

Use of forearm-hand casts in Colles fractures with conservative management: A literature review

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The World Health Organization (WHO) estimates that 12% of fractures caused mainly by falls and traffic accidents lead to disabilities that can end potential productive years of life. Credit for the description of the most common fracture model affecting the distal end of the radius is attributed to Sir Abraham Colles, who first described the fracture in 1814, and it has since been named after him (Enseñat, 2021). Colles fracture, also called Colles-Pouteau fracture, is a fracture that occurs in the radius less than 2,5 cm from the wrist. It is one of the most frequent fractures, especially in women over 60 who may also suffer from osteoporosis (Romero, 2009).

The incidence of fractures is multifactorial and almost always complicated by factors such as age, gender, comorbidities, lifestyle, and occupation. The factors that directly influence the occurrence of a fracture are external forces that are directly or indirectly applied and exceed the point of rupture of bone tissue; the risk factors that directly influence are: a) bone quality, b) age, and c) lifestyle (Domínguez, 2017). It has been observed that the male gender fractures at younger ages (17-49 years) and women at older ages, on average, after the age of 50 (López, 2022). Another factor to consider is osteoporosis, which is a systemic skeletal disease characterized by low bone density and a deterioration of the microarchitecture of bone tissue, with the consequent increase in fragility and susceptibility to the appearance of fractures. This disease most often affects postmenopausal women, in a woman/man ratio that can vary between 3 and 8 women for each man. Pointing to an incidence of 25% for women over 45 and 50% for women over 60 (Contreras, 2001). These types of fractures are more likely to occur during sports, and the risk increases if the patient has osteoporosis (Hermoso, 2003).

The mechanism of production is usually indirect and is produced by a fall in extension or dorsiflexion of the hand. The resulting deformity is known as "humpback" and is sometimes accompanied by avulsion of the ulnar styloid process. If the fall occurs on the back of the hand, that is, in palmar flexion, it is called an inverted Colles fracture or Smith fracture, and the resulting deformity is a "garden shovel" or "scythe", and it can be seen how the ulnar styloid protrudes dorsally (Serrano, 2008).

In the management of Colles fracture, supination greatly improves anatomical and functional results, prevents its most frequent complications, and plays an important role in maintaining the reduction, especially in patients with marked osteoporosis or obliquity of the fracture line (Delgado, 1998).

According to the time of initial treatment, 26.5% receive it within the first six hours, 70% after six hours and up to three weeks, while 3.5% after three weeks of the origin of the injury. This is reported by a study in open fractures in adults treated in a hospital in Latin America (Shiraishi, 2019).

Frykman classifies wrist fractures according to whether they are intra-articular or extra-articular, and whether or not there is a fracture of the distal extremity of the ulna. It establishes eight different types of fractures (Table 1).

Table 1.
Types of Colles fractures according to location

Type	Descriptor
I:	Extra-articular distal radius fracture
II:	Extra-articular distal radius fracture + Distal ulna fracture
III:	Intra-articular radiocarpal fracture of the distal radius
IV:	Intra-articular radiocarpal fracture of the distal radius + Fracture of the distal ulna
V:	Intra-articular distal radius fracture
VI:	Intra-articular distal radius fracture + Distal ulna fracture
VII:	Intra-articular distal radius fracture involving the radiocarpal and radioulnar joints.
VIII:	Fractura de radio distal intraarticular radiocarpiana y radiocubital + Fractura del cúbito distal

Note: Enseñat, 2021.

The **diagnosis** of Colles fractures is generally made clinically: pain, deformity, swelling, and radiographic tests (Lutza, 2004). Figure 1 shows the forearm-hand cast in a Colles fracture with conservative management.



Note: Photographs taken by the author with the patient's permission.

Figure 1. Colles' fracture of the distal forearm.

In a high percentage of Colles fractures, the reduction achieved is lost shortly thereafter, which is attributed to the progressive reduction of edema, loosening of the cast, and free movement of the elbow and hand. However, until now, the deforming role of muscles has not been considered, despite being a fundamental element that must be taken into account in the pathophysiology and therapeutic aspects of any fracture (Delgado, 1998). Therefore, it can be considered that the use of brachial and below-elbow casts has advantages and also some disadvantages for this type of fracture (Table 2).

Table 2

Advantages and disadvantages of using a brachial cast vs. a below-elbow cast in Colles fractures

Joint/limb	Arm	Forearm
Hand	1. Severe swelling of the hand 2. Severe functional limitation of the hand	1. Minimal swelling of the hand 2. Improved finger mobility
Elbow	3. Immobilized elbow	3. Elbow without a cast, so mobilization can begin immediately. 4. The hematoma from the fracture extends to the elbow, and without a cast, it spreads quickly.
Shoulder	4. Double the weight of the plaster cast, limiting shoulder movement	5. Lower weight, allowing the patient to begin early mobilization of the shoulder. 6. Greater comfort reported by patients due to lower weight and increased agility. 7. It is easier to get comfortable resting and sleeping.

Note: Prepared internally based on evidence reported by 50 patients over 5 years.

The objective of this study is to analyze the advantages of using a forearm-hand cast in Colles' fractures treated conservatively. Regarding methodology, the study was based on five years of experience treating 50 patients who came in for diagnosis and conservative management.

CONCLUSIONS

Based on a review of the literature and personal experience, it can be observed that in the past, it was thought that Colles' fracture should be treated using a below-elbow cast to prevent pronosupination and displacement of the fracture. However, over time and through various studies, it has been observed that the same radiographic results are obtained with a forearm-hand cast once the fracture has been properly reduced.

Therefore, although similar results are obtained in both cases, a determining factor in successful recovery is the immediate rehabilitation of Colles fractures with the application of a cast that leaves the joints free, thereby shortening recovery time and leading to greater patient satisfaction.

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