Injection laryngoplasty through a transoral approach using the Guedel oral airway

Laringoplastica iniettiva mediante approccio transorale con l’utilizzo della cannula di Guedel

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SUMMARY
Injection laryngoplasty has gained popularity as a treatment modality for glottal insufficiency. Several approaches have been described, specifically transcutaneous, transoral and transnasal. The authors describe a novel technique performed successfully on three subjects, namely endoscopic injection laryngoplasty using the modified Guedel oral airway. There was marked improvement in dysphonia, maximum phonation time and closed quotient in all three subjects with a decrease in the Voice Handicap Index-10 score. This new approach is a viable approach for the treatment of glottal insufficiency.

KEY WORDS: Glottic insufficiency • Laryngoplasty • Endoscopy

Introduction
Injection laryngoplasty has gained popularity among otolaryngologists as a treatment modality for glottic insufficiency. The main approaches are the transcutaneous, transoral and transnasal. The transoral approach is primarily limited by the presence of hyperactive gag reflex and/or inadequate oral opening, whereas the transcutaneous approach is limited by unfavourable neck anatomy. In both approaches two routes are used, one for visualising the larynx and the other for introducing the injecting needle. In addition, there is a need for an experienced assistant to perform the flexible endoscopy. On the other hand, transnasal injection laryngoplasty as described by Ricci Maccarini A et al. is a safe procedure with limited discomfort to the patient. Nevertheless, it has limited application in cases of a narrow nasal passage, especially in patients who are on anticoagulants.

The authors describe a novel approach, namely fibre optic endoscopic injection laryngoplasty through the transoral approach using the modified Guedel oral airway (Fig. 1). This approach can be used as an alternative to the aforementioned conventional approaches.

This investigation was exempted from the Institutional Review Board Approval. While the patient was seated in the examination room, the oral cavity, oropharynx and larynx were anesthetised by applying xylocaine spray and gel to the dorsum of the tongue, following which the modified Guedel oral airway was inserted. The fibre optic scope with working channel (Ref 11001UD1 by Karl Storz) was then gently introduced thru the oral airway until the laryngeal structures were visualised (Fig. 2). Similar to the transnasal approach, once the fibre optic scope was in place, a 19 gauge fibre optic needle (Endoline Securline – BTC Medical Europe S.R.L., made in Italy) was then engaged at the desired injection site and filling material was injected until voice quality was satisfactory. The scope is usually handled with the right hand and the injecting needle in the left hand. The sy-
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A ringe containing the filling materiel can be either pressed by the surgeon or by the assistant. Patients were instructed to resume oral intake one hour after the procedure to avoid risk of aspiration. Pooling of secretions in the larynx was reduced by administering intramuscular glucopyrrolate (200 micrograms/1 ml) prior to the procedure.

Case series

Patient selection for this approach was based on the presence of either a strong gag reflex (patient 1), intake of anticoagulants and/or the presence of a narrow nasal passage (patients 2 and 3). The first patient was a 23-year-old man with dysphonia and aspiration secondary to an immobile right vocal cord and impaired mobility of the left cord following prolonged intubation that resulted in subglottic scarring. The second patient was a 60-year-old woman with dysphonia and dysphagia secondary to an immobile right vocal cord post resection of a right cerebellopontine angle tumour. The third patient was a 65-year-old woman with dysphonia and dysphagia secondary to a left immobile vocal cord following total thyroidectomy. In all three patients, 0.2 to 0.6 cc of Restylane® (hyaluronic acid stabilised solution 20 mg/ml) was injected lateral to the vocal process and/or at the mid vocal cord. Perceptual evaluation, maximum phonation time, as well as closed quotient and Voice Handicap Index-10 were used as outcome measures.

This novel approach was well tolerated by all patients with no complications. In all three subjects, there was marked improvement in all perceptual parameters (Table I) with an increase in the maximum phonation time by 8 seconds in the first patient, 7 seconds in the second patient and 5.5 seconds in the third. There was also a noticeable decrease in the Voice Handicap Index-10 score in the three subjects (Table II).

The mean closed quotient, measured by computing the ratio of closed frames to the total number of frames, improved from 0 to 0.4 in subject one, from 0.3 to 0.5 in subject two and from 0.4 to 0.5 in subject three.

Discussion

Injection laryngoplasty as an office procedure has become the gold standard treatment of glottic insufficiency. There are ubiquitous reports on the added value of the different approaches used with the main focus being on tolerance, safety and improvement in voice quality and swallowing. As a novel approach, we have combined the usage of the transnasal fibre optic endoscope/working channel with the modified Guedel oral airway primarily used in gastroscopy and bronchoscopy. The added values of this novel approach are; 1, the use of only one route for visualisation of the larynx and introduction of the injecting needle unlike the transoral and transcutaneous approaches; 2, the

### Table I. Perceptual evaluation, GRBAS classification.

| GRBAS classification | Subject 1 | Subject 2 | Subject 3 |
|----------------------|-----------|-----------|-----------|
|                      | Before injection | After injection | Before injection | After injection | Before injection | After injection |
| Grade                | 3         | 1         | 3         | 1         | 3         | 1         |
| Roughness            | 3         | 1         | 3         | 2         | 3         | 2         |
| Breathiness          | 3         | 1         | 3         | 1         | 3         | 1         |
| Aesthesia            | 3         | 2         | 3         | 2         | 3         | 1         |
| Strain               | 0         | 0         | 0         | 0         | 0         | 0         |
use of the modified oral airway facilitates the introduction of the fibre optic endoscope and guides its pathway to the laryngeal inlet with no difficulty or discomfort to the patient as the scope slides on the lingual surface of the oral airway with little if any contact with the mucosa; 3, the fibre optic scope secures the passage of the injection needle through the endoscope working channel thus preventing inadvertent injury to the pharyngeal mucosa; 4, it allows the surgeons to use both hands with no need for an experienced assistant to do the fibre optic endoscopy or for the patient to hold his or her tongue. The scope is usually held by the surgeon’s left hand and the fibre optic needle is held in the right hand. It is important to note that the fibre optic scope can be easily maneuvered through the oral airway because of the enhanced rotation along its longitudinal access achieved by the removal of the dorsal convex roof. Another advantage is the lack of risk for the patient to bite the scope by accident.

Conclusions

This approach is a viable alternative to the transoral, transcervical and transnasal approaches. It is of particular added value to the transcervical approach in patients with unfavourable neck anatomy, to the transoral approach in patients with a strong gag reflex and to the transnasal approach in patients with narrow nasal passages and/or are on anticoagulants.

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