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# Shot Gun Injuries of the Head and Maxillofacial Region in Children and Young Adults: Clinico-Epidemiological Profile

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**Abstract**
*Shot gun or Pellet gun injuries is quite uncommonly faced emergency nowadays by maxillofacial and neurosurgeons worldwide and has invited a challenges in modern day to day practice of surgeons. For this reason a study was conducted in departments of Maxillofacial and Neurosurgery, Govt Medical College and SMHS hospital, between January 2016 to December 2017. The pattern, severity and outcome of injuries in head/neck and maxillofacial region in patients of shot gun injuries particularly in young population was studied.*
**Keywords:** *shot gun injury, head& neck, maxillofacial injury.*

## Introduction

Shotguns are often used for hunting animals worldwide. The gun fires a shower of small, round-shaped pellets, which be similar to iron balls, with high velocity. The typical projectile used in these shotguns or airguns is the lead diabolo pellet but iron pellets are also incorporated in some ammunitions.[1] These comparatively low-energy missiles produce effects on tissues such as laceration and crushing along the missile tract as was also seen in our cases. A majority of these injuries has occurred in children and young adolescents as evident in our study.[1,2] The trauma involved with these injuries is significant because it is mostly the head and neck region that was seen affected.

In our region such injuries are not so uncommon as people are fond of hunting as profession and recreation and frequently patients suffer from shotgun injuries accidently mostly in the head and maxillofacial areas. The results of multiple shotgun wounds especially in head and neck are fatal.[3] People who receive multiple injuries require the coordination of multiple surgical disciplines to optimize the functional and aesthetic outcome.[4]

## Material and Methods

All the patients admitted as primary head, neck and maxillofacial injury by pellets or those referred to Neurosurgery and maxillofacial unit due to multiple injuries during the two year period from January 2016 to December 2017 were included in the study.

All the patients with severe injuries with vital organ involvement who needed life-saving interventions were primarily dealt for those injuries first. After proper evaluation and investigations particularly X-ray and C.T scan of

head and neck region, the patients were shifted to the ward or emergency operation theater as necessary.

The pattern of injuries, position of the pellet in head, neck and maxillofacial region were distributed as maxillofacial, head and neck isolated or combined injuries. The management was categorized as early intervention, late intervention and/or no intervention based on nature of injury. Management and outcome of the patient was considered in the study.

**Fig 01**

## Results

In our study total of 69 patients were included, 64 males and 5 females. The most common region involved being maxillofacial (50), head (12) and neck (7) (Table 2). The most common immediate presentation seen was bleeding from the open wounds (56), facial bone fractures most commonly seen was nasal bone in 14, ethmoid bone in 4, maxillary and inferior orbital wall fractures in 12 patients because of the direct impact, impaired hearing in 4 due to tympanic membrane perforation, haemotympanum, or inner ear damage, vision affected in 26 cases.

Altered consciousness was seen in 6 due to intracranial brain contusions as a result of penetrating pellets or impact momentum (Table 3). In Late presentation group secondary infections was seen in 13 patients only, neuralgic pains in 26- mostly maxillofacial region and scalp region, disfigurement due to maxillofacial bony fractures and bad traumatic scars on face was seen in 9 patients.

**Table 1** Age distribution

| Age (years) | Number of patients (N=69) |
|---|---|
| 0-10 | 15 |
| 10-20 | 54 |

**Table 2** Anatomical area of injury

| Area of injury | Single area | Multiple areas | Total |
|---|---|---|---|
| Maxillofacial | 50 | 12 | 62 |
| Head | 12 | 39 | 51 |
| Neck | 7 | 23 | 30 |

**Table 3;** Signs and symptoms

| Early presentation | Number of cases |
|---|---|
| Bleeding | 56 |
| Loss of vision/hearing | 30 |
| Altered sensorium | 6 |
| Maxillofacial fractures | 40 |
| **Late presentation** | |
| Infection | 13 |
| Neuropathic pain | 26 |
| Deformity visible | 9 |

## Discussion

Air-guns have been considered non-assault weapon but can be occasionally potentially lethal at times. Air-guns or shot guns were known as wind chambers, and used a high pressure air reservoir connected to a cannon barrel. These weapons were used very frequently in the Napoleonic wars in the 17th and 18th centuries [1 pellet 1]. The modern high-powered shot guns or pellet guns can propel a pellet beyond 1100 ft/s (330 m/s).[1,5] Such high velocity projectiles can cause significant damage to soft tissues. A single cartridge upon fire breaks into more than 500 small iron/lead pellets which can penetrate soft tissue of face, neck and eyes.[2,5] Depending upon the velocity and distance from which the gun is fired, pellets can cause both penetrating and non-penetrating injury to the whole body predominantly the head-neck and maxillofacial region.

In our study such injuries were more common in males (92.7%), mostly in young adults and adolescents (78.2%). In our study age of our patients was considerably younger as compared to other studies. In the present research the pattern of pellet gun injures in head-neck and maxillofacial region have been studied and clinical and

radiological documentation of various facial bony fractures and localization of metallic pellets were done. patients with multiple injuries with pellets in maxillofacial region and head/neck region without involvement of vitals structures and without any active bleed or large open wounds no surgical intervention was done thus avoiding more tissue loss with exploration of deep wounds in search of pellets (Figure 1). In 31% of maxillofacial injuries, 83 % of pellets in head region without bone penetration and 63 % of pellet injuries in neck region were kept as such without any intervention. These patients were followed up for about 6 to 12 weeks for delayed complication. According to these findings, it could be recommended that pellets can retain for many weeks without appreciable symptoms and signs or complications, and may be left in situ without any surgical intervention.

With proper management of airway and hemodynamic instability followed by proper evaluation of primary and concomitant injuries with its timely management has improved the outcome of patients of pellet injuries in head-neck and maxillofacial region. The long term outcome couldn't not be assessed in our group of patients as the period of study was short and most of the patients are lost to follow-up due to poor socioeconomic and educational background.

An estimated 32,000 injuries attributable to non-powder firearms (i.e., BB gun, pellet gun, and air rifle) occur each year in the USA, most of which are seen in the pediatric population.[1] Similarly our study also comprised mostly of pediatric population. Many case reports of serious and even fatal non-powder firearm injuries and /or shot gun injuries have been published describing ocular, intracranial, abdominal, and thoracic wounds [6,7] but our emphasis was mostly on head/ neck and maxillofacial areas.

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