

Fingertip Injuries in Children: Epidemiological, Therapeutic Approach and Results

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Abstract

Introduction: Door fingers injuries account for 3.5% of child domestic accidents. The aim of our study was to describe the epidemiological, anatomo-clinical, therapeutic features and results of door fingers injuries in children.

Materials and Methods: This was a cross-sectional study with a descriptive and analytical purpose carried out over a period of 10 years, (January 2010 to September 2020), in the Paediatric Surgery Department. We included all children aged 0 to 15 years old admitted for digital trauma following crushing by a door, a car door, a window, drawers.

Results: We collected 55 cases. The mean age was 5.36 ± 4.12 years (extremes of 1 and 15 years). The male gender accounted for 60% of cases with a sex ratio of 1.5. The lesions were subungual hematoma (38.18%), nail avulsions (14.54%), pulpal wounds (38.18%) with distal amputations in 40% of cases. Distal phalanx fractures were observed in 47.27% of cases. Therapeutically, directed healing was indicated in 16.36% of distal amputations, while flaps were used in 25.45% of cases. Pinning was performed in 69.23% of cases. The evolution was uneventful in 94.54% of cases. The results were excellent in 10.90% of cases and good in 63.63% of cases.

Keywords

- Home accidents
- Trauma
- Fingers
- Children
- Emergency

Conclusion: Door fingers are common in children. A careful clinical examination with meticulous radiological analysis allows appropriate and well codified management. The restoration of a good quality pulpo-ungual complex is the best guarantee of a good long-term functional and aesthetic result.

Introduction

Fingertip injury is a trauma caused by crushing of the distal end of the finger by a door or a car door.¹ The degree of severity of these injuries is highly variable, ranging from a simple subungual hematoma to digital amputation. This trauma is common in the infant population, especially in young children. It is the leading cause of consultation in paediatric trauma emergency units.² Its incidence in Europe is estimated at 3.5% of household accidents, whereas in our context this incidence is unknown or poorly documented because of its ill-founded reputation for benignity and the treatment which is inappropriate, sources of more or less severe sequelae.³

The aim of this work was to describe the epidemiological, therapeutic features and the aesthetic and functional results.

Materials and Methods

The study was carried out in the paediatric surgery department of the Cocody University Hospital. This was a cross-sectional study with a descriptive and analytical purpose over the period since January 2010 till September 2020. This

study concerned all patients aged 0 to 15 years old admitted for recent trauma to the fingers of the hand following crushing by a door or a car door, during the study period. The studied variables were in the following order:

- Socio-demographic: age, gender, laterality, area of residence, school level.
- Clinical and paraclinical: circumstances of occurrence, admission time, side affected, number of fingers affected, nature of lesions, clinically and radiographically.
- Therapeutic: performed treatment.
- Evolutionary; aesthetic and functional result: to classify as excellent, good, average or bad.

Data were collected from patients' medical records. Some parents of patients were contacted by telephone using their numbers left in the files in order to complete the epidemiological and evolutionary information. Privacy of the collected information during the survey was protected by assigning an anonymity number to each survey slip. Prior authorization was obtained from the administrative and health authorities of the Cocody University Hospital. Quantitative variables were expressed as average with a standard deviation and extreme values. Qualitative variables were expressed as

proportions. Data entry was performed using Microsoft Office Word and Excel 2019 software. The comparison of qualitative variables was carried out using the Chi-Square test or Chi-Square test with

Yates correction or Fisher exact test when the application conditions of the Chi-Square test were not applicable. The significance threshold was set for a value of $p < 0.05$.

Result

1- Epidemiological features

Fifty-five (55) cases were collected during the study period. There were 33 boys (60%) and 22 girls (40%), that is a sex ratio of 1.5. The average age of the children was 5.36 years \pm 4.12 years [extreme 1 and 15 years].

Laterality was right in 52 patients (94.5%) and the dominant side was involved in 34 patients (63% of cases).

The door block system was not used in 70% of cases.

Household accident accounted for 94.4% of the circumstances of occurrence of the trauma.

2- Clinical features

The average admission time was 5 ± 2.61 hours [Extremes: 0.5 and 72 hours].

The fingers of the right hand were affected in 29 patients, that is 63.04% of cases.

The trauma was located at the distal end of the middle finger in 18 cases (32.72%) **(Table 1) (Figures 1 and 2)**

Table 1: Distribution according to the site of trauma

Site of trauma	Number	Percentage
Middle finger	18	32.7
Ring finger	13	23.6
Index finger	12	21.8
thumb	08	14.5
Little finger	04	07.4
Total	55	100

**Figure 1:** wound with pulpo-ungual amputation of the right middle finger.

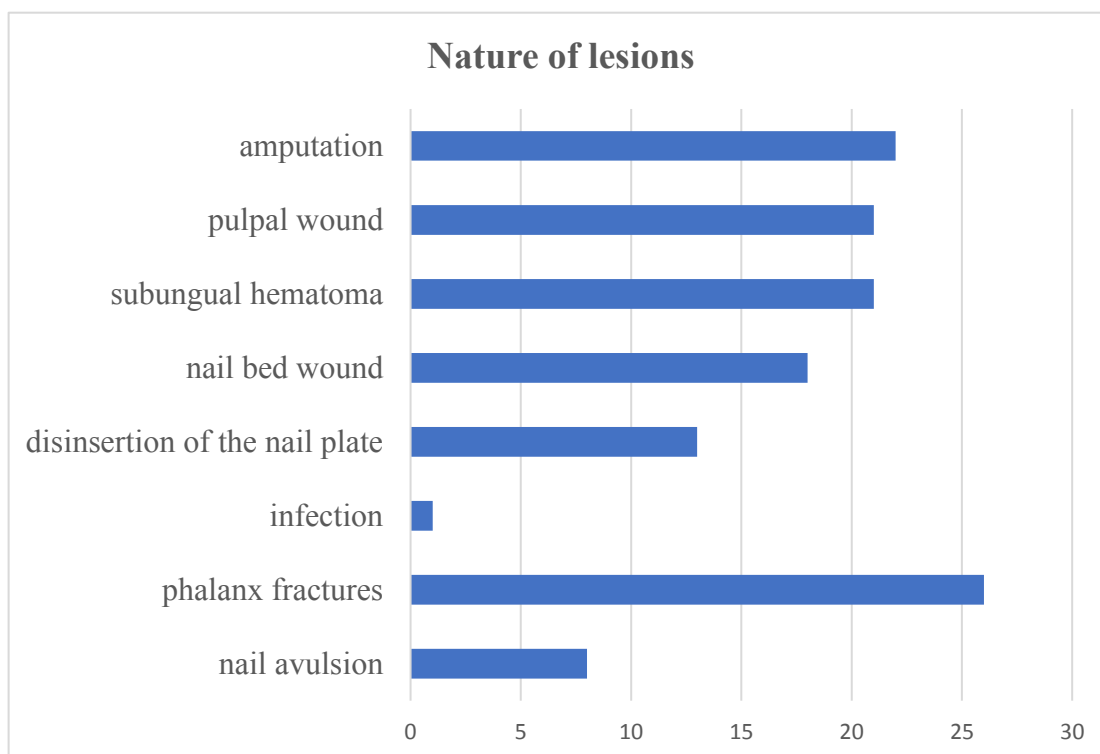


Figure 2: distribution according to the nature of lesions

Subungual hematoma was more common in patients over 5 years old ($p=0.038$; $OR=0.75$; $CI= 0.33-6.75$).

The fractures of the distal phalanx were observed in 26 cases that is 47.27%. These fractures were open in 23 cases and closed in 11 cases. Type 2 opening accounted for 78.26% of open fractures.

The site of these fractures was at the level of the tuft of the distal phalanx (7 cases) or its diaphysis (19 cases).

3- Therapeutic modalities

a) Therapeutic time

Treatment was performed within one hour of admission in 22 patients (40%) (**Figure 3**).

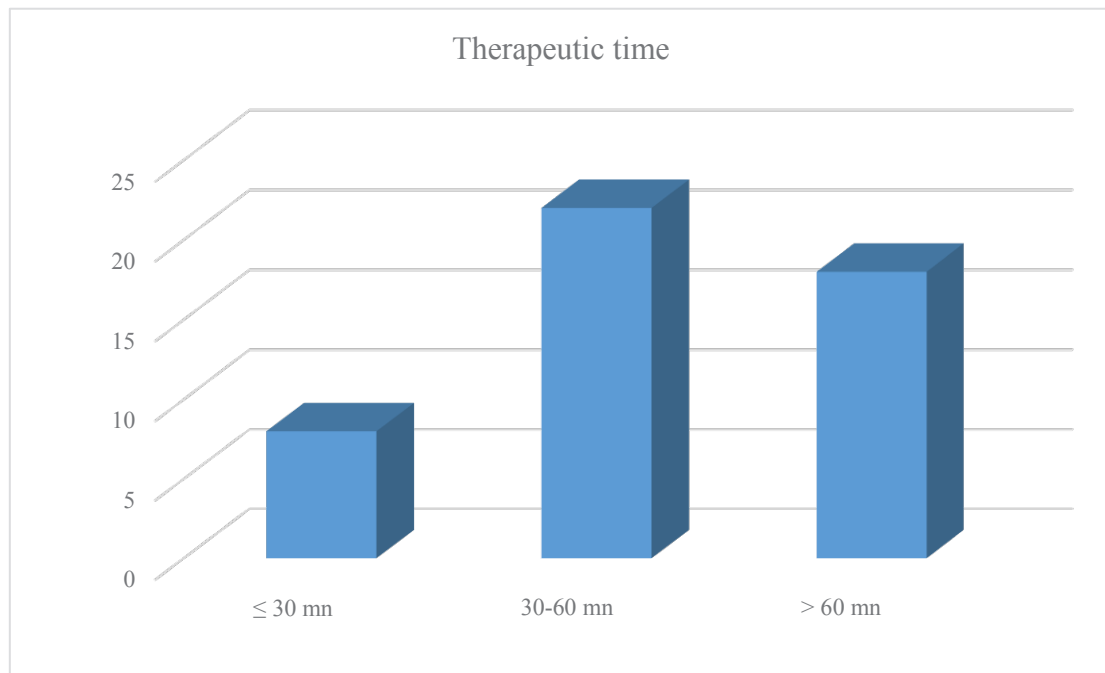


Figure 3: Distribution according to therapeutic time

b) Pulpo-ungual repair techniques

It involved pulpo-ungual repair and/or treatment of fracture cases. Pulpo-ungual

repair techniques were varied (**figure 4**).

Their indications depended on the nature of lesions.

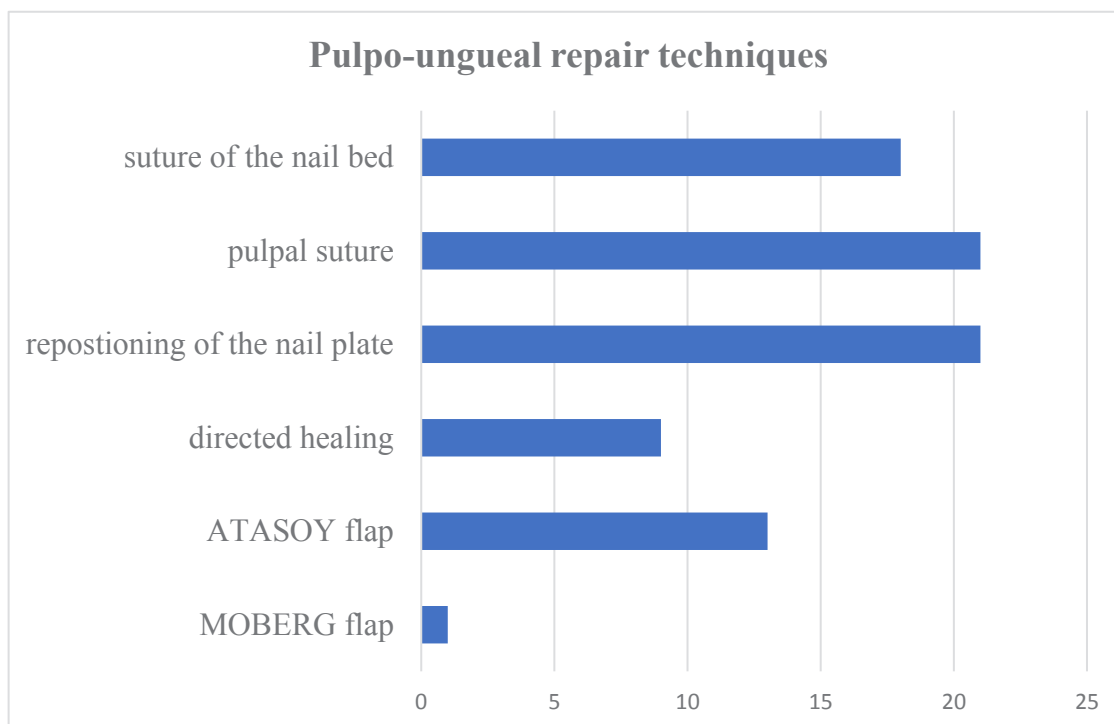


Figure 4: Distribution according to the types of pulpo-ungueal repair techniques

The treatment of distal phalanx fractures was either surgical by osteosynthesis (reduction and pinning (38 cases (69.23%)) or orthopaedic (17 cases (30.76%)).

The length of hospital stay was 48 to 72 hours in 48 patients (87.27%).

The material removal time was 3 weeks in all our patients treated by osteosynthesis. Self-rehabilitation was recommended in 54 patients (98.18%) and one patient (1.18%) was referred to physiotherapy for postoperative rehabilitation

4- Treatment results

4-1) Follow-up

The mean follow-up was 42 months [extremes of 1 and 101 months].

4-2) Short and medium-term results.

The outcome was uneventful in the short and medium term in 52 cases (94.54%). Patients admitted within less than 6 hours

of the trauma had a better post-treatment result ($p= 0.0411$; $OR= 0.56$; $CI=0.156-3.98$). Infection was observed in 3 patients (5.45%).

4-3) Long-term result

The long-term outcome was uneventful in 39 cases (71%) (**Figure 5**).



A



B



C

Figure 5: Atasoy flap repair of a pulpal wound of the left ring finger.

- A: wound with loss of pulpal substance
- B: filling with Atasoy advancement flap
- C: result 36 days after the operation

14 cases of pulpo-ungual dystrophy (25.45%) were distributed as follows:

- 9 cases of nail dystrophy (64.28%)
- 5 cases of trophic pulpal disorder (35.71%)
- 2 cases of sensitivity disorders (3.63%).

Discussion

Hand injuries remain common in children.^{1, 4, 5} The prevalence of 55 cases over our study period is underestimated. Few children victims of this type of trauma are evacuated to a hospital, as reported by Claudet et al.⁶ In our context, parents who, sometimes are financially limited or who judge the lesions benign, prefer self-medication. The male predominance found

in our study is combined with the data of the majority of authors for whom the male gender is concerned in more than 2/3 of cases. This could be explained by the turbulence of male children and consequently their exposure to risky play activities.^{1, 2, 5, 6,7} The average age of 5.36 years in our study was superimposed on that of Claudet et al. and higher than the data of Vergara-Amador. E et al, who found an average age of 4.6 years.^{6,8} According to the literature, fingertip injuries mainly concern children under 5 years old.^{1, 2, 5, 6} The mechanism of occurrence is most often a direct trauma by crushing between two rigid objects exerting a shearing movement.^{1, 2, 8} In our study, direct crushing concerned more than half of the cases and the blunt object was a door (80% of cases). This mechanism of distal crushing of the fingers was favoured by the absence of a door bloc system in 70% of cases in our patients. Lesions remain diverse and varied as observed by Moustapha et al. in a series of 66 cases.³ During a crushing of the distal extremity of the fingers, all the anatomical structures can be involved by the traumatism.¹ The clinical presentation is heterogeneous, ranging from subungual hematoma to amputation.⁸ Lesions were dominated in

our series by distal phalanx fractures, amputations, pulpal wounds and subungual hematomas. The management of trauma to the distal extremity of the fingers first requires a precise assessment of lesions.³ Faced with a disinserted nail plate, the percentage of nail bed lesions is high (60 to 85% of cases).^{1,9} Salazard et al. recommended the systematic exploration of the nail bed when faced with a disinsertion of the plate.^{5, 10, 11} In our series, the exploration is systematically indicated in cases with disinsertion of the plate. The search for a fracture site of the distal phalanx must be systematic. Indeed, epiphyseal detachment fractures of the third phalanx, in general, and tuft fractures, in particular, represent the majority of bone damage. Transverse fractures due to a predominant crushing mechanism are rarer before adolescence.⁵ Thus, the presence of growth cartilage at the basis of the third phalanx, its close relationship with the flexor tendon sheath and the flexibility of the tissues generates specific lesion characteristic to children.⁹ It would therefore be a mistake to underestimate the potential severity of these lesions.¹ Therapeutically, the different pulpo-ungual repair techniques in our study were: pulpal sutures, repositioning of the nail plate, nail

sutures, controlled wound healing and advancement flaps (mainly Atasoy and Moberg flaps). The Atasoy flap was the most used method for flap coverage with 13 cases (23.63%). The Moberg flap, indicated in the loss of pulpal substances of the thumb, was performed in one patient, that is 1.81%. In our study, surgical treatment by pinning of fractures of the distal phalanx was the most used. The outcome was uneventful in 94.54% of cases. Infection was the only early complication in our series as in those of other African series.^{3,12} The morphological and/or functional sequelae can have negative effects on the long-term outcome in the management of a fingertip injury. In our series, they were pulpo-ungual dystrophies and sensitivity disorders such as hypoesthesia.

Conclusion

Fingertip injuries are common in children and have a reputation for apparent benignity. They represent a particular pathological entity within paediatric traumatology. A careful clinical

examination with meticulous radiological analysis allows appropriate and well codified management. The aim of treatment is to restore length, morphology and function of the fingertip and nail. The quality of the initial management will influence the final result. The restoration of a good quality pulpo-ungual complex is the best guarantee of a good long-term functional and aesthetic result.

Ethical Consideration

Study was approved by Institutional ethics Committee of Cocody teaching Hospital.

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Conflict of interests

There is no conflict of interest

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