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Incidence of Seromucous Otitis in Schools in Southern Algeria

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Abstract **Original Research Article**

***Introduction*:** Seromucous otitis (SMO) is a very common pathology, affecting almost 50% of children. It is a benign condition, but should be investigated in adults for neoplasia of the nasopharynx. It is bilateral in 85% of cases, with an average age of 5 years. Although the evolution of this pathology is often favorable in children, with a tendency to spontaneous regression, in adulthood these ears can evolve into simple or dangerous chronic otitis. ***Aim*:** To assess the incidence of seromucous otitis in children in southern Algeria (Laghouat), where the hot season is longer than in temperate or cold regions, and to detect and treat chronic forms. ***Materials & Methods*:** This is a monocentric, prospective study involving all schoolchildren aged between 3 and 12, with no history of otitis (chronic otitis) or sensorineural hearing loss, over a 13- month period (October 2020 to October 2021). The diagnosis of sensorineural hearing loss is based on anamnesis and confirmed by clinical examination and functional hearing tests. ***Results*:** Of the 340 children examined over a one-year period, 28 presented with seromucous otitis, i.e. 8.2% of the sample size, with a peak in frequency between the ages of 4 and 6. There was also a slight male predominance. Promiscuity was the most frequent risk factor, observed in 64% of cases. Spontaneous regression of seromucous otitis was observed in 10 children (35.7%), and surgical treatment with a trans-tympanic aerator with or without adenoidectomy was instituted in 13 children. ***Conclusion*:** The natural evolution of SMO does not always lead to spontaneous regression, and many cases require early management and strict monitoring to prevent complications. It is therefore necessary to introduce screening as part of school hygiene in order to reduce the incidence of chronic otitis in adults.

Keywords: Incidence, Promiscuity, Seromucous Otitis, Early Management, School Hygiene.

INTRODUCTION

Seromucous otitis (SMO) is defined as the presence of an effusion in the middle ear cavities lasting more than 3 months, in the absence of any acute inflammatory signs. The term seromucous otitis was defined by Mawson in 1976 [1]. In a Western, urban or suburban population with no major risk factors (nasotracheal intubation, orofacial clefts, etc.), the prevalence of the disease is considered to be 0% at birth, 5-13% at 1 year, 11-20% at 3 years, 13-18% at 5 years, 6% at 6-7 years and 2.5% at 8 years [2]. It is now accepted that the main causal factor is inflammation of the middle ear [21]. This inflammation follows a viral or bacterial infection of the upper respiratory tract (Tran ba huy infectious secretory accidents in children), the longevity of which varies from child to child and according to certain factors (mastoid size, recurrence of infectious accidents, inadequate use of antibiotic therapy, etc) [24, 25]. The evolution of serous otitis is erratic, with relapses and worsening of symptoms in winter, and more or less complete remission in summer. These ears may progress to perforation, retracted tympanic membrane, adhesive otitis media or even cholesteatoma [3-14]. Knowing the incidence of SMO in school-age children will enable us to assess the risk of developing chronic otitis in adulthood, and above all to devise an action plan to prevent it (screening).

MATERIALS & METHODS

This is a monocentric, prospective, longitudinal, open-label study conducted over a period of one year. The aim of our work is to evaluate the incidence of seromucous otitis in the school environment. Our study included 340 children, attending 3 different communities all located in the city of Laghouat, the elementary school "Rezougue mohamed", the psycho-pedagogical center "Choual attallah" and the nursery school "tifle el anik". The study was carried out with the approval of the hospital's Ethics Committee. All

children attending these centers were included in the study, with the exception of those with a history of otitis (chronic otitis other than seromucous otitis) and children with sensorineural hearing loss. The children underwent an ENT examination at their place of schooling. If seromucous otitis was suspected, the child and his parents were called to the ENT department of the Ahmida Ben Adjila Laghouat hospital for further investigation, including the patient history from the parents, examination of the eardrums under a microscope, nasofibroscopy to look for enlarged adenoids, impedancemetry and a preliminary tonal audiometry (if the child was cooperative) performed by the ENT doctor. Data from the interview, clinical examination and follow-up were reported on questionnaires drawn up at the Ahmida Ben Adjila Laghouat hospital, after informed consent had been obtained from the parents. The diagnosis of seromucous otitis was made in any child with a disturbed otoscopic examination, i.e. a pathological but closed eardrum and a disturbed impedancemetry recording, i.e. except for the A curve with stapedial present. Audiometry was carried out to assess the impact of the disease and to serve as a document for therapeutic evaluation, whenever possible, since it requires the active cooperation of the patient. Once the chronicity of the otitis had been confirmed, by the persistence of clinical and paraclinical signs 3 weeks after the first observation (except for the summer season, when the child was seen from the end of September onwards for reasons of spontaneous regression of the OSM during this period), the use of trans-tympanic aerators after myringotomy was indicated, associated or not with an adenoidectomy, depending on the clinical examination data. Data were entered, recorded and analyzed on an Excel file, version 2016.

RESULTS

The ages of the children included in our study ranged from 3 to 12 years, with a median of 6 years. Of the 340 children screened, 28 cases (8.2%) of seromucous otitis were confirmed, ranging in age from 4 to 11 years, with a median of 6 years, a frequency peak between 4 and 6 years (Figure 1) and a male predominance, with a sex ratio of 3:1 (21 boys - 7 girls). Among the 28 cases studied, promiscuity was the most frequent risk factor, having been found in 18 families, i.e. 64% of cases, while artificial feeding had been introduced in 2 children (Table 1). Questioning also revealed that more than half of the children diagnosed (54%) presented with nocturnal snoring, 18% were being followed up for allergic rhinitis, and only one child had an adenoidectomy as a surgical history. All the children (28 cases) presented symptoms during the autumn and winter seasons, such as: hypoacusis and language disorders (43%), language disorders (29%), delayed schooling (21%), signs of aggression (10.5%), socially withdrawn children (10.5%), it is important to note that 10 children, or 36% of cases, were completely asymptomatic, and it was the otoscopic examination that helped orient the diagnosis. The most frequent finding was a bulging eardrum with loss of shape (82.1% of cases); it should be noted that two children had atelectatic tympanic membrane, indicating an advanced stage of the disease. The disease was bilateral in all cases, i.e. 56 ears tested positive by impedancemetry, with a type B curve observed in 73.9% of cases. Spontaneous regression was observed in 10 children (35.7% of cases), with chronic forms requiring surgical management (56.5%). Of the 13 children operated on, 12 (92.3%) benefited from the insertion of a trans-tympanic airway (TTA) with adenoidectomy, and one case required only TTA insertion [22].

Table1: Distribution of Patients from Our Study by Risk Factors

Risk Factors; OSM (n=28)		
Gender	Male (21)	Female (07)
Promiscuity	Yes (18)	No (10)
Artificial breastfeeding	Yes (02)	No (26)
Adenoid vegetation	Yes (12)	No (16)
History of allergy	Yes (05)	No (23)
Gastroesophageal reflux	Yes (03)	No (25)

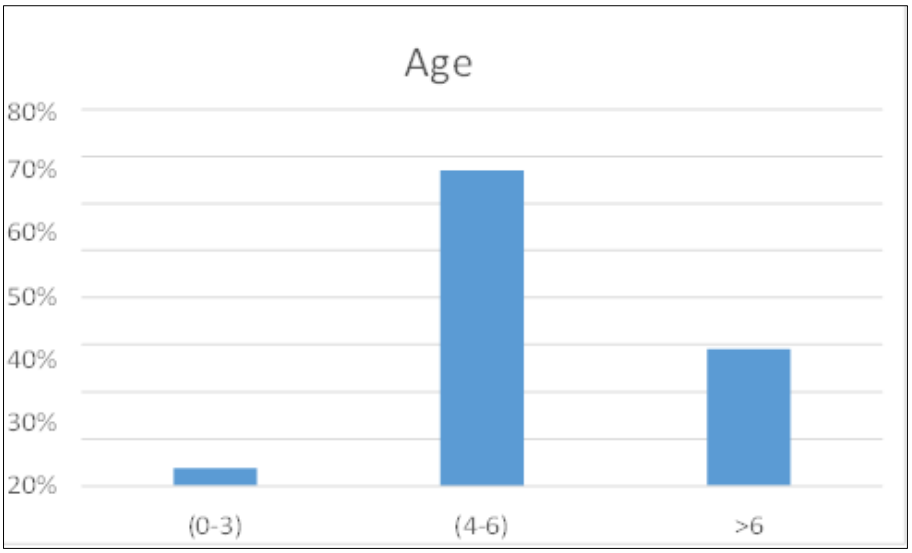

Figure 1: Overall sample distribution by age

DISCUSSION

Seromucous otitis is a public health problem, especially in young children. The repercussions of this condition lie firstly in the hearing loss caused, which will have repercussions on the child's schooling, and secondly in the chronic otitis. The etiopathogenesis of the disease is multifactorial. Infection and dysfunction of the auditory tube are most commonly incriminated [27, 28].

The incidence of seromucous otitis in our study was 8.2%. Similar rates were found in the study by Kiris *et al*., [4]. Where the incidence was 10.43%, and Martines *et al*., with 12.9% [5]. However, we note a significant difference with the study by Casselbrant *et al*., carried out in the USA, with 53% of cases diagnosed in the first year, and 61% in the second year [6]. Similarly, the study by Tos *et al*., in 1983 reported an incidence of 30% [7-16]. All these studies had larger sample sizes, which is probably due to the fourth wave of Covid-19 (Omicron), which hit Algeria between January and April 2021, forcing the closure of schools and nurseries. This may have reduced children's exposure to upper respiratory tract infections, the main risk factor for seromucous otitis [27]. Nevertheless, the incidence of seromucous otitis in our study is fairly close to the literature [6, 7].

Concerning the studies with significantly higher incidences, we believe that climatic factors may influence incidence, the city of Laghouat having a warmer climate with a short winter season compared to the city of Pittsburgh (USA), although this remains rather hypothetical given the size of our study [31]. Indeed, some studies have suggested that respiratory tract infections, the main cause of seromucous otitis, would be more frequent in colder, wetter climates. In the literature, male sex is presented as a risk factor for the occurrence of seromucous otitis, which was confirmed by our study with a sex ratio of 3:1 [23-31]. However, we noted during our research that gender could vary from one study to another, probably due to factors linked to the populations studied or the diagnostic methods used.

In the United States, 66% of seromucous otitis diagnoses were in children aged between 4 and 6 years [8]. In the study by Klopp-Dutote *et al*., the mean age of children with seromucous otitis was 4 years [8-14], a figure in line with that recorded in our study. This age group appears to be particularly at risk, due to the immaturity of the immune system [29] and greater susceptibility to respiratory tract infections [17]. What's more, at this age, children often attend creche or nursery schools, favoring transmission of the pathogens responsible for ENT infections [19]. This may partly explain the higher prevalence of seromucous otitis in this age group. The fragility of the immune system at this age also makes these children more vulnerable to persistent and recurrent infections, favoring the development of chronic forms of seromucous otitis [12]. According to several studies, the presence of chronic middle ear disease can affect language function (Brandes & Ehinger, 1981; Clarkson *et al*., 1989; Gravel & Wallace, 1992; Menyuk, 1986) [11]. In our study, tympanometry curves were distributed as follows: flat curve (type B) in 73.9% of cases; peak shifted towards negative pressures (type C) in 13% of cases; and finally, the tympanogram was normal (type A) in 13% of cases. Our results are quite similar to those of Kiris *et al*., and GERSDORFF *et al*., where a predominance of the type B curve was observed [3], reflecting altered tympanic membrane compliance, characteristic of seromucous otitis.

We have observed academic delay in 21% of children with OSM, i.e. almost one in four. Reichman and Healey observed this in 67% of their patients [14], i.e. 2 out of three children, demonstrating the need for early and appropriate management of seromucous otitis. Indeed, seromucous otitis can lead to a drop in auditory acuity, as well as attention and concentration problems,

which can affect the child's school performance [15]. In addition, language disorders associated with chronic seromucous otitis can also have a negative impact on learning [16]. It is therefore essential to detect and treat seromucous otitis promptly, in order to limit the adverse consequences on the child's development and academic achievements.

Spontaneous regression of seromucous otitis has been noted in 35.7% of cases, a result confirmed by various studies, notably that of Tos *et al*., where 50% of forms were spontaneously resolved [7]. However, it is important to stress that this spontaneous regression may take several months, during which the child remains exposed to the risks associated with seromucous otitis. This is why early treatment is still recommended.

56.5% of our patients benefited from surgical treatment, compared with 91.1% in the literature (AlQudehy *et al*., [18]. This difference can be explained by the frequency of early forms in our study, a direct consequence of screening. In fact, early diagnosis and treatment would help to prevent children from falling behind in their schooling, due to the hearing problems caused by seromucous otitis, and to reduce the incidence of chronic otitis in adults.

CONCLUSION

Seromucous otitis is a chronic pathology with a significant impact on children's schooling and their future. Inadequate management from infancy can lead to the development of chronic, potentially life-threatening otitis [13]. In the light of our findings, it seems imperative to introduce screening programs in nurseries and kindergartens, in line with the peak incidence recorded in our study. The aim is to enable early intervention and thus reduce the morbidity associated with chronic ear infections in adults. This proactive approach could not only improve the quality of life of affected children, but also reduce the healthcare costs associated with late management of this pathology. Systematic screening from an early age, combined with awareness-raising among parents and educational staff, would enable rapid identification of cases and referral to appropriate care, thus preventing long-term complications.

Limitation of Our Study:

- Small sample size.
- Risk factors have not been analyzed in depth.
- No control cases.
- Limited financial resources.

Recommendations:

- Set up regular screening campaigns, especially during the fall and winter seasons, in nurseries, kindergartens and elementary school, integrating school hygiene programs to raise awareness and identify early cases of seromucous otitis.
- Strengthen continuing medical education for general practitioners and pediatricians, to democratize the management of seromucous otitis from the earliest stages, thus promoting early and effective intervention.
- Increased public awareness of the clinical signs of seromucous otitis, with an emphasis on extra-oral manifestations such as behavioral problems and school delays. It is crucial to stress the importance of early management to prevent future complications and optimize clinical outcomes.
- Encourage research into new ways of detecting and managing seromucous otitis, focusing on innovative approaches and emerging technologies to improve early detection and treatment efficacy. These research efforts should also aim to develop non-invasive methods that are well tolerated by young children.
- Setting up long-term follow-up programs for children treated for seromucous otitis, to assess the long-term impact on their development and future quality of life.

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