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## CLINICAL PATTERNS AND CHARACTERISTICS OF CHRONIC SUPPURATIVE OTITIS MEDIA AMONG SCHOOL-AGED CHILDREN PRESENTING TO A TERTIARY CARE CENTRE

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### Keywords:

Chronic Suppurative Otitis Media, School-aged children, Healthcare-seeking behaviour, Caregiver knowledge, Developing countries

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**ABSTRACT: Background:** Chronic Suppurative Otitis Media (CSOM) is a common childhood ear disease that can adversely affect hearing, speech and language development, educational performance, and quality of life. Information on the clinical profile and associated characteristics of affected children is important for planning preventive and management strategies, particularly in resource-limited settings. **Methods:** An institution-based cross-sectional study was conducted over a six-month period among 90 school-going children aged 6–14 years diagnosed with CSOM at a tertiary care centre. Participants were enrolled by consecutive sampling. Data regarding sociodemographic characteristics, clinical profile, healthcare-seeking behaviour, caregiver knowledge, and environmental factors were collected using a structured questionnaire. Otomicroscopy was done. Data were analysed using SPSS version 16.0 and presented as frequencies and percentages. **Results:** Of the 90 children studied, 58 (64.4%) were males and 32 (35.6%) were females. Active ear discharge was the most common presenting complaint (45.5%), followed by hearing loss (38.8%) and ear pain (12.2%). Bilateral disease was observed in 52.2% of cases. Frequently reported characteristics among children with CSOM included exposure to loud noise (86.6%), recurrent upper respiratory tract infections (86.6%), head bathing without ear protection (80.0%), overcrowded living conditions (77.7%), and nasal problems/allergy (72.2%). Delay in seeking medical care beyond three months was noted in 64.4% of children. Only 24% of caregivers demonstrated adequate knowledge regarding possible complications of CSOM. **Conclusion:** School-aged children with CSOM attending this tertiary care centre commonly exhibited environmental, clinical, and socioeconomic characteristics that may contribute to disease persistence. Delayed healthcare-seeking behaviour and limited caregiver awareness were frequently observed. Strengthening caregiver education, promoting early medical consultation, and implementing community-based screening programmes may help reduce the burden of CSOM in children.

**INTRODUCTION:** Chronic Suppurative Otitis Media (CSOM) is defined as a persistent infection of the middle ear and mastoid cavity, characterized by recurrent or continuous ear discharge through a non-intact tympanic membrane lasting more than two weeks.

It represents one of the most common causes of preventable hearing loss in children worldwide and continues to constitute a major public health challenge, particularly in low- and middle-income countries (LMICs) <sup>1</sup>.

Globally, an estimated 297 million individuals are affected by CSOM, with a prevalence of approximately 3.8%, and the disease disproportionately affects populations in resource-limited settings <sup>2</sup>. Children are especially vulnerable due to anatomical factors such as a shorter and more horizontal Eustachian tube,

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immature immune systems, and exposure to a range of modifiable environmental and socioeconomic risk factors. These include low socioeconomic status, poor maternal education, overcrowding, unhygienic ear cleaning practices, and frequent recurrent upper respiratory tract infections (URTIs), all of which predispose children to acute otitis media and its chronicity<sup>3-5</sup>.

Beyond its impact on hearing, CSOM in school-going children has been associated with delays in speech and language acquisition, impaired auditory processing, reduced educational attainment, and diminished quality of life<sup>12</sup>. Untreated or inadequately managed disease carries the risk of serious and life-threatening complications including mastoiditis, labyrinthitis, meningitis, brain abscess, and sigmoid sinus thrombosis. Despite this burden, CSOM often goes unrecognised or receives delayed treatment particularly in rural communities where access to qualified medical care is limited, caregiver awareness is poor, and healthcare-seeking behaviour is influenced by reliance on traditional healers and non-prescription remedies.

While several studies have explored the epidemiology and risk factors of CSOM in South and Southeast Asia<sup>3-5</sup>, limited region-specific data exist from Assam, particularly from districts such as Dhubri — a predominantly rural, border district with significant socioeconomic deprivation and diverse cultural health practices. Understanding the local burden, clinical profile, and observed factors of delayed care-seeking is essential to developing effective, contextually appropriate interventions.

This study was therefore undertaken to evaluate the clinical profile and patterns of CSOM among school-aged children presenting to a tertiary care centre in Dhubri, and to assess the knowledge, attitudes, and healthcare-seeking practices of their caregivers. The findings are expected to inform preventive strategies, guide health education initiatives, and contribute to the evidence base for reducing childhood CSOM-related morbidity in this region.

The following were the objectives of the research as laid out. (a) To assess the clinical profile and patterns of CSOM among school-aged children

presenting to a tertiary care centre (b) To describe the socio-demographic, environmental, and clinical characteristics of school aged children diagnosed with CSOM (c) To assess the knowledge, attitude and healthcare-seeking practices of parents/caregivers of children with CSOM (d) To determine the frequency and distribution of selected environmental and socio-demographic exposures among children with CSOM.

**MATERIALS AND METHODS:** This was an institution-based cross-sectional descriptive study conducted to evaluate the clinical profile, socio-demographic and environmental characteristics and healthcare-seeking behaviour among school-aged children diagnosed with CSOM. The study was conducted in a tertiary care centre serving a largely rural population. The study was conducted over a period of six months.

**Sample size:** A consecutive sampling technique was used. All eligible children aged 6 to 14 years diagnosed with CSOM presenting during the study period were included, resulting in a final sample size of 90.

**Inclusion Criteria:** Children diagnosed with CSOM of age group 6 to 14 years attending ENT department during the study period. Children whose guardians/caregivers provided voluntary informed written consent were included.

**Exclusion Criteria:** Children diagnosed with Acute Suppurative Otitis Media (ASOM), otitis externa, previous ear surgery and Children whose guardians declined to provide consent were excluded.

After obtaining informed written consent from the guardians of each eligible child, data were collected using a structured, pre-tested questionnaire administered by the investigators. The questionnaire captured sociodemographic information (age, sex, family income, household size, parental education), clinical history (duration and laterality of ear discharge, associated symptoms, previous treatments), known environmental, behavioural, and clinical factors, and caregiver knowledge, attitude, and practice regarding CSOM.

The diagnosis of CSOM was established based on a history of recurrent or persistent ear discharge through a perforated tympanic membrane for more than two weeks. Clinical assessment was done by otomicroscopic examination. The duration of ear discharge, laterality, site of tympanic membrane perforation, nature of discharge and presence of complications were documented. Hearing assessment was performed whenever feasible using pure-tone audiometry according to age and cooperation of the child. Delay in seeking treatment was defined as seeking qualified medical care more than three months after the onset of ear discharge.

The collected data were sorted, coded, and entered into SPSS version 16.00 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics were computed for all variables, presented as frequencies and percentages for categorical data. Results were presented in the form of tables and descriptive analysis.

The study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the institutional ethics committee of Dhubri Medical College & Hospital, with Ethical Approval Number: DMCH/IEC/2025/36, dated on 01 November 2025, prior to commencement of the study. Informed written consent was obtained from the guardians of all participating children. Participation was voluntary, and anonymity and confidentiality of data were maintained throughout.

Since the sample size was limited and study was descriptive cross-sectional design, multi-variate analysis was not performed.

RESULTS:

**Demographic Profile:** A total of 90 school-going children diagnosed with CSOM were enrolled over the six-month study period. The study population comprised 58 males (64.4%) and 32 females (35.6%), reflecting a male predominance with a male-to-female ratio of approximately 1.8:1.

TABLE 1: AGE DISTRIBUTION OF STUDY PARTICIPANTS

| Age group   | Number | Percentage |
|-------------|--------|------------|
| 6-8 years   | 30     | 33.3       |
| 9-11 years  | 35     | 38.9       |
| 12-14 years | 25     | 27.8       |

TABLE 2: SEX DISTRIBUTION OF CHILDREN DIAGNOSED WITH CSOM (N = 90)

| Sex    | Number (n) | Percentage (%) |
|--------|------------|----------------|
| Male   | 58         | 64.4           |
| Female | 32         | 35.6           |
| Total  | 90         | 100.0          |

**Clinical Presentation:** Regarding presenting complaints, the majority of children (45.5%, n = 41) presented with active ear discharge, followed by hearing loss in 38.8% (n = 35) and ear pain in 12.2% (n = 11). With respect to laterality, 52.2% (n = 47) had bilateral ear discharge while 47.7% (n = 43) had unilateral involvement.

TABLE 3: DISTRIBUTION OF PRESENTING COMPLAINTS AND LATERALITY OF EAR DISCHARGE

| Clinical Feature     | Number (n) | Percentage (%) |
|----------------------|------------|----------------|
| Active ear discharge | 41         | 45.5           |
| Hearing loss         | 35         | 38.8           |
| Ear pain             | 11         | 12.2           |
| Other complaints     | 3          | 3.3            |
| Bilateral discharge  | 47         | 52.2           |
| Unilateral discharge | 43         | 47.7           |

TABLE 4: DURATION OF SYMPTOMS AMONG STUDY PARTICIPANTS

| Duration of Symptoms | Number(n) | Percentage (%) |
|----------------------|-----------|----------------|
| < 6 months           | 13        | 14             |
| 6 months – 1 year    | 18        | 20             |
| 1 – 3 years          | 32        | 35.5           |
| >3 years             | 27        | 30             |
| Total                | 90        | 100            |

TABLE 5: DISTRIBUTION BASED ON THE TYPE OF DISEASE

| Type of Disease          | Number | Percentage |
|--------------------------|--------|------------|
| Mucosal (Tubotympanic)   | 76     | 84.4       |
| Squamosal (Atticoantral) | 14     | 15.5       |
| Total                    | 90     | 100        |

TABLE 6: DISTRIBUTION BASED ON THE TYPE OF PERFORATION

| Type of Perforation  | Frequency | Percentage |
|----------------------|-----------|------------|
| Central Perforation  | 31        | 34.4       |
| Attic Perforation    | 6         | 6.6        |
| Marginal Perforation | 8         | 8.8        |
| Subtotal Perforation | 17        | 18.8       |
| Total Perforation    | 28        | 31.1       |

**Socioeconomic and Environmental Factors:** Several socio-demographic and environmental exposures were assessed among the 90 children diagnosed with CSOM. Exposure to loud noise was reported in 78 children (86.6%), followed by overcrowding in 70 (77.7%), passive smoking in 34 (37.7%), and keeping pets at home in 22 (24.4%).

These findings describe the frequency of selected exposures among study participants.

### Operational Definitions:

**Overcrowding:** Presence of more than three persons per habitable room in the household, excluding kitchen and bathroom.

**Exposure to Loud Noise:** Regular exposure to high-intensity noise sources (e.g., loudspeakers, traffic, machinery, or amplified music) for at least one hour per day on most days of the week, as reported by caregivers.

**Passive Smoking:** Exposure of the child to tobacco smoke from one or more household members who regularly smoke in the home environment.

**Pets at Home:** Presence of domestic animals or birds kept within the household premises for at least six months preceding the survey.

**TABLE 7: PREVALENCE OF SOCIOECONOMIC AND ENVIRONMENTAL RISK EXPOSURES AMONG CSOM CASES**

| Exposure               | Number (n) | Percentage (%) |
|------------------------|------------|----------------|
| Exposure to loud noise | 78         | 86.6           |
| Overcrowding           | 70         | 77.7           |
| Passive smoking        | 34         | 37.7           |
| Pets at home           | 22         | 24.4           |

**Clinical Factors:** Among clinical and behavioral factors, recurrent upper respiratory tract infections (URTIs) were the most frequently identified, present in 78 children (86.6%), followed by head bathing without ear protection (80.0%, n = 72), nasal problems or allergy (72.2%, n = 65), low nutritional status (62.2%, n = 56), non-compliance to prescribed treatment (60.0%, n = 54), unsafe ear cleaning practices (53.3%, n = 48), use of traditional remedies (48.8%, n = 44), and a history of foreign body insertion into the ear (36.6%, n = 33).

### Operational Definitions:

**Recurrent Upper Respiratory Tract Infection (URTI):** History of three or more episodes of upper respiratory tract infection within the preceding 12 months, as reported by caregivers or documented in medical records.

**Head Bathing Without Ear Protection:** Allowing water to enter the ear during bathing or swimming

without the use of ear plugs, cotton with petroleum jelly, or other protective measures.

**Unsafe Ear Cleaning Practices:** Use of cotton buds, matchsticks, hairpins, feathers, sticks, or other objects

**Nasal Problems/Allergy:** Presence of recurrent nasal obstruction, rhinorrhoea, sneezing, allergic rhinitis, or other chronic nasal symptoms reported by caregivers or documented during clinical assessment.

**Low Nutritional Status:** Children with weight-for-age, height-for-age, or body mass index (BMI)-for-age below the age-appropriate reference standards according to WHO growth charts, or those clinically assessed as undernourished

**Non-compliance to Treatment:** Failure to adhere to prescribed medications, follow-up visits, or ear care instructions as advised by the treating physician.

**Use of Traditional Remedies:** Application of non-prescribed substances or traditional treatments into the ear, including herbal preparations, oils, plant extracts, or remedies obtained from traditional healers.

**History of Foreign Body Insertion:** Self-reported or caregiver-reported insertion of any object into the external auditory canal at any time before presentation.

**Delay in Seeking Medical Care:** Seeking consultation from a qualified medical practitioner more than three months after the onset of persistent or recurrent ear discharge.

**TABLE 8: PREVALENCE OF CLINICAL AND BEHAVIORAL FACTORS AMONG CSOM CASES**

| Clinical and Behavior Factors                 | Number (n) | Percentage (%) |
|-----------------------------------------------|------------|----------------|
| Recurrent upper respiratory infections (URTI) | 78         | 86.6           |
| Head bath without ear plug                    | 72         | 80.0           |
| Nasal problems / allergy                      | 65         | 72.2           |
| Low nutritional status                        | 56         | 62.2           |
| Non-compliance to treatment                   | 54         | 60.0           |
| Unsafe ear cleaning practices                 | 48         | 53.3           |
| Use of traditional remedies                   | 44         | 48.8           |
| History of foreign body insertion             | 33         | 36.6           |

**Caregiver Knowledge, Attitude, and Healthcare-Seeking Behavior:** A structured interviewer-administered questionnaire was used to assess caregiver knowledge and healthcare-seeking behaviour regarding chronic suppurative otitis media (CSOM). The questionnaire was prepared in the local language and consisted of two domains:

Knowledge domain - included questions on awareness of ear discharge as an abnormal condition, possible complications of CSOM, need for medical treatment, and importance of follow-up.

Healthcare-seeking behaviour domain – included questions regarding first healthcare contact, use of home remedies, treatment-seeking delay, previous consultations, and follow-up practices.

The questionnaire contained 10 items. Each correct knowledge response was awarded one point and incorrect or "don't know" responses were scored zero. Caregivers scoring  $\geq 50\%$  of the total knowledge score were classified as having adequate knowledge, while those scoring  $< 50\%$  were classified as having poor knowledge.

The questionnaire was reviewed by ENT faculty members for content validity and was pilot tested among 10 caregivers prior to the study to ensure clarity and comprehensibility. Data obtained during pilot testing were not included in the final analysis.

Delay in seeking qualified medical treatment (defined as seeking care more than three months after symptom onset) was observed in 58 (64.4%) children. Of 90 caregivers, 80 (88.9%) were aware that ear discharge in children is abnormal; however, only 22 (24.4%) were aware of potential complications of CSOM such as hearing loss and intracranial spread, while 68 (75.6%) lacked this knowledge.

Regarding the first point of healthcare contact, 38 (42.2%) caregivers first consulted a pharmacist, 18

(20.0%) visited a traditional healer (kabiraj), 12 (13.3%) sought homeopathic treatment, and only 22 (24.4%) consulted a qualified medical practitioner. Home remedies were used by 44 (48.8%) caregivers. Regular follow-up was reported by 42 (46.7%) patients, while 48 (53.3%) did not maintain regular follow-up.

**TABLE 9: FIRST POINT OF HEALTHCARE CONTACT REPORTED BY CAREGIVERS OF CHILDREN WITH CSOM**

| First Point of Contact         | Number (n) | Percentage (%) |
|--------------------------------|------------|----------------|
| Pharmacist                     | 38         | 42.2           |
| Traditional healer (Kabiraj)   | 18         | 20.0           |
| Homeopathic practitioner       | 12         | 13.3           |
| Qualified medical practitioner | 22         | 24.4           |

**Barriers to Early Healthcare Seeking:** Delayed healthcare-seeking behaviour (defined as seeking qualified medical care more than three months after symptom onset) was observed in 58 (64.4%) children. Among caregivers categorized as having poor knowledge regarding CSOM based on questionnaire responses, 45 (66.2%) children experienced delayed treatment-seeking, compared with 5 (22.7%) among those with adequate knowledge. Similarly, delayed healthcare-seeking was observed among 34 (77.3%) of 44 caregivers who reported using home remedies, compared with 20 (43.5%) of 46 caregivers who did not use home remedies.

Among children whose caregivers initially consulted a qualified medical practitioner, delayed treatment-seeking was reported in 14 cases, whereas 43 cases of delayed treatment-seeking were observed among those whose caregivers first consulted non-qualified healthcare providers. Delayed treatment-seeking was also observed among children with irregular follow-up practices. These findings describe patterns observed within the study population and may indicate potential barriers to timely healthcare utilization among children with CSOM.

**TABLE 10: DISTRIBUTION OF TREATMENT -SEEKING DELAY ACCORDING TO CAREGIVER KNOWLEDGE AND HEALTH CARE -SEEKING PRACTICES**

| Variable        | No Delay (n) | Delay Present (n) | Total (n) |
|-----------------|--------------|-------------------|-----------|
| Knowledge level |              |                   |           |
| Poor knowledge  | 13           | 45                | 58        |
| Good knowledge  | 27           | 5                 | 32        |
| Home remedy use |              |                   |           |

|                          |    |    |    |
|--------------------------|----|----|----|
| Yes                      | 10 | 34 | 44 |
| No                       | 26 | 20 | 46 |
| First consultation       |    |    |    |
| Qualified doctor         | 7  | 14 | 22 |
| Unqualified practitioner | 25 | 43 | 68 |
| Regular follow-up        |    |    |    |
| No                       | 23 | 25 | 48 |
| Yes                      | 26 | 16 | 42 |

**DISCUSSIONS:** This study provides a comprehensive evaluation of the clinical profile, patterns, and healthcare-seeking behaviour of school-going children with CSOM at a tertiary care centre in Dhubri, Assam. The findings reflect the complex interplay of biological, environmental, socioeconomic, and behavioural factors that characterise the epidemiology of CSOM in resource-constrained settings.

A male predominance was observed in our study, with 64.4% of cases in males and 35.6% in females. This finding is consistent with several published studies from South Asia and sub-Saharan Africa reporting higher prevalence of CSOM in male children<sup>3</sup>. In contrast, a large-scale study by Shaheen *et al.* conducted in rural Bangladesh reported a marginally higher prevalence among girls, attributing this to differential hygiene practices and head-bathing habits<sup>4</sup>. The male predominance observed in our cohort may reflect differences in outdoor exposure, hygiene practices, and healthcare utilisation patterns, and warrants further investigation in prospective studies.

Active ear discharge was the most common presenting complaint (45.5%), followed by hearing loss (38.8%) and ear pain (12.2%). Bilateral involvement was observed in 52.2% of cases. These findings are aligned with previously reported clinical patterns of CSOM in children from developing country settings<sup>1</sup>. The high proportion of bilateral disease is of particular concern, as it implies a greater functional impact on hearing and language development, and is associated with higher complication rates<sup>12</sup>. The relatively higher frequency of hearing loss as a presenting symptom compared to earlier studies may indicate that many children in this cohort presented with advanced or long-standing disease.

Globally, CSOM is recognised as a disease of poverty, with the majority of its burden borne by developing countries<sup>6</sup>. Recent rural surveys in

India have demonstrated variable prevalence rates, highlighting the critical need for regionally specific data<sup>7, 8</sup>. Our study corroborates the multiple exposures frequently reported in CSOM patients, consistent with multiple international studies identifying a combination of biological, environmental, and socioeconomic determinants<sup>10, 11</sup>.

Recurrent URTIs (86.6%) and loud noise exposure (86.6%) were the most prevalent risk exposures. Recurrent URTIs facilitate ascending nasopharyngeal infection via the Eustachian tube, promoting middle ear inflammation and perpetuating chronicity<sup>11</sup>. Overcrowding (77.7%), identified in three-quarters of participants, facilitates respiratory pathogen transmission and is a well-established risk exposure for CSOM in LMICs<sup>3</sup>. Head bathing without ear protection (80.0%) and unsafe ear cleaning practices (53.3%) are modifiable behavioural factors that directly introduce contaminated water and pathogens into the middle ear through a perforated tympanic membrane.

Nasal problems and allergic disease (72.2%) contribute to Eustachian tube dysfunction, impairing drainage of the middle ear. Malnutrition (62.2%) compromises immunological defences, increasing susceptibility to persistent infection. These findings are consistent with multi-country analyses of CSOM determinants<sup>10</sup>. The high prevalence of non-compliance with treatment (60.0%) and use of traditional remedies (48.8%) in our cohort points to systemic barriers in the continuum of care, including poor disease literacy, financial constraints, and cultural health beliefs.

A critical finding of this study is the extremely poor caregiver knowledge regarding CSOM complications: only 24.4% of caregivers were aware of complications such as hearing loss and intracranial extension, despite 88.9% recognising ear discharge as abnormal. This gap between

disease awareness and complication knowledge has been reported in similar populations. A study conducted in the Magura district of Bangladesh found that approximately 60% of mothers lacked knowledge about CSOM and its sequelae<sup>14</sup>. Comparable knowledge deficits were documented in a cross-sectional study from Kigali, Rwanda<sup>15</sup>. These findings reflect a globally prevalent pattern in which community awareness campaigns have failed to bridge the knowledge gap regarding consequences of untreated CSOM.

Delayed healthcare-seeking was more frequently observed among caregivers with poor knowledge and among those who used home remedies. These associations underscore how knowledge deficits and reliance on non-allopathic remedies together create a compounding barrier to timely care. In contrast, the source of first medical consultation and regularity of follow-up did not demonstrate statistically significant associations with treatment delay, possibly reflecting the limited sample size.

The pattern of healthcare-seeking behaviour observed — with only 24.4% of caregivers consulting a qualified medical practitioner as their first point of contact — is deeply concerning. The majority sought care from pharmacists (42.2%), traditional healers (20%), or homeopathic practitioners (13.3%). Ready availability of antibiotics and ear drops from pharmacies without prescription has been identified as a significant contributor to delayed diagnosis and inappropriate treatment in similar settings<sup>16</sup>. This pattern facilitates partial treatment, masking symptoms while allowing underlying disease progression and the development of antibiotic resistance. The constellation of findings from this study emphasises that CSOM control in this region requires a multi-pronged approach. Community awareness campaigns targeting caregivers should focus not merely on disease recognition but specifically on knowledge of complications, appropriate care-seeking, and the harms of self-medication and traditional remedies. School-based hearing screening programmes could enable earlier detection, while improving access to qualified ENT care in rural areas remains a structural priority. Regulation of over-the-counter sale of ototopical agents and antibiotics requires policy attention at the state level.

**CONCLUSION:** This study demonstrates that school-going children in Dhubri diagnosed with CSOM exhibited a convergence of environmental, socioeconomic, and clinical factors — most prominently recurrent upper respiratory tract infections, overcrowding, loud noise exposure, and head bathing without ear protection. Low nutritional status, unsafe ear practices, and use of traditional remedies further compound disease burden. Poor caregiver knowledge of CSOM complications and consequent delayed healthcare-seeking behaviour represent critical, modifiable contributors to morbidity in this population. Significant associations between poor knowledge and delayed treatment, and between home remedy use and delayed treatment, were demonstrated. Only a quarter of children were brought to a qualified medical practitioner as the initial point of care — a pattern that perpetuates diagnostic delay, inadequate treatment, and risk of serious complications.

These findings underscore an urgent need for structured community health education programmes targeting caregivers of school-aged children, particularly in rural and semi-urban areas. School-based ENT screening camps, improved primary healthcare access, and regulation of over-the-counter dispensing of antibiotics and ear drops are essential complementary strategies. Active community-based case detection and prompt initiation of appropriate treatment are critical to reducing the burden of CSOM, preventing complications, and safeguarding the hearing, development, and academic potential of affected children.

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