Published online: 2019-10-07

Original Article

Is there an optimal resting velopharyngeal gap in operated cleft palate patients?

Rajesh Yellinedi, Mukunda Reddy Damalacheruvu

Department of Plastic and Reconstructive Surgery, Nizams Institute of Medical Sciences, Hyderabad, Andhra Pradesh, India

Address for correspondence: Dr. Rajesh Yellinedi, Department of Plastic and Reconstructive Surgery, Nizams Institute of Medical Sciences, Punjagutta, Hyderabad - 82, Andhra Pradesh, India. E-mail: drraj7779journals@gmail.com

ABSTRACT

Context: Videofluoroscopy in operated cleft palate patients. **Aims:** To determine the existence of an optimal resting velopharyngeal (VP) gap in operated cleft palate patients **Settings and Design:** A retrospective analysis of lateral view videofluoroscopy of operated cleft palate patients. **Materials and Methods:** A total of 117 cases of operated cleft palate underwent videofluoroscopy between 2006 and 2011. The lateral view of videofluoroscopy was utilised in the study. A retrospective analysis of the lateral view of videofluoroscopy of these 117 patients was performed to analyse the resting VP gap and its relationship to VP closure. **Statistical analysis used:** None. **Results:** Of the 117 cases, 35 had a resting gap of less than 6 mm, 34 had a resting gap between 6 and 10 mm and 48 patients had a resting gap of more than 10 mm. **Conclusions:** The conclusive finding was that almost all the patients with a resting gap of <6 mm (group C) achieved radiological closure of the velopharynx with speech; thus, they had the least chance of VP insufficiency (VPI). Those patients with a resting gap of >10 mm (group A) did not achieve VP closure on phonation, thus having full-blown VPI. Therefore, it can be concluded that the ideal resting VP gap is approximately 6 mm so as to get the maximal chance of VP closure and thus prevent VPI.

KEY WORDS

Resting gap; videofluoroscopy; velopharyngeal incompetence; cleft palate

INTRODUCTION

Videofluoroscopy is a very useful tool in the investigation of patients with velopharyngeal insufficiency (VPI). The lateral view of videofluoroscopy is particularly useful in the visualisation of the movement of the soft palate during phonation, the measurement of VP gap at rest and during phonation as well the relative movement of the posterior pharyngeal wall during speech.

Video available on www.ijps.org

Access this article online

Quick Response Code:

Website: www.ijps.org

DOI: 10.4103/0970-0358.113716

The velopharynx is a space that at rest is roughly rectangular. The anterior border is formed by the soft palate, the posterior border by the posterior pharyngeal wall and the lateral wall by the lateral pharyngeal wall. During speech, the velum moves posteriorly and superiorly to make contact with the posterior pharyngeal wall. This is a composite movement which regulates the airflow during speech. Failure of this mechanism in cleft palate patients leads to VPI.[1-3]

MATERIALS AND METHODS

One hundred and seventeen cases of operated cleft palate underwent videofluoroscopy between 2006 and 2011. The lateral view of videofluoroscopy was utilised in the study. A retrospective analysis of the lateral view of videofluoroscopy of these 117 patients was performed to analyse the resting VP gap and its relationship to VP closure [Table 1].

Of the total 117 patients, 72 were male and 45 were female. The age range was from 8 to 15 years with a mean age of 11.2 yrs. Videofluoroscopy was performed after a gap of at least six months post surgery. All patients underwent two-flap palatoplasty with muscle repair.

Procedure of videofluoroscopy

The Digital Subtraction Angiography DSA laboratory (Siemens DSA suite by Siemens Medical Services Munich, Germany) of the radiology department was used for doing the videofluoroscopies. Prior to procedure, the patient was explained about the risk of radiation and a consent was obtained. The patient was instructed to lie supine on the examination table. An oral barium contrast diluted with normal saline in a 1:3 ratio was used. Of this, 1 cc of the diluted contrast was given intraorally for visualisation of the tongue and oropharynx and 1cc was instilled into each nostril for visualising the soft palate and posterior pharyngeal wall. The lateral view was obtained by rotating the C-arm of the machine. The lower border of the mandible was aligned in order to get a true lateral view. After verifying the position, the patient was asked to repeat a sample of words as instructed by the doctor without moving the head. VP motion with speech was recorded for a period of 20 seconds. Later in the post-procedure console, the resting gap, soft palate movement was calculated in millimetres. Resting gap was measured from the knuckle of the soft palate to the tentative point of closure on the posterior pharyngeal wall.

Videofluoroscopy in controls

Before the study, 15 normal patients were evaluated by lateral view videofluoroscopy for the analysis of resting gap. The mean resting gap in the normal persons was 7.5 mm (range: 6.5 to 8.3 mm). There was also relative paucity in the movement of the posterior pharyngeal wall [Video 1].

RESULTS

Of the 117 cases, 35 had a resting gap of less than 6 mm, 34 had a resting gap between 6 and 10 mm and 48 patients had a resting gap of more than 10 mm [Table 2]. Age subsets are shown in each group [Table 3].

Those patients with a resting gap of >10 mm (group A) did not achieve velopharyngeal closure on phonation; thus having full-blown VPI [Figures 1-4] [Video 2].

Those with a resting gap between 6 and 10 mm (borderline closure group B) did not achieve radiological closure of velopharynx with speech but were close to achieving closure [Figures 5-8] [Video 3].

The conclusive finding was that almost all the patients with a resting gap of <6 mm (group C) achieved radiological closure of the velopharynx (in anteroposterior dimension on lateral view of videofluoroscopy) with speech; thus, there was the least possibility of VPI [Figures 9-12] [Video 4].

Thus, it can be concluded that the ideal resting VP gap is approximately 6 mm so as to get the maximal possibility of VP closure and prevent VPI.

Apart from the resting gap, there was always an appreciable forward movement of the posterior pharyngeal wall during speech in groups A and B but much more in group A. This movement appears to be a compensation in an effort to minimise the escape of nasal air during speech.

Table 1: Sex distribution

Male	72
Female	45
Total	117

Table 2: Distribution of patients according to resting gap

Resting gap>10 mm (large)	48	Group A
Resting gap between 6 and 10 mm (borderline)	34	Group B
Resting gap<6 mm (ideal)	35	Group C
	117	

Table 3: Age distribution

	Number of patients (n)	Age range in years	Mean age (years)
Group A	48	8-13	11.2
Group B	34	9-14	11.7
Group C	35	9-14	10.8

Figure 1: Large resting gap of 11.05 mm

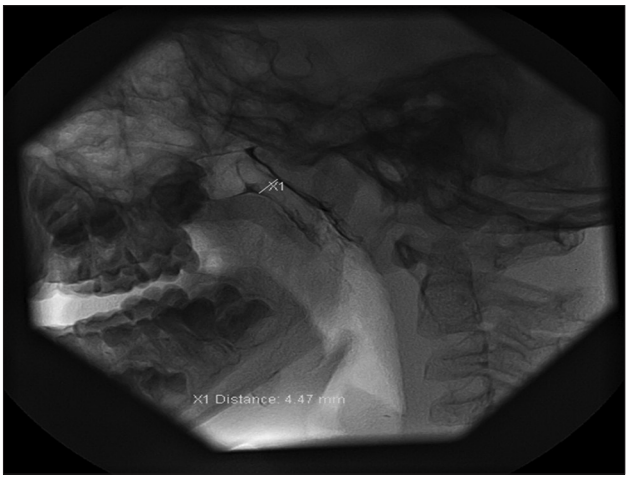

Figure 2: On phonation, there is still a gap of 4.7 mm; hence, velopharyngeal insufficiency is evident

Figure 3: Large resting gap of 12 mm

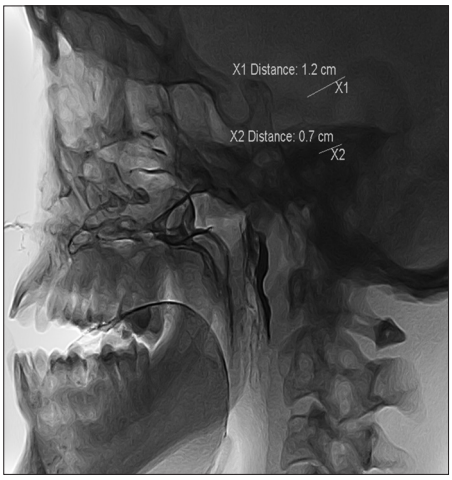

Figure 4: Due to large resting gap, there is still a gap of 7 mm on phonation

Figure 5: Resting gap of 8.8 mm

Figure 6: Borderline closure on phonation

DISCUSSION

One of the most common problems following surgical correction of cleft palate is the development of VPI. VPI occurs when the velum and lateral and posterior pharyngeal walls fail to separate the oral cavity from the nasal cavity during speech.[4] The resting gap is a very important parameter in the management of VPI. It also guides the surgical procedure to be performed for VPI.

Figure 7: Another patient with resting gap of 8.7 mm

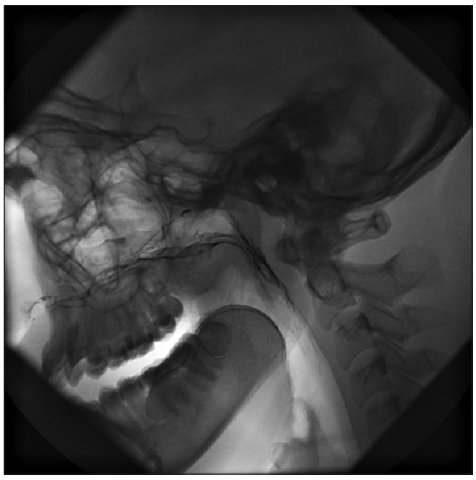

Figure 8: There is still a small gap on phonation

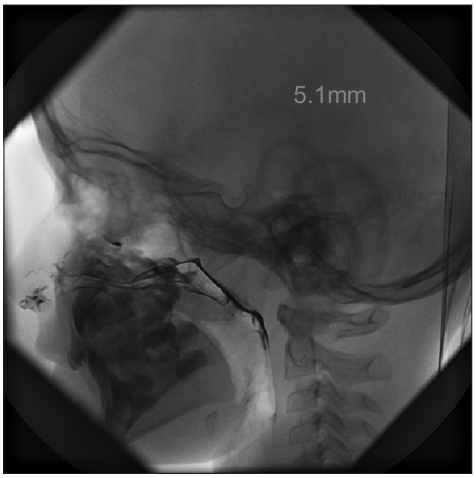

Figure 9: An ideal resting gap of 5.1 mm

Figure 10: Perfect radiological closure on phonation; thus, the least possibility of velopharyngeal insufficiency

Figure 11: Another patient with a resting gap of 5 mm

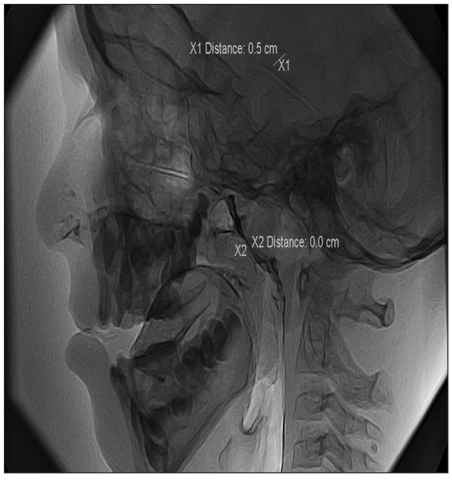

Figure 12: Good radiological closure with speech

From our study, we have concluded that the lower the resting gap, the fewer are the chances for the development of VPI.

We have also concluded that the ideal resting gap is approximately 6 mm. All patients who have a resting gap of less than 6 mm achieve radiological closure on phonation. Even with a resting gap of <6 mm, if there is no closure, it indicates improper repair of the soft palate (levator palati) and the need for rerepair of the

levator palati.[5] Thus, the average excursion of the levator palati is around 6 mm.

Those with a resting gap of >10 mm do not achieve radiological closure and thus have full-blown VPI and require secondary surgery for VPI.

A resting gap of less than 6 mm is mainly to attain VP closure more consistently because surgically what we can obtain is mainly a good VP closure; thus, we anticipate that better speech will follow.

Although movement of the velar and lateral pharyngeal walls also contribute to VP closure, a resting gap of less than 6 mm gives us an objective guideline which is useful in obtaining VP closure more consistently.

Thus, post surgery for cleft palate, it is important not only to obtain a meticulous closure of the cleft but also to see how close the repaired soft palate is to the posterior pharyngeal wall (about a cm behind the junction of the hard and soft palates) at the level of eustachian orifice under anaesthesia.

REFERENCES

1. Marsh JL. Velo-pharyngeal dysfunction: Evaluation and management. Indian J Plast Surg 2009;42 Suppl:S129-36.
2. Marsh JL. The evaluation and management of velopharyngeal dysfunction. Clin Plast Surg 2004;31:261-9.
3. Marsh JL. Management of velopharyngeal dysfunction: Differential diagnosis for differential management. J Craniofac Surg 2003;14:621-8.
4. Lam E, Hundert S, Wilkes GH. Lateral pharyngeal wall and velar movement and tailoring velopharyngeal surgery: Determinants of velopharyngeal incompetence resolution in patients with cleft palate. Plast Reconstr Surg 2007;120:495-505.
5. Sommerlad BC, Mehendale FV, Birch MJ, Sell D, Hattee C, Harland K. Palate re-repair revisited. Cleft Palate Craniofac J 2002;39:295-307.

How to cite this article: Yellinedi R, Damalacheruvu MR. Is there an optimal resting velopharyngeal gap in operated cleft palate patients?. Indian J Plast Surg 2013;46:87-91.

Source of Support: Nil, **Conflict of Interest:** None declared.