

CASE SERIES AND REPORTS

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 glottic 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 glottic insufficiency.

KEY WORDS: Glottic insufficiency • Laryngoplasty • Endoscopy

RIASSUNTO

Le laringoplastiche iniettive hanno ottenuto notevole popolarità come modalità di trattamento per l'insufficienza glottica. Numerosi approcci sono stati descritti: transcutaneo, transorale, transnasale. Gli autori descrivono una nuova tecnica, eseguita con successo in tre pazienti: la laringoplastica iniettiva endoscopica con l'utilizzo la cannula di Guedel modificata. C'è stato un marcato miglioramento della disfonia, del tempo massimo fonatorio e del quoziente di chiusura glottica, insieme ad un decremento del Voice-Handicap Index-10 score. Questo nuovo valido approccio è applicabile per il trattamento dell'insufficienza glottica.

PAROLE CHIAVE: *Insufficienza glottica • Laringoplastica • Endoscopia*

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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^{1,2}. On the other hand, transnasal injection laryngoplasty as described by Ricci Maccarini A et al. is a safe procedure with limited discomfort to the patient³. Nevertheless, it has limited application in cases of a narrow nasal passage, especially in patients who are on anticoagulants³.

The authors describe a novel approach, namely fibre optic endoscopic injection laryngoplasty through the transoral approach using the modified Guedel oral airway⁴ (Fig. 1).

This approach can be used as 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 anaesthetised 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 introduced through the working channel of the endoscope and its blunted tip was used to palpate the posterolateral and mid aspect of the vocal cord to ensure complete anaesthesia. The needle 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-



Fig. 1. The modified Guedel oral airway with the roof of the convex curvature removed.



Fig. 2. Patient in the sitting position and the fiberoptic scope introduced through the modified Guedel oral airway.

ringe containing the filling material 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-10⁵ 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 insufficiency². 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
Asthenia	3	2	3	2	3	1
Strain	0	0	0	0	0	0

Table II. Voice Handicap Index (VHI-10).

VHI-10	Subject 1		Subject 2		Subject 3	
	Before injection	After injection	Before injection	After injection	Before injection	After injection
F1. My voice makes it difficult for people to hear me	4	1	4	0	4	0
P2. I run out of air when I talk	4	2	3	1	4	0
F3. People have difficulty understanding me in a noisy room	4	1	4	1	3	1
P4. The sound of my voice varies throughout the day	4	2	4	2	2	1
F5. My family has difficulty hearing me when I call them throughout the house	4	1	4	0	4	0
F6. I use the phone less often than I would like to	4	2	4	1	4	1
E7. I'm tense when talking to others because of my voice	4	2	3	1	2	1
F8. I tend to avoid groups of people because of my voice	4	1	4	0	3	1
E9. People seem irritated with my voice	3	0	3	0	1	0
P10. People ask, "what's wrong with your voice?"	4	1	4	1	4	1
Total score	39	13	37	7	31	6

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, transcutaneous and transnasal approaches. It is of particular added value to the transcutaneous 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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