



FEATURE ARTICLES

Z-Palatoplasty

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KEYWORDS

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Revision
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Obstructive sleep
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stenosis;
Treatment

The goal of the Z-palatoplasty is to widen the space between the palate and posterior pharyngeal wall, between the palate and tongue base, and either to maintain or even widen the lateral dimensions of the pharynx, goals that are not always achieved with classical uvulopalatopharyngoplasty, where patients may end up with an extremely narrow palatal arch in which the diameter of the oropharyngeal inlet is decreased due to a forward approximation of the posterior palatal mucosa, with a resulting new shape of the free edge of the palate that is triangular, rather than square. Splitting the soft palate and retracting it anterolaterally create an effective anterolateral pull, which actually continues to widen the airway as healing and contracture occur. None of the palatal musculature is resected, despite the aggressive palatal shortening, thereby addressing and minimizing the risk for permanent velopharyngeal insufficiency. This procedure is performed with adjunctive tongue-base reduction procedures, which addresses the hypopharyngeal airway.

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Due to its limited success in curing obstructive sleep apnea-hypopnea syndrome (OSAHS),¹ many adjunctive procedures and modifications were proposed after the introduction of the classic uvulopalatopharyngoplasty (UPPP) by Fujita et al² in 1981. Its role as part of a comprehensive treatment plan remains, however, solidly accepted in most situations in which the palate, with or without the tonsils, is contributing to airway turbulence and obstruction. The goal of UPPP is to widen the airspace in 3 areas: (1) the retro-palatal space, (2) the space between tongue base and palate; and (3) the lateral dimensions. This is accomplished through 2 components: (1) the palatoplasty component, which involves palatal shortening with closure of mucosal incisions; and (2) the pharyngoplasty component, which is comprised of a classical tonsillectomy with pharyngeal closure. These goals, however, are not always achieved with classical UPPP, and, despite our best efforts, patients may end up with an extremely narrow palatal arch in which the diameter of the oropharyngeal inlet is decreased due to a forward

approximation of the posterior palatal mucosa. The resulting new shape of the free edge of the palate is triangular, rather than square. Further contraction of the wound occurs due to scarring secondary to the resection of the posterior tonsillar pillars, and additional narrowing is caused, which further affects long-term results (Figure 1).³ Additionally, patients that previously underwent tonsillectomy are poor candidates for classic UPPP due to scarring or absence of the posterior pillar from the previous tonsillectomy. These patients have an already narrowed space between the soft palate and posterior pharyngeal wall, and often do not have any redundant pharyngeal folds. Important modifications of the classical UPPP proposed by Fairbanks,⁴ in which the posterior pillar is advanced lateral cephalad to widen the retro-palatal space, are, hence, not possible.

The goal of the Z-palatoplasty (ZPP) is to widen the space between the palate and posterior pharyngeal wall, between the palate and tongue base, and either to maintain or even widen the lateral dimensions of the pharynx. This is accomplished by changing the scar contracture tension line to an anterolateral vector, and by widening the anteroposterior and lateral oropharyngeal air spaces at the level of the palate. Splitting the soft palate and retracting it anterolaterally create an effective anterolateral pull, which actually continues to widen the airway as healing and contracture

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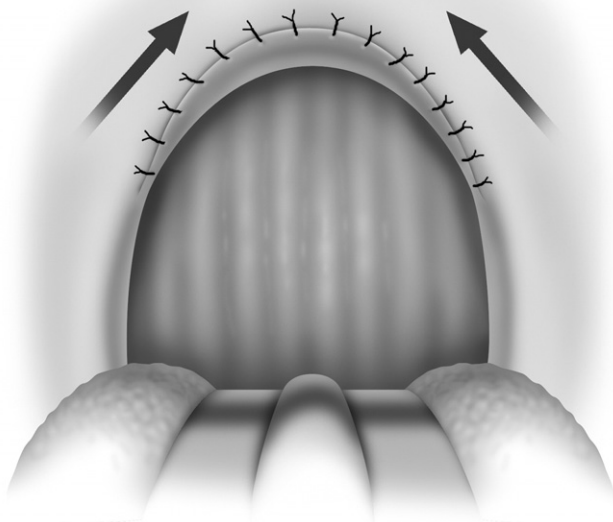


Figure 1 Traditional UPPP. The direction of pull (arrows) is anteromedial, eventually narrowing the retropharyngeal airway in the midline.

occur (Figure 2). None of the palatal musculature is resected, despite the aggressive palatal shortening, thereby addressing and minimizing the risk for permanent velopharyngeal insufficiency (VPI). This procedure is performed with adjunctive tongue-base reduction by radiofrequency (TBRF), which addresses the hypopharyngeal airway.

Patient selection

General guidelines for surgical intervention include significant symptoms of snoring and daytime somnolence, documented failure of continuous positive airway pressure (CPAP) trial, documented failure of conservative measures

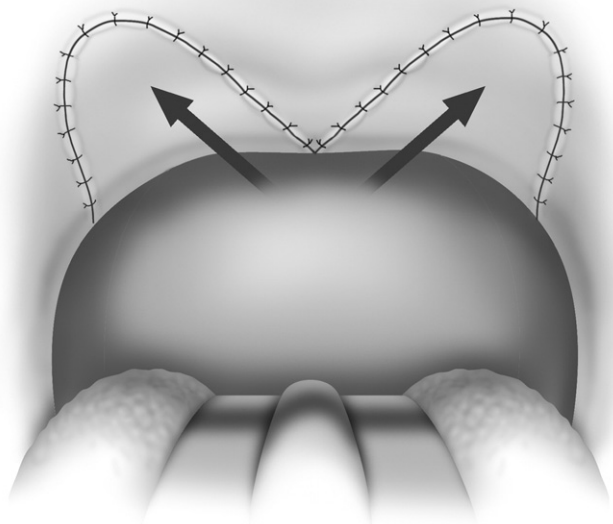


Figure 2 Z-palatoplasty. Note the anterolateral direction of pull (arrows) on the soft palate that widens the retropharyngeal space.

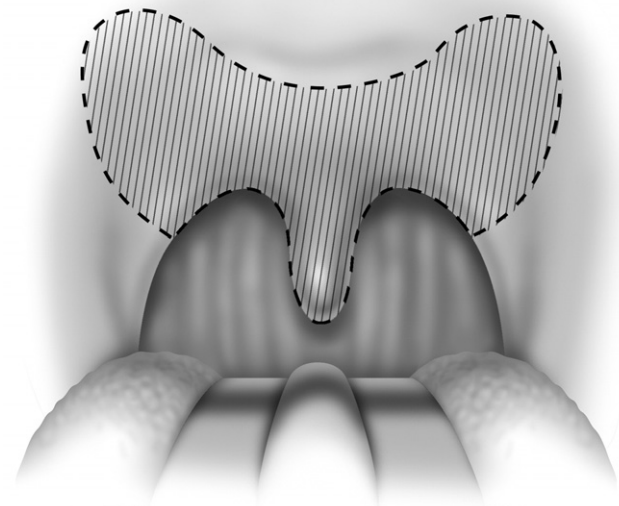


Figure 3 The incision of the palatal flap is marked.

such as dental appliances, changes in sleeping position, and sleep hygiene in general. Apparent obstruction at the level of the soft palate must be determined by fiberoptic nasopharyngolaryngoscopy and Mueller maneuver or sleep endoscopy. Adequate medical clearance and a thorough review of the procedure, its implications, potential outcomes, and complications with the patient are essential components of the preoperative work-up.

Specific criteria for ZPP include patients classified as stage II and III according to Friedman's Anatomic Staging System.⁵ Because ZPP produces a significant widening of the retro-palatal space, it is an aggressive procedure, with significant temporary VPI and the risk for permanent VPI. It should be reserved for patients with moderate-to-severe OSAHS with moderate-to-severe symptoms.

Surgical technique

Candidates eligible to undergo a modified UPPP technique can be divided into 3 groups: (1) patients with intact tonsils; (2) patients status post tonsillectomy; and (3) patients who have previous conservative palatal resection, such as laser-assisted UPPP or classic UPPP.

The key points of ZPP are the removal of the anterior mucosa only, and the splitting of the soft palate in the midline, cutting the palatoglossus muscle, and the sewing of the posterior palatal mucosa to the anterior resection margin, which retracts the midline anterolaterally and widens the retropharyngeal area.

The surgical technique for the modified ZPP are illustrated in Figures 3-10.

Two adjacent flaps are outlined in the palate (Figure 3). The anterior midline margin of the flap is halfway between the hard palate and free edge of the soft palate, and the distal margin corresponds to the free edge of the palate and uvula. The lateral extent is posterior to the midline and extends to the lateral extent of the palate near the hamulus. The mucosa from only the anterior aspect of the 2 flaps is subsequently

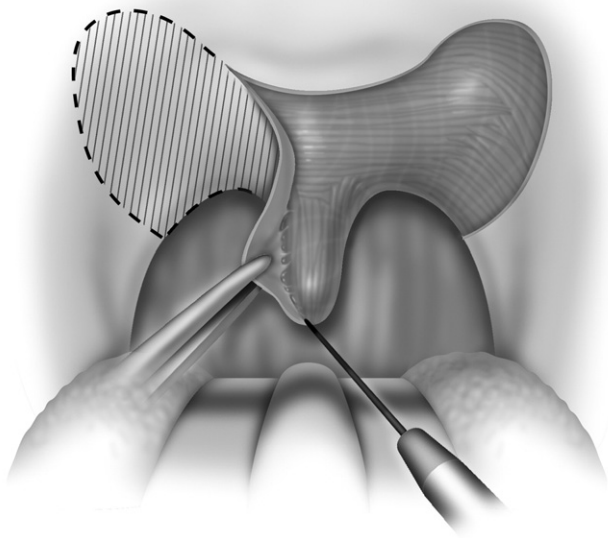


Figure 4 The mucosa over the palatal flap is removed, exposing the palatal musculature.

removed (Figure 4). Figure 5 illustrates how the preoperative uvula and palate hang close to the posterior pharyngeal wall, narrowing the retropharyngeal space. The 2 flaps are



Figure 5 Lateral view of the soft palate and uvula after the mucosa is excised. Note that the uvula and palate are hanging close to the posterior pharyngeal wall, narrowing the retropharyngeal space.

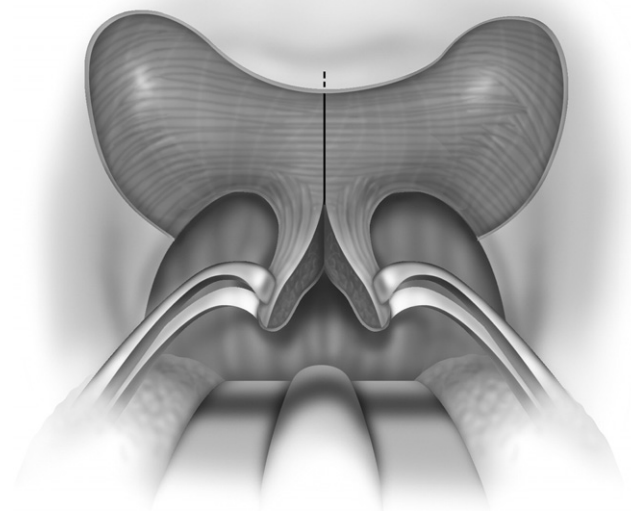


Figure 6 The uvula and palate are split in the midline with a cold knife.

then separated from each other by splitting the palatal segment down the midline (Figure 6), extending them laterally in a butterfly fashion (Figure 7), and dividing the palatoglossus muscle. A 2-layer closure is then done, which brings the midline all the way to the anterolateral margin of the palate (Figures 8 and 9). If the flaps are under tension, a horizontal cut along the soft palate is made to eliminate tension (Figure 10). The primary closure is done at the submucosal level, which then enables a tension-free closure of the mucosa. A distance of at least 3-4 cm between the posterior pharynx and palate is created. Figure 11 illustrates the widening of the nasopharynx after the midline palatoplasty. The lateral dimension of the palate is usually increased to approximately 4 cm.

All patients with Friedman stage II or III disease also receive hypopharyngeal treatment. The treatment options

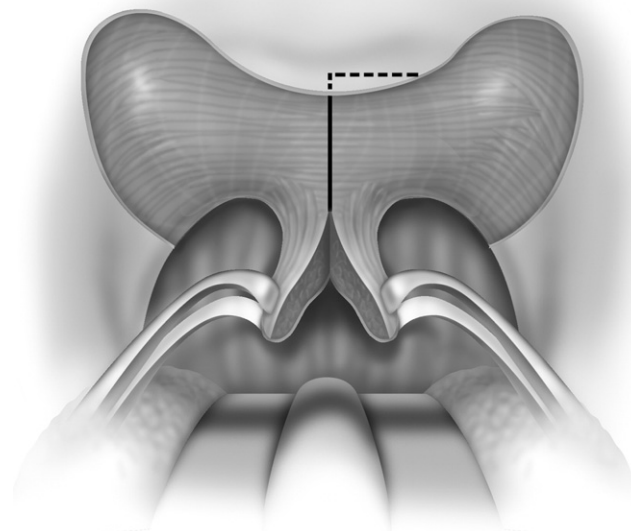


Figure 7 A horizontal relaxing incision along the hard/soft palate junction can be made to reduce tension if the flaps do not reach the lateral extent.

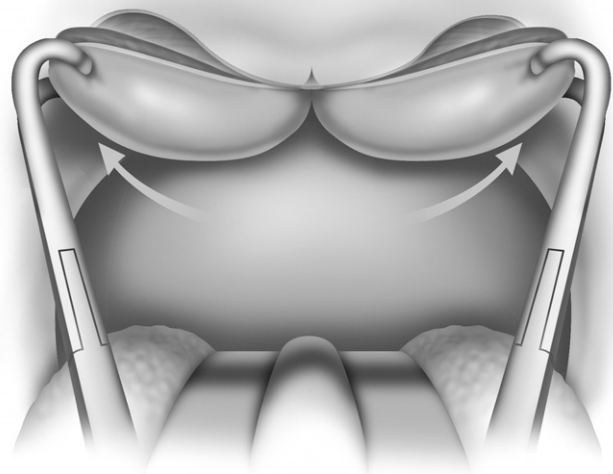


Figure 8 The uvular flaps along with the soft palate are reflected back laterally over the soft palate (arrows).

include either coblation glossectomy, TBRF, or tongue-base advancement procedures.

Postoperative management and complications

As with any intervention that involves resection of the soft palate, significant morbidity is observed on the first 24-72 hours postoperatively in the form of significant pain and dysphagia. The ability of the patient to tolerate at least a liquid diet, oral pain medications, antibiotics, and steroids determines the moment when the patient can be safely discharged home. While the discharge could in theory be on the same day of the surgery, most patients will need 1 or 2 days of intravenous fluids and medications before they can start taking an oral diet. Before discharge, patients are

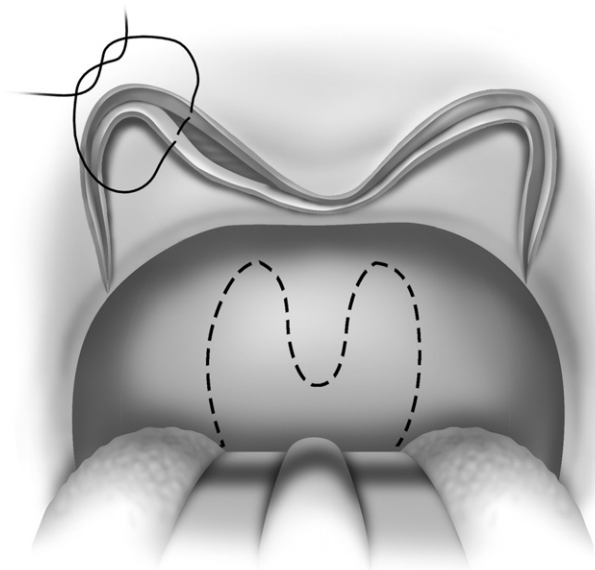


Figure 9 Two-layered closure of the palatal flaps. The submucosal layer is approximated first with 2-0 polyglactin 910 (Vicryl; Ethicon, Inc, Somerville, NJ).

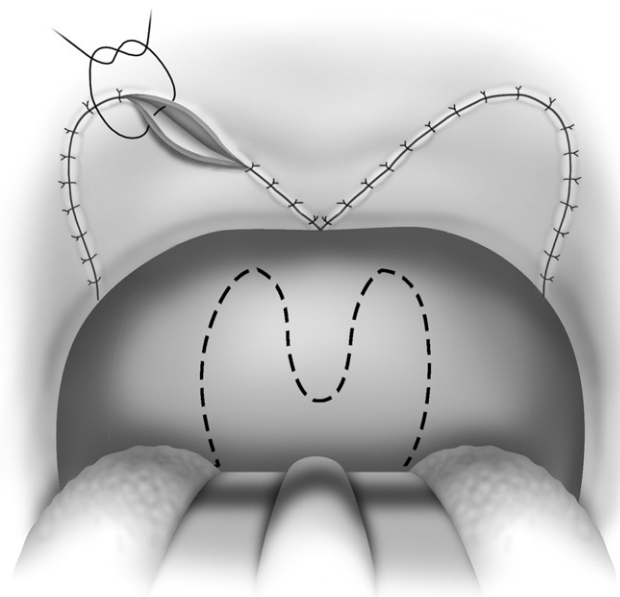


Figure 10 Two-layered closure of the palatal flaps. The mucosal closure with 3-0 chromic suture.

prescribed acetaminophen with codeine elixir as needed for pain. Pain medication requirements average 6.5 days and so does the progression from liquid or soft diet to normal diet.

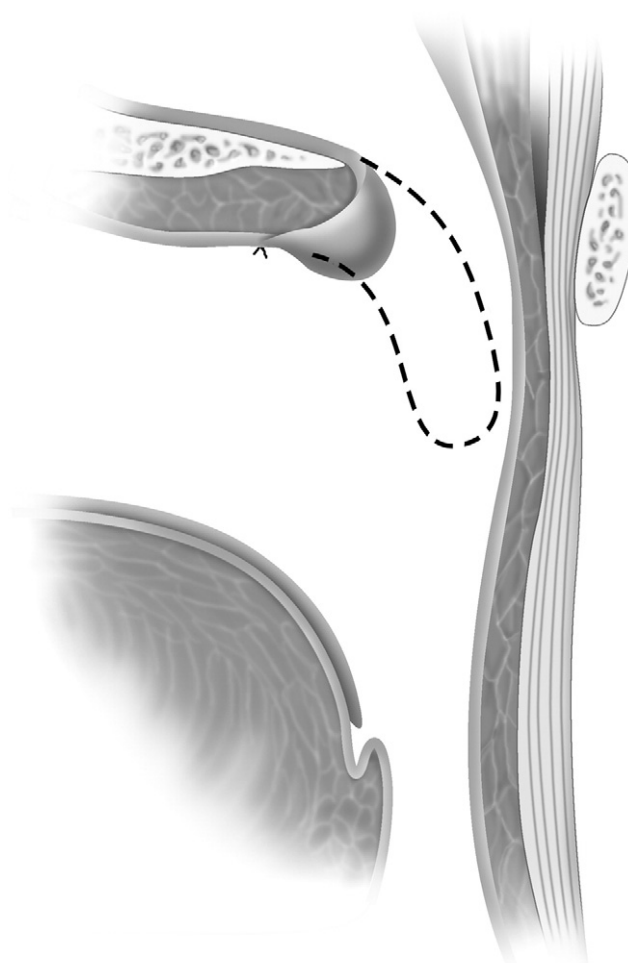


Figure 11 Lateral view showing the widening of the nasopharynx after midline palatoplasty.

Postoperative antibiotics and steroids are also recommended, for a total of 7 days. Additional TBRF sessions may be necessary, depending on the improvement of symptoms of each individual patient.

Complications of the procedure are comparable to classic UPPP. Bleeding is always a potential complication and the risk, again, comparable to classic UPPP. Typically, patients can eat a normal diet after 2 weeks. Mild VPI may become manifest when drinking quickly and may persist for up to 3 months. After 3 months, patients have a normal deglutition. Severity of VPI symptoms diminishes with time and is expected to resolve progressively. Permanent VPI is a potential complication that must be considered in every patient. Additional morbidity of the procedure is usually related to throat discomfort symptoms, including globus sensation, mild dysphagia, dry throat, and inability to clear the throat. These symptoms are almost universal after any form of UPPP.

Other complications are related to the adjunctive procedures performed. Tongue-base infection is related to TBRF and requires antibiotic treatment. In rare cases, it may lead to tongue-base abscess formation, which may require incision and drainage.

Success rate of the procedure

The subjective success is based on comparative improvement on snoring level, daytime sleepiness, and overall well-being. Patients that underwent ZPP were compared with patients who had previously undergone UPPP for the treatment of OSAHS, and the results achieved in these parameters were far superior with ZPP, particularly with adjunctive TBRF. Quality of life scores improve significantly more after ZPP than after UPPP.⁶

When focusing on objective success, ZPP shows considerable improvement over UPPP. Objective cure rates for stage II patients treated with ZPP and TBRF are close to 70%, compared with about 30% for classic UPPP with TBRF.⁶

Limitations of this technique include a higher risk of temporary VPI due to a more aggressive modification of the palatal anatomy, even though the resection is limited to the mucosa. While VPI was only temporary, should permanent VPI ensue, this procedure is probably not reversible. There are also no clear anatomic landmarks to assist in describing the size of the flaps, and, ultimately, the guidelines outlined in this chapter do not substitute for the surgeon's judgment. The procedure is significantly more difficult technically, and it takes longer to perform. A learning curve, as with any other procedure, leads to progressively better results.

Conclusions

No single procedure is effective in treating all OSAHS patients. Treatment should be tailored to the anatomy of each patient. Rerouting the uvula together with the soft palate laterally improves the airway characteristics by enlarging the retro-palatal space, which is a distinct advantage over the traditional UPPP. This acquires even more importance when addressing the obstruction at the level of the palate in patients without tonsils.

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