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Deafness: Epidemiological, Clinical and Therapeutic Aspects in 15 Year Olds and over at the University Hospital Center Gabriel Toure of Bamako

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Abstract

Objective: To study the epidemiological, clinical and therapeutic aspects of hearing loss in 15-year-olds and over at the CHU GT of Bamako. **Materials and Method:** This is a longitudinal prospective study carried out in the ENT department of the University hospital Gabriel Toure in Bamako over 13 months (from September 2018 to September 2019). We carried out an exhaustive sampling of all the patients who consulted in the department for hearing loss and whose deafness was confirmed at pure tone audiometry with age greater than or equal to 15 years. The exclusion criteria were all patients under the age of 15 as well as a hearing loss related to earwax or foreign bodies and refusals to participate in the study. **Results:** Two hundred and thirty (230) patients were collected during the study. Dominated by the male sex with a sex ratio of 1.5 or 3 men for 2 women, with an average age of 38.16 ± 19 years with extremes ranging from 15 to 86 years. Among our patients, 37.40% had unilateral deafness, progressive installation evolving more than 12 weeks with a rate of cases had headaches 41% and had a history of chronic otitis media (CMO) 27%. There were a few cases of mixed type deafness, 30% had mild deafness, 22% moderate deafness and 40% severe deafness, according to the BIAP classification. Among our patients, 22.16% had conductive hearing loss, and those with sensorineural hearing loss accounted for 15.24%. **Conclusion:** Pure tone audiometry remains essential in the diagnosis of deafness. It not only makes it possible to confirm or invalidate the deafness, but also to define

the type of deafness and especially to classify the deafness according to the degree of the average hearing loss established by the BIAP.

Keywords

Pure Tone Audiometry Deafness BIAP

1. Introduction

Hearing plays a fundamental role in social and professional communication [1]. The World Health Organization (WHO) estimates that 466 million people suffer from disabling hearing loss worldwide, including 34 million children. For France, Inserm estimates that deafness affects 6% of 15 - 24 years old, and more than 65% of people aged 65 and over [2]. Early detection and treatment of hearing loss at any age are essential. It leads to social isolation, depression and an accelerated decline in cognitive functions. Diagnosis requires otoscopy and confirmation of the type and degree of hearing loss by audiometry [3]. However, the etiological diagnosis constitutes the major problem as well as its therapeutic management.

In Mali, while certain aspects of deafness have been the subject of studies [4], there was no specific study dealing with it as a whole. Thus we evoked it in its entirety in order to have a database in the service and compared our results with the data of the literature while setting the objective of describing the clinical and therapeutic epidemiological aspects of hearing loss in patients aged 15 and over at the University hospital Gabriel Toure, Bamako.

2. Materials and Methods

This is a longitudinal prospective study carried out in the ENT department of the University hospital Gabriel Toure in Bamako over 13 months (from September 2018 to September 2019). We made an exhaustive sampling of all patients who consulted for hearing loss. Thus we have collected two hundred and thirty (230) cases of all forms of hearing loss confirmed by pure tone audiometry.

2.1. Inclusion Criteria

Minimum age patient 15 years and older.

Hypoacusis confirmed by pure tone audiometry.

2.2. Non-Inclusion Criteria

Patients under 15 years and older.

Hearing loss related to earwax plugs or foreign bodies.

Refusal to participate in the study.

2.3. Data Collection Technique

The information was obtained using our questionnaire established for this pur-

pose, either by the patient himself or his parents in the event of severe hearing loss or speech impairment. The recording of the data was done on our survey sheet. The enrollment of patients went through a procedure, which consisted of:

- Selection for consultation according to the reason for consultation: hypoacusis, tinnitus, vertigo, blast, employment report, medical expertise, among others.
- Enrollment according to the inclusion criteria.
- The otorrhea was previously aspirated.
- Reference to the audiometric unit: receive the patient, install him and explain to him the procedure and the expected results.
- Implementation of the examination, which begins with the air conduction of the better ear, then the other and ends with the bone conduction of the better ear.
- Analysis and interpretation of results.

2.4. The Ethical Aspect

This is a purely scientific work that aims to improve the management of hearing loss. Anonymity is strictly respected. The results will be used to improve the quality of care for patients with hearing loss. The consent of the patients or their relatives (accompanying) was obtained beforehand.

2.5. Variables Studied

- Socio-demographic data (age, sex, profession, residence),
- Clinical data (reason for consultation, mode of onset, medical and surgical history, associated otological signs),
- Paraclinical data (threshold tonal audiometry),
- Therapeutic data.

2.6. Data Processing and Analysis

Data were analyzed using Epi info-version 3.5.3 software. The graphs were made on EXCEL office 2019.

3. Results

Two hundred and thirty (230) patients were collected during the study period. The age group between 26 and 35 years was the most represented with a rate of 23% (Table 1). Dominated by the male sex with a sex ratio of 1.5 or 3 men for 2 women, the average age was 38.16 years with extremes ranging from 15 to 86 years. Breeders were the most represented with a rate of 20%, followed by merchants 11%, students 10.4%, workers 10%, and housewives at 9.6%. The majority of patients were brought to the consultation by their parents, *i.e.*, a rate of 51.3% of cases.

Clinically, 70% of our patients had hypoacusis associated with tinnitus; it was bilateral in 56.1% with a duration of evolution greater than 12 weeks in 43%.

Table 1. Representation of patients according to age group.

Age group	Effective	Percentage (%)
15 - 25	46	20.0
26 - 35	**53**	**23.0**
36 - 45	32	13.9
46 - 55	29	12.6
56 - 65	29	12.2
66 - 75	20	8.7
76 et plus	21	9.1
Total	**230**	**100.0**

Chronic otitis media was the most found ATCD in 27%. The examination of the external auditory canal was normal in 77.4%; on the other hand, the otoscopy of the eardrum found a unilateral or bilateral tympanic perforation in 62.16%, a unilateral or bilateral retraction pocket 6.08% and 3.04%. In 66.08%, the deafness was transmission type on audiometry and it was average in 51.30% (Table 2). Computed tomography performed in 116 cases was in favor of chronic non-cholesteatomatous otomastoiditis in 68.09%. Simple chronic otitis media (CMO) with an open eardrum was the most common causal pathology found in 52.17% (Table 3). 64.40% of average hearing loss was due to chronic otitis media (CMO) with the open eardrum, while 33.33% of deep deafness was due to acute sound trauma (Table 4). Of the 230 patients in our series, 65 patients received medical treatment, 12 patients received hearing aids and 153 or 66.52% of patients received ear surgery. Thus we performed a tympanoplasty alone or associated with an antrotomy in 110 patients, Type II tympanoplasty in 18 patients, a petromastoid recess in 9 cases, a mastoatticotomy in 8 cases, a stapedectomy in 4 cases, a meatoplasty in 3 cases and one case of cochlear implant (Table 5).

4. Discussion and Comments

4.1. Methodological Aspect

During this study, we were limited by a number of issues such as:

- Calibration of the audiometer.
- The educational level of patients to differentiate sound from vibration.
- The change of address of certain patients or contact persons in Bamako.
- Failure to keep appointments for post-operative check-ups by some patients.

4.2. Aspect Hospital Frequency

According to new WHO estimates, 466 million people worldwide have disabling hearing loss, 34 million of them children. It is estimated that by 2050, more than 900 million people, or one in 10 people, will suffer from disabling hearing loss [2] During the study period, we recorded 7035 outpatient admissions, of which 915 patients, or 13% benefited from an audiometric examination and 230 patients

Table 2. Representation of patients according to mean hearing loss.

Hearing loss	Effective	Percentage (%)
Lightweight	67	20.13
Mean	**118**	**51.30**
Severe	34	14.78
deep	9	3.91
Cophosis	2	0.86
Total	**230**	**100**

Table 3. Representation of patients according to the causal pathology.

Causal pathology	Effective	Percentage (%)
Simple CMO with open tympanum	**120**	**52.17**
atelectatic otitis	35	15.21
cholesteatomatous CMO	26	11.30
Tympanosclerosis	11	4.78
Presbycusis	10	4.34
Otosclerosis	9	3.91
Chronic sound trauma	8	3.47
Acute sound trauma	6	2.60
External auditory meatus stenosis	3	1.30
rock fracture	2	0.86
Total	**230**	**100**

Table 4. Distribution of patients according to the correlation between the causal pathology and the mean hearing loss.

Pathologies	PAM (en dB)					Total
	21 - 40	41 - 70	71 - 90	91 - 119	120 et plus	
Simple CMO with open tympanum	33	76	11	0	0	120
Tympanosclerosis	9	2	0	0	0	11
atelectatic otitis	20	13	2	0	0	35
cholesteatomatous CMO	4	11	9	2	0	26
Presbycusis	0	6	4	0	0	10
Otosclerosis	0	5	3	1		9
External auditory meatus stenosis	1	2	0	0	0	3
Acute sound trauma	0	0	1	3	2	6
Chronic sound trauma	0	3	4	1	0	8
rock fracture	0	0	0	2	0	2
Total	67	118	34	9	2	230

Table 5. Representation of patients according to the treatment performed.

Treatment	Effective	Percentage (%)
Tympanoplasty type I	**87**	**37.82**
hearing aid	12	5.21
cochlear implant	1	0.43
Meatoplasty	3	1.30
Tympanoplasty type II	18	7.82
Antrotomy plus type 1 tympanoplasty	23	10.00
Mastoatticotomy	8	3.47
Petrostoid recess	9	3.91
Medical treatment	65	28.26
Stapedectomy	4	1.73
Total	**230**	**100**

or 3.26% met our criteria. This study corroborates that previously carried out in the department [4]. Some studies from sub-Saharan Africa share this same observation. For example, in Burkina Faso, it affects 1,500,000 people according to the study conducted by Zoungrana P [5]. But European studies on the subject have found frequencies clearly higher than our series. Thus in France, the prevalence of deafness is estimated at 8.7% or 5,182,000 people with all degrees of deafness [2]. This hospital frequency does not represent the prevalence of deafness in the general population, it just gives an overview of the activities of the service.

4.3. Gender Appearance

In our study, the male sex was the most affected at 54.35% against 45.65% of the female sex, *i.e.*, a sex ratio of 1.19. This observation was shared by several authors in the sub-region who found similar results during their various works with respectively 57.6%; 62.55%; 50.51% [4] [6] [7]. This high rate of males can be explained by the fact that males are generally more exposed to ENT pathologies, particularly otological conditions, but also their frequentation in noisy environments (professions or hobbies) [8].

4.4. Appearance Age

The age group between 25 and 35 years old was the most represented with a rate of 23%, the average age was 37.62 years old with extremes of 15 and 80 years old in our study. This age group corresponds to that of the young population. Recall that according to the National Institute of Statistics in Mali, the population aged 15 to 65 constitutes 81.7% of the Malian population [9]. At this young age, hearing is essential in human relations; therefore, any decrease in this hearing is quickly perceived by the individual and motivates a consultation. In fact, it is at this age that learning needs hearing more than ever and it is at this age that an individual takes good care or rather is more attentive to his person.

4.5. Clinical Aspects

Our patients consulted for bilateral hypoacusis in 56.1%. This situation is attributable to the fact that the discomfort becomes more and more perceptible, so the patient is forced to seek a solution. This is superimposed on the severity and the type of deafness. Our results were corroborated by the results of certain studies in the literature [10] [11]. In our work, 70.00% of our patients had hypoacusis associated with tinnitus and in 13.4% of cases with otorrhea. According to a previous study [4] in the same department, tinnitus was the sign most associated with deafness in 46.22%. According to Londero [12], tinnitus is often the only auditory sign associated with deafness and more than 80% of patients with tinnitus have an abnormal audiogram. In our study, the eardrum was pathological in 83.04% with unilateral or bilateral perforation in 62.16% of cases. The initial otoscopic examination makes it possible to determine two main entities: deafness with pathological otoscopy and deafness with normal otoscopy [13].

4.6. Audiometric Aspects

Bilateral deafness was the most represented with a rate of 56.1%. We also recorded 66.08% conductive deafness, 17.81% sensorineural deafness and 16.08% mixed deafness. We were able to distinguish five (5) different degrees of deafness in accordance with the BIAP classification. Moderate deafness was the most common with a rate of 51.30%, it was mild in 20.13% and severe in 14.78%. Most of the patients only consulted when the deafness became socially embarrassing, when they had difficulty communicating. At this degree of hearing loss, speech is only perceived when the voice is raised. We recorded four (4) cases of Cophosis, *i.e.*, 0.86%. Our results are close to those of the literature [4] [6].

4.7. Etiological Aspects

In our study, otological damage of infectious origin was mainly found in approximately 83.47% and among its causes 52.17% was linked to simple chronic otitis media with an open eardrum, 11.30% to otitis cholesteatomatosis against 14.34% of deafness etiologies with the normal eardrum. In general, the impact of a painful ear with otorrhoea panics the patient and his entourage, which may explain their motivation to be consulted. Computed tomography of the rocks and magnetic resonance imaging are necessary to support the etiological assessment. CT was our radiological examination of choice. We asked for it in 116 cases or 50.43% and it was in favor of chronic cholesteatomatous otomastoiditis in 26 cases or 11.30%, in 9 cases or 3.91%, it was in favor of otosclerosis. We have only used MRI because it has only recently become available in our country and its cost remains extremely high for our population.

4.8. Therapeutic Aspects

In our study, multiple treatments were proposed ranging from hearing aids to surgery as well as medical treatments. Of the 230 patients in our series, 65 pa-

tients received medical treatment, 12 patients received hearing aids and 153 or 66.52% of patients received ear surgery. Thus we performed a tympanoplasty alone or associated with an antrotomy in 110 patients, Type II tympanoplasty in 18 patients, a petromastoid recess in 9 cases, and a mastoatticotomy in 8 cases, a stapedectomy in 4 cases, a meatoplasty in 3 cases and a cochlear implant case. In general, surgery remains the main indication in the management of chronic otitis media and some of its sequelae [13].

5. Conclusion

Pure tone audiometry remains essential in the diagnosis of deafness. It not only makes it possible to confirm or invalidate the deafness, but also to define the type of deafness and especially to classify the deafness according to the degree of the average hearing loss established by the BIAP. Keywords: pure tone audiometry, deafness, BIAP.

Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this article.

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