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Pressure Cooker - A Potential Hazard in Domestic Setting

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ABSTRACT

Pressure cooker is an integral part of Asian kitchen, and is frequently used in Nepal. Steam under pressure generated while cooking has high boiling point and great penetrating power. The use of pressure cooker in kitchen is associated with unintentional injuries that mostly include pressure cooker burns. In rare instances the pressure cooker may accidently explode and may cause serious injuries. The same mechanism is used in making explosive device for mass homicides. An unusual case of penetrating facial injury sustained in a pressure cooker explosion in a domestic setting is reported along with a brief review of literature on pressure cooker explosions.

KEY WORDS

Domestic accidents, explosion, facial injury, foreign body, Nepal, pressure cooker

INTRODUCTION

Steam under pressure has high boiling point and greater penetrating power. Denis Papin used this principle in 1679 and invented steam digester which forms the basis of modern day's pressure cooker and autoclaves.[1] Since then pressure cookers are a popular component in the households especially in the Asian countries as it reduces cooking time and saves fuel. Besides, its utility in the kitchen, its misuse as an explosive device has been documented globally.[2]

Unintentional injuries in domestic kitchen settings are not uncommon, and include minor cuts, burns and scalds or sometimes major mishaps usually involving fire accidents, stove burst etc. These incidents mostly occur either due to improper use of the device or faulty apparatus. The use of pressure cooker in kitchen is associated with unintentional injuries that mostly include pressure cooker burns,[3-5] accidental explosion during household cooking however is rarely reported.[5,6]

The pressure cooker is an integral part of every Nepalese kitchen. An unusual case of penetrating facial injury sustained in a pressure cooker explosion in a domestic setting is reported along with a brief review of literature on pressure cooker explosions.

CASE REPORTS

In a rural household, a 62 year old female met with a domestic pressure cooker blast while cooking. She was rushed to the nearest tertiary care teaching hospital that was 63 kilometers away from her residence. On presentation in the emergency room, the only external injury was an irregular lacerated wound measuring 4 cm x 3 cm over the right parotid region. A metallic foreign body was observed to be impacted into the wound (Fig. 1). This muscle deep wound was situated 3.5 cms from the right ear lobule and 6 cms below the lateral canthus of right eye. There was no active bleeding from the wound. The buccal mucosa underneath was intact. Face was deviated to the left with lagophthalmos of right eye. The patient showed features of lower motor neuron type of facial palsy. The vitals were stable and the patient complained of burning pain over her right cheek. The diagnosis was aided by radiological imaging (Fig. 2) that showed a rectangular shadow over the mandibular region. After preliminary routine investigations the wound was explored under general anesthesia and the impacted foreign body was removed. The metallic foreign body happened to be a pressure cooker nozzle which was lodged just above the terminal branches of the facial nerve. The underlying bony architecture, parotid gland and ducts were intact. The foreign body was removed and primary closure of the wound was done. Investigations revealed that the pressure cooker was a faulty one with a malfunctioning safety valve that led to the accident.

Figure 1. A metallic foreign body impacted in the right cheek of the victim.

DISCUSSION

In this modern era where earthen clay pots are replaced by metallic ones, pressure cookers are a common cooking utensil in Asian kitchen. The outer surface of the pressure cooker is hot and can cause burn injuries referred to as pressure cooker burns. Besides, when the steam under pressure escapes from the nozzle, it can cause scalds to the person in close vicinity. Under high pressure, the hot nozzle itself may suddenly escape with high velocity and act like a projectile causing serious damage which can be a combination of mechanical injury and burns. The velocity

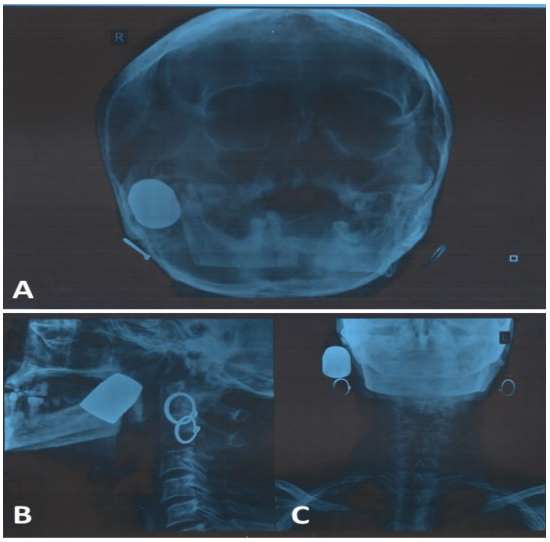

Figure 2. Radiographs showing the location and extent of penetration of the foreign body; a pressure cooker nozzle.

of the nozzle may be high enough to even penetrate the body. Most of the literature on the pressure cooker related injuries describes the pressure cooker burns except for a case where burns were accompanied by fracture of mandible and in another that resulted in serious ocular trauma caused by the nozzle of the pressure cooker lid.[3-6] In a related series of boilers and pressure vessels accidents in Hong Kong, it was concluded that the associated morbidity and mortality could be the result of ignored safety procedures for operation and maintenance of pressure equipment.[7] In this series, among the cases involving pressure cookers; the pressure inside the cookers was estimated to be over 450 kPa that is sufficiently enough to cause devastation.[7]

In this era of information technology, the terrorist groups have globalized the tactic of making improvised explosive device (IEDs) from pressure cooker commonly referred to as Pressure Cooker Improvised Explosive Devices (PCIEDs). The origin of PCIED dates back to the end of 20th century and is linked to distribution of pressure cookers at United Nations refugee camps. These United Nations High Commissioner for Refugees (UNHCR) supplies of pressure cookers that were meant for the benefit of the refugees led to the unwanted creation of PCIEDs. The uses of PCIEDs were reported first in Nepal in or around 1996. Since then the PCIEDs have been used for mass killings and terrorist activities that are reported from the plains to the high Himalayas, Afghanistan, Iraq, Kenya and the USA. The explosions using PCIEDs can be devastating and are known to cause large scale damage. PCIEDs that exploded at the finish-line of the Boston marathon, reportedly wounded over 250 people and caused three fatalities.[2] In Nepal, during the period of civil war between 1996 and 2006, buying, selling and transportation of pressure cooker was banned by the government because of its wide spread use for mass homicides.

'Pressure cookers are used in a kitchen to speed up the preparation of food and in the hands of terrorist they can have a similar effect of accelerating the power and lethality of a so-called low explosive'.[8] In domestic setting, human error or faulty appliances can cause damage to the life and property. Reporting of these cases is important to identify the cause of mishap and to plan prevention of similar and related incidents. Pressure cooker related burns and explosions in kitchen are largely preventable. Malfunctioning safety valves, improper use of ill-maintained cookers or leaving them unattended for long hours are some of the common causes for these kitchen accidents commonly involving the women. Increased public awareness about the safety issues in kitchen especially while handling pressure cookers can be an effective measure in this regard. Improvised pressure cookers with well established safety standards should be used. Awareness programs about the safe operation and maintenance of pressure cooker such as cleaning of the valve and rubber seal and prompt replacement of the faulty ones should be conducted among women. The manufacturers should strictly adhere to the quality check of the pressure cookers, while distributors and sellers should clearly instruct the buyers about its operation and maintenance, along with an insert of user manual in the local language preferably.

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