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ORIGINAL RESEARCH

Modified cautery-assisted palatal stiffening operation: New method for treating snoring and mild obstructive sleep apnea

Kenny P. Pang, FRCSEd, FRCSI(OTO), FAMS(ORL), and David J. Terris, MD, Augusta, GA; and Tan Tock Seng, Singapore

OBJECTIVE: To assess a new method (modified cautery-assisted palatal stiffening operation [CAPSO]) to treat snoring and mild obstructive sleep apnea (OSA).

DESIGN: A prospective, nonrandomized trial.

METHODS: Thirteen patients with simple snoring and mild OSA underwent the modified CAPSO under local anaesthesia. All patients had preoperative polysomnography and at 3 months postoperatively.

RESULTS: All patients were Friedman stage II and III, with tonsil size 0, 1, or 2. All patients had improvement in their snoring. Eighty-four percent of the patients had improvement in the Epworth Sleepiness Scale, from 12.2 to 8.9. Objective success on the polysomnogram was noted in 6 out of the 8 patients (75%) with mild OSA. The AHI improved from 12.3 to 5.2 (P < 0.05), and the LSAT improved from 88.3% to 92.5% (P < 0.05).

CONCLUSION: The modified CAPSO is a simple, low-cost, and effective office-based method to treat snoring and mild obstructive sleep apnea.

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Sleep-disordered breathing is a spectrum of diseases that includes snoring, upper-airway resistance syndrome, and obstructive sleep apnea (OSA). Snoring is caused by the vibration of the structures in the oral cavity and oropharynx, namely, the soft palate, uvula, tonsils, base of tongue, epiglottis, and pharyngeal walls. Snoring is considered a social nuisance and an objectionable social problem. However, most sleep authorities believe that it may represent an alarm to alert one to the possibility of OSA. Obstructive sleep

apnea is a common sleep disorder; Young et al¹ studied 602 state employees with attended overnight polysomnography and found that the incidence of sleep-disordered breathing was 24% in men and 9% in women. Most of these patients are undiagnosed. It is estimated that up to 93% of females and 82% of males with moderate to severe OSA remain undiagnosed.²

A multitude of techniques have been introduced to treat snoring. The basis of each method is to create scar tissue, to incite fibrosis, and to stiffen the palate. This decreases the vibration of the palate and diminishes snoring, with the intention of reduced collapsibility and therefore fewer apneic episodes. Several of the newer methods involve the use of expensive implants or sophisticated equipment. The ideal technique would be an office-based procedure that would require no special equipment or implants and that achieves effective results in a reliable and predictable fashion.

The palatal stiffening operation was first introduced by Ellis³ in 1994 and improvised by Mair and Day⁴ in 2000. Both authors reported good results, although it produced a stellate puckered scar on the soft palate that resulted in tenting of the lateral pharyngeal walls and therefore narrowing of the lateral distance between the tonsillar pillars laterally. These anatomic manifestations may explain why some patients did not have any clear benefit from the procedure.

We describe a modified palatal stiffening technique designed to create the palatal scar and fibrosis that is anatomically

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ically more sound, which results in retraction of the palate superiorly, avoiding the puckered scar and stenosis of the lateral pharyngeal walls.

METHODS AND MATERIALS

Patients evaluated in the snoring/sleep subspecialty clinics were offered a modified cautery-assisted palatal stiffening operation (CAPSO) (Fig 1) during an 18-month period. The inclusion criteria was age >18 years, body mass index (BMI) <33, tonsil size grade 1 and 2, elongated uvula, all Mallampati grades, minimal base of tongue collapse (<25%) as seen on Muller’s maneuver, simple snorers (AHI <5), and patients designated as mild OSA (apnea-hypopnea index [AHI] <15). The study protocol and methodology was reviewed and approved by the institutional review board.

We pursued a comprehensive clinical assessment including a thorough physical examination, nasoendoscopy, and a level I overnight attended polysomnography. Patients completed the Epworth Sleepiness Scale and a visual analog scale (VAS) for snoring before and 7, 14, 30, 60, and 90 days after surgery. The sleep partner completed a similar scale for snoring. The patient also completed a VAS for pain on postoperative days 1, 3, 7, and 14. Examination included height; weight; neck circumference; BMI; blood pressure; and assessment of the nasal cavity, posterior nasal space, oropharyngeal area, soft palatal redundancy, uvula size and

thickness, tonsillar size, and Mallampati grade. Flexible nasoendoscopy was performed for all patients, and collapse during a Mueller’s maneuver was graded for the soft palate, lateral pharyngeal walls, and base of tongue on a 5-point scale.⁵

Monitoring during polysomnography included an electroencephalogram, electro-oculogram, electromyogram of the chin, electrocardiogram, body position, nasal and oral airflow, thoracic and abdominal effort, limb movement, pulse oximetry, and snoring sound level. Complete sleep staging was performed, and polysomnographic variables evaluated included sleep parameters, sleep time, sleep latency, sleep efficiency, rapid eye movemet (REM) and non-REM events, arousals, respiratory events (AHI), oxygen desaturation, snoring level, body position, and limb movements. The polysomnograms were all scored by a sleep technologist and reviewed by a sleep physician.

Outcome measures included subjective improvement in snoring based on the VAS and improvement in sleepiness as indicated by the Epworth scale. Objective changes were presented by the polysomnographic findings. Reduction of at least 50% of the preprocedure AHI and postprocedure AHI below 15 was deemed a success.

Procedural Technique

The procedure was performed under local anesthesia in the office as an outpatient. The patient was seated in an examination chair with the mouth open. Topical benzocaine (14%) was used to anesthetize the palatal region. A total of

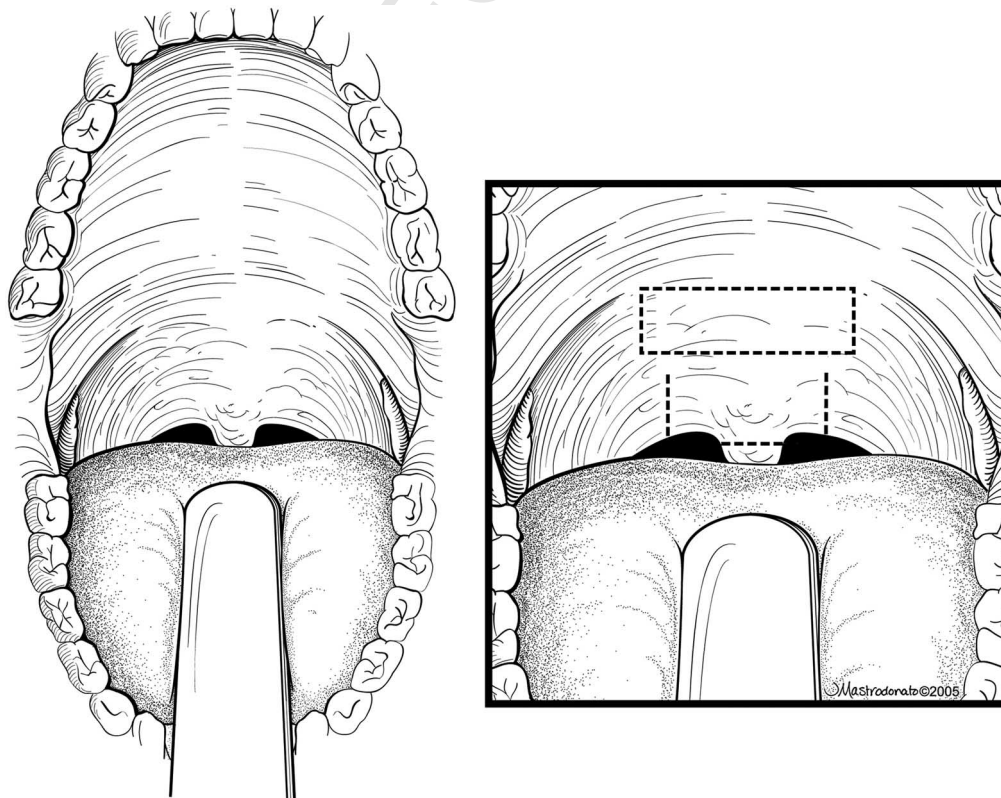


Figure 1 Entire procedure showing the uvulectomy, vertical trenches, and horizontal strip of mucosa removed.

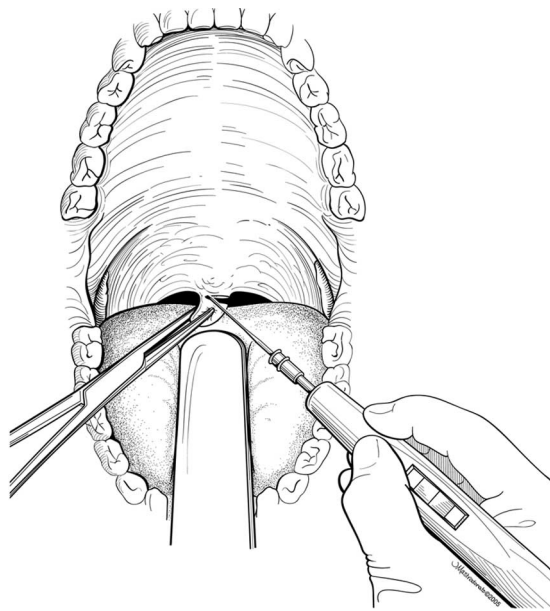


Figure 2 Uvulectomy is first performed.

3 mL of 1:100,000 adrenaline and 2% xylocaine was injected into 3 sites of the soft palate. An uvulectomy was performed (Fig 2), followed by vertical cuts on either side of the uvula (Fig 3) through both soft palatal arches. A horizontal rectangular strip of mucosa was removed from the soft palate (50 mm in length × 7 mm in width) down to the muscle layer (Fig 4). Hemostasis was achieved with electrocautery. All patients were prescribed with anesthetic gargles (Difflam) and lozenges (Difflam), nonsteroidal anti-inflammatory agents (naproxen sodium), narcotics (like codeine), and cyclooxygenase-2 inhibitors. The final result is a fibrotic palate that is retracted superiorly, with the oropharyngeal airway widened superiorly (Fig 5).

RESULTS

Thirteen patients chose to undergo the modified CAPSO procedure for management of their snoring or mild OSA. All 13 patients were men, with a mean age of 35.7 years old (range, 24-47 years old). The mean BMI was 28.4 (range, 21.6-31.2). All patients were classified as Friedman stage II and III,⁶ with tonsil size 0, 1, or 2. The mean preoperative AHI was 11.6 (range, 3.5-14.8), with a mean preoperative AI of 5.6 (range, 0.5-9.1). The mean preoperative lowest oxygen saturation was 91.4% (range, 88%-94%). All patients had a 3-month postoperative polysomnogram done. There were 5 patients who were simple snorers (mean AHI of 3.9) and 8 patients who had mild OSA (mean AHI of 12.3).

The mean operative time was 15.6 minutes (range, 12-25 minutes). There were no complications; specifically, there were no patients with velopharyngeal incompetence, fistula, or primary or secondary hemorrhage.

All patients (13/13) had improvement in their snoring, and the patients and their sleep partners were satisfied with

the result at 3 months postoperatively. The VAS showed gradual reduction in the snoring intensity with time, ranging from a preoperative level of 8.3 (range, 7.5-9.1) to a low of 3.3 (range, 2.5-4.6) at 90 days postoperatively.

Similar improvements were seen in the Epworth scale, which decreased from 12.2 (range, 8-15) to 8.9 (range, 5-13) at 90 days postoperatively, although 2 patients (25.4%) did not feel less tired than they were preoperatively. Subjectively, many patients felt that during the night, they experienced more dreams during their sleep, and much less choking sensation and gasping for air.

Pain was the most common complaint. The procedure itself was painless; however, the VAS revealed significant pain, which reached a maximum on day 2, (mean, 8.6; range, 7.3-9.1). The pain score improved to a mean of 2.2 (range, 1.8-3.6) at day 14. Most patients consumed all of their prescribed analgesics.

Objective polysomnographic success was noted in 6 out of the 8 patients (75%) with mild OSA. The mean preoperative AHI improved from 12.3 to 5.2 postoperatively ($P < 0.05$). The lowest oxygen saturation improved from 88.3% to 92.5% ($P < 0.05$). There were no improvements in the

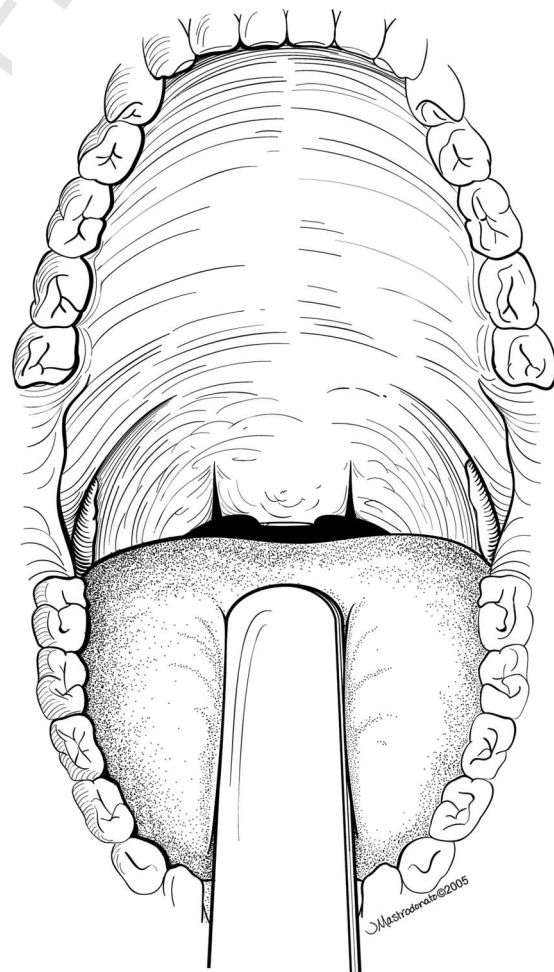


Figure 3 Vertical trenches are made on both soft palate arches.

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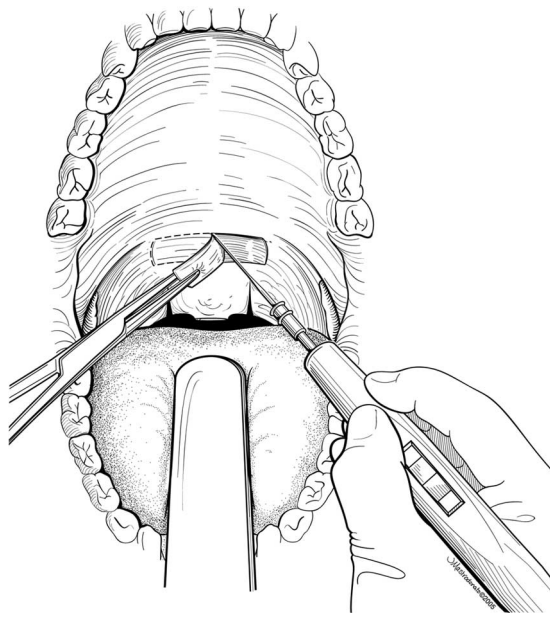


Figure 4 Horizontal strip of mucosa removed off the soft palate.

proportion of slow wave sleep or REM sleep. None of the patients suffered worsening of their AHI.

DISCUSSION

The laser-assisted uvulopalatoplasty (LAUP)⁷ is effective for patients who snore. Kamami⁷ studied 417 snorers who underwent LAUP and found a reduction of snoring in 95% of the patients after 1 year. Most authors report modest improvement after LAUP for patients with mild OSA,^{7,8} although a success rate as high as 75% was described by Walker et al.⁸ Mair and Day⁴ reported a promising 77% success rate for snoring in 206 patients, at 1 year, who underwent CAPSO. We sought to investigate an office-based procedure that could be used to treat both snoring and mild OSA.

By combining the use of cautery with the principles of the laser palatoplasty technique and the creation of a horizontal denuded mucosal strip on the soft palate, we have achieved promising results in a small cohort of simple snorers and patients with mild OSA. Not only were there improvements in the VAS for snoring and the Epworth Sleepiness Scale, but most of the sleep partners were happy with the reduction in snoring intensity at 90 days after the procedure. Subjectively, many patients reported improvements in daytime sleepiness and felt that they were no longer tired during the day. The frequency of choking sensation and gasping at night had also reduced, and patients reported more dreams during their sleep. All patients had improvements in their AHI and LSAT; however, there was no significant increase in the slow wave sleep and REM sleep. We believe that the results reflect the scarring and

fibrosis of the soft palate and the “pull” of the scar superiorly that shortens and stiffens the soft palate. The effect is also enhanced by the shortening of the soft palate which, increases the anteroposterior distance of the velopharynx.

There are a number of advantages of this procedure. It is anatomically sound (because it causes scarring superiorly), and it can be performed as an office-based procedure on an outpatient basis. The procedure is brief, low cost, and does not require expensive implants. It is performed in a single session with excellent results and a low complication rate. The main disadvantage is the amount of pain incurred in the postoperative period; this was overcome adequately with narcotic and nonnarcotic medication. It is important to exercise careful patient selection. Only patients who are simple snorers or mild sleep apneics, with primarily retropalatal flutter and/or obstruction, with small tonsils and BMI <33, should be offered the modified CAPSO technique.

CONCLUSION

The modified CAPSO technique has shown promising and encouraging results in a small cohort of patients with simple

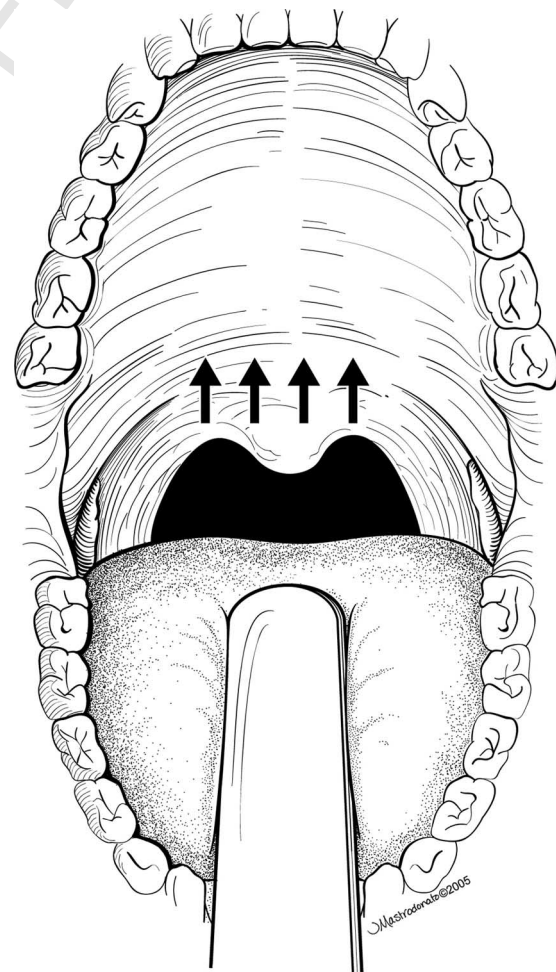


Figure 5 Final result of the soft palate, with scarring of the palate superiorly.

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snoring and mild OSA. We endorse this procedure as an inexpensive, simple alternative to implantable devices and sophisticated equipment currently available.

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