

Outcome of Surgical Approach and Speech Therapy on Quality of Speech in Patients Suffering Cleft Palate

Leily Mohajerzadeh¹ , Iman Harirforoosh^{1*} , Reyhaneh Kazemi¹, Ahmad Khaleghnejad Tabari¹, Mohsen Rouzrokh¹, Javad Ghoroubi¹, Mehdi Sarafi¹

¹Pediatric Surgery Research Center, Research Institute for Children's Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran

***Address for Corresponder:** Dr.Iman Harirforoosh, Pediatric Surgery Research Center, Research Institute for Children's Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran (email:iman.harirforoosh@gmail.com)

How to cite this article:

Mohajerzadeh L, Harirforoosh I, Kazemi R, Khaleghnejad Tabari A, Rouzrokh M, Ghoroubi J, Sarafi M. Outcome of Surgical Approach and Speech Therapy on Quality of Speech in Patients Suffering Cleft Palate. Iranian Journal of Pediatric Surgery 2021; 7 (2): 90 - 97 .

DOI: <https://doi.org/10.22037/irjps.v7i2.34973>

Abstract

Introduction: A patient suffering from cleft palate has speech problems even after undergoing surgical procedures to correct it. These problems can be improved by some modality of speech therapy. In this study we aimed to evaluate the outcome of our surgical approach and also the impact of speech therapy on quality of speech in patients who suffered from cleft palate and had undergone surgical correction in Mofid hospital since 2011 to 2015.

Materials and Methods: We evaluated the quality of speech in the patients suffering cleft palate, older than 3 years who had undergone surgical correction since 2011 to 2015 in our center. Parameters were evaluated in this study included hypernasality, audible nasal emission and disarticulation due to velopharyngeal insufficiency. This process was performed by our center's speech professionals and informed consent was obtained from the patient's parents.

received: 23 May 2021

accepted: 1 August 2021

Published online: November 2021

This open-access article is distributed under the terms of the Creative Commons Attribution Non Commercial 3.0 License (CC BY-NC 3.0).
Downloaded from: <http://journals.sbm.ac.ir/irjps>

Results: We studied 202 children, 101 males and 101 females. The first surgical procedure was done in the average age of 16 months. Among the postoperative complications, 90.1% of the patients had hypernasality and 66% of the patients had velopharyngeal insufficiency. All these patients were referred to speech therapy and it was shown that there is a significant improvement in the quality of their speech. There was no significant relationship between gender and prevalence of postoperative complications or hypernasality as one of the speech quality elements (P value: 0.34) and there was no significant difference between the age of first surgical reconstructive surgery and speech quality outcomes, but the early reconstruction had strong relation with reduction in postoperative complications and overall final result (P value: 0.043). According to Kruskal-Wallis statistical analysis, there were no significant superiority on speech quality outcome among the three mentioned different surgical methods (P value: 0.203). Also there was a significant improvement in correcting hypernasality as one of the main complications after speech therapy courses (P value: 0.0087).

Keywords

- Cleft palate
- Hypernasality
- Speech therapy
- Complications

Conclusion: In this study, supportive measures such as speech therapy have been shown to improve post-operative complications of cleft palate, such as hypernasality, nasal emission and disarticulation due to velopharyngeal insufficiency. Duration of speech therapy was also significantly effective on speech improvement.

Introduction

Cleft lip and palate are separations in the upper lip, the roof of the mouth (palate) or both. These problems occur when facial structures which develop in the embryo don't close and fuse completely. These are among the most common congenital defects and they are mostly isolated but may occur in relation with many inherited genetic conditions or syndromes.

Patients suffering cleft palate are at risk for speech and language developmental problems.¹ When the palate has these defects and velopharyngeal insufficiency (VPI) is present, feeding, hearing, speech and language problems often occur². Many of the recent literature propose that early surgical cleft repair between 6 to 18 month in these patients has greater speech

and language developmental outcome and reduces hearing loss³. Velopalatine insufficiency remains as a common problem regardless of improvement in surgical palatoplasty techniques and its incidence is estimated to be 15-25% in different studies⁴⁻⁵. The main goal of surgical cleft palate correction is to achieve complete closure of the cleft and having an intact, smooth and hard palate with normal velopharyngeal function⁶. Facial deformity and speech impairment will not be completely corrected in every newborn receiving surgical correction and this will cause health care and familial burden of disease increment⁷. Speech and language therapists have the ability to decrease this gap and many of the patients will be improved by this approach post surgically. In this study we evaluated the improvement in postsurgical speech quality in patients with cleft palate.

Materials and Methods

In this retrospective study, 202 children were recruited who had undergone complete cleft palate palatoplasty between 2011 to 2015 in our tertiary center of Mofid children hospital. The inclusion criteria of this study was the age of 3 years and older with a history of primary or secondary surgical reconstruction of cleft palate. The age of having surgical reconstruction was 12 month in most of the patients with the mean of 16 month in all of them. Genetic syndromes, cognitive delay, neurological syndrome or sensorineural hearing loss and postoperative fistula were the exclusion criteria of this study. All these patients

were called back for speech quality evaluation using the available patient's documented information. This evaluation was done by our center's professional speech therapists. In addition to speech quality evaluation, patient's anatomical problems and also craniofacial abnormalities were examined. Data was collected and documented. Symptoms of speech problems include hypernasality, audible nasal emission, and disarticulation due to velopharyngeal insufficiency. Also the improvement in speech ability and quality was re-evaluated by the center's professional speech therapists after patients passing a course of speech therapy. More than these, all the patients passed a hearing screening test at the time of evaluation.

The items of speech quality assessment included nasal emission, articulation and hypernasality. Nasal emission evaluation was standardly done by a mirror and articulation development factors were development of simple sounds, words and connected sentences.

Statistical analyses were performed by using the Statistical Package for Social Sciences, version 20 (SPSS, Chicago, Illinois). Final results were demonstrated as frequency and percentage. We used Fisher's exact test for significance of percentage evaluation between two groups and MnNemar test was also used for comparison of the results before and after the course of speech therapy. P values of about <0.05 were considered as significant.

Results

202 children were enrolled in this study who had undergone cleft palate reconstructive surgery in our pediatric surgical tertiary center, Mofid hospital, Tehran, Iran during 2011 to 2015. One hundred and one of the patients (50%) were male and 101 (50%) were female. 34.2% of the patients resided in Tehran and the rest of the patients were from other cities. Mean age for first surgical reconstruction was about 16 month, but most of the patients underwent this first

surgical reconstruction at age of 12 month and the mean duration of hospitalization was 4 days. Earliest age of surgery was 1.5 month and the latest one was 13 years. According to findings of this study, 58 (28.7%) patients had delay in starting to speak in comparison to their normal peers and 182 (90.1%) of patients had difficulty in pronouncing alphabets and 175 (86.6%) of the patients had nasal emission which could happen due to velopharyngeal insufficiency **Table 1**.

Table1: Complications of cleft palate in pronunciation of the words and sound production in the study patients

Complications of cleft palate in pronunciation of the words and sound production	Percentage
Hypernasality	90.1%
Late start to speak	28.7%
Difficulty in pronouncing or uttering alphabets	90.1%
Nasal emission	86.6%
Velopharyngeal insufficiency	66.2%

Of the patients who have been enrolled in this study, 18.3% had a history of recurrent middle ear infection that was caused by anatomical defects in these patients and 12.9% of the patients suffered from auditory problems and were referred for audiology consultation and proper intervention.

Regarding the reconstructive surgical techniques, about 70 patients (35.2%) were managed by the Veau-Ward-Kilner (VWK) pushback method, 128 patients (64.3%) by Von Langenbeck and only one patient by Bardach two flap palatoplasty method **Table2**.

Table2: Reconstructive surgical techniques

Surgical technique	Prevalence(Absolute number)	Prevalence(Percentage)	P value
Veau-Ward-	70	35.2%	P value:

Kilner (VWK) pushback			0.203
Von langenbeck	128	64.3%	
Bardach two flap palatoplasty	1	0.5%	

147 patients suffered from velopharyngeal insufficiency as the complication of surgery and 67.8% (137 patients) underwent speech therapy courses. One of these patients underwent sphincter pharyngoplasty and one patient underwent pharyngeal flap imposition and for 4% (8 patients) repeat surgical cleft palate reconstruction was done. In follow up reevaluation, 182 patients (90.1%) had hypernasality and all of them were referred to a speech therapist.

By using mann-whitney statistical study, there was no significant relation between gender of the patients and prevalence of postoperative complications or hypernasality as one of the speech quality elements (P value: 0.34). There was no significant difference between the age of first surgical reconstructive surgery and speech quality outcomes, but the early reconstructive surgery had strong relation with reduction in postoperative complications and overall final result (P value: 0.043). According to Kruskal-Wallis statistical analysis, there were no significant superiority on speech quality outcome among the three mentioned different surgical methods (P value: 0.203). Also there was a significant improvement in correcting hypernasality as one of the main complications after speech therapy courses (P value: 0.0087).

Cleft palate would happen in relation with other congenital abnormalities and in this study there was a significant relation between concurrent occurrence of cleft palate and cleft lip (in 88 of the patients: 43.6%) and also cardiovascular congenital disorders (18 of the patients: 9%) or neurological abnormalities (17 of the patients: 8.5%). Two cases of Pierre Robin sequence also occurred. With the aspect of anatomical distribution of the cleft palate, 18.8% of this patients population had only soft palate abnormalities and 80% had complete cleft palate. Also 1% of the patients had submucosal cleft palate. Three and a half percent of all had unilateral and 96.5% had bilateral cleft palate, but according to Mann-whitney study, this made no significant difference in speech quality after speech therapy courses (P value: 0.85).

Postoperative complications of the primary reconstructive surgery of cleft palate include: 42.8% (86 patients) had oral-nasal fistula which among them, 16.8% suffered from fistula in hard palate, 7.9% in soft palate and 17.8% had concurrent hard and soft palate fistulae. Ninety six and a half percent (83 patients) of this group underwent redo surgical reconstruction of fistula but unfortunately 3.5% (3 patients), did not receive the reconstructive surgery because of the poor

follow up. Among the patients in group of oral-nasal fistula, 59.3% (51 patients) needed only one-time fistula reconstruction but 23.3% (20 patients), 10.5% (9 patients), 3.5% (3 patients), 3.5% (3 patients) need two, three, four and five reconstructive surgeries for fistula management respectively. There was no significant relation between fistula formation as a complication of surgical reconstruction and hypernasality as a parameter of speech quality outcome (P value:0.45).

Other findings of this study included: the longest duration of speech therapy was 12 month and the mean was 8 month and there was a direct relation between duration of speech therapy and final speech quality result (P value: 0.0076).

Discussion

Cleft lip and palate are separations in the upper lip, the roof of the mouth (palate) or both. These problems are caused when facial structures which develops in the embryo don't close and fuse completely. These are among the most common congenital defects and they are mostly isolated but can occur in relation with many inherited genetic conditions or syndromes.

Patients with cleft palate are at risk of speech and language developmental problems.¹ When the palate is involved with this defects and velopharyngeal insufficiency (VPI) is present, feeding, hearing, speech and language problems often occur.² Many of the recent literature propose that early surgical cleft repair between 6 to 18 month has greater speech

and language developmental outcome and reduces hearing loss.³ Velopalatine insufficiency still remains as a common problem regardless of improvements in surgical palatoplasty techniques and its incidence is estimated to be 15-25% in different studies.⁴⁻⁵ The main goal of surgical cleft palate correction is to achieve complete closure of the cleft and having an intact smooth and hard palate with normal velopharyngeal function.⁶ Facial deformity and speech impairment will not be completely corrected in every newborn receiving surgical correction and this will cause health care and familial burden of disease increment.⁷ Speech and language therapists have the ability to decrease this gap and many of the patients will be improved by this approach post surgically.

In this retrospective study we evaluated the improvement in postoperative speech quality in patients with cleft palate who underwent surgical reconstruction during 2011 to 2015. Finally, 202 patients who were older than 3 years, passed the inclusion criteria of the study and were evaluated for their quality of speech and speech problems by a standard protocol of speech evaluation by our center's speech therapy professionals. The data was gathered and documented and finally statistical analysis was done.

In this study we showed that speech therapy is essential and necessary for management of speech quality in patients who underwent cleft palate reconstructive surgery and this approach obviously reduced the velopharyngeal insufficiency

and hypernasality problems in these patients.

Also, the mean duration of speech therapy was 8 month and there was a direct relation between the age of surgery and final speech quality result.

Haapanen et al's study which was done on 108 patients showed that the best and most effective age for surgical reconstruction of cleft palate is between 12 and 18 months old and Cronin modification technique was superior to Push back technique of surgical reconstruction.⁸⁻¹⁰ In this study it has been revealed that there is no significant difference between different techniques of surgery in the management of these patients and none of them were superior to the others.

Davari et al estimated that the prevalence of hypernasality, post reconstructive operation is about 70.9% and there was no significant difference between different genders¹¹. Also Magee et al in their study showed that interventional reconstruction of these defects as the aspect of general health cost burden and cost effectiveness is absolutely effective and it can prominently reduce the disability caused by this defect.¹² The findings of Mary Hardin-Jones¹³⁻¹⁴ indicated a large degree of variability in opinions of speech-language pathologists (SLP), who responded regarding assessment and treatment of children with cleft lip and palate. In the present study the hypernasality prevalence was about 90.1% and we also found that there is no

significant difference between different gender groups.

Conclusion

Finally, we showed that post reconstructive operation speech therapy will be useful on improving the speech quality outcome of patients suffering from congenital cleft palate (P value: 0.0078). This improvement is in complications such as hypernasality, nasal emission and difficulty in pronunciation of the words due to velopharyngeal insufficiency. Also the duration of speech therapy has a direct relation with final speech quality result. Finally, by the findings of this study, we strongly recommend that surgeons use speech therapy as one of the most important aspects of their patients' cleft palate management.

Ethical Consideration

This study was approved by Research Institute of Children Health - Shahid Beheshti University of Medical Sciences with code number IR.SBMU.RICH.REC.1400.016

Acknowledgements

Not applicable

Funding/Support

Not applicable

Conflict of interests

There is no conflict of interest.

References

1. Sharp HM, Dailey S, Moon JB: Speech and language development disorders in infants and children with cleft lip and palate. *Pediatr Ann* 2003;32(7):476-80.
2. Paliobei V, Psifidis A, Anagnostopoulos D: Hearing and speech assessment of cleft palate patients after palatal closure: Long-term results. *Int J Pediatr Otorhinolaryngol* 2005;69(10):1373-81.
3. Kaplan I, Dresner J, Gorodischer C, et al: The simultaneous repair of cleft lip and palate in early infancy. *Br J Plast Surg* 1974;27(2):134-8.
4. Becker DB, Grames LM, Pilgram T, et al: The effect of timing of surgery for velopharyngeal dysfunction on speech. *J Craniofac Surg* 2004;15(5):804-809.
5. Timmons MJ, Wyatt RA, Murphy T: Speech after repair of isolated cleft palate and cleft lip and palate. *Br J Plast Surg* 2001;54(5):377-384.
6. Grant HR, Quiney RE, Mercer DM, et al: Cleft palate and glue ear. *Arch Dis Child* 1988;63(2):176-179.
7. Pope AW, Tillman K, Snyder HT: Parenting stress in infancy and psychosocial adjustment in toddlerhood: a longitudinal study of children with craniofacial anomalies. *Cleft Palate Craniofac J* 2005;42(5):556-9.
8. Haapanen M-L, Rantala S-L: Correlation between the age at repair and speech outcome in patients with isolated cleft palate. *Scandinavian journal of plastic and reconstructive surgery and hand surgery* 1992;26(1):71-8.
9. Haapanen M-L: Factors affecting speech in patients with isolated cleft palate. A methodic, clinical and instrumental study. *Scandinavian journal of plastic and reconstructive surgery and hand surgery Supplementum* 1992;26:1-61.
10. Fakhim SA, Shahidi N, Javan GK. Quality of Speech Following Cleft Palate Surgery in Children. *Advances in Bioscience and Clinical Medicine* 2018;6(2):14-8.
11. Mapar D, Khanlar F, Sadeghi S, et al: The incidence of velopharyngeal insufficiency and oronasal fistula after primary palatal surgery with Sommerladintravelarveloplasty: A retrospective study in Isfahan Cleft Care Team. *Int J Pediatr Otorhinolaryngol* 2019;120:6-10
12. Magee WP, Vander Burg R, Hatcher KW: Cleft lip and palate as a cost-effective health care treatment in the developing world. *World journal of surgery* 2010;34(3):420-7.
13. Hardin-Jones M, Jones DL, Dolezal RC: Opinions of speech-language pathologists regarding speech management for children with cleft lip and palate. *The Cleft Palate-Craniofacial Journal* 2020;57(1):55-64.
14. American Cleft Palate-Craniofacial Association. Parameters for evaluation and treatment of patients with cleft lip/palate or other craniofacial differences. *Cleft Palate Craniofacial J* 2018a;55(1):137-157.