SURGICAL REVISION OF THE PHARYNGEAL FLAP

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ABSTRACT

The superiorly based pharyngeal flap is the surgical technique most frequently used for the correction of velopharyngeal insufficiency (VPI). The technique consists of a bridge of myomucosal tissue joining the soft palate to the posterior pharyngeal, delimiting two lateral orifices. Although it is considered to be the most effective treatment of VPD, surgery may undergo changes during healing, possibly leading to the recurrence of hypernasality or to the onset of respiratory complaints that did not exist before surgery. In such cases, revision of the surgery is necessary. The objective of the present study was to investigate the causes leading to the indication of surgical revision of the pharyngeal flap at HRAC-USP. A survey was conducted of the medical records of patients submitted to surgical revision of the pharyngeal flap at HRAC-USP from October 1980 to May 2003, with analysis of the results of perceptual assessment and nasopharyngoscopic evaluation before surgical revision of the pharyngeal flap. Ninety-three patients (61.3%) required revision of the pharyngeal flap because of respiratory complaints after surgery, 34.4% because of continued VPD symptoms and 4.3% because of respiratory complaints and continued VPD symptoms after surgery. The onset of respiratory complaints after pharyngeal flap surgery was the main cause leading to the indication of surgical revision of the pharyngeal flap.

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KEY WORDS: cleft palate; surgery; velopharyngeal insufficiency

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INTRODUCTION

Some patients with cleft palate, even after primary surgery, continue to present symptoms of velopharingeal dysfunction (VFD) (BARDACH, 1995; WITT et al., 1998). These symptoms in speech are hypernasality (nasal air emission), compensatory articulatory disturbs (CAD) and low intra-buccal pressure (WITZEL, 1995; TRINDADE; TRINDADE JUNIOR, 1996; PETERSON-FALZONE et al., 2001; KUMMER, 2001). When the primary surgery fails to correct the clinical signs of VFD it is necessary a secondary surgery in the palate that aims to narrow the velopharyngeal orifice in order to allow its complete closure, eliminating the consequences of the velopharyngeal dysfunction (SHPRINTZEN, 1995). There are many techniques in the literature aiming to correct the VFD. The pharyngeal flap with superior pedicle is most used. This technique, a routine at the Hospital for rehabilitation of Craniofacial Deformities (HRAC-USP), includes the elevation of a flap from the posterior pharynx wall, which is united to the soft palate as a bridge between both structures and delimiting two lateral orifices. These are the most important points in the operation since they should be built in a way to have an adequate diameter and permeability to allow, at rest, an efficient nasal respiration. At the same time, they must be closed during the production of speech phonemes, avoiding nasal air escape and hypernasality. In order to attain closure it is important the presence of movement of the lateral walls of the pharynx. In this way, the flap should be made at the point in which the medial movement takes place with greater intensity. Another point for a successful surgery is the determination of the width of the flap by pre-operative instrumental evaluation, taking into consideration the intensity of the lateral movement of the pharynx (ROCHA, 1997).

Many authors consider that the pharyngeal flap is the most effective procedure to correct VFD, mainly in severe cases. However, this is the technique more frequently associated to onset of obstruction of the airways and obstructive sleep apnea (THURSTON et al., 1980; BAROT et al., 1986; SHPRINTZEN, 1988; LESAVOY et al., 1996; PEÑA et al., 2000; SLOAN, 2000). The secondary nasal obstruction (partial or total) to the pharyngeal flap is a result of the anatomical structures of the upper airways. This leads to a modification from the usual nasal respiration to a buccal respiration and, sometimes, with a hyponasality in the speech (CAOUETTE-LABERGE et al., 1992).

Presently, with the technological advances in nasopharyngoscopy and video fluoroscopy it is possible to diagnose with greater precision the grade of VFD and to define the width of the

flap and the adequate point of its insertion. However, both the flap and the lateral orifices can undergo modification after operation due to scaring. Since the healing and contraction process of tissues can not be controlled and that the post-operative modification in the size and form of the orifices and of the flap are not predictable, in some cases this can result in recurrence of hypernasality or obstruction of the airways (FRIEDMAN et al., 1992; BARDACH, 1995). In these cases a new operation (pharyngeal flap revision) is necessary to correct the flap failure.

With narrowing, partial or total necrosis or dehiscence of the flap, the lateral orifices become greater and the VFD and the hypernasality remains (BARDACH, 1995). In these cases it is necessary to make a new flap or to narrow the lateral orifices (BARONE et al., 1994; WITT et al., 1998).

The failure of the pharyngeal flap can be due also to the reduced size of the lateral orifices, which become insufficient to keep the nasal respiration at rest. In theses cases snoring, buccal respiration, sleep obstructive apnea and speech hyponasality may occur. These symptoms can appear immediately after operation, as a consequence of the anatomical and physiological modification of the velopharyngeal sphincter. When these symptoms persist for a long time it is necessary revision with priority to respiration over speech. One of the most used procedures in these cases is the increase of the lateral orifices or the reduction of the width of the flap (BAROT et al., 1986). In severe cases it is indicated the resection of the flap, which can lead to recurrent hypernasality. According to Lesavy et al. (1996) the obstruction of the upper airways after flap operation is frequent although transitory and the high incidence of obstruction is more likely to be derived from edema and alteration in the anatomy of the oropharynx. The onset of respiratory symptoms after flap operation, presently, has been stressed and treated and, according to the literature, any other techniques can fail have some potential of risk for failure in the resolution of the speech problem or in leading to secondary airway obstruction (WELLS et al., 1999; PEÑA et al., 2000).

Taking the above in consideration, the aim of the present study is to verify the causes for indication of a flap revision at the HRAC-USP.

METHODS

All of the medical records of patients that underwent surgical revision of pharyngeal flap at the HRAC-USP from October 1980 to may 2003 were scrutinized.

To understand the causes for indication the revision were analyzed the perceptive-auditory evaluations of speech and nasopharyngoscopy were analyzed, as well as respiratory complaints reported by patients before the revision. For the analysis the following aspects were taken into consideration:

Perceptive-auditive evaluation

– *Ressonance*: classified as normal, hypernasal, hyponasal, normal and mixed ressonance (presence of hypernasality and hyponasality).

– *Nasal air emission*: presence or absence of nasal air emission detected in the test of nasal emission (mirror test).

– *Compensatory articulation disturb (CAD)*: presence or absence of compensatory articulation disturbs.

– *Respiratory symptoms*: the complaints were recorded during interview after surgery during the perceptive-auditive evaluation.

Nasopharyngoscopic evaluation

Lateral orifices of the flap while in rest: classified in permeable, uni or bilaterally partially obstructed and uni or bilaterally obstructed.

Velopharyngeal closure: presence of velopharyngeal closure in one or both orifices, absence of velopharyngeal closure in one or both orifices.

RESULTS

From October 1980 to May 2003 2451 flap operations were done at HRAC-USP. 93 (3.8%) out of them were submitted to surgery for flap revision. This reduced number can be explained by varied factors, among them: patients that did not returne for follow-up; patients not willingly to go for flap revision; patients referred to palate prosthesis (bulb); and cases that were successful with operation.

Patients were separated in 3 groups; *group I* with 57 (61.3%) cases that had flap revision due to respiratory difficulties after the primary surgery; *group II* with 32 (34.4%) cases that had revision due to continued VFD after primary surgery and *group III*, with 4 (4.3%) cases that had revision due to both respiratory difficulties and VFD (FIGURE 1).

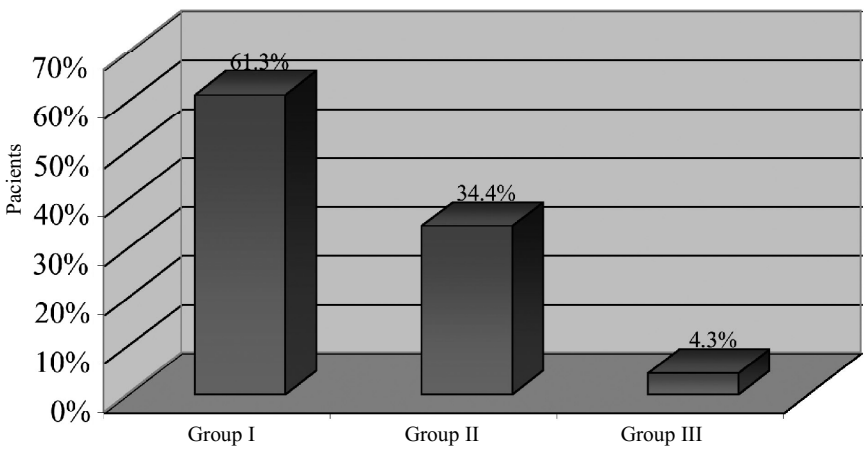

FIGURE 1 – Percentual of cases in groups I, II and III.

It should be stressed that 10 (17.75%) cases needed two revisions. Two cases of them due to persisting VFD and in 8 due to respiratory difficulty even after the revision (TABLES 1 and 2). The respiratory complaints reported by patients were: in *group I* oral respiration (27), snoring (24), uni or bilateral nasal obstruction (30), sialorhea (3), marked tireness at physical exercices (4) sensation of respiratory obstruction during sleep (4), cephalea (1) and noisy respiration (1). In *group II*, oral respiration (7), nasal obstruction (2) and snoring (2); *group III*, nasal obstruction (3) and oral respiration (1). It should be stressed that one patient could report more than one of the above mentioned symptoms.

TABLE 1 – Results of the perceptive-auditive evaluation for groups I, II and III.

Groups	Respiratory symptoms	Ressonance					EAN			CAD	
		Hyper	Hypo	NL	M	S/D	Present	Absent	S/D	P	A
I (n=57)	100%	15.79%	56.14%	17.54%	1.75%	8.77%	73.68%	19.30%	7.02%	43.86%	56.14%
II (n=32)	34.38%	90.63%	0%	0%	0%	9.38%	100%	0%	0%	50%	50%
III (n=4)	100%	75%	0%	0%	25%	0%	100%	0%	0%	100%	0%

EAN: nasal air escape; CAD: compensatory articulation dysfunction;
Hyper: hypernasality; Hypo: hyponasality; NL: normal; M: mixed; S/D: data not available;
P: present; A: absent

TABLE 2 – Results of the nasopharryngoscope evaluation for groups I, II and III.

Groups	Velopharyngeal orifice at rest				Velopharyngeal closure		
	to	po	Per	S/D	P	A	S/D
I (n=57)	24.57%	50.87%	15.79%	8.77%	42.11%	12.28%	45.61%
II (n=32)	0%	0%	100%	0%	0%	93.75%	6.25%
III (n=4)	25%	50%	25%	0%	0%	100%	0%

to: total obstruction
po: partial obstruction
Per: permeable
P: present
A: absent
S/D: data not available

DISCUSSION

The pharyngeal flap has been the most used technique since long ago (WITT et al., 1998) and is considered as the most efficient in the correction of symptoms of VFD, specially in severe cases (SLOAN, 2000). The diagnosis of VFD and the indication for pharyngeal flap are done through perceptive-auditive evaluation and by instrumental evaluation. At the HRAC-USP nasopharyngoscopy is a routine for planning flap operation allowing an anatomical and physiologic evaluation of the structures of the velopharingeal sphincter during speech (SHPRINTZEN, 1995; PETERSON-FALZONE et al., 2001; KUMMER, 2001). The presence of movement of the lateral walls is basic to indicate flap operation in the correction of VFD (ARGAMASO et al., 1980; ROCHA, 1997). However, even with detailed information for instrumental exam, the surgery can fail to eliminate VFD with persisting speech symptoms. As mentioned before, since the contraction of tissue during healing cannot be controlled, the size of the orifice can vary after surgery. Besides that, the flap can also contract during healing modifying its width and thickness. In the present study 38.7% of cases (group II + group III) needed revision due to persisting VFD, presenting hypernasality and nasal air emission. None of them present complete velopharyngeal closure after operation. When the lateral orifice remains ample or the flap is situated above of below the optimum level for constriction of the lateral wall, the velopharyngeal closure did not take place and the hypernasality persist. In these cases it is necessary another revision and the surgical procedure can involve narrowing of the lateral orifices or the construction of a new flap in cases of a very narrow one (BARDACH, 1995) or even the repositioning of the flap in the correct position. In the present study,

none of the cases that remained with VFD presented velopharyngeal closure after surgery. Although not being the target of this study, the nasopharingoscope findings also provided information on the surgical procedure to the performance at surgical revision, including, in these cases, narrowing of one or both lateral orifices, repositioning of the flap in the correct position and removal of the pharyngeal flap. Another important aspect contributing to the failure of the flap, in cases of persisting VFD, is the presence of compensatory articulation dysfunction (CAD). There is a direct relation between the presence of CAD and the functioning of the velopharyngeal sphincter. It is known that individuals with VFD develop articulation compensation. As CADs occur in alternative points of the vocal pathway that are most of the time below the level of velopharyngeal closure, the movements of the sphincter structures are poor or non-existent in their presence. Thus, even with the flap, which favor the veloharyngeal closure, if the patient use phoneme substitution by CADs, the velophariygeal closure will not take place and the hypernasality and other VFD symptoms will persist. In other words, the modifications in the anatomical structure did not change the function. The flap operation can promote a favorable anatomy to attain adequate velopharyngeal closure, however the patient needs speed therapy to learn how to use this anatomical structure to attain velopharyngeal closure during speech (KUMMER, 2001). In the present study it was seen that in half the patients of group II and all of group III DAC was present, which may have contributed, at least partially, to the absence of velopharyngeal closure and the consequent failure of the flap in these cases.

The mechanical obstruction created by the flap becomes a non-physiological structure once it is an anatomical structure that normally does not exist. One the one hand, it can improve speech. On the other, it can harm other functions. Besides that, the healing contraction can affect the size and the form of the flap as well as of the lateral orifices, making impossible the complete control of the orifices. In some cases, the orifices can become too narrow.

The pharyngeal flap is the surgical technique most associated with the onset of respiratory difficulties as a consequence of the obstruction of the airways (GRAY, 1990; LESAVOY et al., 1996; WELLS et al., 1999; PEÑA et al., 2000). Recently a study was conducted at the Laboratory of Physiology of the HRAC-USP (YAMASHITA, 2003) aiming to verify the effect of flap on the internal dimensions of the nose and correlate these findings with the onset of respiratory complaints after surgery. The author verified the onset and worsening of respiratory complaints, such as oral respiration, snoring and sensation of respiratory obstruction

during sleep in 36% of cases in the long run. She also observed the reduction of the nasopharyngeal dimensions to subnormal levels in some cases. It is frequent the onset of symptoms of nasal airways obstruction, such as those mentioned, immediately after surgery as a consequence of the sudden modification of the anatomy of the nasopharynx associated to post-operative edema. However, these symptoms can persist with time (JORGE, 2002; YAMASHITA, 2003) and can vary in severity leading even to obstructive sleep apnea (BARDACH, 1995). In the present study it was seen a high percentage of cases in need for secondary revision of the flap due to respiratory complaints after operation. The surgical revision in these cases consists in the amplification of one or both lateral orifices to a size big enough to allow nasal respiration at rest. In the severe cases or when the amplification of the orifices does not solve the respiratory obstruction the remove of the flap is needed, when the recurrence the hypernasality may take place (BARDACH, 1995). In the present study 24.57% cases had total obstruction of one orifice, 29.5% with partial obstruction of both orifices and 21.3% partial obstruction of one orifice with complaints of oral respiration, snoring at sleep, uni or bilateral nasal obstruction, sialorhea during sleep, excessive tireness during physical exercice, sensation of respiratory obstruction at sleep, cephalea, among others. Besides that, most of the patients had hyponasality, another symptom related to narrow orifices. The surgical revision, in these cases, included the amplification of one or both orifices or the resection of the flap. In these cases, the restoration of an adequate respiration was a priority over correction of the speech, since the consequences of the respiratory difficulty, mainly during sleep, are more harmful to health than the hypernasal voice.

CONCLUSION

The results of the present study lead to the conclusion that, even though VFD was observed in most cases with indication for revision of flap, the onset of respiratory complaints, caused probably by airway obstruction, was the main cause for surgical revisions of pharyngeal flap surgery at HRAC-USP.

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