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Surgical Treatment by Pinning of Carpometacarpal Dislocation at the Donka University Hospital Center: A Propos of 12 Cases

Diallo Mamadou Moustapha, Lamah Leopold, Barry Alhassane, Camara Nouhou Mangue, Diallo Alpha Mamadou Fellah

Department of Orthopedic, Traumatological Surgery of the Donka National Hospital, Conakry, Guinea
Email: mustodjinkan85@yahoo.fr

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Abstract

Carpo-metacarpal dislocations are rare hand injuries. They are misdiagnosed due to their non-specific clinical signs. The authors report on their experience in the management of carpometacarpal dislocations in a specialized hand surgery center. Our study included patients received and treated in the department for a carpometacarpal dislocation. Dislocation fractures of Bennett and Rolando were excluded. The postoperative functional evaluation took place after 18 months by the DASH score. Twelve patients participated: one case of neuro-algodystrophy and one pin infection. The mean DASH functional outcome score was 1.10 at 18 months. Since carpometacarpal dislocations are rare and easily misdiagnosed, the surgeon should assume the possibility of them in patients with high-energy trauma, and imaging studies should be carefully evaluated. Pinning is an effective treatment option that provides good long-term functional results.

Keywords

Dislocation, Fracture, Carpo-Metacarpal Joints

1. Introduction

Carpometacarpal (CMC) joint dislocations are rare pathologies with an estimated incidence of 1% to 1.5% of hand injuries worldwide [1]. Due to their rarity, these lesions tend to be overlooked or misdiagnosed; furthermore, no evidence-based guidelines have been developed for their diagnosis and manage-

ment, and most available data are based on the experience of individual authors, such as those published by Frick *et al.* in 2011 [2]. The second and fifth CMC joints are inherently stable structures due to their surfaces and the number of dorsal, palmar, and intra-articular ligaments that surround them; while the trapeziometacarpal joint is a biconcavoconvex joint that allows movement in multiple planes, its shape provides stability and is further strengthened by its capsule and ligaments. Therefore, excessive axial loading is required to disrupt the anatomy of the CMC joint, such as in motorcycle accidents or hitting a hard surface with the fist [3]. The fourth and fifth metacarpals are the most commonly injured joints; dorsal dislocations are the most frequent, because the palmar musculotendinous structures provide more stability to the palmar surface [4]. CMC dislocations are frequently overlooked or misdiagnosed for several reasons: clinical manifestations tend to be nonspecific, swelling may mask hand deformity, while imaging evaluation of plain radiographs is difficult due to the poor image quality, overlapping bone structures, or simple inexperience of the attending physician [5] [6] [7]. Up to 80% of these lesions may be associated with metacarpal or carpal fractures, further complicating their diagnosis and management [2] [8].

The choice of technique is not always easy and there is no real consensus in the literature. However, when these lesions are unrecognized or poorly treated in an emergency, they can leave disabling sequelae for the grip.

The aim of our work was to study the records of patients operated on urgently for LCMC. The choice of surgical treatment is discussed through the clinical and radiological results.

2. Patients and Method

We performed a retrospective study for all patients with CMC dislocation treated by our department between November 2016 and October 2020. Data were obtained from patient records at the orthopedic and trauma surgery department.

Each patient was assessed by a surgeon in the emergency department; The diagnosis was made by clinical examination and AP and lateral radiographs. We included in our study all patients received, treated and followed up in our department for carpometacarpal dislocation.

Patients with Bennett-Rolando fracture dislocation were excluded.

Surgical management was performed within the first 24 hours of arrival at the hospital.

The mean follow-up was five months (3 - 18). The patients were all men with an average age of 25.41 years (16 - 36). The mechanism of injury was motorcycle accidents and assaults in our patients with damage to the dominant hand.

The treatment of the lesions according to the number and location of the dislocated metacarpals was as follows: M5 isolated: 1 case M4-M5: 8 cases; M3-M4-M5: 2 cases; M2-M3-M4-M5: 1 case. There were 8 basal metacarpal fractures and 1 M4 diaphyseal fracture.

The hand X-ray shows a diaphyseal fracture of M4 with a carpometacarpal dislocation of the 5th ray (Figure 1).

All patients were treated surgically within 24 to 72 hours. Stabilization of the dislocation was achieved by carpometacarpal pinning of the involved rays associated with.

The control X-ray of the hand shows a good good reduction of the fracture and the dislocation stabilized by radius pins (Figure 2).

At the final evaluation, we made recorded medical observations which made it possible to evaluate three clinical criteria: pain: absent, present during grip tightening, present during daily activities, permanent; finger curl recovery: complete, incomplete; subjective strength.

Functional assessment was performed with the DASH (Disabilities of the Arm, Shoulder, and Hand) score at 18 months.

Data analysis was performed with Epiinfos 7.2 software.

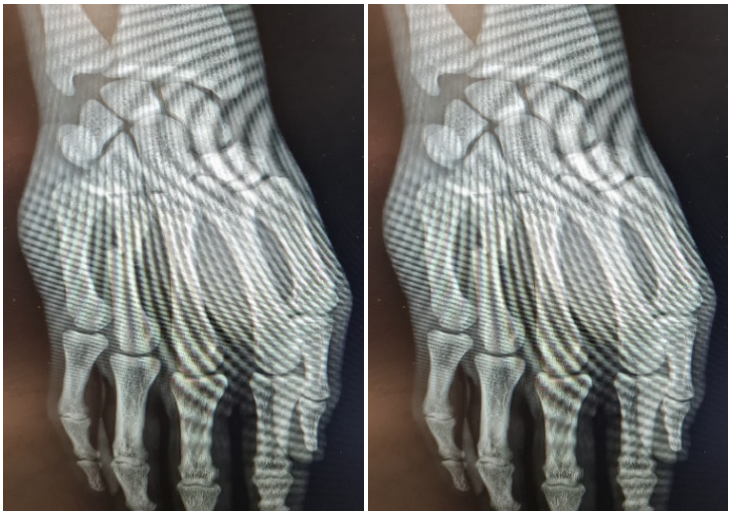

Figure 1. Initial right hand X-ray.

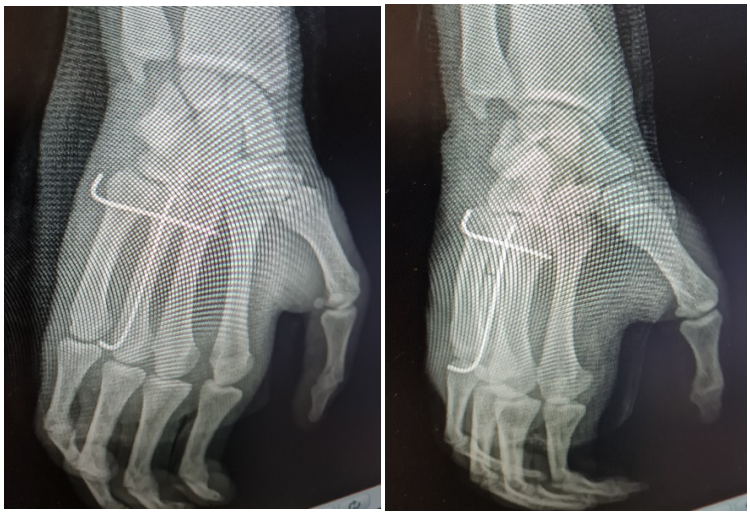

Figure 2. X-ray control right hand.

3. Results

The last control radiographs were satisfactory in all the pure dislocations. These were stabilized by percutaneous pinning in all cases. All the fractures had healed. We found a case of neuroalgodystrophy and a case of local infection on a pin.

At the last consultation, 92% of the patients presented no pain and had regained complete rolling of the fingers. 5% percent of the patients described the persistence of pain during tightening; none presented with pain during daily activities. Three patients still had intermittent pain in the territory of the sensory branch of the ulnar nerve. The rolling of the fingers was complete for 97% of the patients at the last follow-up. We have extended rehabilitation in 3% of our patients. On average, the start of rehabilitation was later in these patients.

We have summarized our series in **Table 1**.

4. Discussion

CMC joint dislocation is rare, accounting for approximately 1% of all hand injuries worldwide, and appears to be even rarer in Mexico. The first reports of this lesion were published by Cooper and Roux in the 19th century [9]. Due to the low incidence of the lesion, information regarding its diagnosis and treatment tends to be limited to case reports and selected case series. Moreover, information from developing countries is lacking and almost non-existent. This type of injury is caused after the application of longitudinal trauma to the metacarpal head, causing axial compression on the bone and dorsal displacement of its base, causing rupture of the stabilizing ligaments [10].

Many recent publications deal with dislocations or fracture-dislocations. They generally concern all long finger dislocations [11] [12] [13] [14] [15]. In the series by Gangloff *et al.* carpometacarpal dislocations of the fifth ray have been

Table 1. Summary of the series.

Nombre	Sexe	Age	Articulation	Fracture	DASH 18 mois
1	M	16	M5	-	3.5
2	M	18	M4M5	M4 Base	1.3
3	M	20	M2M3M4M5	M2 Base	0
4	M	23	M4M5	-	2.7
5	M	24	M4M5	-	0
6	M	21	M3M4M5	M3 Base	0.8
7	M	25	M4M5	DiaphysIS M4	0
8	M	26	M4M5	M4 Base	1.5
7	M	32	M4M5	M4 Base	1.8
10	M	31	M4M5	M4 Base	0
11	M	33	M4M5	M4 Base	1.7
12	M	36	M4M5	M4 Base	0

reported [6] [7]. In our series we reviewed all the patients with an average age of 25.41 years. The radiological assessment and the medical observations collected during the final evaluation which make it possible to evaluate the results of the treatment [6] [7]. We have distinguished the fixed M2-M3 block from the relatively mobile M4-M5 block, whose CMC joints have anteroposterior mobility which contributes to the deepening of the palmar arch [6] [14]. In our series, M4M5 involvement was more frequent and 1 case of M5. This can be explained as much by mobility and ligament laxity as by the bordering position of these rays, which are more exposed to trauma. M2 or M2M3 dislocations are rarer [16] [17]. Those of M3, M4 and M3-M4 are exceptional [18]. The CMC joints are reinforced by very resistant periarticular soft tissues (dorsal, palmar and interosseous ligaments, flexors, extensors), which explains why fracture-dislocations are more frequent than pure dislocations [19] [20] [21]. We found 2 cases of M3M4M5 and one case of M2M3M4M5. The disorganization of the carpometacarpal bone interlocking supposes a severe trauma. In our series, the etiologies were assaults and scooter accidents. This is an indirect mechanism: the longitudinal force of the shock applied opposite the metacarpal heads detaches M5 and the internal part of its base. Several authors have reported that carpometacarpal dislocations are often accompanied by other bone and/or soft tissue lesions. In our study, four main criteria were retained as having an importance in the management. These are the location and number of metacarpals involved, the presence of a fracture-dislocation, the direction of displacement and the existence of associated lesions [22].

Diagnosis is not easy, which may be responsible for a delay in treatment [6] [7]. The mechanism may be suggestive, but the clinical examination typically finds a large painful hand with functional impotence, without specific signs [6] [18].

The radiographic assessment must be systematic and must include frontal, profile and 3/4 images. The profile view looks for a misalignment between the metacarpals and the second row of the carpus; the increase in the palmodorsal diameter of the carpus is often masked by the central metacarpals [6] [23].

There is no consensus in the literature regarding treatment. The objective is twofold: to obtain an anatomical reduction, which guarantees a good functional result and prevents the appearance of osteoarthritis; and maintain reduction to allow ligament healing. Management must be rapid because of the risk of irreducibility, skin pain, even vascular-nervous compression, in the most serious cases [24] [25] [26]. Rehabilitation consisted of early mobilization of the MP and PIP joints in order to fight against sequel stiffness [19].

Stabilization is achieved by Kirchner wires which secure the dislocated metacarpals to the back of the carpus and then to the neighboring metacarpals [12] [19]. Percutaneous cross pinning, intermetacarpal or centromedullary, are used by many authors [7] [26] [27]. It is an attractive technique that can give good results, especially in the case of pure dislocations.

In Gangloff's series, the results were satisfactory for pain, finger mobility and

subjective strength in 31 patients reviewed with an average follow-up of six months [6] [7].

At the last follow-up, 92% of the patients showed no pain and had regained complete rolling of the fingers. 5% percent of the patients described the persistence of pain during tightening; none presented with pain during daily activities. Three patients still had intermittent pain in the territory of the sensory branch of the ulnar nerve.

The absence of initial management or poorly conducted treatment is, on the other hand, a poor prognosis [15]. These traumas are potentially serious for the function of the digital chain concerned, due to the risk of post-traumatic osteoarthritis, stiffness or instability [24]. Functional impairment typically results from persistent instability, or joint degeneration secondary to trauma that has gone unnoticed and/or poorly treated [6] [28].

The main limitation of our study is that the sample of patients is small and its retrospective nature and the lack of scanner in our CHU. However, it represents the first series studied in Guinea.

5. Conclusion

Carpo-metacarpal dislocations of the long fingers are rare lesions, often associated with fractures of the carpus or the bones of the hand. A large number go unnoticed either because of a poorly done summary examination or because of multiple lesions. Surgical stabilization must be systematic. In the absence of perfect initial treatment, the impact on hand function can be major.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Green, D.P. (2007) Green's Operative Surgery of the Hand. 5th Edition, Elsevier, Amsterdam.

[2] Frick Mezzadri, G., Yzem, I., Plotard, F. and Herzberg, G. (2011) Luxations carpom etacarpiennes fraiches des doigts longs. Etude propos de 100 cas. *Spécialiste de la chirurgie de la main*, **30**, 333-339. https://doi.org/10.1016/j.main.2011.06.010

[3] Nakamura, K., Patterson, R.M. and Viegas, S.F. (2001) The Ligament and Skeletal Anatomy of the Second through Fifth Carpometacarpal Joints and Adjacent Structures. *Journal of Hand Surgery* (*American Volume*), **26**, 1016-1029. https://doi.org/10.1053/jhsu.2001.26329

[4] Canale, S.T. (2003) Campbell's Operative Orthopaedics. 10th Edition, Mosby, St. Louis.

[5] Kural, C., Basaran, S.H., Ercin, E., Bayrak, A., Bilgili, M.G. and Baca, E. (2014) Fourth and Fifth Carpometacarpal Fracture Dislocations. *Acta Orthopaedica et Traumatologica Turcica*, **48**, 655-660. https://doi.org/10.3944/AOTT.2014.14.0040

[6] Frick, L., Mezzadri, G., Yzem, I., Plotard, F. and Herzberg, G. (2011) Luxations

carpométacarpiennes fraîches des doigts longs. Étude à propos de 100 cas. *Chirurgie de la Main*, **30**, 333-339. https://doi.org/10.1016/j.main.2011.06.010

[7] Gangloff, D., Mansat, P., Gaston, A., Apredoaei, C. and Rongiere, M. (2007) Carpometacarpal Dislocation of the Fifth Finger: Descriptive Study of 31 Cases. *Chirurgie de la Main*, **26**, 206-213. https://doi.org/10.1016/j.main.2007.06.002

[8] Perez-Serna, A.G. and Figueroa-Cal Mayor, F. (2009) Fractura-luxacion Carpometacarpiana Multiple. *Acta Ortopédica Mexicana*, **23**, 149-152.

[9] Dobyns, J.H., Linscheid, R.L. and Cooney, W.P. (1983) Fractures and Dislocations of the Wrist and Hand, Then and Now. *Journal of Hand Surgery* (*American Volume*), **8**, 687-690. https://doi.org/10.1016/S0363-5023(83)80247-0

[10] Ayala-Gamboa, U. (2012) Luxacion dorsal de la articulacion carpometacarpiana: Informe de tres casos. *Anales Medicos*, **57**, 144-148.

[11] Masquelet, A.C., Nordin, J.Y., Savary, L. and Poulizac, C. (1986) À propos d'un cas de luxation antérieure des quatre derniers métacarpiens. *Annales de Chirurgie de la Main*, **5**, 63-66. https://doi.org/10.1016/S0753-9053(86)80051-5

[12] Ameziane, L. (2002) Total Carpometacarpal Dislocations. About Two Cases. *Chirurgie de la Main*, **21**, 309-312. https://doi.org/10.1016/S1297-3203(02)00131-2

[13] Dillon, J., Street, J. and Mahalingham, K. (2005) Divergent Dislocation of the Ring and Little Finger Carpometacarpal Joints—A Rare Injury Pattern. *Acta Orthopaedica Belgica*, **71**, 353-356.

[14] Sedel, L. (1975) Les luxations carpométacarpiennes. À propos de 11 cas. *Annales de Chirurgie*, **29**, 481-489.

[15] Garcia-Elias, M., Bishop, A.T., Dobyns, J.H., Cooney, W.P. and Linscheid, R.L. (1990) Transcarpal Carpometacarpal Dislocations, Excluding the Thumb. *Journal of Hand Surgery*, **15**, 531-540. https://doi.org/10.1016/S0363-5023(09)90011-9

[16] Benoit, O., Polveche, G., Barbier, J. and Thery, D. (2001) Fracture-Dislocation of the Second Carpometacarpal Joint. Case Report and Review of the Literature. *Chirurgie de la Main*, **20**, 397-402. https://doi.org/10.1016/S1297-3203(01)00065-8

[17] Kumar, R. and Malhotra, R. (2001) Divergent Fracture-Dislocation of the Second Carpometacarpal Joint and the Three Ulnar Carpometacarpal Joints. *Journal of Hand Surgery*, **26**, 123-129. https://doi.org/10.1053/jhsu.2001.20153

[18] Chardel, P. (1997) Luxations et fractures-luxations des articulations carpo-métacarpiennes des doigts longs. In: Merle, M. and Dautel, G., Eds., *La main traumatique. L'urgence*, Masson, Paris, 52-65.

[19] Lawiis, J.F. and Gunther, S.F. (1991) Carpometacarpal Dislocations. *Journal of Bone and Joint Surgery*, **73**, 52-58. https://doi.org/10.2106/00004623-199173010-00007

[20] Fakih, R.R., Fraser, A.M. and Pimpalnerkar, A.L. (1998) Hamate Fracture with Dislocation of the Ring and Little Finger Metacarpals. *Journal of Hand Surgery*, **23**, 96-97. https://doi.org/10.1016/S0266-7681(98)80231-3

[21] Hunt 3rd, T.R. (2006) Degenerative and Post-Traumatic Arthritis Affecting the Carpometacarpal Joint of the Fingers. *Hand Clinics*, **22**, 221-228. https://doi.org/10.1016/j.hcl.2006.02.004

[22] Le Nen, D., Hu, W., Dubrana, F., Prud'homme, M., Genestet, M., *et al.* (2003) Fractures, entorses et luxations de la main et des doigts. Encycl Med Chir (Elsevier, Paris), Appareil locomoteur, 14-047, C-10.

[23] Henderson, J.J. and Arafa, M.A. (1987) Carpometacarpal Dislocation. An Easily Missed Diagnosis. *Journal of Bone and Joint Surgery*, **69**, 212-214. https://doi.org/10.1302/0301-620X.69B2.3818751

[24] Hodgson, P.D. and Shewring, D.J. (2007) The "Metacarpal Cascade Lines" Use in the Diagnosis of Dislocations of the Carpometacarpal Joints. *Journal of Hand Surgery*, **32**, 277-281. https://doi.org/10.1016/J.JHSB.2006.09.020

[25] Stern, P.J. (1993) Fractures of the Metacarpals and Phalanges. In: Green, D.P., Ed., *Operative Hand Surgery*, Churchill Livingstone, New York, 1695-1758.

[26] Dubert, T. (1994) Arthroplastie stablisée du cinquième métacarpien. Proposition thérapeutique pour le traitement des fractures-luxations anciennes du cinquième métacarpien. *Annales de Chirurgie de la Main*, **13**, 363-365. https://doi.org/10.1016/S0753-9053(05)80074-2

[27] Gerard, F., Garbui, P., Tropet, Y. and Vichard, P. (1998) Les luxations carpo-métacar-piennes dorsales traumatiques des doigts longs. À propos de 30 luxations. *La Main*, **3**, 23-32.

[28] Herzberg, G. (2008) Perilunate and Axial Carpal Dislocations and Fracture-Dislocation. *Journal of Hand Surgery*, **33**, 1659-1668. https://doi.org/10.1016/j.jhsa.2008.09.013