

Post-traumatic synostosis of the proximal radioulnar joint: About one case and review of the literature

R. Acquaviva, M. Hallez, R. Elbaum
CHIREC orthopaedic group
Brussel, Belgium



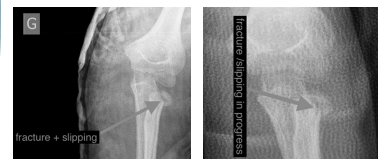
The only man who never makes mistakes is the one who does nothing.

THEODORE ROOSEVELT
(1858 - 1919)

Introduction

- ▶ Very rare complication for radial head fracture and even other trauma (elbow dislocation, radius/cubitus shaft fracture,...) or after forearm osteotomy
- ▶ Lost of range of motion (Prosupination)
- ▶ Lot of treatment in literature as:
 - preventive irradiation
 - resection without interposition
 - resection/interposition
 - resection wo interposition + irradiation
 - resection/interposition + irradiation
- ▶ Still no consensus

Case report

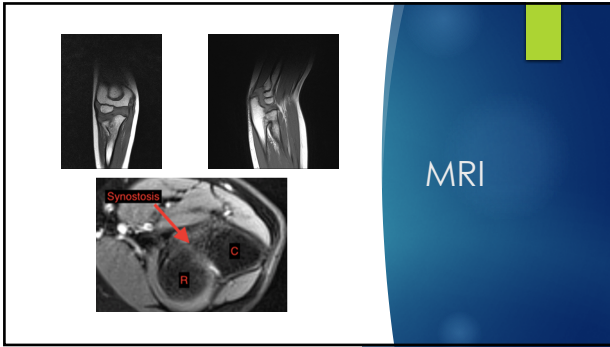


First visit on
01/09/2016

- ▶ Pain in the forearm and the elbow
- ▶ Limited ROM
- ▶ Functional disability to draw and write
- ▶ Limitation PS 30/0/30
- ▶ Extension -30°
- ▶ Elective pain on radial head

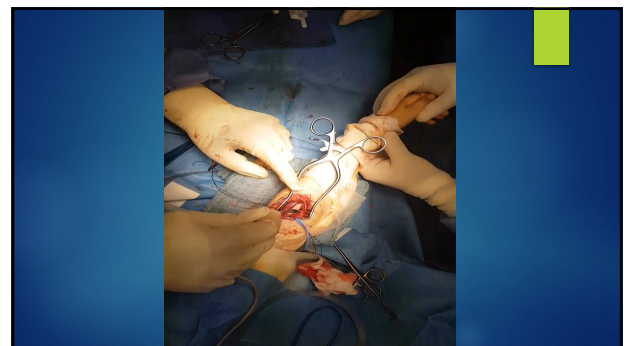
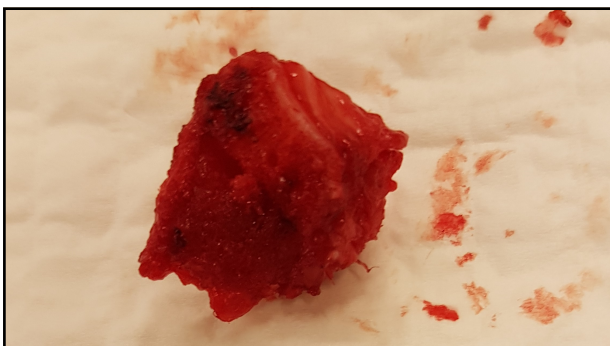
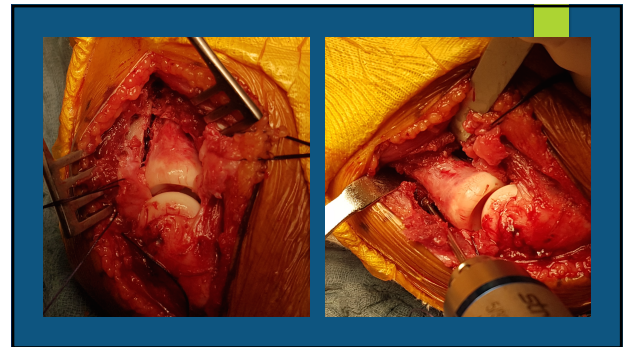
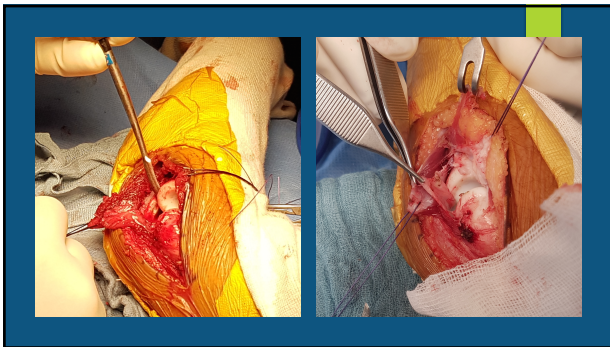
CT-Scan+ 3D Reconstruction





Treatment

Open surgery: Boyd Approach	Resection of synostosis
Bank fascia lata interposition	AINS post-operative
Cast for 3 weeks	PT




Post-operative follow-up

1 w post-op :
wound control + BAB

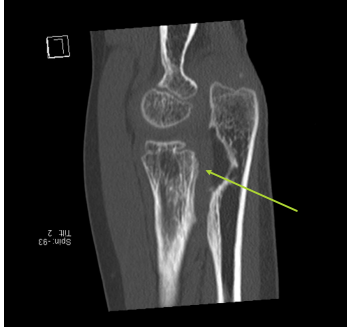
3 w post-op:
remove cast + self kine

7 w post-op:

- - PS > 60/45
- - Rx showing resection zone
- - start kine




POST OP 12/2016



CT Scan 27/03/17

Complete resection of the synostosis



POST OP 04/2017

6 Mo later recurrence with partial anterior synostosis and PS limitation 20°/20°



► Anterior approach (Henry)




Abord antérieur du coude selon Henry avec bifurcation dans l'interligne du coude. Mise en évidence du brachial antérieur et du long supinateur. Ligature des différents vaisseaux superficiels. Mise en évidence du nerf radial qui sera laqué. On se dirige progressivement vers l'interligne articulaire radio-ulnaire proximal. Désinsertion du court supinateur et ouverture de la capsule articulaire. Mise en évidence de la tête radiale. On visualise une **zone protubérante au** niveau de la région sigmoïdienne entre l'ulna et le radius.

LAST FU 11/2018

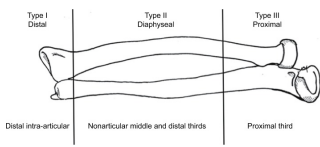
- No pain
- Complete RTS (Ballet)
- No limitation at school
- PS 45/0/60
- Temporary paraparesis in the radial territory (Extensor)




Post traumatic synostosis of proximal (PPRUS) radio ulnar joint in childhood: How to deal with it?



Vince and Miller classification



PPRUS Classification

Vince K. G., Miller J. E. Cross union complicating fracture of the forearm. *The Journal of Bone & Joint Surgery—American Volume*. 1987;69:640-653.

PPRUS Etiology

- Proximal Radial or Ulnar fracture or dislocations
- After closed or open reduction
- Periosteal interpositions
- Surgical approach with traumatization of the tissue
- Repeated manipulation
- Excessive callus formation

- Isolated fractures of the proximal end of the radius in children epidemiology, treatment and prognosis. *Henrikson B Acta Orthop Scand*. 1969; 40(2):244-60.
- Injuries involving the proximal radial epiphysis. *O'Brien PJ Clin Orthop Relat Res*. 1965 Jul-Aug; 41(1):51-8.
- Severe fracture of the neck of the radius in children. *Dougall AJ J R Coll Surg Edinb*. 1969 Jun; 14(4):220-5.
- Radioulnar synostosis following proximal radial fracture in child. *Roy DR Orthop Rev*. 1986 Feb; 15(2):89-94.

PPRUS Epidemiology

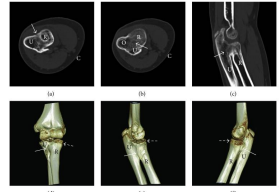
- 1900**
 - Mouchet A. Les fractures du col du radius. *Chirurgie* 1900;21:596-622
- 1969**
 - Acta Orthop Scand. 1969;40(2):244-60. Isolated fractures of the proximal end of the radius in children epidemiology, treatment and prognosis. Henrikson B.
- 1982**
 - Ogden JA. Skeletal injury in the child. Philadelphia: Lea and Febiger
- 1997**
 - von Laer L, Pirwitz A, Vocke AK. Posttraumatic problem cases involving the elbow in children. *Orthopade*
- 2012**
 - Wierer M, Huber-Wagner S, Mutschler W. Post-traumatic proximal radioulnar synostosis. Surgical technique and review of the literature. *Unfallchirurgie* 2012;115:451-6

Case Rep Orthop. 2018 Feb 19:2018

Posttraumatic Proximal Radioulnar Synostosis after Closed Reduction for a Radial Neck and Olecranon Fracture.

Keller PR, Cole HA, Stutz CM, Schoenecker JG

Here, we present a pediatric case of PPRUS that developed after a nonoperatively treated minimally displaced radial neck fracture with concomitant olecranon fracture. While more cases are needed to establish the association between this pattern of injury and PPRUS, we recommend that when encountering patients with a minimally displaced radial neck fracture and a concomitant elbow injury, the rare possibility of developing proximal radioulnar synostosis should be considered.



PPRUS Treatment option

- Roy DR. Radioulnar synostosis following proximal radial fracture in child. *Orthop Rev* 1986;15:89-94
- Aner A, Singer M, Feldbin Z, et al. Surgical treatment of posttraumatic radioulnar synostosis in children. *J Pediatr Orthop* 2002;22:598-600
- Kaminen S, Maritz NG, Morrey BF. Proximal radial resection for posttraumatic radioulnar synostosis: a new technique to improve forearm rotation. *J Bone Joint Surg Am* 2002;84-A:745-51
- Proubasta JR, Lluich A. Proximal radioulnar synostosis treated by interpositional silicone arthroplasty. A case report. *Int Orthop* 1993;19:242-4
- Abzans RA, Simmons BP, Brown RA, Bolte MJ. Treatment of posttraumatic radioulnar synostosis with excision and low-dose radiation. *J Hand Surg Am* 1993;18:703-7
- Friedrich JB, Hanel DP, Chilcote H, Katolik U. The use of tensor fascia lata interposition grafts for the treatment of posttraumatic radioulnar synostosis. *J Hand Surg Am* 2006;31:785-90

Aktuelle Traumatol. 1986
Feb;16(1):13-6.

**[Post-traumatic radio-
ulnar synostoses in
childhood].**

**Bätz W, Hofmann-v Kap-
herr S, Pistor G.**

- ▶ This article reports on five children treated surgically during 1973-1975 for posttraumatic radioulnar synostosis.
- ▶ The article presents the technique of surgical treatment of proximal radioulnar synostosis with Lyodura sheathing.
- ▶ Follow-up examination showed good results in two children, a moderate result in one, and poor results of surgery in two cases.
- ▶ Improved results may be expected from further improvement of the surgical method, such as resection of the bicipital tuberosity (tuberositas radii) or from additional partial sheathing of the ulna at the side facing the radius.

Aust N Z J Surg. 1993 Dec

**Post-traumatic radio-ulnar
synostosis treated by surgical
excision and adjunctive
radiotherapy.**

Thurston AJ, Spry NA.

- ▶ The management of three cases of traumatic radio-ulnar synostosis involved surgical excision of the synostotic bone followed by radiotherapy.
- ▶ Irradiation was commenced on the first postoperative day and was continued daily.
- ▶ No acute side effects were observed. All three patients regained a good, functional range of forearm rotation with no evidence of recurrence of the synostosis after 2 years.

J Bone Joint Surg Am. 2002 May.

**Proximal radial resection for
posttraumatic radioulnar
synostosis: a new technique to
improve forearm rotation.**

Kamineni S, Maritz NG, Morrey BF.

- ▶ Resection of a 1-cm-thick section of the proximal part of the radial shaft provides a safe and reliable method of improving forearm rotation in patients with heterotopic ossification of the elbow.
- ▶ A single technical factor that seems to positively influence the result is the application of bone wax at the resection site.
- ▶ This simple procedure is ideally suited for patients who have a proximal radioulnar synostosis that (1) **is too extensive to allow a safe and discrete resection**, (2) **involves the articular surface**, and (3) **is associated with an anatomical deformity**.

**J Pediatr Orthop. 2002 Sep-
Oct;22(5):598-600.**

**Surgical treatment of
posttraumatic radioulnar
synostosis in children.**

**Aner A, Singer M, Feldbrin
Z, Rzetelny V, Bar-On E.**

- ▶ The authors describe two children who underwent surgical treatment of radioulnar synostosis. **One case involved simple excision; the other, excision and interposition of Goretex vascular graft material.** In a review of the literature, no other report of the latter type of surgical treatment was found. A discussion of the literature concerning this rare complication in children and the current surgical treatment options are included.

Conclusion

**The Posttraumatic Proximal
Cross-union of the Forearm in
Childhood: What is
Recommended?**

**Marcel Duda, Tobias
Fehrer, Thomas A.
Schilthauer, and Christiane
Kruppa**
Orthop Rev (Pavia). 2013 Jun.

- ▶ Postoperative cross-unions are rarely seen in the pediatric population and there is no consensus as to treatment.
- ▶ Compared to the adult population, worse results in pediatric diaphyseal (type 2) cross-unions are reported.
- ▶ We suggest resection within 6-24 months without necessarily an interposition technique.
- ▶ For delayed treatment, resection of the radial head as salvage procedure can be performed.
- ▶ We advocate postoperative oral therapy with NSAID in all patients and irradiation in cases of delayed treatment of cross-unions.
- ▶ All patients should be treated with intensive physiotherapy and continuative postoperative follow up to prevent a loss of range of motion.

**Experience is the
name everyone
gives to his
mistakes.**

OSCAR WILDE (1854-1900)