

## The Traumatic Hand by Spinning Top: About 7 Patients and review of the Literature

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### Abstract

### Original Research Article

The traumatic hand by spinning top occurs frequently in developing countries. It tends to occur in young people, leading to psychologic and socio-economic disability and loss. In this series of 7 patients, the middle age was 37 years. The left hand was involved in 72% and was treated in the Department of Traumatology and Orthopedic Surgery affiliated to Ibn Sina Hospital in Rabat. These accidents are correlated with somnolence and lack of vigilance. The most frequent causes are absence of security systems and heterogeneity of the wood but also the unpredictability of the machines used in butchery. Prevention in this pathology is considered the main treatment.

**Keywords:** Traumatology-Hand-Spinning-Carpenter-Butcher.

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## INTRODUCTION

Wounds of the hand by woodworking machines are very frequent lesions. Among these, the traumatic hand by top constitutes in countries in the process of industrialization a real socio-economic scourge, due to its frequency and the complexity and the young and often not assured people that it touches. This lesion requires urgent treatment urgent and iterative loading in specialized centers.

However in these countries, hand accidents are still too often taken care of in surgical departments or general orthopedics in the best of cases. First intention, surgery must be the most rational possible: finding a compromise in the conservation of hand functionality. Furthermore, the result of these complex lesions, often require several surgical interventions procedures which must be part of a strategy of management developed by the initially surgeon who treats these lesions. In this retrospective work, we will state the therapeutic

methods and the evolution of the patients who were victims of these professional accidents.

## MATERIEL AND METHODS

Our work concerns 7 patients who were admitted in the orthopedic and traumatological surgery department of the ibn sina hospital in Rabat following accidents at work causing a dilapidation of their hand, which is commonly called a top hand. Our series has seen the predominance of one profession in particular, which is carpentry. Indeed, five of the patients were carpenters and the others two were butchers. These patients presented with a dilapidated hand, resulting in multiple wounds, fractures of the metacarpals and phalanges. They were urgently admitted to the operating room and underwent extensive trimming and washing, evacuation of foreign bodies from the wounds, amputation of fingers that could not be reimplanted, then osteosynthesis of the various fractures found with Kirchner pins 14,16,18,20. Pins were removed on the 45th day and rehabilitation was then started.



**Figure 1: Clinical image of hand decay observed in a carpenter**



**Figure 2: Deterioration of the hand with palmar wound of 8 cm**



**Figure 3: Clinical image of a typical top hand**



**Figure 4: Bone exposition and tendon injuries as part of a top hand**

## RESULTS

All of our injured patients were seen in the emergency room where an assessment initial clinical and radiological was done.

Several epidemiological criteria, relating to the injured, the circumstances of the trauma and the state of the machine were recorded in an operating sheet. It was always about wounded male sex. The average age was 32 years (27–41 years). The left side was affected five times (72%). The dominant side was straight 6 times (86%). In three injured (43%), there was the notion of traumatic hand sequelae (digital amputations varied, painful stumps, interphalangeal arthrodesis), that is to say that they were already injured previously in a similar occupational accident.

Inattention was reported by all injured. The distribution depending on the time of occurrence of the accident showed two frequency peaks: 9 a.m.–12 p.m. and 1 p.m.–3 p.m.

The splinters of wood, as a rule due to the passage of a dry knot, were found 4 times (58%), but we noted that the mechanical protector or electrical part of the router was systematically removed because that it slowed the growth of the wood and interfered with the machining of small pieces of wood.

The patients were then admitted to the operating room in emergency, benefited from a trimming and abundant washing of the hand in order to remove the wood debris, which had remained at the level of the wounds. Prophylactic antibiotics were systematically prescribed. The surgical procedures performed were diverse. Tendon sutures for tendons that were not torn, reimplantation of still viable fingers with vascular and nerve repair, proximal or distal interphalangeal arthrosis and capsulorrhaphy.

The clinical evolution was favorable in our patients although the psychological impact of this type of injury persists in these injured patients, for whom their hand remains their main source of income to support the needs of their family.



**Figure 5: Spinning top hand after osteosynthesis and reconstruction**



**Figure 6: Dorsal face of the hand after osteosynthesis and reconstruction**



**Figure 7: Importance of the skin injury**



**Figure 8: Osteosynthesis of the phalangeal fractures**

## DISCUSSION

Spinning hands replicate the classic profile hand injuries in developing countries.

These frequent accidents affect a young and poor population and trained to handle machines more and more complicated. Routing is a technique of woodworking, which connects the machine, the wood and the worker. Any failure in one of these three elements is likely to cause a hand injury.

### 4.1: Factors linked to the machine

Failure of the security system, which is usually equipped with the spindle, moulder, whether mono- or multi-function.

This mechanical or electrical safety system is the more often removed in order to work small patterns size or to speed up the productivity of a cutting machine.

Faulty maintenance, in particular the sharpening absence of irons which require too much pressure on the wood. This increases the risk of skidding. If quantitatively these machines are overused, they are much less qualitatively. In fact, out of ignorance or for the sake of haste, many reasons for wood are worked by unsuitable interchangeable parts.

#### 4.2: Factors linked to the wood

When pushing the parts, a good orientation of the fibers of the wood in the same direction avoids splinters. Of even, the risk of slipping increases in case of hard wood and heterogeneous. The presence of dry knots is the threat the most important.

#### 4.3: Human factors

Young age, lack of qualifications and inattention are risk factors for industrial hand injuries. The left side was the most affected (72%) independently on the dominant side. This is in contrast to other hand injuries, which do not present generally no significant difference between two sides, dominant and non-dominant.

The predominance left is explained by the position more exposed. It serves as a guide and lateral pusher for the piece of wood, which she brings closer to the shaft of the spinning top. Also, the repercussions due to splinters of wood risk to place the left hand in contact with the rotating blade.

Conversely, the right hand serving as a longitudinal pusher usually remains undamaged. There prehension of sequelae traumatic hands is defective due to the limitation of digital winding.

Fatigue would not be a main factor in the occurrence of hand injuries at the carpenters.

However, retains the drowsiness and circadian rhythm as risk factors, since 34% of hand injuries in carpenters occur between noon and 3 p.m. In our series, the first peak of upsurge around 9–12 a.m could be correlated to the maximum number of machines put into service.

The second peak between 1 p.m. and 5 p.m. can be attributed to postprandial drowsiness.



Figure 9: Machine used in carpentry work



Figure 10: Other type of machines used in the carpentry field

## CONCLUSION

Serious hand injuries from spinning tops, particularly among carpenters and butchers, are serious public health problems. The prevention of these accidents must be collective and individual.

It will focus on several points:

- Information through awareness campaigns at the regional or national level on the dangers of the spinning top. The doctors and emergency services—hand will organize it. She will also address the dangers of haste and the heterogeneity of the wood to be worked;
- Improvement of working conditions with checks the condition of machines and their systems of security. Improving the “design” of machines could increase their safety;
- Compulsory vocational training for young carpenters handling these dangerous machines;
- Strengthening and enforcement of labor laws relating to the hiring of young workers and the use dangerous machines.

Spinning top hand accidents require a grip care in specialized hand emergency centers in order to limit the permanent incapacity of the injured as much as possible and also to reduce the number of costly surgical revisions and sometimes random in the event of delay or inadequacy initial support.

It is for these reasons that the prevention of these accidents is the best treatment.

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