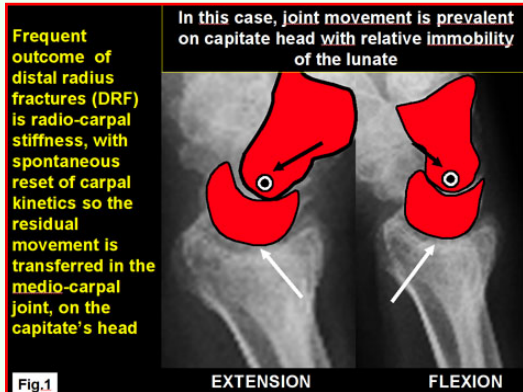


“REGRESSIVE” PATHO-MECHANICS OF DISTAL RADIAL FRACTURES, AND SAVAGE BY RECONSTRUCTION OF COXA MANUS

Grippi Gaetano Maurizio

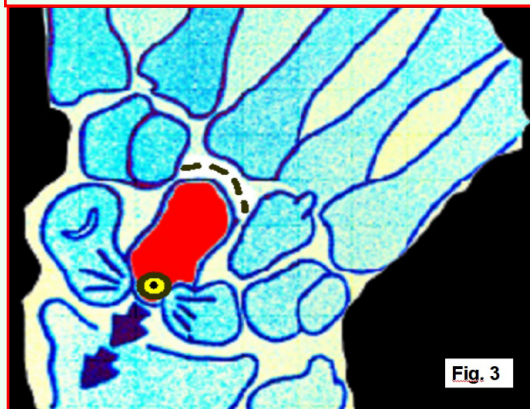
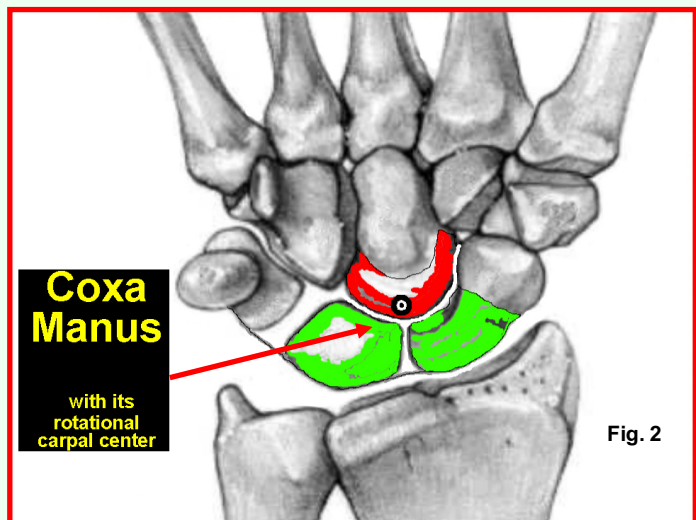
Hand Surgery in UOA of Orthopaedic – S. Lazzaro Hospital – Alba (CN) - ASL CN2 of Piemont, Italy



Objective - Frequent outcome of Distal Radius Fractures (DRF) is radio-carpal stiffness, with spontaneous reset of carpal kinetics so the residual movement is transferred in the medio-carpal joint, on the capitate's head (Fig.1).

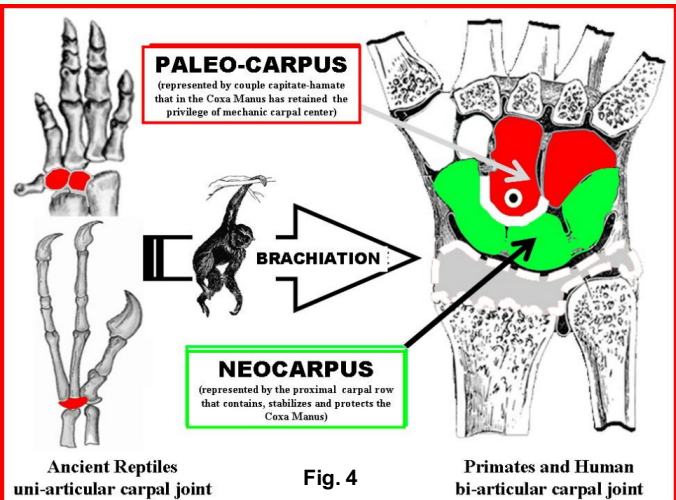
This opportunity is an interesting adaptation to trauma, produced by Evolution during phylogenesis of Primate's Anterior Autopod towards the particular order of human carpus.

In fact, according to **Biarticular Concentric Carpal Mechanism (BCCM)** (1-2), this assimilates the carpus to a bi-articular hip prosthesis that, in the small prosthetic head - reproduced from Capitate - has the center of rotation (CR) (Fig. 2). Using this similitude, at the center of the carpus is identified the “ball and socket” joint of **Coxa Manus (CM)**, the “true” primitive carpal joint, where takes place the s.c. “dart-trowing motion”.



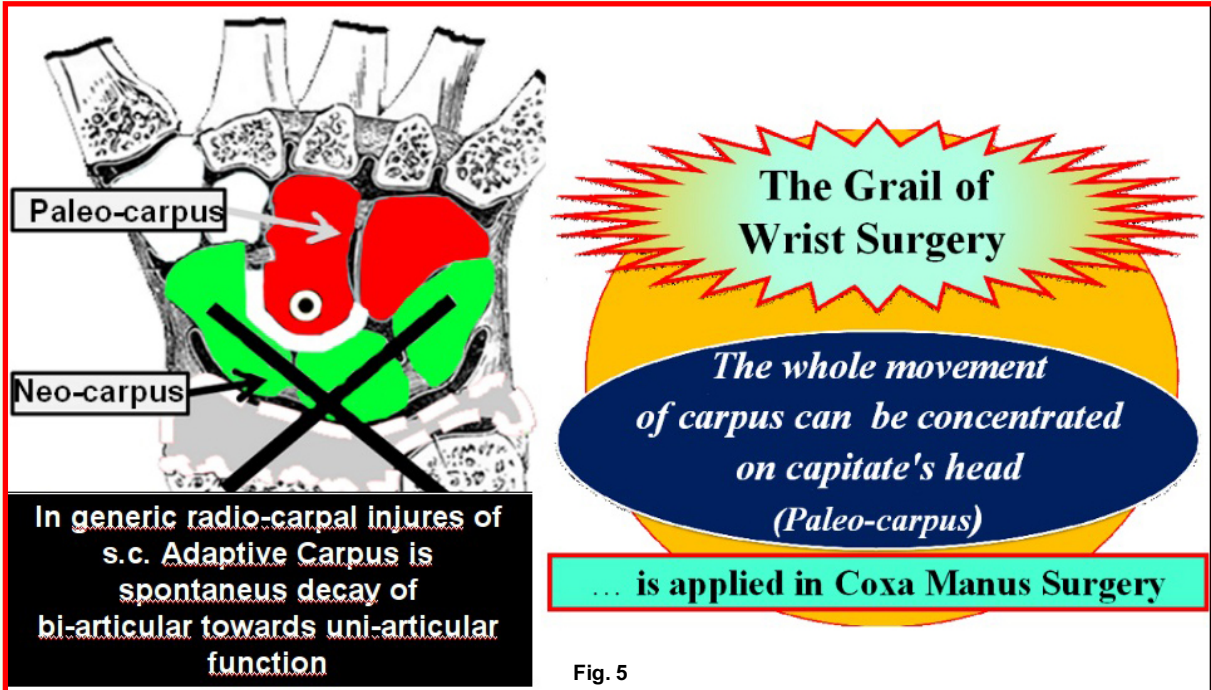
Disconnection of Coxa Manus causes, or rather “IS” the Carpal Instability. Certified by the patognomonic sign of the static or dinamic dislocation of capitate's head with its rotation carpal center (Fig. 3).

In the Evolution and Brachiation of Primates, the Human bi-articular carpal joint comes from the Reptiles uni-articular joint, with an onto-phylogenetic development for which the radio-carpal appears after the mid-carpal joint (4). So that, in wrist is possible to distinguish two parts: a distal, ancient: the **Paleo-Carpus**, represented by couple capitate-hamate, that in the Coxa Manus has retained the privilege of mechanic carpal center, the other proximal, recently: the **Neo-Carpus**, represented by the proximal carpal row that contains stabilizes and protects the Coxa Manus (Fig. 4), (5).

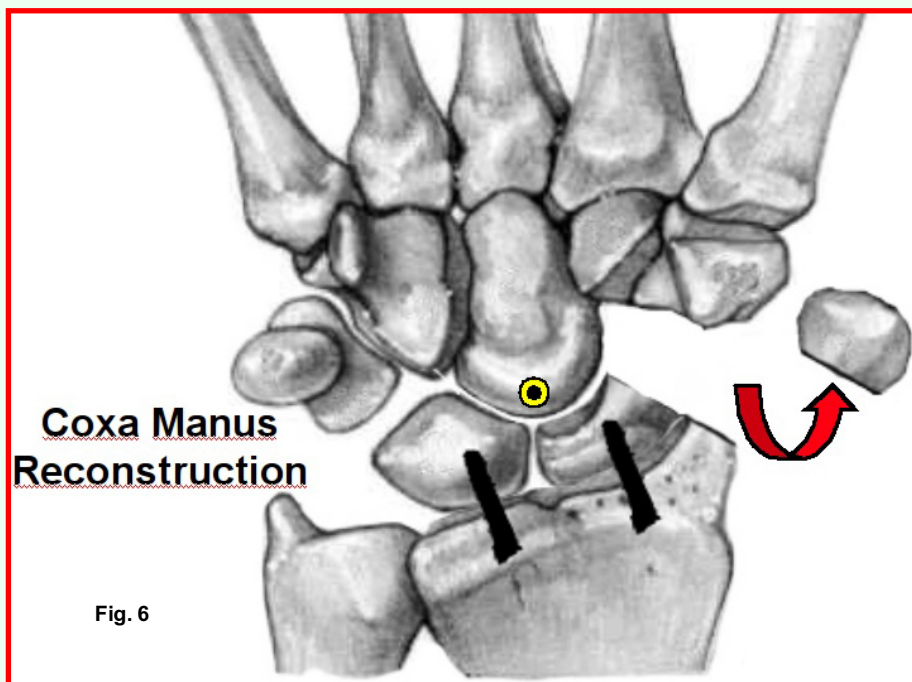


In generic radio-carpal injury of s.c. **Adaptive Carpus (AC)** is spontaneous decay of bi-articular towards uni-articular function, basically centred on Coxa Manus and its "dart-trowing motion" (6). This patho-mechanics (resurrecting the ancestral Paleo-Carpus leadership) is potential stereotype in any anatomical alteration (congenital or acquired) of Neo-Carpus: then, emerging in the outcomes of distal radius fractures, in Madelung, in Kienböck, in SNAC-SLAC-SCAC wrist, etc.

In the same way – to recover problematic radio-carpal injures - valid surgical option is to concentrate the whole movement of carpus on capitate' head. That is, on Paleo-Carpus. This concept is the s.c. **"Grail of Wrist Surgery"** and is applied and has produced the Coxa Manus Surgery (Fig. 5), (5).



Methods: Particularly useful and versatile is the **Reconstruction of Coxa Manus (CMR)** that consists in a volar radius-lunate-(hemi-scapoid) arthrodesis (with scaphoid distal resection) - Fig. 6. The operation optimizes the physiological adaptation by bi-articular towards uni-articular function, implicit in Adaptive Carpus. In this way, the capitate's head is centred and provided with a new stable support and a full dart trowing motion. **The first CMR we did in June 2000, in a SNAC Wrist (3).**



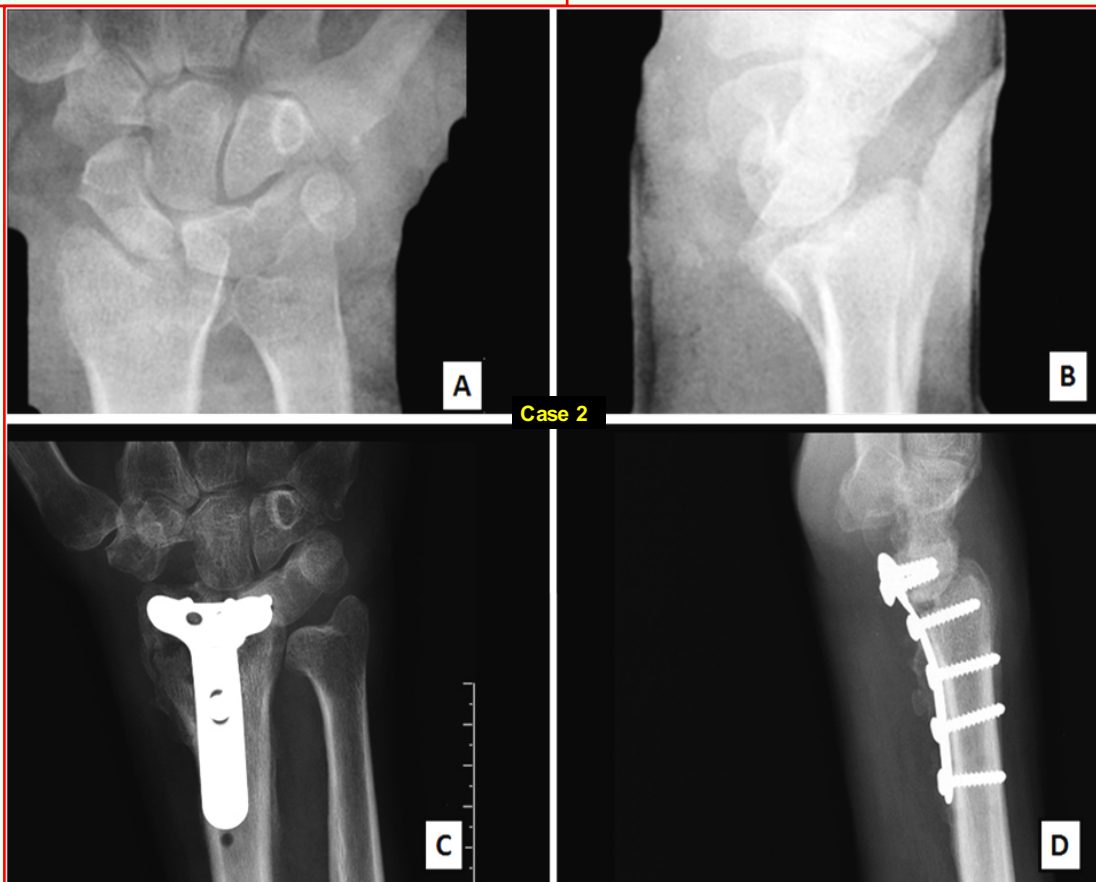
USE OF COXA MANUS RECONSTRUCTION (CMR) IN THE OUTCOMES OF DISTAL RADIUS FRACTURES

The CMR eliminates movement in the radio-carpic damaged joint and amplifies that in the mid-carpic unscathed joint. The intervention is specifically indicated in cases of chronic pain and/or stiffness to prevent the useful function (ie, less than 45° of extension, 30° of flexion, 15° of ulnar deviation and/or radial and 50° of pronation and/or supination).

It is performed by volar access, to prevent unwanted dorsal capsular retraction; it requires integrity of capitate's head and it is related to better recovery (up to 80%) of the flexion-extension and/or ulnar-radial deviation. In some complicated outcomes also by limitation of pronation and supination and/or ulno-carpal conflict, you may need to associate the Sauvé-Kapandj procedure (or other lysis interventions) and/or corrective osteotomy of the radio in the eventual presence of axial deformity. To support the initial proposition, 19 operated cases are introduced (of which, 4 are shown in detail into exemplify the indications and clinical outcome).

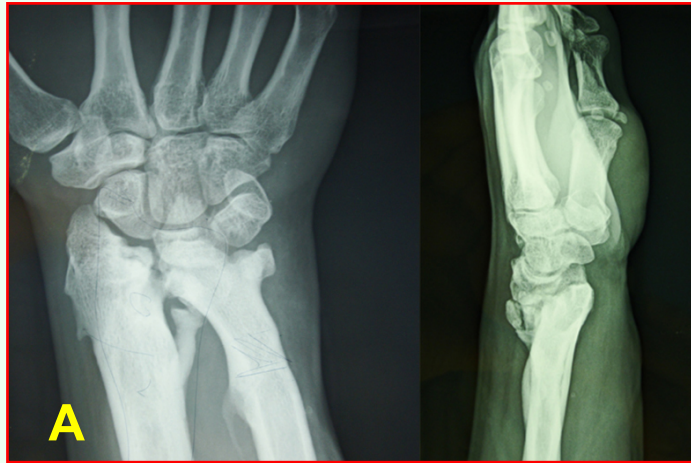


Case 1: dx rigid wrist in C2 fracture-dislocation outcomes (a). The rx control to 11 months after the RCM shows the good carpal realignment (b).

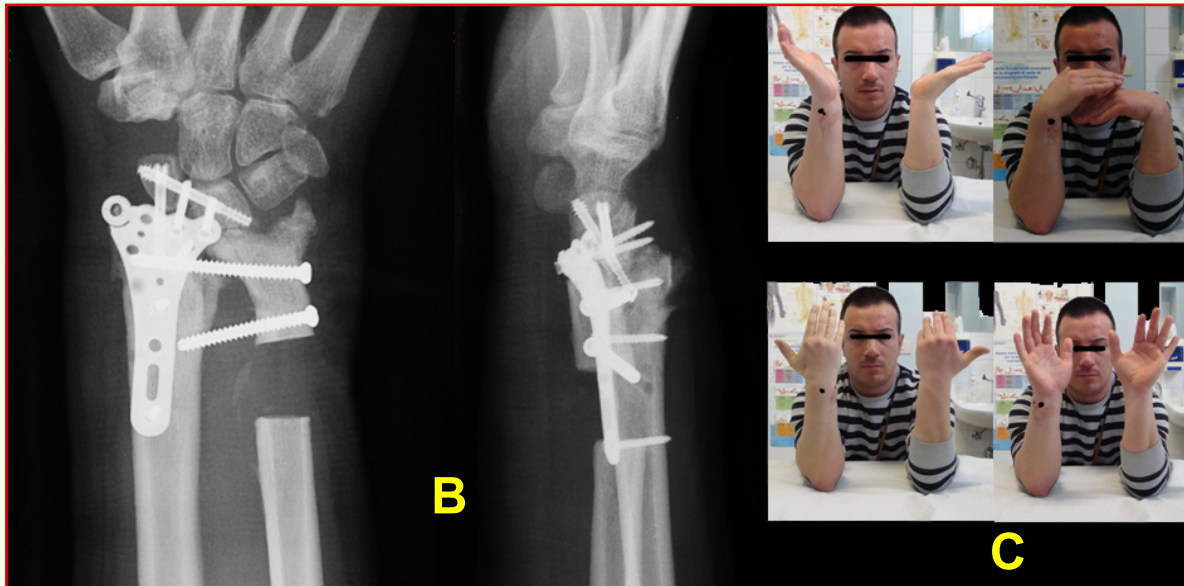


Case 2: dx wrist of a forty year old baker with B3 fracture and volar subluxation outcomes (A-B). The rx control to 12 months after the RCM (performed by a volar plate) shows the good carpal realignment (C-D).

Case 3: Dx rigid wrist in malunion fractures of distal radius-ulna (A). Rx control at fourteen month post corrective radius osteotomy (to solve the varus), Sauvé Kapandj procedures (to solve pronosupination) and Coxa Manus Reconstruction (performed with the use of screws and volar plate) shows the excellent realignment of the carpus and implant stability (B). Clinical assessment clearly shows the excellent recovery of the global range of wrist motion (C).



Case 3



Case 4: Rarely, when it is not possible to reconstruct the articular surface radiocarpal, the CMR can be performed immediately. As in this comminuted fracture (A, B). To ensure the best stability and early mobilization have been used screws and volar plate, with excellent outcome (C,D).

Results - From 2002 to 2015 we treated by CMR 19 wrists with DRF outcomes. The results (assessed according to the parameters of the Mayo Wrist Score Chart, with a 4,8 year average follow-up) have been satisfactory in 90% of cases.

Conclusions - In suffering post-DRF wrist, the CMR has proved to be valid savage operation, able to perfect Nature's carpus adaptation in the trauma, with reliable and satisfactory results.

REFERENCES: www.chirurgia-mano.org - gmgrippi@libero.it

- 1)- Grippi GM: Cinematica del condilo carpale con introduzione al Modello Carpale Biarticolare Concentrico (MBC) e sua applicazione al problema dell'instabilità carpale. Riv. Chir. Riab.Mano Arto Sup., 34 (3), 389- 401, 1997.
- 2)- Grippi GM., Pompilio D: Surgery in the Outcomes of Traumatic Wrist: Coxa Manus Surgery: Proceedings of 8 th Congress of the Federation of the European Societies for Surgery of the Hand. Amsterdam, May 22-25,2002; 57-64 – Editor Steven Hovius by Monduzzi Bologna, Italy 2002
- 3)- Grippi GM: La ricostruzione della "Coxa Manus" Indicazioni e tecnica chirurgica. Riv. Chir. Mano – Vol. 40 (3) 2003.
- 4)- Grippi GM: Patomeccanica "regressiva" delle fratture articolari del radio distale e salvataggio con l'intervento di Ricostruzione della Coxa Manus. Min. Ort. Traum. Vol. 59, n° 5, ottobre 2008
- 5)- Grippi G.M.: Bi articular Concentric Carpal Mechanics and Coxa Manus Surgery. Proceedings of the 9th Triennial Hand and Wrist Biomechanics International (HWBI) Symposium Milan, Italy, June 16-17, 2015.
- 6) - Grippi GM, Cugola L.: Carpo adattativo e trattamento con la chirurgia della Coxa Manus. Riv. Chr. Mano – Vol. 48 (2) 2011.