Stomatologija. Baltic Dental and Maxillofacial Journal, 22: 80-5, 2020

Nasalance scores for Vietnamese-speaking children with oral clefts

Van Thai Nguyen[1], Lagle Lehes[2], Thi Thuy Hang Truong[3], Thi Van Anh Hoang[3], Triin Jagomägi[4]

SUMMARY

Objective. The study aimed to obtain nasalance scores for Vietnamese-speaking patients with repaired cleft palate with or without cleft lip.

Methods. A total of 29 children with cleft palate with or without cleft lip (4–18 years old, mean age 7.9±3.5 years old) were included in this study. Speech material was designed specifically for the Vietnamese language. The speech material consisted of oral stimuli (19 oral words and 18 oral sentences), oro-nasal stimuli (eight sentences), and nasal stimuli (seven sentences). The patients repeated the stimuli after the examiner. The Nasometer II (model 6450) was used to compute nasalance scores.

Results. The mean nasalance scores were 27.1% for oral stimuli, 40.2% for oro-nasal stimuli, and 57.5% for nasal stimuli. Hypernasality was detected in 41.4% of the patients.

Conclusion. Vietnamese-speaking patients with repaired cleft palate with or without cleft lip who did not undergo speech therapy had poor speech outcomes.

Key words: child, cleft palate, speech, speech disorders, Vietnam.

INTRODUCTION

Oral clefts are congenital birth defects that include a cleft lip (CL), cleft lip and palate (CLP), and isolated cleft palate (CP) (1). Patients with oral clefts often require multiple treatments to regain function as well as aesthetics. Developing normal speech is one of the primary goals of cleft treatment. An assessment of speech, therefore, is essential in reporting the outcomes of cleft treatment (2).

Hypernasality is one of the most common speech disorders in patients with cleft palate with or without cleft lip (CP±L) (3). Perceptual assessment of speech by speech-language pathologists is considered the gold standard to assess speech disorders related to CP±L (4). However, perceptual assessment alone is not sufficient to evaluate if hypernasality is caused by a palatal fistula, velopharyngeal inadequacy, or a combination of both (5). Also, the quality and reliability of perceptual assessment are dependent on the experience of evaluator and professional bias (6). Some clinicians prefer having an objective assessment of speech, i.e. instrumental assessment, besides their subjective and perceptual assessment (7)

Nasometry is a non-invasive computer-based acoustic instrumental technique that calculates the ratio of nasal acoustic energy to the total of nasal and oral acoustic energy (8). One such instrument is called a Nasometer. The ratio is termed as the nasalance score (8). Nasalance, as measured by the Nasometer, is substantially correlated with perceptual measures of nasality in children with a repaired CP (9).

Patients with oral clefts in our hospital have been operated by the Chonbuk National University surgical team for many years. The treatment has focused on surgery; speech therapy has not been incorporated. Nasalance of operated patients has not been investigated. In recent years, the Nasometer has been introduced for research purposes in our hospital. Therefore, we conducted this study to investigate nasalance scores for surgically treated Vietnamese-speaking patients with CP±L.

MATERIAL AND METHODS

Participants

The study was approved by the ethics committee of Hue University of Medicine and Pharmacy

[1]*Tallinn Health Care College, Medical Technology Education Center, Tallinn, Estonia*
[2]*Tartu University Hospital ENT Clinic, Tartu, Estonia*
[3]*The Office of Genetic Counseling and Disabled Children, Hue, Vietnam*
[4]*Institute of Dentistry, University of Tartu, Tartu, Estonia*

Address correspondence to Van Thai Nguyen, DDS, PhD, Tallinn Health Care College, Medical Technology Education Center, Kännu 67, Tallinn 13418, Estonia.
E-mail address: vanthai.nguyen@ttk.ee

(date of issue: 24 December 2015) (Appendix A). Informed consent was obtained from parents or patients who were 18 or older (Appendix B). The study was conducted in March 2016.

Patient records at the hospital were screened for patients who met the following inclusion criteria: repaired CP±L; no associated syndrome and no mental retardation; native Vietnamese-speaking; and ≥ 4 years old. Cleft types were recorded as CLP and CP. The speech of patients was screened by two Vietnamese speech-language pathologists (SLPs) using a brief conversational interchange technique. The patient answered questions about their name, age, and grade level. Patients who were unable to complete the speech stimuli, unable to repeat the stimuli, uncooperative, having hearing problems, or suffering from the common cold or nasal congestion were excluded.

Patients in this study were operated by the Chonbok National University surgical team using the same surgical protocol. The cleft surgery was performed by three experienced surgeons. Lip closure was performed at 6 to 12 months with modified Millard or Tennison method. One-stage hard and soft palate closure was performed at 12 to 24 months with V-Y pushback method. The included patients were not examined or treated by SLPs previously. Presurgical orthopaedics, and secondary alveolar bone grafting was also not provided to the included patients.

Speech material

Speech stimuli containing nasal phonemes are not helpful in identifying hypernasality but may be valuable in identifying hyponasality (10). A person with nasal obstruction should manifest low nasalance scores, i.e. hyponasal speech, when asked to produce nasal stimuli which are loaded with nasal sounds (11).

The speech material was composed specifically for the Vietnamese language and used to obtain normative nasalance scores for non-cleft Vietnamese-speaking children. The speech material consisted of three stimuli: oral stimuli, oro-nasal stimuli, and nasal stimuli (12). The speech material is shown in Appendix C. The oral stimuli, which were devoid of nasal consonants, composed of 19 oral words and 18 oral sentences. The oral stimuli were designed to detect hypernasality (13). The oro-nasal stimuli included eight sentences (33.8% nasal consonants). The nasal stimuli, which were loaded with nasal consonants, had seven sentences (83.0% nasal consonants). The nasal stimuli were designed to detect hyponasality (14).

Nasometry

Nasalance scores were obtained using the Nasometer II (model 6450) (PENTAX Medical, Montvale, NJ) with the NasometerTM software (PENTAX Medical, Montvale, NJ). The assessment procedure was conducted in a quiet room. The Nasometer was calibrated daily before the assessment in accordance with the instruction of the manufacturer. After adjusting the headset of the Nasometer according to the manual, the patients were asked to repeat each stimulus after the examiner, with a brief pause in between. The software gave a nasalance score for each stimulus. The mean nasalance score was calculated by averaging the score of all stimuli in each category (oral stimuli, oro-nasal stimuli, nasal stimuli). Also, a speech-language pathologist noted nasal emission of the patients when they repeated the stimuli.

Nasalance scores interpretation

As suggested by previous studies, clinical level of abnormal resonance is determined by assuming a limit of 2 standard deviations (SDs) beyond the mean (15, 16). Applying those findings, cut-off scores for oral stimuli, oro-nasal stimuli, and nasal stimuli were suggested for the Vietnamese language. Nasalance scores above 24.7% indicated an excessive amount of acoustic nasal energy or hypernasality. Nasalance scores below 38.5% indicated hyponasality (12).

Statistical analysis

The statistical analysis was performed using the SPSS statistical package version 22.0 (SPSS Inc, Chicago, IL). Independent t-tests were used to compare the differences in the scores between genders, and cleft types. The Chi-square test was used to compare categorical variables. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Twenty-nine children (12 boys, 17 girls) from 4 to 18 years old (mean age 7.9 ± 3.5 years old) were included in the study. There were no significant differences in nasalance scores between genders as well as cleft types ($p>0.05$); therefore, they were combined for the analysis.

Nasalance scores

The mean nasalance scores for Vietnamese-speaking children with CP±L were 27.1% for oral stimuli, 40.2% for oro-nasal stimuli, and 57.5% for

nasal stimuli. About half of the patients (41.4%) had hypernasality.

DISCUSSION

Nasalance scores for Vietnamese-speaking patients with CP±L

The present study introduced the nasalance scores for Vietnamese-speaking children with CP±L. The children were operated by the Korean operation team and did not receive speech therapy. We found that the children had a high occurrence of hypernasality.

The occurrence of hypernasality in our study was much higher than other cleft studies, for example, 10.2% in children with UCLP in the United Kingdom (17), 11% in children with CLP and 38% in children with CP in Finland (18). The reasons for hypernasality could be oronasal fistula, lacking speech therapy, or different surgical techniques. An oronasal fistula in operated patients with CP is considered a contributor to hypernasality (2). Children with UCLP in the United Kingdom study has a low occurrence of hypernasality because about two-thirds of patients received speech therapy, and the centralization of cleft services improved speech outcomes (2). In our study, we did not make a record of the presence or absence of the oronasal fistula. Therefore, we could not draw any conclusions on the effect of oronasal fistula on nasality.

Factors influencing nasalance scores

There are some factors that affect nasalance scores: language, age, and cleft types. Since the mean scores of nasalance scores are dependent on the language, the cut-off score is also language-specific, for example 27% in the Brazilian Portuguese language, 29% in the Finnish language, or 32% in the English language (13, 18, 19).

Prior studies on other languages showed that nasalance scores for adults were significantly higher than those for children (20, 21). The age effect was observed in a non-cleft population and explained by two phenomena: structural changes and physiological changes associated with age (22). Soft and hard tissues of the craniofacial complex such as mouth, jaws, palates, nose, sinuses, and cranium change noticeably over time that could affect the acoustic characteristics of resonance (18). Changes in sensorimotor structures and functions with age could influence the operation of the velopharyngeal sphincter for rapid dynamic control during speech (22).

The effect of cleft types on nasalance differed among studies. Haapanen (18) showed that children with CP had significantly higher nasalance scores than children with CLP and CL in oral stimuli. Van Lierde, De Bodt (23) found no differences in the nasalance scores and perceptual judgments of nasality between UCLP and BCLP. Swennen, Grimaldi (5) showed no differences in the nasalance scores between the four cleft groups (UCL, UCLP, BCLP, CP) for the sustained vowels, the oral sentences, and the three oro-nasal reading passages. In contrast, the speech of patients with BCLP was significantly less intelligible and had more articulation errors due to the cleft (24).

Pros and cons of the Nasometer

Nasalance scores for patients with CP±L were investigated in other languages as shown in Table. Nasometer has its own advantages. Because the procedure is non-invasive, Nasometer is suitable for young children (25). This instrument is relatively small and portable; therefore, it can be used by SLPs

Table. The mean nasalance scores (%) and standard deviation for patients with clefts in different languages

Language	Authors, Year	Age	Male/ Female	Diagnosis	Mean nasalance scores		
					Oral stimuli	Oro-nasal stimuli	Nasal stimuli
Dutch	Van Lierde, 2002 (23)	4-16	n=37	UCLP	26.0±4.9	40.7±3.8	54.3±2.6
				BCLP	27.8±3.5	39.3±3.2	50.2±3.3
				UCLP+BCLP	26.9±3.0	40.0±2.5	52.3±2.1
English	Pinborough-Zimmerman, 1998 (28)	4-13	14/1	UCLP, BCLP, CP	31.1	39.4	52.3
German	Swennen, 2004 (5)	≈13	74/51	UCL	26.9±11.8	44.0±9.0	70.4±6.0
				UCLP	31.9±11.7	46.0±7.1	65.8±6.4
				BCLP	30.7±12.8	44.9±8.3	67.2±4.9
				CP	33.7±12.1	47.2±8.1	68.0±6.8
Malay	Norsila, 2013 (29)	NG	12/15	CP±L	42.9±14.4	NG	59.6±6.2
Vietnamese	Shin, 2017 (30)	NG	n=10	NG	34.7	NG	NG

UCL – unilateral cleft lip; UCLP – unilateral cleft lip and palate; BCLP – bilateral cleft lip and palate; CP±L – cleft palate with or without cleft lip; CP – cleft palate; NG – not given.

in any clinical setting such as rehabilitation centres, public schools, or private practices (26). Besides the advantages, it should be noted that the audible nasal air emission, when producing some consonants, could be detected by the nasal microphone of the Nasometer. As a consequence, this could lead to an artificial increase in the nasalance score (14). The nasalance scores can be obtained before and after treatment in order to make a comparison, but should not be used to make treatment decisions (27). Nasalance scores should be interpreted with caution and cannot be used as a substitute for perceptual assessment (25, 26).

Limitations and future directions

Due to the nature of this cross-sectional study, we could not investigate the effects of other aspects on the nasalance scores outcomes, such as age, gender, types of surgery, surgery time. Prospective studies are needed to investigate the effects of other aspects on the nasalance scores outcomes.

Since cleft centres are establishing in Vietnam, it is important to include speech assessment in the cleft treatment protocol. In response to that needs, postgraduate programs should focus on training for SLPs since there is a lack of SLPs in Vietnam. When SLPs are trained and specialized in cleft speech assessment, we expect to combine perceptual assessment and instrumental assessment to evaluate the speech outcomes of patients with CL/P. Other aspects of speech outcomes should be investigated, such as voice, articulation errors, and intelligibility.

CONCLUSIONS

Operated patients with CL/P who did not undergo speech therapy in Vietnam had poor speech outcomes. The study found that about half of the patients had hypernasality. It is recommended that speech therapy must be implemented in the cleft treatment protocol in Vietnam even when the treatment is provided by foreign teams.

CONFLICTS OF INTEREST

The authors state no conflict of interest.

FUNDING

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

APPENDICES

Appendix A. The ethics committee approval

December 24th, 2015
Dr. xxx
xxx
Subject: Approval of the study – "Study of situation and treatment needs of operated cleft lip and palate patients" by the Ethics Committee.
Dear Dr. xxx
The Institutional Ethics Committee of Hue University of Medicine and Pharmacy has reviewed and approved the following study:
Study title: Study of situation and treatment needs of operated cleft lip and palate patients" by the Ethics Committee.
Principal investigator: xxx, MD.
This study is approved for the research period from March 2016 to December 2017.
It is your responsibility to ensure that all people associated with the study are made aware of what has been actually approved.
Please note that the following conditions apply to your approval. Failure to abide by the conditions may result in suspension or discontinuation of approval and/or disciplinary action.
a. Limit of Approval: Approval is limited strictly to the study as submitted in your application
b. All procedures within this study must follow what have been submitted in your ethics application.
c. Approval is for the above mentioned period. Research must be renewed (if needed) until it is complete.
Yours sincerely,
The Institutional Ethics Committee of Hue University of Medicine and Pharmacy

CHAIR	SECRETARY
(signed and sealed)	(signed)
A/Prof xxx, MD, PhD	xxx, MD, PhD

Appendix B. The consent form in Vietnamese

PHIẾU CHẤP THUẬN THAM GIA NGHIÊN CỨU
Mô tả nghiên cứu
Tên nghiên cứu: "Nghiên cứu về tình hình và nhu cầu điều trị của bệnh nhân khe hở môi vòm miệng đã phẫu thuật."
Trong nghiên cứu này, các thông tin liên quan đến bệnh nhân được thu thập thông qua khám lâm sàng, lấy dấu răng hai hàm, chụp ảnh, chụp phim Xquang và đánh giá phát âm. Ngoài ra, còn có các câu hỏi phỏng vấn liên quan đến độ hài lòng về thời kỳ mang thai và cho con bú. Nghiên cứu này giúp đánh giá được kết quả điều trị, cũng như các yếu tố liên quan đến bệnh lý.
Phần chấp thuận
Tôi đã được cung cấp các thông tin về nội dung và mục tiêu nghiên cứu. Tôi có cơ hội để hỏi và được giải đáp các thắc mắc.
Tôi hiểu rằng việc tham gia nghiên cứu là hoàn toàn tự nguyện. Tôi có thể từ chối tham gia nghiên cứu hoặc rút khỏi nghiên cứu bất cứ lúc nào. Việc rút khỏi nghiên cứu không ảnh hưởng đến việc điều trị tiếp tục của tôi tại Bệnh viện Trường Đại học Y Dược Huế.
Nếu tôi có bất kỳ câu hỏi gì về nghiên cứu, tôi có thể liên hệ BS Nguyễn Văn Thái – Khoa Răng Hàm Mặt Trường Đại học Y Dược Huế.
Tôi hiểu rằng thông tin thu thập từ nghiên cứu sẽ được sử dụng cho luận văn, bài báo khoa học. Tôi cho phép sử dụng các kết quả, số liệu đó dưới dạng nguồn dữ liệu ẩn danh.
Tôi xin xác nhận sự chấp thuận tham gia nghiên cứu của tôi.

Tên người tham gia nghiên cứu Chữ ký Ngày

Trường hợp bệnh nhân là trẻ em (< 18 tuổi)
Tôi đồng ý cho con của tôi, tên là …… tham gia vào nghiên cứu này.
Tên bố/mẹ hoặc người bảo hộ Chữ ký Ngày

Appendix C. Speech material

C1. Oral stimuli
C1.1. Oral words
Hoa, Phở, Trẻ, Quýt, Pa-tê, Tai, Gà, Đỏ, Voi, Thỏ, Rổ, Bò, Xe, Dao, Sữa, Gió, Chó, Khế, Ly
C1.2. Oral sentences
Pa pa
Bà bảy bị bổ
Tí tập tạ
Đu đủ đỏ
Con cò có cái cổ cao
Gà gô gáy
Xôi xúc xích
Phì phà phì phò
Vũ về vội vã
Lí la lí lắc
Thỏ thích thơ
Ríu ra ríu rít
Chú chích chòe
Tre trúc trơ trụi
Khúc kha khúc khích
Hà hả hê
Dao dây dưa
Su sửa sổ sách

C2. Oro-nasal stimuli
Quê hương là chùm khế ngọt
Cho con trèo hái mỗi ngày
Quê hương là đường đi học
Con về rợp bướm vàng bay
Quê hương là con diều biếc
Tuổi thơ con thả trên đồng
Quê hương là con đò nhỏ
Êm đềm khua nước ven sông

C3. Nasal stimuli
Nu na nu nống
Hỏi han mọi người
Mênh mông sóng nước
Ngày tháng năm
Mình muốn tắm mưa
Nói chuyện lan man
Nhắn nhủ nhau nói năng nhẹ nhàng

REFERENCES

1. Mossey PA, Little J, Munger RG, Dixon MJ, Shaw WC. Cleft lip and palate. Lancet (London, England). 2009;374(9703):1773-85.
2. Sell D, Grunwell P, Mildinhall S, Murphy T, Cornish TA, Bearn D, et al. Cleft lip and palate care in the United Kingdom--the Clinical Standards Advisory Group (CSAG) Study. Part 3: speech outcomes. The Cleft palate-craniofacial journal : official publication of the American Cleft Palate-Craniofacial Association. 2001;38(1):30-7.
3. Schonweiler R, Lisson JA, Schonweiler B, Eckardt A, Ptok M, Trankmann J, et al. A retrospective study of hearing, speech and language function in children with clefts following palatoplasty and veloplasty procedures at 18-24 months of age. International journal of pediatric otorhinolaryngology. 1999;50(3):205-17.
4. Larangeira FR, Dutka Jde C, Whitaker ME, de Souza OM, Lauris JR, da Silva MJ, et al. Speech nasality and nasometry in cleft lip and palate. Brazilian journal of otorhinolaryngology. 2016;82(3):326-33.
5. Swennen GR, Grimaldi H, Upheber J, Kramer FJ, Dempf R. Nasalance measures in German-speaking cleft patients. The Journal of craniofacial surgery. 2004;15(1):158-64; discussion 64.
6. Kummer AW, Clark SL, Redle EE, Thomsen LL, Billmire DA. Current practice in assessing and reporting speech outcomes of cleft palate and velopharyngeal surgery: a survey of cleft palate/craniofacial professionals. The Cleft palate-craniofacial journal : official publication of the American Cleft Palate-Craniofacial Association. 2012;49(2):146-52.
7. Peterson-Falzone SJ, Trost-Cardamone J, Karnell MP, Hardin-Jones MA. The Clinician's Guide to Treating Cleft Palate Speech. Missouri (MO): Elsevier; 2017. 336 p.
8. Brunnegard K, Lohmander A, van Doorn J. Comparison between perceptual assessments of nasality and nasalance scores. Int J Lang Commun Disord. 2012;47(5):556-66.
9. Hamilton E. Critical Review: What is the relationship between nasalance as measured by the Nasometer and perceptual measures of nasality in English speaking children with a history of cleft palate and/or related craniofacial anomalies? Ontario (ON): Western University: School of Communication Sciences and Disorders; 2013.
10. Watterson T, Hinton J, McFarlane S. Novel stimuli for obtaining nasalance measures from young children. The Cleft palate-craniofacial journal : official publication of the American Cleft Palate-Craniofacial Association. 1996;33(1):67-73.
11. Dalston RM, Warren DW, Dalston ET. The identification of nasal obstruction through clinical judgments of hyponasality and nasometric assessment of speech acoustics. American journal of orthodontics and dentofacial orthopedics : official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics. 1991;100(1):59-65.
12. Nguyen VT, Lehes L, Truong TTH, Hoang TVA, Jagomägi T. Normative nasalance scores for Vietnamese-speaking children. Logopedics Phoniatrics Vocology. 2017:1-7.
13. Dalston RM, Warren DW, Dalston ET. Use of nasometry as a diagnostic tool for identifying patients with velopharyngeal impairment. The Cleft palate-craniofacial journal : official publication of the American Cleft Palate-Craniofacial Association. 1991;28(2):184-8; discussion 8-9.
14. Dalston RM, Warren DW, Dalston ET. A preliminary investigation concerning the use of nasometry in identifying patients with hyponasality and/or nasal airway impairment. Journal of speech and hearing research. 1991;34(1):11-8.
15. Van Doorn J, Purcell A. Nasalance levels in the speech of normal Australian children. The Cleft palate-craniofacial journal : official publication of the American Cleft Palate-Craniofacial Association. 1998;35(4):287-92.
16. Van der Heijden P, Hobbel HH, Van der Laan BF, Korsten-Meijer AG, Goorhuis-Brouwer SM. Nasometry normative data for young Dutch children. International journal of pediatric otorhinolaryngology. 2011;75(3):420-4.
17. Sell D, Mildinhall S, Albery L, Wills AK, Sandy JR, Ness AR. The Cleft Care UK study. Part 4: perceptual speech outcomes. Orthodontics & craniofacial research. 2015;18(Suppl 2):36-46.
18. Haapanen ML. Cleft type and speech proficiency. Folia

phoniatrica et logopaedica : official organ of the International Association of Logopedics and Phoniatrics (IALP). 1994;46(2):57-63.
19. Pegoraro-Krook MI, Marino VCdC, Silva L, Dutka JdCR. Correlação entre nasalância e nasalidade em crianças com hipernasalidade [Correlation between nasalance and nasality in children with hypernasality]. Revista CEFAC. 2014;16:1936-44.
20. Ha S, Cho SH. Nasalance scores for normal Korean-speaking adults and children: Effects of age, vowel context, and stimulus length. International journal of pediatric otorhinolaryngology. 2015;79(8):1235-9.
21. Van Lierde KM, Wuyts FL, De Bodt M, Van Cauwenberge P. Age-related patterns of nasal resonance in normal Flemish children and young adults. Scandinavian journal of plastic and reconstructive surgery and hand surgery. 2003;37(6):344-50.
22. Rochet A, Sovis E, Mielke D. Characteristics of Nasalance in Speakers of Western Canadian English and French. Canadian Journal of Speech-Language Pathology and Audiology. 1998;22(2):94-103.
23. Van Lierde KM, De Bodt M, Van Borsel J, Wuyts FL, Van Cauwenberge P. Effect of cleft type on overall speech intelligibility and resonance. Folia phoniatrica et logopaedica : official organ of the International Association of Logopedics and Phoniatrics (IALP). 2002;54(3):158-68.
24. Karling J, Larson O, Leanderson R, Henningsson G. Speech in unilateral and bilateral cleft palate patients from Stockholm. The Cleft palate-craniofacial journal : official publication of the American Cleft Palate-Craniofacial Association. 1993;30(1):73-7.
25. Keuning KH, Wieneke GH, van Wijngaarden HA, Dejonckere PH. The correlation between nasalance and a differentiated perceptual rating of speech in Dutch patients with velopharyngeal insufficiency. The Cleft palate-craniofacial journal : official publication of the American Cleft Palate-Craniofacial Association. 2002;39(3):277-84.
26. Hardin MA, Van Demark DR, Morris HL, Payne MM. Correspondence between nasalance scores and listener judgments of hypernasality and hyponasality. The Cleft palate-craniofacial journal : official publication of the American Cleft Palate-Craniofacial Association. 1992;29(4):346-51.
27. Nagarajan R, Savitha VH, Subramaniyan B. Communication disorders in individuals with cleft lip and palate: An overview. Indian J Plast Surg. 2009;42(Suppl):S137-43.
28. Pinborough-Zimmerman J, Canady C, Yamashiro DK, Morales L, Jr. Articulation and nasality changes resulting from sustained palatal fistula obturation. The Cleft palate-craniofacial journal : official publication of the American Cleft Palate-Craniofacial Association. 1998;35(1):81-7.
29. Norsila AW, Jamilah J, Sandra V, Ab Rani S. Nasalance scores of Malay (Kelantan dialect) in children with and without palatal cleft. Arch Orofac Sci. 2013;8(1):27-33.
30. Shin YJ, Kim Y, Kim HG. The comparative study of resonance disorders for Vietnamese and Korean cleft palate speakers using nasometer. Maxillofacial plastic and reconstructive surgery. 2017;39(1):9.

Received: 08 01 2020
Accepted for publishing: 25 09 2020