

Otological Injuries Observed in Head and Neck Trauma in a Second-Line Hospital

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Abstract

Otological injuries are common during cervicofacial trauma. The aim of this study is to describe the epidemiological characteristics and to map otological injuries during head and neck trauma. This was an observational, descriptive, prospective study conducted at the ENT unit of the Referral Health Center Hospital in Mali from January 2017 to September 2018. Patients with middle and/or inner ear injuries due to trauma were included. The prevalence of otologic injuries was 34.54% of cases. The mean age was 25 years and the sex ratio was 1.11. Students accounted for 42.10%. The mechanism of occurrence was an intentional assault in 68.42% of the cases followed by road traffic accidents (15.79%). The most common functional signs were hearing loss (68.42%), tinnitus (57.89%), and facial paralysis in 5.26%. Otoscopy showed tympanic perforation (47.83%), otorrhagia (21.05%) and otoliquorrhea (5.26%). Rock fractures with osteodural breach (10.53%) and pneumocephaly were found on a CT scan of the rock. The evolution was marked by the regression of the facial paralysis and the healing of the tympanum in 45.45% of the cases. Sequelae persisted in the form of sensorineural deafness (17%). The otological lesions observed during cervicofacial trauma are varied. The challenges in our context are felt at three levels: the improvement of the technical platform, the long-term follow-up of patients, and the cost of care in terms of equipment. These lesions are responsible for disabling deafness, a source of difficulty in social and school integration.

Keywords

Otological Lesions, Trauma, Sequelae, Hearing Loss, Disability

1. Introduction

Head and neck traumas are damage or injury to the face and/or neck caused by a

violent external action [1]. They often occur during variable circumstances such as road accidents, by 2 or 4-wheeled vehicles, intentional blows and injuries (IBI) by bladed weapons or firearms, sports accidents, domestic accidents and work accidents, and attempts at autolysis.

Otological injuries consisting of lesions of a traumatic nature mainly affecting the ear are diverse and very frequent during these traumas, which occurred in 40% of cases in the emergency department of the Gabriel Touré University Hospital in Mali in 2007 [1] and in more than 75% of road accidents in France [2]. The ear is indeed a paired and symmetrical organ, and it is a set of cavities dug in the temporal bone, more precisely in its thickest and hardest part which is the rock. It is located laterally on each side of the skull in the temporal bone. It represents the peripheral auditory apparatus, and it plays an important role in balance through its vestibular apparatus. It is crossed among other things by the facial nerve. It is divided into three parts: The outer ear, the middle ear and the inner ear, each structure performs a specific function. The ear contains a large number of complex structures in a small space [3] [4].

The etiological circumstances being varied, the risk of occurrence of otological injuries is due on the one hand to the incivism of the population by the absence of wearing helmets on two-wheelers. This risk is multiplied by the exposure of the ear as an impact zone and by the fragility of the ear structures.

They occur in the context of polytrauma or they can be isolated, not involving the vital prognosis [5].

These otological injuries can be mild, ranging from a simple abrasion of the external auditory canal to functional disabilities such as sensorineural hearing loss. These injuries are a source of morbidity with an impact on socio-professional and school life.

In Mali, there are few studies previously conducted on head and neck injuries during traumas reporting a large number of otological injuries (40% in 2007, 51% in Konaté in 2015), but none was related specifically to otological lesions [1] [6].

The aim of this study is to describe the epidemiological characteristics and to map the otological injuries during head and neck trauma.

2. Method

We conducted an observational, prospective, descriptive study from January 2017 to September 2018 at the ENT department of the CSREF of Commune I of Bamako. The study population concerned patients presenting with an otologic symptom after head and neck trauma. The sample size was related to the study period, eighteen months.

All patients admitted to the ENT unit with an ear injury after a trauma to the head and neck area were included. Exclusion criteria: Isolated external ear injury with a cotton swab.

For each patient, the following variables were studied:

- sociodemographic variables: age, sex, occupation, marital status, place of residence;
- clinical variables: mechanism of occurrence of the injuries, reason for consultation, specific distribution of each injury, functional exploration, especially tonal audiometry, as well as the scannographic examination and the clinical evolution of the patients.

The information was recorded in a file, after the patient's agreement, then shown in **Table 1** and then the variables were analyzed.

3. Results

We collected 19 cases of otological trauma including 10 men for 09 women with a sex ratio of 1.11 in favor of men. The prevalence of otological injuries was 34.54% of cases. The mean age of the patients was 25 years with extremes of 3 and 59 years. We collected 10 men for 09 women with a sex ratio of 1.11 in favor of men. Students (42.10%) represented the major part of this population, followed by drivers (10.53%), and housewives (10.53%), the patients were admitted to the ENT department with a general condition rated at 15 according to the Glasgow index in 68.42% of the cases, at 14 in 15.79% of the cases and rated at 12 in 15.79% of the cases. The first causes found were assault, followed by road accidents related to two-wheeled vehicles with respective rates of 68.42% and 15.79%, followed by the use of cotton swabs (10.53%) and nose blowing (5.26%) (**Table 2**). The functional signs encountered were hearing loss in 68.42%, tinnitus in 57.89%, and otorrhagia in 21.05% (**Table 3**).

The most frequent physical injury was a tympanic perforation in 47.83% of cases, followed by hematoma in 15.79%.

The functional hearing assessment noted conductive hearing loss in 84.21%,

Table 1. Socio-demographic characteristics; age by occupation.

Occupation	Age		
	[3 - 20]	[21 - 40]	[41 - 60]
Pupil/Student	3	5	0
Driver	0	2	0
Housewife	0	2	0
Health worker	0	1	1
Other	1	1	3

Table 2. Etiology of trauma.

Etiology	Number	Percentage
Intentional assault and injuries	13	68.42
Traffic accident (RTA)	3	15.79
Cotton swabs	2	10.53
Blowing the nose	1	5.26
Total	19	100

Table 3. Functional signs.

Functional signs	Number	Percentage %
Hearing loss	16	68.42
Tinnitus	11	57.89
Otorrhagia	4	21.05
Otoliqorrhœa	1	5.26
Facial paralysis	1	5.26

mild: 87.50% of cases with a mean hearing loss of 35 dB, moderate conductive hearing loss in 12.50% and a mean hearing loss of 55 dB, mixed hearing loss in 12.50% of cases and sensorineural hearing loss in 6.25% of cases with a mean hearing loss of 77 dB.

CT scan of the rock was performed in 10.50% of cases and reported extralabyrinthical longitudinal fracture of the rock: 5.25% and transverse fracture with osteomeningeal breach: 5.25% (**Figure 1**).

Medical treatment: 78.94% (15/19) consisted of analgesics such as acetaminophen at a rate of 1 g every 6 hours, antibiotics such as amoxicillin/amoxicillin + clavulanic acid sometimes associated with corticosteroids at a rate of 1 mg/kg/day; a type I tympanoplasty was performed in 4 patients (21.06%), and monitoring + information, education, and advice were recommended in 10.53% (2/19).

During the follow-up, we observed the drying up of the otoliqorrhœa in three days, almost complete disappearance of the facial paralysis in 12 weeks, the complete regression of the hemotympanum in 3 weeks on average, the complete healing of 63.64% of perforation cases. We also noted auditory sequelae in 21.05% of cases, in particular, 2 cases of deafness: 10.53% and 2 cases of tinnitus in 10.53% in whom the medicinal cocktail based on corticoid: 1mg/kg/day, Ginko biloba: 1 tab three times a day and vitamin B complex: 1 tab twice a day did not work. And the techniques of TRT and CBT increasingly recommended for the management of tinnitus in patients with sequelae were not yet appropriate in our context due to a lack of qualified human resources.

4. Discussion

Due to its topography and the fragility of its elements, the ear is very often subject to trauma. We can note as factors favouring these injuries the absence of the wearing of helmet by a young population which moves essentially in 2 wheels as well as the considerable frequency of the voluntary blows and wounds in particular with slaps. In fact, in our context, we also note the absence of strong legislation on the compulsory wearing of helmets or at least the non-application of this legislation. The resulting otological sequelae are all the more worrying because of the inadequacy of the technical platform, the scarcity of qualified personnel and the costs of treatment.

During our study, we collected 19 cases of otological trauma out of 55 cases of head and neck trauma, that is to say, a frequency of 34.54% approximately equal to that of KEITA M.A. at the Gabriel Touré University Hospital in 2011 where



Figure 1. Axial section showing the fracture line.

they represented 39.67% of head and neck trauma [1], a little less in Pati S. (22%) [5].

The young age in our context with an average age of 25 years and the predominance of the male sex is shared by several authors: Diompana, J. Kouassi or Ouoba K. [7] [8] [9]. This can be explained by the fact that young people are more inclined to use two-wheeled vehicles and to disregard road safety rules [10]. Moreover, males are more prone to fights than females.

Intentional injuries were the most frequent mode of occurrence in 68.42% of cases, followed by road accidents, contrary to studies by our colleagues who note a predominance of road accidents [1] [5] [8] [9] [11] [12]. This can be explained by the fact that the men, especially the younger they are, are much more impulsive and aggressive, quick to react with blows during arguments and a large part of this violence was gender-based violence, in a second time accidents on the public highway are more prone to polytrauma, including otological lesions and in our country, polytrauma, particularly when the limbs or the abdominal or spinal region are concerned, is automatically transferred to the third reference centers where multidisciplinary care is more effective and the technical platform more consequent. This also explains the small size of our sample.

Hearing loss was the most frequently encountered functional sign, as in Gurbax Singh (42%) [13], followed by tinnitus 57.89% of cases related to the extreme vulnerability of the sensory organs of the ear.

Audiometry revealed a hearing loss in 84.21% of cases, including 14 cases of conductive hearing loss, mild to moderate: with an average hearing loss ranging from 35 to 55 dB, 1 case of mixed hearing loss and 1 case of sensorineural hearing loss with an average hearing loss of 77 dB.

The CT scan of the rock allowed an evaluation of the otological injuries by highlighting the characteristics of the fracture lines, and the characteristics of the structures of the ear affected. We counted 10.53% of fractures as extra labyrinthine longitudinal fracture of the rock and transverse fracture with osteomeningeal breach. Slightly lower than Gurbax Singh's result, 18% [13].

Management was based on the topography of these injuries (external, middle,

internal ear). Our therapeutic approach was based on medical treatment, monitoring of the tympanic perforation and type I tympanoplasty (in cases without closure of the breach). From the fracture point of view, monitoring was required because there was no damage to other noble structures: facial nerve, ossicle, etc.

Despite appropriate management, we noted 21% of sequelae, such as sensori-neural hearing loss (10.53%) and tinnitus (10.53%), which reduced the patients' quality of life, as in Montava [11]. Hearing rehabilitation was proposed in the form of hearing aids, but the patients found themselves faced with the unavailability or high cost of prosthetic treatment.

Limits observed during the study: some files could not be taken into account for lack of follow-up (return of patients).

5. Conclusion

The otological injuries observed during head and neck trauma are varied: from simple hematomas with reversible deafness to disabling auditory sequelae in school and/or socio-professional life. The challenges in our context are felt at three levels: the improvement of the technical platform, the long-term follow-up of patients, and the cost of management in terms of equipment.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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