: Parental/guardian consent obtained.

Provenance and peer review: Not commissioned; externally peer reviewed.

Article information

BMJ Case Rep. 2018; 2018: bcr2017222925.

Published online 2018 Oct 2. doi: [10.1136/bcr-2017-222925](https://doi.org/10.1136/bcr-2017-222925)

PMCID: PMC6169642

PMID: 30279246

Case Report

[Brandon Cope](#)¹ and [Michael Tracy](#)²

¹Orthopedics, Geisinger Commonwealth School of Medicine, Scranton, Pennsylvania, USA

²Coordinated Health Scranton Orthopedics, Dickson City, Pennsylvania, USA

Correspondence to [Brandon Cope](mailto:bcope@som.geisinger.edu), bcope@som.geisinger.edu

Accepted 2018 Sep 13.

Copyright © BMJ Publishing Group Limited 2018. No commercial re-use. See rights and permissions. Published by BMJ.

Articles from BMJ Case Reports are provided here courtesy of **BMJ Publishing Group**

References

1. Magill HK, Aitken AP. Nursemaid's elbow. *Surg Gynecol Obstet* 1954;98:753–6. [PubMed] [Google Scholar]
2. Diab HS, Hamed MM, Allam Y. Obscure pathology of pulled elbow: dynamic high-resolution ultrasound-assisted classification. *J Child Orthop* 2010;4:539–43. [10.1007/s11832-010-0298-y](https://doi.org/10.1007/s11832-010-0298-y) [PMC free article] [PubMed] [CrossRef] [Google Scholar]

3. Schutzman SA, Teach S. Upper-extremity impairment in young children. *Ann Emerg Med* 1995;26:474–9. 10.1016/S0196-0644(95)70117-6 [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
4. Sacchetti A, Ramoska EE, Glasgow C. Nonclassic history in children with radial head subluxations. *J Emerg Med* 1990;8:151–3. 10.1016/0736-4679(90)90224-J [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
5. Wong K, Troncoso AB, Calello DP, et al. . Radial head subluxation: factors associated with its recurrence and radiographic evaluation in a tertiary pediatric emergency department. *J Emerg Med* 2016;51:621–7. 10.1016/j.jemermed.2016.07.081 [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
6. Irie T, Sono T, Hayama Y, et al. . Investigation on 2331 cases of pulled elbow over the last 10 years. *Pediatr Rep* 2014;6:5090 10.4081/pr.2014.5090 [[PMC free article](#)] [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
7. Asher MA. Dislocations of the upper extremity in children. *Orthop Clin North Am* 1976;7:583–91. [[PubMed](#)] [[Google Scholar](#)]
8. Usama KK. Brachial artery injury analysis of 80 cases. *Kufa Med Journal* 2009;12:175–83. [[Google Scholar](#)]
9. Bitsch M, Hensler MK, Schroeder TV. [Traumatic lesions of the axillary and brachial artery]. *Ugeskr Laeger* 1994;156:3890–3. [[PubMed](#)] [[Google Scholar](#)]
10. Niver GE, Ilyas AM. Management of radial nerve palsy following fractures of the humerus. *Orthop Clin North Am* 2013;44:419–24. 10.1016/j.ocl.2013.03.012 [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
11. Cohen-Rosenblum A, Bielski RJ. Elbow pain after a fall: nursemaid's elbow or fracture? *Pediatr Ann* 2016;45:e214–e217. 10.3928/00904481-20160506-01 [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
12. Frumkin K. Nursemaid's elbow: a radiographic demonstration. *Ann Emerg Med* 1985;14:690–3. 10.1016/S0196-0644(85)80890-8 [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
13. Snyder HS. Radiographic changes with radial head subluxation in children. *J Emerg Med* 1990;8:265–9. 10.1016/0736-4679(90)90003-E [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
14. Choung W, Heinrich SD. Acute annular ligament interposition into the radiocapitellar joint in children (nursemaid's elbow). *J Pediatr Orthop* 1995;15:454–6. 10.1097/01241398-199507000-00008 [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
15. Kaufman D, Leung J. Evaluation of the patient with extremity trauma: an evidence based approach. *Emerg Med Clin North Am* 1999;17:77–95. 10.1016/S0733-8627(05)70048-1 [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
16. Macias CG, Wiebe R, Bothner J. History and radiographic findings associated with clinically suspected radial head subluxations. *Pediatr Emerg Care* 2000;16:22–5. 10.1097/00006565-200002000-00007 [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]