

Research Article

Otological and audiological manifestations in cleft lip and cleft palate children: a clinical study

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ABSTRACT

Background: Cleft lip and cleft palate are the commonest congenital anomalies of the orofacial region. The incidence of middle ear problems and hearing loss is reported to be higher in children with cleft palate &/or cleft lip.

Methods: A prospective, observational case-control study comprising 80 subjects (40 cases and 40 controls) was undertaken at Yenepoya Medical College Hospital, Mangalore, Karnataka, India. All subjects enrolled were subjected to detailed ENT examination including otoscopy, pure tone audiometry and impedance audiometry.

Results: Retracted tympanic membrane suggestive of Otitis Media with Effusion (OME) and conductive hearing loss was observed in more than 50% of patients with cleft palate &/or cleft lip. Tympanogram of B type suggesting OME was observed in 27% of cases. Chronic otitis media was observed in 32.5% of cases.

Conclusions: The prevalence of OME, Chronic otitis media and hearing loss was observed to be higher among children with cleft palate &/or cleft lip. Otological and audiometric assessment should be performed for all patients having cleft palate &/or cleft lip atleast before surgery in order to facilitate early identification and intervention for middle ear problems particularly middle ear effusion.

Keywords: Cleft lip, Cleft palate, Middle ear effusion, Conductive hearing loss

INTRODUCTION

The incidence of hearing loss is known to be higher in children with cleft lip and/or cleft palate. There is great concern towards the production of normal speech and the prevention of facial deformity and so considerable attention is paid towards the development of a competent velopharyngeal sphincter and normal facial development in these children. Unfortunately, attention is often not paid to the complication of hearing loss in these children. The occurrence of recurrent acute otitis media or otitis media with effusion has been reported to be higher in children with cleft palate.^{1,2} The etiologic basis for middle ear pathology and hearing loss in patients with Cleft palate is considered to be Eustachian tube

dysfunction due to functional obstruction, secondary to failure of the palatal muscles to assist in opening the Eustachian tube.³

Hearing loss in early childhood associated with otitis media with effusion may result in impaired speech, language, and even cognitive development.⁴

Early otological intervention is therefore necessary in such children in order to lessen the burden of hearing loss. This study was undertaken to evaluate the otological manifestations and audiological status of children with congenital cleft lip/cleft palate and compare it with normal children.

METHODS

A Prospective observational case control study comprising of 80 subjects (40 cases and 40 controls) was conducted. After obtaining clearance from the Institutional Ethics committee, 60 children in the age range 7-14years admitted for unilateral/bilateral cleft lip/cleft palate repair were enrolled into the study group. Children with congenital hearing loss and syndromic craniofacial anomalies were excluded. Sixty normal children (without congenital cleft lip and/or cleft palate) age and sex matched with the study group were selected as controls. Detailed history was obtained from each child enrolled into the study. Ear, Nose and Throat (ENT) examination including otoscopic examination was performed. Pure tone audiometry was done in a sound proof room using a calibrated Inter acoustics clinical audiometer AC-40 (Denmark). The transducers used for the testing were TDH 39 Supra Aural Head phones and Radio Ear B 71 bone vibrator. Modified Hughson-Westlake procedure (ASHA 1978) was used for threshold estimation. The threshold was determined based on the American National Standard Institute (ANSI) across all the frequency octaves from 250 Hz to 8000 Hz. According to ANSI S3.21, threshold is determined as the “lowest hearing level at which responses occur in at least one half of a series of ascending trials, with a minimum of two responses out of three required at a single level” (ANSI 1978, 1986). The thresholds obtained were used for the quantitative assessment of degree of hearing loss based on the Clark’s (1981) modification of Goodman classification of severity of hearing loss (1965). Tympanometry was performed using an automatic impedance audiometer (Inter acoustics). Pressures between -100 and +50 decapascals were considered normal. Tympanograms are classified in to three types based on the Lidén-Jerger system: Type A being normal with the As subtype indicating low compliance suggesting ossicular fixation and Ad subtype indicating high compliance suggesting ossicular discontinuity. Type B is suggestive of immobility of tympanic membrane due to fluid in the middle ear and is a flat or dome shaped graph. Type C tympanogram is seen when peak pressure is less than -150 decapascals and is indicative of negative middle ear pressure.^{5,6}

The data obtained was recorded & tabulated on Microsoft excel worksheet and descriptive statistics was performed.

RESULTS

Of the 40 patients enrolled, 27 (67.5%) were male and 13 (32.5%) were female. Twenty five patients had Cleft Lip with Palate (CLP) of which 16 were unilateral and 9 were bilateral. Thirteen patients had cleft palate without cleft lip (CP), of which 8 were unilateral and 4 were bilateral. One patient had a submucous cleft palate. Isolated cleft lip (CLP) was seen in 2 cases (Figure 1).

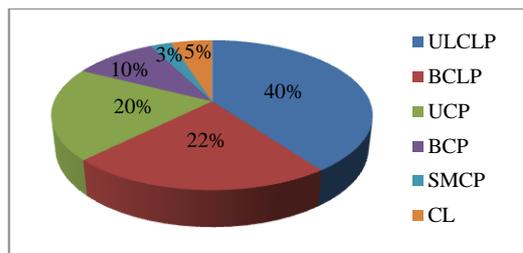


Figure 1: Distribution of cleft types.

UCLP - Unilateral cleft lip and palate; BCLP - Bilateral cleft lip and palate; UCP - Unilateral cleft palate; BCP - Bilateral cleft palate; SMCP - Submucous cleft palate; CL - Cleft lip

Otosopic examination showed retraction of the pars tensa in 55% (n=22) of the cases while the same was seen only in 32.5% (n=13) of controls (p=0.042). Fifty percent (n=11) of patients studied had grade 2 retraction, 23% (n=5) had grade 3 retraction, 18% (n=4) had grade 3 retraction and 9% (n=2) had grade 4 retraction respectively. Normal Pars tensa was seen in 52.5% (n=21) while retraction was noted in 32.5% (n=13) of control group (normal) subjects. Thirteen patients of the study group (32.5%) had chronic otitis media (COM) of which 15% (n=6) had squamosal variant and the rest 17.5% (n=7) had mucosal disease. Among controls, 15% (n=6) had COM of which, 10% (n=4) had mucosal disease and 5% (n=2) had squamosal disease.

Sixty three percent (n= 25) of patients with cleft lip and/or cleft palate had hearing loss of which 55% (n=22) had conductive hearing loss and 7.5% (n=3) had mixed hearing loss. Degree of hearing loss was observed to be mild in 25% (n=1), moderate in 22% (n=9) and moderate to severe in 8% (n=3) respectively. A total of 38% of control group subjects had hearing loss with 27% (n=11) having mild loss and 8% having moderate hearing loss (n=3). Only 3% (n=1) of normal subjects had mixed hearing loss. Hearing loss in study group was significantly higher than that of controls (p=0.025). (Figure 2).

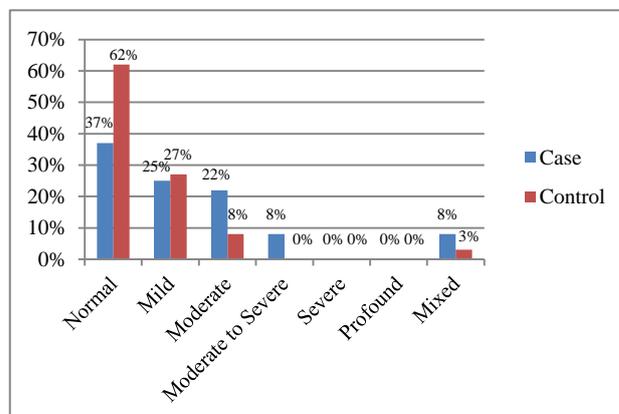


Figure 2: Comparison of hearing loss in CLP patients versus controls.

Impedance audiometry was suggestive of middle ear effusion in 27% (n=11) of cases, who demonstrated a Type B tympanogram. Type C tympanogram which could suggest Eustachian tube dysfunction was seen in 15% (n=6). Majority (62%, n=25) of controls showed Type A tympanogram while type B and type C tympanogram were seen in 18% (n=7) and 3% (n=1) respectively. As type of tympanogram was seen in 5% (n=2) of cases and 2% of controls. Tympanometry was not done in subjects with features of chronic otitis media (Figure 3).

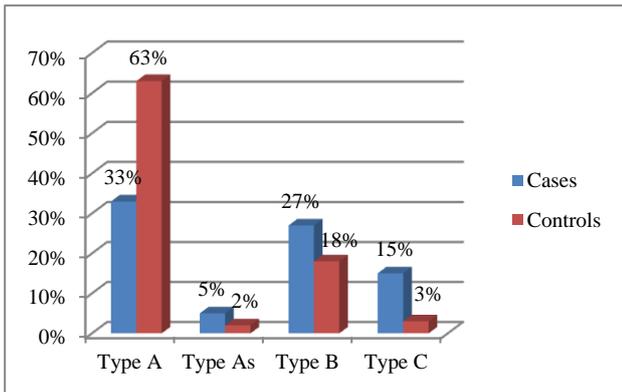


Figure 3: Tympanogram types among CLP patients versus controls.

DISCUSSION

Orofacial clefts are the commonest congenital abnormalities of the craniofacial region. Cleft lip and palate have a worldwide incidence of 1 in 600. The worldwide prevalence of cleft lip with or without cleft palate is reported to be 9.92 per 10000, cleft lip is reported to be 3.28 per 10000 and cleft lip and palate is reported to be 6.64 per 10000. The birth prevalence of clefts in India is reported to be around 27000 to 33000 per year.^{1,2} Many studies have confirmed that patients with CLP are at greater risk for middle ear disorders and hearing loss, with the percentage of these problems varying between 50%-90%.⁷⁻¹⁴ It is postulated that failure of palatal muscles to help in opening the Eustachian tube leads to its obstruction which results in middle ear disorders and hearing loss in these patients.³ This study was conducted to determine the otological and audiological features in children in the age range 7-14 years with congenital cleft lip &/or palate and compare them with that of normal children.

CLP is reported to have male preponderance with male to female ratio being 2:1.^{13,15} The same was observed in this study too with the male to female ratio being 2.1:1.

Retracted pars tensa was observed on otoscopic examination in 55% of cases studied suggesting the possibility of otitis media with effusion. This is in agreement with previously reported studies from the Indian subcontinent.^{12,13}

Previous studies have reported a 5-6% prevalence of acute and chronic otitis media. The prevalence of chronic otitis media among CLP patients in this study was 32.5%. Chronic otitis media was also observed in greater number of subjects in the study group as compared to controls. Cholesteatoma was seen in 15% of CLP patients in contrast to 5% of controls. This is higher than that noted in previous studies which have reported the incidence of cholesteatoma in 1-5.9%.^{12,13,16,17}

Findings of this study are in concordance with earlier studies which reported hearing loss to be a common feature in CLP patients.^{7,9,12,13,17,18} Fifty five percent of CLP patients had conductive hearing loss which varied from mild to moderately severe with mild hearing loss being the commonest. Hearing loss was observed to be significantly higher in study group as compared to controls (p=0.025).

Tympanometry was suggestive of middle ear effusion in 27% of cases and negative middle ear pressure (Eustachian tube dysfunction) in 15% of cases. Higher prevalence of otitis media with effusion was also reported by previous investigators.⁷⁻¹³ Eustachian tube dysfunction secondary to functional abnormality of palatine musculature is reported to be the cause for Middle ear effusion. There is considerable debate over the recovery of Eustachian tube function and improvement in hearing following successful palatal repair. While some authors report higher incidence of recovery of Eustachian tube function following cleft palate repair,^{19,20} others have emphasized that palatal repair had no or marginal effect on middle ear function.^{8,14} Early intervention for middle ear effusion is recommended as, hearing loss in childhood could affect speech and language development as well as scholastic performance. Hence, myringotomy with ventilation tube insertion is recommended at the time of palatal repair in patients whose otoscopic examination and audiometric features were suggestive of otitis media with effusion.

CONCLUSION

Observations of this study reveal higher prevalence of otitis media with effusion, chronic otitis media and hearing loss in children with CLP. It is hence recommended that otological and audiometric assessment be performed for all patients having CLP at least before surgery in order to facilitate early identification and intervention of middle ear problems particularly middle ear effusion. This would enable prevent progression of hearing loss in these patients as well as minimize complications.

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Conflict of interest: None declared

Ethical approval: The study protocol was approved by the institutional ethics committee

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