

# INJURIES ASSOCIATED WITH FIREWORKS – A REAL THREAT AMONG CHILDREN POPULATION

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## Abstract

People use fireworks to celebrate religious and other holidays in many countries around the world. Fireworks have been banned in a lot of countries but still pose a high potential risk of injuries, especially among male children. Hands and fingers sustain the largest number of injuries followed by legs, then eye injuries. In addition, the lesions from fireworks can be "life-changing" if it occurs on someone's dominant hand, which may never regain its original function if the injury is very severe, or if it produces loss of vision.

**Keywords:** Fireworks, Injuries, Children, Legislation, Prevention

## Introduction

Fireworks are devices with origin in ancient China and they contain combustible chemicals that cause explosives [1], bright and colorful effects. They contain sulfur, charcoal and gunpowder, and the red-hot fragments can reach more than 1,300 degrees, according to the CPSC (Consumer Product Safety Commission in the USA). They are used in many countries around the world to celebrate different festive occasions related to religious traditions, historical or cultural events. Examples include Independence Day in the United States, Guy Fawkes' night in Australia, Britain and New Zealand, Deewali in India, New Year in China and Italy, Prophet's birthday in Libya and Hari Raya festival in Malaysia [2]. In Romania, fireworks pose serious problems during Christmas or Easter Holiday and New Year's Eve.

## Purpose

Children are in high risk of injury from fireworks and represent more than 30% of emergency room visits for fireworks-related injuries. Children between the ages of 5 and 9 years are more than twice as likely as people in other age groups to be injured by fireworks [3]. Other studies say that adolescents, especially boys are more affected. Boys' injuries are usually self inflicted, while injured girls are usually bystanders [4].

In Romania there are no studies with reference to fireworks. The legislation has existed since 1995, but illegal sales and imports increase especially during the Christian holidays and the end of the year, when unsupervised children are victims of these devices. We want to describe as an example the case of an adolescent boy admitted in the Clinic last year around Christmas Eve with a hand

injury after a firework explosion while holding the device. As a complement to the lesional framework, we wanted to describe the legislative state and to present certain safety rules in handling these devices.

## Material and method

The case that we wanted to present is an 11 year old boy who came in the Emergency Room and then was admitted in our Department for write hand lesions after a firework explosion while holding it in his hand. He had severe blast lesions in his palm and of his thumb, with nail loss. The soft tissue of the first phalanx of the index, including the nail, were amputated, exposing the bone (figg. 1-4).

He went immediately in the operating room, where, under general anesthesia we've done an amputation of the first phalanx of the index and also of the distal interphalangeal joint. The remaining soft tissue was used to close the amputation site. After repeated dressing every 24 and then 48h, in 4 weeks the result is shown in figg. 5-7.

## Results

The end result in this case was a good one, without serious injuries that can lead to a severe functional disability, such as blindness or amputation of important parts of the hand or even the entire hand. This boy will manage to use the right hand with no difficulty, even for writing.

Such cases, as an example, must lead the authorities to get more seriously involved in the problem of fireworks and all so-called explosive entertainment devices that can cause severe injuries, if handled by unauthorized persons, especially children, and in inappropriate environments.

Romanian law divides firework devices in 4 classes [5]. Objects from first class can be sold all year long, second class only between 27th -31th of December and can be used only on the 31st of December and 1st of January. Pyrotechnic devices in classes III and IV may be handed over and put into use only to persons authorized as pyrotechnicians.

For the organization of fireworks with pyrotechnic objects from the 3rd and 4th classes, the approval of the county police inspectorate, respectively of the General Police Department of Bucharest is required. Fireworks with pyrotechnic objects from the 4th grade can be performed only by specialized persons, authorized by law, with all measures taken to prevent fires.

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**Fig. 1-4.**The aspect of the right hand after firework explosion, including the Xray



**Fig. 5-7.** The result after one month from surgical treatment

In order to prevent fires and to ensure operative interventions, the organizers of fireworks with pyrotechnic objects from classes III and IV must notify the local fire service 24 hours before their conduct.

All these safety and accident prevention measures are not enough if the population is not properly informed through various media, such as the press, television, radio

or authorized brochures, so that the danger itself can be fully realized.

During the winter holidays and Easter, illegal traders sell pyrotechnic products of dangerous grades without approval or precautions. These products also end up in the hands of unsupervised children who become direct victims of injuries caused by uncontrolled explosions or may cause other indirect victims.

Studies say that most of the injuries caused by pyrotechnic products and hospitalised, were caused by firecrackers and sparklers [2]. Basically a law cannot totally prevent the population from obtaining and using fireworks. Injuries due to fireworks can result from both legal [6] and illegal ones [7,8]. In order to develop safety measures, the type of fireworks causing injuries should be punctiliously studied and a comprehensive approach is necessary [9-14]. Recommendations include parental education and supervision at home during holidays like Easter and Christmas or New Year's Eve, and only attending formally organised fireworks displays [12,15].

Legislation has a significant effect on injury rates. In some states in America, where the law was permissive, injury rate was seven times greater [12]. In Hungary, incidences were reduced following a 'legislative ban on private fireworks displays' [13].

Many studies recommend the introduction of stricter regulations and banning the sale of pyrotechnic objects.

There should also be greater control of sellers and encouraging the population to use only approved fireworks and sites. School education has to be supported and developed [16].

### Conclusions

Fireworks are associated with serious injuries. Hands and fingers are more affected; other body parts affected by firework accidents are the legs and eyes, followed by the head, face, ears and arms.

It is important to know that most of these injuries among pediatric age group can be preventable. Fireworks must not be given to children even in safe public sites.

Legislation must be more severe and the competent authorities must closely monitor its observance both during the festive seasons and throughout the rest of the year. Also parental supervision and school education are also needed to prevent injuries from pyrotechnic devices.

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