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SUBSPECIALTY PROCEDURES

Intramedullary Ulnar Fixation for the Treatment of Monteggia Fracture

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Published outcomes of this procedure can be found at: *J Pediatr Orthop*. 2015 Mar;35(2): 115-20, and *J Pediatr Orthop*. 2017 Sep;37(6):e335-e341.

Investigation performed at the Scottish Rite Hospital for Children, Dallas, Texas

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Abstract

Background: Although many pediatric Monteggia fractures can be treated nonoperatively, the presence of any residual radiocapitellar subluxation following ulnar reduction mandates a more aggressive approach to restore and maintain ulnar length. In younger children, restoration and maintenance of ulna length may be achieved through intramedullary fixation of the ulnar shaft.

Description: A Steinmann pin or flexible intramedullary nail is introduced percutaneously through the olecranon apophysis and advanced within the medullary canal to the ulnar fracture site. If necessary, the ulnar length and alignment are then restored by either a closed reduction or open reduction. The pin or nail is advanced across the fracture site into the distal fracture fragment and then advanced to a point just proximal to the distal ulnar physis. Once restoration of normal radiocapitellar alignment is verified fluoroscopically, the pin is bent and cut outside of the skin and a cast or splint is applied.

Alternatives: Closed reduction and cast immobilization is a well-accepted form of treatment for a Monteggia fracture. If ulnar length and alignment along with an anatomic reduction of the radiocapitellar joint can be achieved in this fashion, surgery can be avoided, but close radiographic follow-up is recommended to assess for loss of alignment with subsequent radial-head subluxation. Open reduction and internal fixation with use of a plate-and-screw construct can achieve similar results to intramedullary fixation and should be considered for length-unstable fractures and those in which an appropriately sized intramedullary implant fails to maintain adequate ulnar alignment. If plastic deformation of the ulna is present with residual radiocapitellar subluxation following reduction of the ulnar diaphysis, consideration should be given to elongating the ulna through the fracture site with use of plate fixation in order to allow reduction of the radial head.

Rationale: Intramedullary fixation provides several benefits over open reduction and plate fixation for these injuries. In general, treatment can be rendered with a shorter anesthetic time, less scarring, and without the concern for symptomatic retained hardware associated with plating along the subcutaneous boarder of the ulna shaft.

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Expected Outcomes: Compared with nonoperative treatment, intramedullary fixation of length-stable Monteggia fractures has lower rates of recurrent radial-head subluxation and loss of ulnar alignment requiring subsequent operative treatment[1]. If healing is achieved without residual radiocapitellar instability, good elbow function can be expected.

Important Tips:

- The entry point for the intramedullary implant should be slightly radial to the tip of the olecranon apophysis to compensate for the anatomic varus bow of the proximal aspect of the ulna.
- Intramedullary fixation is ideal for length-stable ulnar fractures. If a comminuted or long oblique fracture is present, an intramedullary device may not maintain ulnar length, leading to residual or recurrent radiocapitellar instability. For length-unstable fractures, therefore, a plate-and-screw construct should be considered.
- No more than 3 attempts should be made to pass the intramedullary implant into the distal ulnar segment by closed means in order to limit the risk of iatrogenic compartment syndrome.
- If anatomic alignment of the radiocapitellar joint is not achieved following an apparent anatomic reduction of the ulna, assess for plastic deformation of the ulna and consider open elongation of the ulna through the fracture site with use of plate fixation.
- Following fixation and radial-head reduction, immobilize the forearm in the position of maximal radiocapitellar stability (typically in supination).

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