

Original Paper

Quality of Speech Following Cleft Palate Surgery in Children

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ABSTRACT

Background: Surgical treatment of cleft palate is accompanied with speech problems. Speech therapy in these children after surgery can improve their speech. In this study, we aimed to evaluate the quality of speaking in operated cleft palate patients and speech therapy effects in a small group of these patients. **Methods:** In this cross-sectional study, speech quality of 55 children with operated cleft palate was assessed regarding resonance, audible nasal emission, consonant production and speech acceptability. Speech outcomes after therapy were evaluated in 19 patients. **Results:** Cleft palate types were unilateral cleft and lip palate in 18 cases, bilateral cleft and lip palate in 4 cases, secondary cleft palate type in 30 cases and of mere-soft palate in 3 cases. Thirty-five children were operated during the first year of life and 20 were operated after the first year. More than 55% of patients had normal hypernasality with few cases of severe hypernasality and less than 45% had error in consonant production. Patients operated during first year of life had more speech problems. Speech parameters were improved in 19 patients after speech therapy. **Conclusion:** In conclusion, children with cleft palate have some degrees of speech disorders after repair surgery than could be improved by the speech therapy. Speech therapy should be considered as one of the main treatment protocols along with repair surgery in children with cleft palate.

INTRODUCTION

Children with cleft palate are at risk for speech and language development problems (1,2). When the palate is involved and velopharyngeal insufficiency (VPI) is present, feeding problems, hearing problems and speech and language problems often occur (1-6). Optimal timing of cleft palate repair remains controversial. The majority of recent literature advocates early repair, between 6 and 18 months of age, facilitating normal speech and language development, and preventing hearing loss (7-12). While palatoplasty techniques have improved in recent years, VPI remains a common problem regardless of the surgical technique and remains a problem for 15%–25% of these patients (13-17). The aim of palate repair is to create a complete closure, having an intact hard and soft palate with a normal functioning velopharyngeal mechanism (18). Even when newborns with cleft deformities receive appropriate treatment, some still have facial deformity and speech impairment (19-21), which further increases the health care and familial burden of the disease (22). With the help of Speech and Language thera-

pists it is possible to improve these patients' speech. In this study we aimed to evaluate speech outcome after cleft palate surgery and the speech improvement after speech therapy in a subgroup of patients.

METHODS

In this cross-sectional study, 55 children with operated cleft palate with two flap palatoplasty and intravelar veloplasty techniques during June 2008 and January 2010 in Children Teaching Hospital were recruited. Inclusion criteria were: complete cleft of primary and secondary palate, palate repair by 12 months of age, absence of dysmorphology associated with a genetic syndrome according to a geneticist, cognitive delay, neurological syndromes or sensorineural hearing loss, monolingual speaking family, and absence of postoperative fistulae. All the children passed a hearing screening at the time of evaluation. All children underwent speech evaluations between age 4-6 years. A videotape recording of each child was made by a speech and language therapist. Speech

assessments were performed in all patients postoperatively. The assessment evaluated nasal emission, articulation, and hypernasality by speech language pathologists. Nasal emission was evaluated by using a mirror. Patients were assessed for articulation development of simple sounds, words and connected sentences. All of the children whom did not have history of previous speech therapy (19 patients) underwent articulation therapy to different extents and results before and after speech therapy were documented. Samples of rote speech, repetition of sentences from the Cleft Audit Protocol for Speech (CAPS) and spontaneous conversation were recorded. CAPS analyses the main features of speech from intelligibility to consonant characteristics. Statistical analyses were performed using the Statistical Package for Social Sciences, version 17.0 (SPSS, Chicago, Illinois). Data were demonstrated as frequency and percent. Fisher's exact test was used to for testing the significance of percentages between groups and McNemar test was used to compare results before and after speech therapy. A p value <0.05 was considered significant.

RESULTS

Fifty-five children were enrolled in the study; 35 children were operated <1-year-old and 20 were operated over

1-year-old. There were 25 males and 30 females. Primary cleft palate was unilateral cleft and lip palate in 18 cases, bilateral cleft and lip palate in 4 cases, secondary cleft palate type in 30 cases and of submucous palate in 3 cases. Speech evaluation results are demonstrated in Table 1. After repair surgery, most patients had normal hypernasality in words (63.6%) and sentences (56.36%) with few cases with severe hypernasality and no cases had hyponasality. Voice disorder was also present in only 2 cases. Patients had mostly error in consonant production in words (43.63%) and sentences (38.18%). In comparison between repair surgery ages using Fisher's exact test, we observed that although more speech problems existed in children operated <1 years old, only error in consonant production of words was significant ($p=0.02$). Nineteen patients underwent few speech therapy sessions and all speech variables were improved after the therapy sessions (Table 2). Using McNamara test, only improvement in audible nasal emission in words was significant.

DISCUSSION

The aim of cleft palate repair, besides aesthetic reasons, is to enable normal speech for the child. The speech is measured with different scales and parameters that make it hard to compare between studies (17, 23, 24). However, almost in

Table 1. Speech Evaluation results in all patients

Speech Parameters	all (%)	<1 years (%)	>1 years (%)
Hypernasality			
Words			
Normal	35 (63.6)	20 (57.1)	15 (75)
Mild	8 (14.5)	7 (20)	1 (5)
Moderate	7 (12.7)	5 (14.3)	2 (10)
Severe	5 (9.1)	3 (8.6)	2 (10)
Sentences			
Normal	31 (56.4)	18 (51.4)	13 (65)
Mild	8 (14.5)	5 (14.3)	3 (15)
Moderate	8 (14.5)	6 (17.1)	2 (10)
Severe	8 (14.5)	6 (17.1)	2 (10)
Hyponasality in words	0 (0)	0 (0)	0 (0)
Voice disorder	2 (3.6)	0 (0)	2 (10)
Audible nasal emission			
Words	4 (7.3)	3 (8.6)	1 (5)
Sentences	9 (16.4)	6 (17.1)	3 (15)
Error in consonant production			
Words	31 (56.4)	24 (68.6)	7 (35)
Sentences	34 (61.8)	24 (68.6)	10 (50)
Speech acceptability in colloquial speech			
Normal	32 (58.2)	17 (48.6)	15 (75)
Mild	8 (14.5)	6 (17.1)	2 (10)
Moderate	9 (16.4)	8 (22.9)	1 (5)
Severe	6 (10.9)	4 (11.4)	2 (10)
Speech acceptability in speech sample			
Normal	28 (50.9)	15 (42.9)	13 (65)
Mild	7 (12.7)	5 (14.3)	2 (10)
Moderate	11 (20)	8 (22.9)	3 (15)
Severe	9 (16.4)	7 (20)	2 (10)

Table 2. Speech evaluation results before and after Speech therapy.

Speech Parameters	Before Speech Therapy (%)	After Speech Therapy	P value
Hypernasality			
Words			
Normal	2 (10.5)	7 (36.8%)	----
Mild	4 (21.1)	7 (36.8%)	
Moderate	8 (42.1)	5 (26.3%)	
Severe	5 (26.3)	0 (0)	
Sentences			
Normal	2 (10.5)	4 (21.1%)	----
Mild	3 (15.8)	6 (31.6%)	
Moderate	5 (26.3)	6 (31.6%)	
Severe	9 (47.4)	3 (15.8%)	
Hyponasality in words	0 (0)	0 (0%)	----
Voice disorder	3 (15.8)	1 (5.3%)	NS
Audible nasal emission			
Words	7 (36.8)	1 (5.3%)	0.03*
Sentences	8 (42.1)	6 (31.6)	NS
Error in consonant production			
Words	18 (94.7)	13 (68.4%)	NS
Sentences	18 (94.7)	14 (73.7)	NS
speech acceptability in colloquial speech			
Normal			
Normal	3 (15.8)	7 (36.8%)	----
Mild	1 (5.3)	4 (21.1%)	
Moderate	3 (15.8)	7 (36.8%)	
Severe	12 (63.2)	1 (5.3%)	
speech acceptability in speech sample			
Normal	1 (5.3)	6 (31.6%)	----
Mild	3 (15.8)	3 (15.8%)	
Moderate	2 (10.5)	7 (36.8%)	
Severe	13 (68.4)	3 (15.8%)	

most studies the resonance, consonant production, nasal air escape and articulation is usually measured. In this study we evaluated speech quality in cleft palate patients after repair surgery. Among 55 children, less than 50% had some degrees of hypernasality in words and sentences. In more than 50% the speech parameters were normal during evaluation. Speech acceptability in sample or colloquial speech was normal in over 50% of children. The degree of hypernasality after surgery was reported between 8% and 67% in different studies which had different incidence due to time of primary surgery, type of repair surgery and type of cleft palate and having cleft lip or not (2,5,17,25-30). Other speech disorders including audible nasal air leakage and articulation errors were also reported. However, unlike our findings Timmons and colleagues (17) found no nasal emission as well as no cases with moderate or severe hypernasality. Also, intelligibility was normal in 37% cleft palate patients. Although the degree of hypernasality in our study are within the reported incidences, but in comparison to some studies our patients have more speech disorders with more severity. It could be due to the reason that in our center there is no organized protocol for cleft palate children to receive speech therapy and there is possible that few parents seek these therapies

for their children. Unlike our population, most these studies have performed speech therapy as needed. Speech motor development occurs during the first year of life. It is possible that by increase in the age of palate repair, integrating velopharyngeal movements into the coordinative structure for speech become more difficult and will result in speech disorders including hypernasal speech. Hardin-Jones and Jones (5) observed that with increase in age of surgery, the more hypernasality occurs. Similarly, Pradini and colleagues (31) observed that consonant production errors increase with the age of surgery. Unlike these findings, although not significant, we observed that patients operated during the first year of life had more hypernasality and abnormal speech findings. It is reported that speech therapy can improve results of cleft repair surgery. Ruiters and colleagues (32) observed that most speech parameters improved after speech therapy including the decrease in hypernasality from 38% to 10% and articulation problems from 57% to 25%. In our study only 19 patients had not received previous speech therapy and underwent few session of therapy and all speech parameters were improved after treatment. Although we observed no significant improvement, the results are indicative of usefulness of speech therapy in these patients. Unfortunately, as

mentioned in our center there is no well-organized protocol for following patients after surgery and evaluating their results. One reason is the non-compliance of the parents to the therapy which they presume that there is no need for further treatment after repair surgery. The other reason is that there is no professional speech and language therapist eager to cooperate in these patients' treatment.

CONCLUSION

In conclusion, children with cleft palate have some degrees of speech disorders after repair surgery than could be improved by the speech therapy. Speech therapy should be considered as one of the main treatment protocols along side with repair surgery in children with cleft palate.

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