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Case Report

The Lobster Claw-A Handy Outcome of Post Trap Gun Injury with Amputation of Index, Middle and Ring Fingers

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Abstract

Trap-gun injuries are becoming increasingly common. This case highlights a rare occurrence, an upper limb injury secondary to a trap gun being triggered. It also however, highlights an interesting outcome, the creation of a cleft hand, which proves to be a functional outcome in a third world setting, without access to advanced techniques such as microvascular surgery.

Keywords: Trap gun injury; Lobster claw; Traumatic amputation of fingers; Functional outcome

Introduction

Ectrodactyly is the term used to describe a congenital cleft hand, which results from either a failure of development of one or more rays or congenital fusion of rays [1,2]. This disorder can result in great disability depending on its severity, as it yields a myriad of presentations.

A "Trap gun" is a home-made firearm, usually attached to a "victim-triggered device" [3]. It is used by farmers for protection of their crop and/or livestock from wild animals as it is usually nested low to the ground and charged with ammunition designed to incapacitate rather than kill. More commonly in the Caribbean setting, it is used by those who partake in the illegal cultivation of marijuana, as a means of warding off the unfortunate who may encounter their fields. In these instances, the ammunition used is usually tainted with contaminated contents and aimed to maim and/or kill. These devices are usually targeted mostly at the lower limb. Injuries due to trap guns are rare, and not surprisingly occur exclusively in rural areas. The main injury caused by these devices are compound fractures [3].

It leads one to ask though; what do these two entities have in common? We present a case of unique interest. A varied injury to that traditionally attributed to trap guns and a unique outcome in a third world setting.

Case Presentation

A 21-year-old right hand dominant female, was brought to the emergency department within 6 hours following a trap-gun injury to her right hand. The origin and purpose of the trap gun was unknown to the patient. History revealed on that morning the patient went out to help her family pineapple business farm and, on her way, back home she accidentally sustained injury to her right hand.

On examination she was haemodynamically stable with a blood pressure of 133/97 mm Hg and a pulse of 57 beats per minute. All her injuries were confined to her right hand **(Figure 1)**. These comprised:

(a) Amputated index finger (D2) at the level of the distal third of the metacarpal.

(b) Partial amputation of the middle finger (D3) at the level of the base of the proximal phalanx

(c)Partial amputation of the ring finger (D4) at the level of the base of the proximal phalanx.

Once stabilized in the emergency department, she was admitted to the orthopedic ward, where she received Intravenous C-Penicillin and analgesia. She underwent emergent debridement and formalization of the amputations later on that same day.

At surgery, all devitalized tissue was excised to healthy bleeding tissue. No gross contamination was observed, but the prominence of the second to fourth metacarpals was found to be hindering opposition. As such, the metacarpal of the middle finger was resected down to its base, with the metacarpals of

Figure 1: X-rays of Right hand of Ms. J.S after injury.

the index and ring fingers being beveled in their transected end to allow the transverse metacarpal ligament from the fifth metacarpal to be attached to the first metacarpal. Thus, this created a cleft type hand, commonly referred to as a "lobster claw hand", which would allow grasp between the two remnant digits.

Her postop recovery was partly complicated with minor surgical site infection with Enterobacter species and Coagulase negative Staphylococcus, both sensitive to Cefuroxime, Ciprofloxacin and Gentamicin. The patient was started on intravenous Cefuroxime, to which she responded, and after two (2) days, her wound was dry. She was converted to oral Cefuroxime and discharged home.

Figure 2: Healed right hand of the patient performing Pincer Grasp.

Figure 3: The patient is demonstrating the Lateral grasp.

She was then referred to the physiotherapist for further rehabilitation. After several sessions, her finger movements start to improve with good opposing function of her digits and the ability to grasp objects the Pincer Grasp **(Figure 2)** and hold objects the Lateral grasp **(Figure 3)**.

Discussion

Trap gun injuries in the third world are rare3, but are becoming increasingly reported4, especially as the illegal drug trade continues to expand its reach. Searches on databases such as Pubmed reveal no documented cases to date, in the Caribbean literature (see Illustration below).

As many as (76) seventy-six percent of reported victims are farmers [4]. These smooth bore devices, similar to "mole guns" [5], result in significant tissue destruction and contamination. They are most commonly associated with open fractures, and have a high rate of development of osteomyelitis [3,4]. As highlighted previously, trap guns are usually aimed at the lower limbs to disable and incapacitate. Thus, the features which make this case unique are; (i) the injury of J.S, which is confined to the upper limb compared to the more traditional

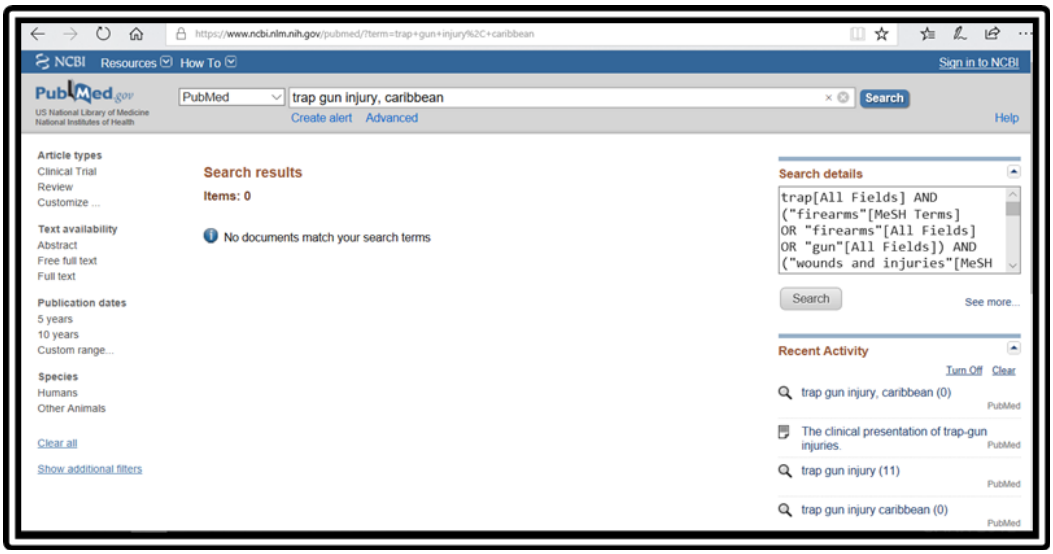

Illustration 4: Search Results of Documented Caribbean Trapgun Injuries.

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lower limb and (ii) the formation of a "lobster claw", which has left the patient functional, despite these anomalies requiring corrective surgery in most congenital cases.

Microvascular surgical replantation of severed digits has been found to have a mediocre outcome even in large centers, with the best results naturally coming from those with more experience [6-8]. The techniques, developed and refined since 1902 by Carell, came to the fore in 1960 with the highlighting of the operating microscope by Jacobson and Suarez [9]. Refinement of techniques over time has resulted in the possibility of repairing vessels of outer diameter as small as 1.0mm [10]. This surgical subspecialty however, is not readily available in the third world setting of Caribbean medical care. Thus, replantation of amputated digits is generally not performed.

Given, the lack of availability of microvascular surgical expertise, one is left to maintain function in deformed limbs, with basic surgical techniques. Taking into consideration the functions of the hand, i.e., the specific types of grasps, priority of preservation is given to those functions which will have the greatest benefit to the patient. Grasp can be broadly categorized as either "Power" or "Precision", and can be further subdivided based on the use of Pad Opposition, Palm Opposition or Side (lateral) Opposition [11-14]. In many of these grasps, multiple fingers combine to join the thumb as functional units [14].

These combined finger units transmit forces through a "virtual" finger, such as that forces transmitted from the midpoint between the index and middle fingers, used in the tripod grasp [15]. The retention of tripod grasp, has been found to be the main predictor in the success of hand function in pathologic states [16]. However, it is the "virtual finger" created by transmission of opposing forces that makes the important tripod grasp, essentially a two-finger grasp. This is an important consideration as to why the "lobster claw" is a functional orientation.

Conclusion

This case serves to highlight the possibility of a functional outcome with a bit of lateral thinking. Though not as cosmetically appealing as having a full hand, it can be a good option in a third world/developing setting for the management of severe traumatic multi-digit amputations, when microvascular surgical facilities are not readily available. A lobster claw hand can yield a functional outcome

Consent: Informed consent was obtained from the patient for use of personal details to facilitate documentation of this unique case.

Conflict of Interest Statement: The authors bear no conflict of interest in the management or write up of this case.

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