

Clinical Outcomes after Cleft Palate Repair at a Major Referral Hospital in Addis Ababa, Ethiopia

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Background: The two most common complications after primary palatoplasty are oronasal fistula and velopharyngeal insufficiency (VPI). To the best of our knowledge, there have been no studies examining postpalatoplasty speech outcomes in Ethiopia.

Methods: A hospital-based retrospective cross sectional study design was used. A total of 149 patient records were reviewed, and 103 patients fulfilled all the inclusion criteria. These 103 cleft lip and palate patients who had undergone cleft palate repair at Yekatit 12 Hospital Medical College and who had undergone long-term speech assessment with the speech therapy department from January 2019 to December 2021 were included in this study. The bivariate/multivariate logistic regression was used to compare between different groups of patients, with the level of significance set at a *P* value of less than 0.05.

Results: Moderate and severe hypernasality was seen in 45.7% of patients. Age at time of palatal surgery has significant association with incidence of hypernasality (*P* = 0.01). The type of cleft, sex of the patient, and type of surgery had no significant association with incidence of hypernasality. Oronasal fistula was seen in 25% of patients, with Pittsburgh type VI being the most common (40%).

Conclusions: There is a high rate of VPI and oronasal fistula in this cohort of patients who underwent palatoplasty at Yekatit 12 Hospital. One of the factors for higher complication rate was older age at time of surgery. Therefore, patient education and strengthening the cleft care with training are paramount to ensure better results. (*Plast Reconstr Surg Glob Open* 2024; 12:e6225; doi: [10.1097/GOX.00000000000006225](https://doi.org/10.1097/GOX.00000000000006225); Published online 11 October 2024.)

INTRODUCTION

The two most common complications after primary palatoplasty are oronasal fistula and velopharyngeal insufficiency (VPI). The literature reports a wide range of oronasal fistula incidences from 0% to 77.8%,^{1,2} whereas VPI occurs in about 20% to 30% of cases after primary palatoplasty.³⁻⁶

A palatal fistula is an opening between the oral and nasal cavity that occurs along the suture line(s) after surgery.⁷ It affects the speech of the patient and may result in nasal regurgitation of food. Oronasal fistula after primary palatoplasty occurs as a result of a failure of normal palatal wound healing after repair.^{8,9} The occurrence of palatal

fistula may be related to patient factors and operative factors. Among patient factors, age at time of operation,¹⁰ type of cleft,⁹ and presence of syndrome¹¹ are implicated. Some operative factors associated with oronasal fistula include surgeon experience,^{8,10} the presence of tension at the repair site, bleeding, and infection.¹²

Over the past several years, advancements in the surgical management of cleft palate have been achieved through improvements in surgical techniques, such as proper muscle repair with approaches such as Furlow double-opposing Z-plasty, and the optimal timing of palatal surgery, which has shifted from 18–24 months old before the 1980s to 9–12 months old currently. These developments have contributed to a decrease in the postoperative rate of oronasal fistula, a reduction in persistent VPI, and enhanced speech outcomes, leading to improved clinical outcomes overall.¹³ A meta-analysis of eleven studies, including 2505 children, concluded that the rate of fistula after primary palatal surgery was 4.9%.¹⁴

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VPI is a term used to denote an anatomical, or structural, defect responsible for inadequate closure of the velopharyngeal valve.¹⁵ The velopharyngeal valve is defined by the soft palate, or velum, by the lateral pharyngeal walls, and by the posterior pharyngeal wall. VPI is a type of velopharyngeal dysfunction and is the most common cause of reduced intelligibility of speech in patients with cleft palate. VPI is characterized by nasal air emission and/or hypernasality from mechanical restriction, malposition, or insufficiency of soft palate. Variables such as palatoplasty type, cleft type, initial time of repair, and patient craniofacial morphology all have a significant impact on the occurrence of VPI.¹⁶

So far, no single study in Ethiopia has assessed postpalatoplasty outcomes. In this research study, we aimed to investigate the incidence of oronasal fistula and VPI among patients who had undergone palatoplasty at Yekatit 12 Hospital.

METHODS

The study was conducted at Yekatit 12 Hospital Medical College. It is the first hospital in Ethiopia with comprehensive cleft care, including three plastic surgeons, speech therapists, orthodontists, otolaryngologists, and social workers. We retrospectively reviewed clinical records of 146 patients who underwent cleft palate repair at our center and had follow-up at the speech therapy department for at least 6 months after palatoplasty. All patients who had follow-up at the speech therapy department from January 2019 to December 2021 were included in this study. Perceptual speech assessments were conducted by the unit's speech therapist using a structured checklist. Patients who underwent surgery at younger age were evaluated after reaching the age of 3 years. For patients operated on after the age of 3, the timing of speech assessment postsurgery varied individually, ranging from 3 months to 5 years.

Syndromic patients, patients who undergone palatoplasty at other centers and were referred to our speech therapy department, and patients with incomplete records of speech assessments were excluded from this study. Institutional review board approval was sought and granted from Addis Ababa University research board.

Data were collected from patient records on the patient's age at the time of repair, the type of cleft, the presence of a fistula, the type of surgery, and the degree of hypernasality. Type of cleft was classified using Veau cleft classification. The Pittsburgh fistula classification used for palatal fistulas and the resonance (hypernasality) rating by Kuehn et al was used.¹⁷

Data collected from the checklist were coded into the Statistical Package for the Social Sciences version 25.0. Bivariate/multivariate logistic regression was used to compare between different groups of patients, with the level of significance set at a *P* value of less than 0.05.

RESULTS

Demography and Cleft Characteristics

A total of 149 patient records were reviewed, and 103 patients fulfilled all the inclusion criteria. Forty six patients were excluded from the study using exclusion criteria (Table 1).

Takeaways

Question: What is the incidence of velopharyngeal insufficiency (VPI) and oronasal fistula after cleft palate repair at a major referral hospital in Ethiopia?

Findings: There is high incidence of VPI and oronasal fistula after cleft palate repair at Yekatit 12 Hospital, with 45.7% of patients experiencing moderate to severe hypernasality, and oronasal fistula observed in 25% of patients, predominantly Pietersburg type VI.

Meaning: The study highlights the significant occurrence of VPI and oronasal fistula postcleft palate repair in Ethiopia, emphasizing the importance of patient education, training, and early intervention strategies to improve surgical outcomes and reduce complications in this population.

A total of 56 (54.4%) male and 47 (45.6%) female patients were included in the study. The mean age of patients at the time of repair was 4 years, ranging from 1 to 27 years (Table 2). The most common type of cleft in this study was Veau type III, which was around 52.4%, and the most common type of surgery performed in the study population was Bardach palatoplasty (91.3%). Furlow palatoplasty was done exclusively for Veau type I cleft type.

Rate of VPI

Moderate and severe hypernasality was seen in 45.7% of patients. Mild hypernasality was noted in 35.9% of patients, and the remaining patients had normal resonance. Forty-five percent of patients had nasal air emission and 40% of patients had understandable speech intelligibility, whereas 52.4% were occasionally hard to understand. Even though there was a high rate of moderate and severe hypernasality, only 8.7% of patients received speech surgery recommendation by a speech therapist (Table 3). There was nonaudible nasal air emission in 17.5% of patients and audible nasal emission in 28.2% of patients. If we consider moderate and severe hypernasality as the presence of VPI, there was statistically significant

Table 1. Characteristics of Excluded Patients

Total Patients	149
Exclusion patients	43
Surgery in other hospital	19
Lack of speech assessment	12
Syndromic patient	3
Incomplete record	9
Inclusion patients	103

Table 2. Age at Time of Surgery

Age at Time of Surgery, y	Frequency	Percentage, %
≤ 2	51	49.5
2–5	35	34.0
5–10	8	7.8
> 10	9	8.7
Total	103	100.0

Table 3. Hypernasality Grade in Study Population

Hypernasality Grade	Frequency	Percentage, %
Appropriate	19	18.4
Mild	37	35.9
Moderate	29	28.2
Excessive	18	17.5
Total	103	100.0

association between age at time of repair more than 2 years and incidence of VPI (19% versus 63%, $P < 0.001$) (Table 4).

Rate of Oronasal Fistula

Oronasal fistula was seen in 25% of patients, with Pittsburgh type VI being the most common (40%) (Fig. 1). Age at time of surgery, sex, and type of surgery have no significant association with presence of fistula, but there was significant association with type III and IV cleft and presence of fistula (3.7 % versus 33%, $P = 0.037$) (Fig. 2).

DISCUSSION

Rate of VPI

In our study, the rate of moderate and severe hypernasality was 45.7%, which was higher than in most western studies, which ranged from 4% to 30%. The higher rate of VPI in our study could be attributed to the fact that our patients were older at the time of cleft palate repair. In our study, the average age for palatoplasty was approximately 4 years, with over half of the patients undergoing surgery after the age of 2 years. This contrasts with Western studies where the average age for repair is typically around 1 year.⁴ In general, it has been established that earlier palatal repair has a lower incidence of VPI¹⁸ and compensatory articulations, but there is a risk of problems with maxillary and midface growth.¹⁹ A better speech outcome for patients who have surgery at a young age can be explained by a number of factors. The child can start to catch up and develop pressure speech sounds at the proper time by having the velopharyngeal valve normalized before normal speech development is complete. Additionally,

because of the child's adequate velopharyngeal function, there is a lower risk of the child developing compensatory speech productions. This relationship was also observed in our study, which found a statistically significant association between the rate of VPI and age at the time of cleft palate repair older than age of 2 years (19% versus 63%, $P = 0.001$) (Fig. 3).

We did not get any studies on VPI rates in Africa to compare with our findings. Nevertheless, when we compared our study's VPI rate with Iranian studies, which reported a rate of 66.5%, our findings were similar.²⁰ In our study, 40% of patients displayed understandable speech, whereas 52.4% were occasionally hard to understand. This aligns with a Nigerian study that assessed speech solely based on caregiver reports, where 58% were reported to have normal speech.²¹ There is still disagreement over the impact of Veau cleft type on VPI outcomes, as other studies contradict the idea that cleft type impacts speech outcomes. There was a higher rate of VPI in patients with Veau type III and IV, but there was no significant statistical association (23% versus 63%, $P = 0.14$) in our study (Table 4).

Rate of Fistula

In this study, oronasal fistula was seen in 25% of patients with Pietersburg type VI being the most common (40%). Fistula rates range from 0% to 60.9% in various studies around the world. A prospective study, which was done in neighboring Uganda in 2016, showed a higher fistula rate compared with our study. Palatal fistula frequency in their study from a total of 54 patients who were followed up for at least 3 months was 35%. The hard palate (Pittsburgh IV) was involved in 58% of the fistulas, the soft palate (Pittsburgh II) was involved in 25%, and the junction of the hard and soft palates (Pittsburgh III) was involved in 17%.²² Our findings are comparable to studies conducted in Nigeria and Iran which revealed a fistula rate of 21% and 23.7%, respectively.^{20,21}

A systematic review done by Tache et al²³ analyzed 36 articles which included 4651 patients with 351 fistulas recorded after primary palatoplasty, a rate of approximately 9.94%. In comparison to the average fistula rate in this systematic review, our facility had high rates of palatal

Table 4. Bivariable/Multivariable Analysis of Presence of VPI among Study Population

Variables	COD (95% CI)	AOR (95% CI)	P
Age at time of surgery			
≤ 2	1	1	
> 2	4.59 (1.992–10.577)	4.989 (2.110–11.792)	0.000
Type of cleft			
Veau type I	1		
Veau type II	0.614 (0.108–3.48)		
Veau type III	0.441 (0.089–2.176)		
Veau type IV	1.312 (0.233–7.409)		
Sex			
Male	1		
Female	0.578 (0.263–1.271)		
Type of surgery			
Bardach palatoplasty	1		
Furlow palatoplasty	2.585 (0.610–10.962)		

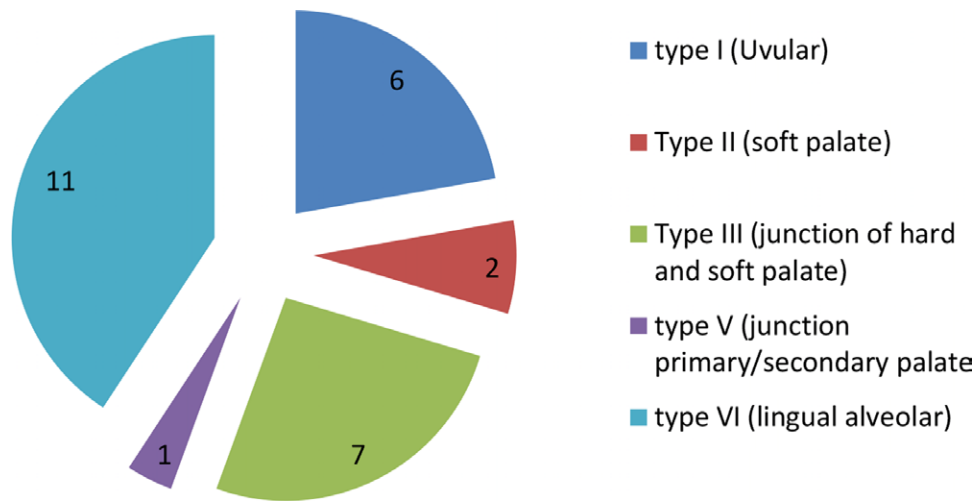


Fig. 1. Types of fistula in study population.

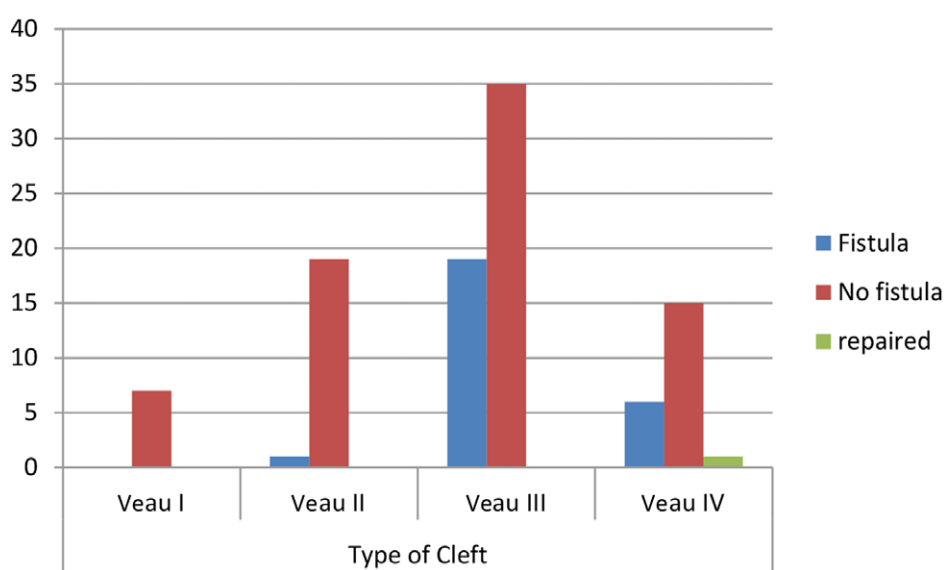


Fig. 2. Association of type of cleft with presence of fistula.

fistula, which could be attributed to a high rate of malnutrition and poor postoperative follow-up, both of which are quite common in developing countries like ours.

Age at time of surgery, sex, and type of surgery have no significant association with presence of fistula, but there was significant association with types III and IV of cleft and presence of fistula (3.7% versus 33%, $P = 0.037$) (Fig. 2). This relationship was also observed in several studies, which found that the rate of fistula increases with the high grade of cleft.²⁴

In general, our institution experiences a higher incidence of oronasal fistulae and relatively elevated rates of VPI compared with studies conducted in Western settings. This discrepancy is often attributed to limited access to specialized healthcare services and resources, which frequently leads to delayed treatment of cleft palate conditions. The scarcity of speech therapists, coupled with

inconsistent follow-up for speech therapy sessions, compounds these challenges. Additionally, nutritional deficiencies are known to impede the healing process, thereby increasing the likelihood of complications such as fistulae and VPI. Cultural beliefs and stigmatization further hinder timely intervention and rehabilitation efforts, adding to the difficulties faced by our patients.

Limitations

In light of the fact that the only method by which our study evaluated the presence of VPI was clinical speech evaluation by speech therapists, we advise future research to evaluate the presence of VPI using static or dynamic imaging. Another limitation of this study is that patients who had normal speech or only very slight hypernasality might not have come back for follow-up. As a result, the study participants may predominantly include those with

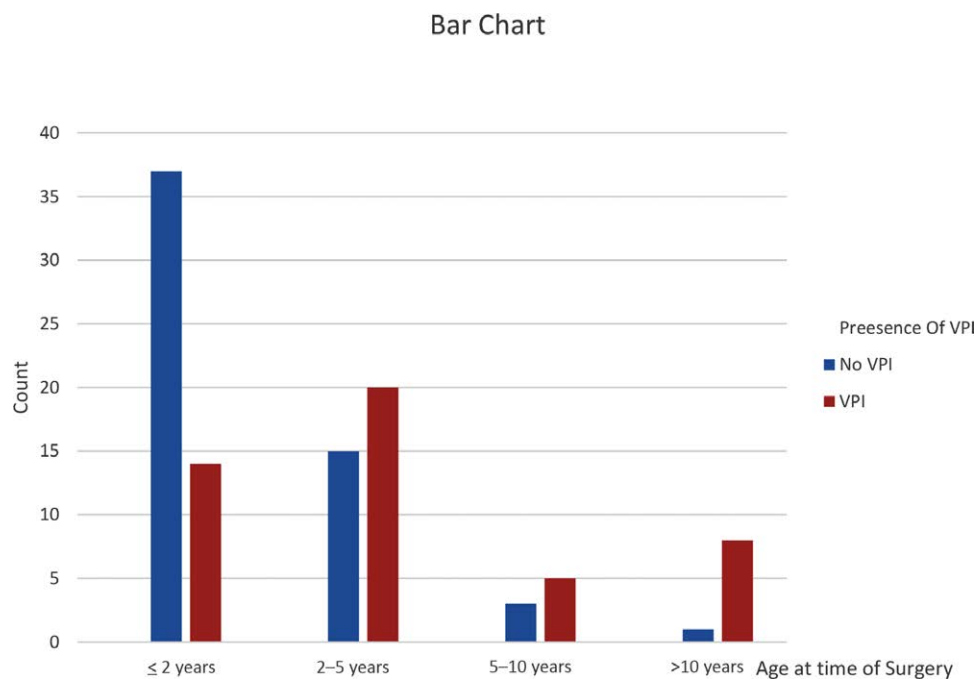


Fig. 3. Association of age at time of surgery with rate of VPI in study population.

more pronounced hypernasality or symptomatic fistulas. This could potentially inflate the estimated occurrence of hypernasality and fistulas in our study population.

CONCLUSIONS AND RECOMMENDATIONS

There is high rate of VPI and oronasal fistula in this cohort of patients who underwent palatoplasty in Yekatit 12 Hospital during the study period. This elevated rate could be attributed to the relatively older age at the time of palate repair and poor postoperative follow-up, emphasizing the importance of early intervention and good postop follow-up to mitigate this complication.

To decrease the rates of oronasal fistulae and VPI in our institution, we propose a multifaceted approach. This includes enhancing surgical techniques and postoperative care through training programs for surgeons and implementing standardized protocols. We aim to strengthen speech therapy services by recruiting and training additional therapists, providing structured programs, and ensuring regular follow-up sessions. Collaboration with nutritionists will address nutritional deficiencies, whereas community outreach and education campaigns will raise awareness and reduce stigma. Establishing multidisciplinary care teams and continuous quality improvement initiatives will ensure comprehensive and coordinated care, leading to improved outcomes for patients undergoing cleft palate repair.

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DISCLOSURES

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