Bullet and Blast ENT Injuries in Counter-Insurgency Area

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Abstract

Background: Many ENT injuries are not recognized easily, but they have the potential of increasing the morbidity.

Methods: ENT injuries managed in two tertiary care Level-IV hospitals between 2006 and 2007 were studied with a view to formulate strategy in efficient management of these cases.

Result: Emergency bags did not carry readymade packs to control nasal bleeds. Routinely screening of ears in all blast injury cases in the 'Blast Injury Program' helped in early identification of hearing loss. Lack of sufficient stenting of nasal cavities resulted in severe nasal stenosis which was difficult to repair. Splinters lodged in pharyngeal wall escaped detection, resulting in concealed haemorrhage and shock.

Conclusion: Nasal packs and epistaxis catheters must be included in emergency bags to minimize blood loss at first contact. Screening for ear trauma in all blast injuries increases detection rate and is beneficial to the soldier. Stenting of injured nasal cavities and early transfer to a tertiary care hospital could reduce morbidity. Plain radiography of head and neck areas could help detect splinters in vital areas and guide management.

MJAFI 2010; 66 : 29-31

Key Words: Combat injuries ENT; Blast injuries ear

Introduction

Indian soldier is adept at counter insurgency operations. However these operations result in significant injuries. Bullet and blast injuries can be devastating and result in permanent deformities, if not dealt with correctly.

Preparedness is crucial to management. The basic concept of immediate care remains the same ABC (airway, breathing, circulation). However definitive treatment rendered at the earliest goes a long way in reducing morbidity.

The aim of this article is to improve the level of ENT care to casualties in counter insurgency areas based on the analysis of injuries.

Material and Methods

The pattern of ENT injuries sustained during counter insurgency operations from the year 2006-07 were studied at two tertiary care, Level IV hospitals, with a view to formulate a strategy in handling these injuries and to minimize the complications that follow.

Level I- was the primary care which is usually provided by a buddy or a battle field nursing assistant (BFNA). Level II - a field hospital of a brigade or division. Level III - theatre deployed hospital. Level IV- a tertiary care Command hospital with all specialists available or Base hospital which has all the specialists except reconstructive surgeon available.

Evaluation included equipment and material available to

deal with nasal bleeds at Level –I. Other questions addressed were-(a) is it worthwhile to screen all blast injury victims for hearing loss even though they do not have any injury in head and neck area? The 'Blast Injury Program' was started in hospital 'A' in June '07 to screen ears of all blast injury victims as soon as they were stable and again at the time of discharge. We did a clinical evaluation of hearing in all cases followed by audiometry only in those detected to have any hearing loss as judged by conversational voice and forced whisper, at the time of admission and recorded our findings. In case of evidence of injury we filled up the injury report/ battle casualty certificate. At the time of discharge i.e. after sick leave of four to eight weeks, a re-evaluation was done and a pure tone audiometry only done for those with a persisting perforation/ hearing loss/ persisting tinnitus. (b) What was the best time to do tympanoplasty in ears damaged in bomb blasts? Here as there were only two cases who needed tympanoplasty a comparison could not be made, but difficulties encountered were documented. (c) Is there any lacuna in ENT care at various levels? For this we noted the delay in transferring the patient to a centre where definitive treatment could be given and the failure to deal with a problem which affected the final outcome.

Results

A BFNA bag had only cotton and gauze to stop a nasal bleed. The emergency doctor's bag which contains all the basic equipment to handle an emergency at Level II, III and IV also only contained the same. Readymade packs like

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Merocel, Tilley's forceps and Thudicum speculum to deal with nasal bleeds were not kept in these bags. Other readymade alternatives like an Epistaxis catheter for anterior nasal bleeds and Foley's catheter for post nasal bleeds were also not part of these kits.

In 2006, out of the total number of battle casualties treated at the tertiary care, Level IV hospital 'A', 5.5% were wholly or partially related to ENT. In 2007, this figure was 15.7%. The 'Blast Injury Programme' was started in the hospital in June 2007 to screen ears of all patients exposed to bomb blasts at close range. This increased the total ENT cases to 21.1%. On screening it was found that invariably all had tympanic membrane haemorrhagic contusions after exposure to blast in the range of 50 metres. Those with other grievous injuries were unaware of the ear problem, being pre-occupied with the injuries. The cases with no obvious ENT injuries detected during screening (3 out of 7 i.e. 42.8%) had persisting high tone sensorineural deafness of 70-80 db at 4 KHz and tinnitus of variable degree which usually subsided over a period of time. Two patients, who reported primarily for ear problem, had large tympanic membrane perforations and mixed deafness. These patients with shattered tympanic membranes were sent on sick leave, giving time for natural healing. Review of these cases, however, revealed no evidence of healing. Tympanoplasty undertaken after three months of trauma was difficult as the displaced ossicles had become embedded in fragmented middle ear mucosa. One patient developed vertigo and tinnitus per operatively while mucosa from embedded ossicles was being removed indicating possible perilymph leak. One patient with a bullet lodged in the ear canal developed severe sensorineural deafness and meatal oedema which persisted for more than a month and was followed by mild meatal stenosis. A detailed breakup of all cases revealed ears to be the most commonly affected.

In hospital 'B,' out of the total number of battle casualties treated in 2006, 5.9% were wholly or partially related to ENT. In 2007, 7.4% were wholly or partially ENT related. Detailed breakup for the two years again revealed that the ears were most commonly involved. Occasionally patients were held back longer than necessary before transfer to a reconstructive surgeon, to allow time for healing and primary repair of wounds of head and neck. In the process, however, nasal cavities were not adequately splinted causing severe nasal stenosis which became difficult to deal with later. Among the total of five nose cases in hospital 'A', two patients had developed unilateral severe nasal stenosis which required extensive surgery while one developed adhesions as splinting was done for a very short period.

There were three cases of significant neck injuries. One patient expired. Delayed recognition of source of bleeding into stomach due to a splinter injury in the throat resulted in fatality. This patient did not have any external wound on the neck and the splinter had gone through the open mouth and lodged in the lateral and posterior pharyngeal wall.

Discussion

It is a well known fact that survival is directly linked

to the speed with which first aid is given and subsequent deformities minimized when definitive care is given at the earliest [1]. Since a BFNA is only an infantry soldier trained in first aid he may not be able to pack the nose. His training to properly position the patient to avoid aspiration should suffice. However, if the emergency doctor's bag available with most Level II, III and IV hospitals includes readymade nasal packs, epistaxis catheters and Foley's catheter, it could be very useful.

Ears having air filled cavities were most commonly involved in blast injuries. Screening showed that effect of blast on the ears went unnoticed when there was trauma in other parts of the body also. In only three out of seven soldiers, the high tone loss persisted even after eight weeks. As screening had been done on arrival and showed high tone loss, ototoxic drugs as the cause was excluded. As such we had advised the surgeons to avoid such drugs in these cases. Wherever aminoglycosides were used, it was for short periods. Hence persisting hearing loss was unlikely to be due to drugs.

Maximum recovery in acute acoustic trauma occurs in the first two days. The same is not true of massive threshold shifts produced by explosions, where significant recovery continues for weeks, as seen in most of our cases. These findings are similar to other studies [4]. We did not give any therapy to these patients as there is doubt about the efficacy and safety of some treatments like steroid usage [3]. Tinnitus was common, which disappeared gradually in all cases. Hinchliffe et al [5], suggested that it is frequently a symptom of compensation when it persists.

Immediate surgical repair with grafting is not indicated for traumatic perforations of the tympanic membrane because of excellent chance of spontaneous recovery [3]. Surgery is indicated if the perforation does not heal in three to six months. However, in our experience, we found that large perforations with tissue loss do not heal (Fig.1) and surgery at a later stage is difficult as disrupted ossicles get engulfed in soft tissue and sealed areas of perilymph leak get reopened.

Blast Injury Programme screening is done immediately on reporting to a hospital. This approach is cost effective and early diagnosis also prevents anxiety related problems.

Improved body armour i.e. the Patka on the head made of bullet proof material/helmet that soldiers wear in counter insurgency operations has helped to protect the upper part of the face. However in severe mutilating injuries, the main challenge is not only functional but also cosmetic. As function takes priority, stenting of nasal cavities acquires great importance. Our experience shows that this is not done where ENT surgeons are

Fig. 1 : Blast injury ear

Fig. 2 : Nasal cavity stented using endotracheal tube

Fig. 3 : Bullet in ear canal

not available, leading to severe nasal stenosis. Careful debridement followed by stenting using endotracheal tubes keeps the cavity open (Fig. 2). Lacerations of the external meatus caused by bullet injuries (Fig.3) should be packed with nonadherent gauze and antibiotic ointment to prevent stenosis [6].

Neck injuries in our experience were relatively less, probably due to natural protection by the chin. However the one fatality that occurred due to splinter lodged in pharyngeal area (Fig.4) leading to concealed haemorrhage into the stomach emphasizes the potential for neck injuries to turn fatal. Radiography is very helpful as splinters may go in through open mouth without any external wound and external profuse bleeding in throat and nose will manifest only once the blood pressure is restored. Our experience shows that a careful examination of the upper airway is mandatory if large amount of blood is found in the stomach.

The overall percentage of ENT injuries is comparable with studies done in Iraq and Afghanistan [2]. There was hardly any variation in the percentage of ENT injuries in the two hospitals, 'A' and 'B' in 2006 (5.5 % and 5.9% respectively). However in 2007 there was considerable variation (21.1% and 7.4% respectively).

Fig. 4 : Splinters in prevertebral and parapharyngeal area through open mouth

This was because in 2007 hospital 'A' received a number of injuries occurring due to accidental mine blasts during training when the soldiers were not wearing head gear and institution of Blast Injury Program which could pick up more cases.

To conclude, best outcomes in ENT related combat injuries can be achieved by (a) reducing blood loss and aspiration at the primary care stage by proper training of BFNA in positioning methods and carrying readymade packs in emergency kits, (b) screening all blast injuries for hearing loss, (c) stenting of injured nasal cavities and early transfer to a tertiary care centre and (d) routine radiography of head and neck in blast injuries to rule out splinters lodged in the neck.

Conflicts of Interest

None identified

Intellectual Contribution of Authors

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