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Surgical correction of lateral pharyngeal wall collapse in sleep-related disordered breathing: Functional expansion pharyngoplasty

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KEYWORDS
Obstructive sleep apnea;
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The recent evolution regarding the techniques of pharyngoplasty has been focused on the concept of obtaining the expansion and stabilization of the pharyngeal airspace through the treatment of lateral pharyngeal wall (LPW) collapse rather than through ablation of the redundant pharyngeal soft tissue. The role of LPW in the pathogenesis of obstructive sleep apnea syndrome has been demonstrated by radiologic and sleep endoscopy studies and the narrowing of the LPW appears to be the sole independent risk factor for obstructive sleep apnea syndrome. The functional expansion pharyngoplasty represents a conservative modification of expansion sphincter pharyngoplasty and can be used in patients with obstruction of the upper airway due to the LPWs collapse without altering physiological functions of the upper airway, including smell, taste, swallowing, and speech.

Introduction

Among the variety of surgical procedures described to expand the pharyngeal lumen in obstructive sleep apnea syndrome (OSAS), uvulopalatopharyngoplasty (UPPP) remains the most frequently performed technique for the treatment of retropalatal obstruction. UPPP first described by Fujita in 1981,[1] basically consists of a tonsillectomy, trimming of the soft palate and uvula and suturing of the tonsillar pillars. Owing to its low success rate and the considerable morbidities involved,[2] the role of this technique has been questioned since the 1990s and, in the last 2 decades, many modifications of UPPP have been proposed. The recent evolution regarding the techniques of pharyngoplasty has been focused on the concept of obtaining the expansion and stabilization of the pharyngeal airspace through the treatment of lateral pharyngeal wall (LPW) collapse rather than through ablation of the redundant pharyngeal soft tissue. The role of LPW in the pathogenesis of OSAS has been demonstrated by Schwab et al.[3] The narrowing of the LPW appears to be the sole independent risk factor for OSAS. We present a new surgical technique called " Functional Expansion Pharyngoplasty" (FEP) that represents a conservative modification of expansion sphincter pharyngoplasty as described by Pang and Woodson.[4]

The FEP technique involves the splinting of the LPW and advancement of the soft palate obtained by means of superolateral repositioning of the palatopharyngeus muscle (PPM) with a less aggressive and more "physiological" approach to the LPW and soft palate, to fulfill both increase of pharyngeal airspace and decrease of pharyngeal collapse, without undermining velum muscles, thus avoiding scarring of the velum.

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Indications

This surgical technique is indicated in the treatment of retropalatal obstruction in patients with OSAS as an isolated technique or in combination with other nasal and hypopharyngeal techniques in a multilevel protocol. In our protocol, the surgery originates from a diagnostic work up completed by drug-induced sleep endoscopy. In case of retropalatal obstruction and LPW collapse, we perform this procedure to treat the retropalatal segment; in case of the coexistence of retrolingual-hypopharyngeal obstruction, FEP was combined with hyoid suspension or tongue base reduction.

Surgical technique

The surgery is performed while the patients are under general anesthesia and in supine position with their head extended. The authors perform the procedure with orally endotracheal intubation and a mouth gag is then used to adequately expose the oropharynx. The operation was initiated with a bilateral tonsillectomy performed with a cold instrument to spare the palatopharyngeus muscle (PPM) and the mucosa of the tonsillar pillars (Figure 1).

The key point of the surgical procedure is the identification and careful dissection of the PPM at the midpoint of the tonsillar fossa (Figure 2). Using a dissection forceps and pulling up the muscular faciculus with a 2-0 vicryl, the authors separated the superior two-thirds of the PPM from the superior pharyngeal constrictor muscle; medially, a muscular rim of the PPM is preserved to avoid damage to the pillar mucosa and consequent retracting scar tissue. Using an angulate scissor (Long Fomon type), the PPM is transected, creating a superior flap medially based on the palatine musculature; the inferior third of the PPM is laterally sutured to the SPC (Figure 3). With a gentle blunt dissection using curved hemostatic forceps, a tunnel is then obtained through the palatal musculature from the apex of the tonsillar fossa to the hamulus of the pterygoid process (Figure 4). The PPM flap is then elevated with a superolateral rotation through the palatine tunnel and fixed to the palatine musculature, close to the pterygoid hamulus, using a 2-0 MH vicryl "figure-eight suture" (Figures 5 and 6). The PPM flap is anchored, stitching 3 times (with different angulations) into the muscle before its relocation to obtain a steady anterolateral fixation of the flap that moves the soft palate in a forward direction and creates an immediate widening of the anteroposterior and lateral oropharyngeal diameters (Figure 7). The procedure ends with suturing the superior two-thirds of the tonsillar pillars; the uvula is trimmed only when abnormally elongated (Figure 8).

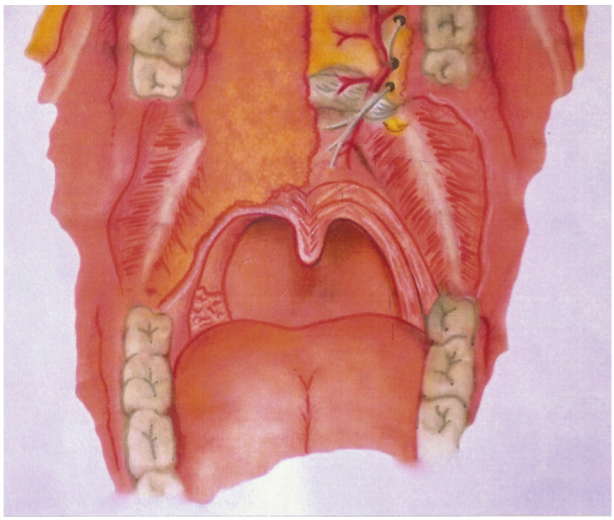

Figure 1 Tonsillectomy. (Color version of figure is available online.)

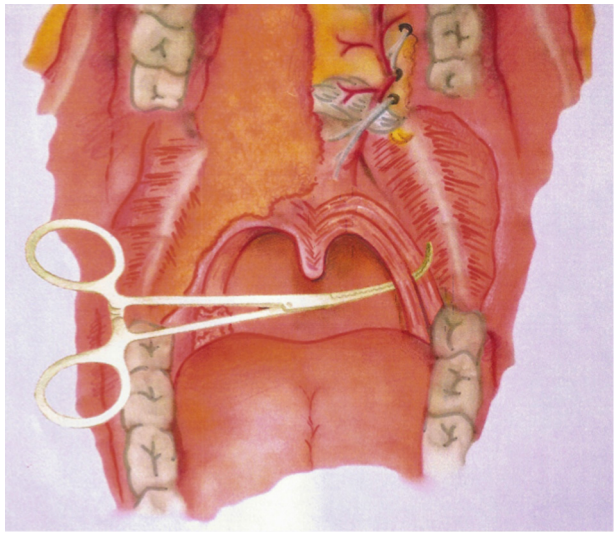

Figure 2 Identification and careful dissection of the PPM. (Color version of figure is available online.)

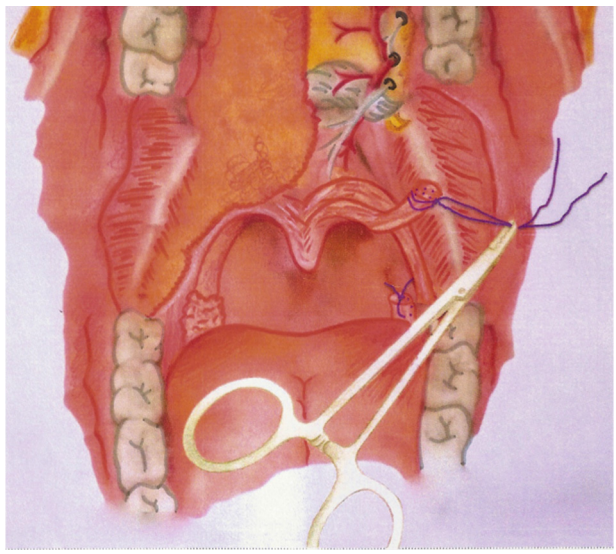

Figure 3 The PPM is transected, creating a superior flap medially based on the palatine musculature; the inferior third of the PPM is laterally sutured to the SPC. SPC, superior pharyngeal constrictor. (Color version of figure is available online.)