

Pattern of Hand Involvement in Cracker Blast Related Injury : A Retrospective Study

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Abstract

Crackers or fireworks are an integral part of the celebration of any event and are nice to see and give enjoyment. But if handled with carelessness these may cause severe injury, even death has been reported. Though any part of the body can be injured, hands are commonly involved in such injuries. This study aimed to assess the pattern of hand injuries caused by fireworks among the patients who presented to a tertiary centre of India.

Keywords: Cracker; Hand; Injury; Firework.

Introduction

During festival seasons, firecrackers are one of the more important causes of burn injury. Though the fireworks/cracker related burn injury can occur throughout the year, festival season shows a sharp increase in the number of cases. Diwali is an important festival in India. The crackers market is at its peak during this festival season. Crackers are available easily in most of the markets, despite the presence of strict regulations and laws.

The crackers are small devices containing explosive materials of varying strength, which make a loud sound on explosions. Most of the burns or injuries caused by such firework involve hands and face.¹ In addition to this, ears and eyes may also be involved. Deaths have also been reported. In this study, we evaluate the pattern of hand injuries due to cracker blast presented to a tertiary centre in one year.

Material and Methods

This is a retrospective study conducted in the department of plastic and reconstructive surgery in a tertiary care centre in the southern part of India. All the cases of cracker-related hand injuries presented during 2019 were included in this study. Retrospective data was collected with the help of X-Rays, clinical photographs, and case sheets. (Table-1)

The pattern of soft tissue involvement of fingers was categorized as laceration, avulsion, and amputation. The bone injuries were classified as fracture and dislocation. In addition, webspace involvement was also studied. In addition to this, the distribution of data according to age, gender, mode of injury, involved structure, and hand involvement was also studied. (Table-2-6)

Result

Total of 33 patients were presented with a cracker-related injury to the hand. Most of them were male. The right hand was commonly involved and

bilateral hand involvement was seen in one case. Laceration of finger or webspace was commonly seen. (Figure-1, 2 and 3) Thumb, index, and middle finger were commonly involved. Amputation was also common in these three fingers only.

Table 1: Details of the patients.

S. No.	Age (years)	Gender	Hand involved	Digits involved	Web space involved
1	13	M	right	I,II,III,IV	—
2	8	M	right	I, II, III	1st
3	19	M	right	I, II, III	—
4	14	M	right	I,II,III,IV	—
5	24	M	right	III, IV	—
6	9	M	right	I, II, III	1st, 2nd, 3rd
7	13	F	right	I, II, III	—
8	31	M	right	I, III, IV	1st
9	30	M	left	I, II, III	1st, 2nd
10	16	M	left	—	1st
11	49	M	right	—	1st
12	5	M	right	III	—
13	16	M	left	II, III	1st, 2nd
14	12	M	right	I, II, III	1st
15	13	F	left	I, IV	1st
16	17	M	right	I, II, IV	—
17	9	M	right	I, II	1st, 2nd
18	19	M	right	I, II, III, IV, V	1st, 3rd
19	35	M	right	I, II, III, IV	1st
20	14	M	left	I, II, III	—
21	17	M	right	I, II, III	1st
22	70	M	Both	Right-I Left- I, II	Right-1st,2nd Left-1st, 2nd
23	13	M	right	I, II, III, IV	2nd
24	9	M	right	II	1st
25	10	M	right	I, II, III	2nd
26	60	M	left	I, II	—
27	13	M	left	III	2nd, 3rd
28	29	M	right	I, II, III	1st, 2nd
29	38	M	right	I, II, III, IV, V	1st
30	30	M	right	I, II	—
31	13	M	right	I, II, III	—
32	9	M	right	I, II, III	—
33	15	M	right	I, II, III	2nd

Table 2: Gender distribution.

Male	31
Female	2
Total	33

Table 3: Hand involvement.

Isolated right hand	25
Isolated left hand	7
Both hand	1

Table 4: Finger laceration.

Thumb	27
Index finger	26
Middle finger	24
Ring finger	10
Little finger	3
Total cases having one or more finger laceration	31

Table 5: Web space laceration.

First web space	18
Second web space	11
Third web space	3
Fourth web space	0
Total cases having one or more web space laceration	22

Table 6: Finger amputation.

	Thumb	Index finger	Middle finger	Ring finger	Little finger
Distal phalanx	7	5	7	1	0
Middle phalanx	–	0	1	0	0
proximal phalanx	1	3	0	1	0
Total	8	7	8	3	0



Fig. 2: Complex injury with first web space involvement.



Fig. 3: First and second webspaces involvement.



Fig. 1: Digital amputation.

Discussion

Fireworks are devices of ancient Chinese origin containing combustible chemicals that cause an explosion or spectacular effects.² Fireworks, commonly known as crackers, are low hazard explosive comprising of any composition or device manufactured with a view to produce coloured fire or flame, light effect, sound effect, smoke effect (coloured or natural), or combination of such effects. These can be classified in different manners.

The spectrum of firework injuries that have been reported includes burns, contusions, lacerations, foreign bodies, and amputations. There are even reports of death. The majority of injuries resulting from personal use of firecrackers, they mostly involve the hands and most injuries happen at home.

The explosion of a firecracker generates a blast wave that spreads out from a point source. The blast wave consists of two parts – a shock wave of high pressure, followed closely by a blast wind, or air in motion. In general, the damage produced by blast waves decreases exponentially with distance from the point source of the blast.

The injuries that occur in a firework-injured hand include soft tissue injuries, fractures, burns, and traumatic amputations in addition to disruption of the neurovascular supply. Soft tissue injuries include abrasion and lacerations or in more serious form as avulsion injury. Fractures occur when the vibration of the blast component causes the phalanges to break while the distal volar plates of the interphalangeal joints (IPJs) give way, which results in dislocations and avulsion fractures of the IPJs. In most cases, these joints undergo amputation. Traumatic amputation occurs when the soft tissues, bones, tendons and ligaments are unable to withstand the explosive force of the firecracker, resulting in a shattering of bone, disruption of the joint, and irreparable damage to the blood vessels and digital nerves as well as insufficient skin coverage. Most commonly thumb, index finger, and middle finger are involved. First and second web spaces are also affected commonly. Males are more common victims.

These injuries are often preventable to a great extent. Public awareness and strict rules

and regulation are key factors to reduce such incidences.^{3,4,5}

Conclusion

Crackers or fireworks are commonly used during festival seasons in India. But these fireworks are inherently dangerous. The hands are commonly injured due to cracker blast. The injuries may be a simple laceration to amputation of multiple fingers. To minimize the accidents, awareness of safety practices and adherence to strict quality control should be there.

Conflicts of interest

None

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