Neuromonitoring of the laryngeal recurrent nerve during supracricoid laryngectomy with cricohyoidopexy
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Abstract

Introduction: The preservation of a functional crycoarythenoid unit during supracricoid laryngectomy with cricohyoidopexy is of foremost importance for the realization of the phonatory and protective functions of the neolarynx. Thus the sparing or the recurrent nerve during surgery is of paramount significance.

Materials and Methods: the laryngeal recurrent nerve was identified and exposed with the help of Neurosign in 15 patients undergoing supracricoid laryngectomy with cricohyoidopexy. Following removal of the surgical specimen the integrity of the cricoarythenoid joint was confirmed by stimulation of the recurrent nerve with 1mV. The same was achieved postoperatively by means of 70 rigid videoendoscopy.

Results: in all cases the recurrent nerve could be identified, presented and spared intraoperatively. We did not observe any case with immobile arytenoid. Patients could be decanulated and put on oral feeding in one month time.

Conclusion: the cautious disarticulation of the cricothyroid joint complemented with monitoring of the laryngeal recurrent nerve guarantees sparing of the crycoarythenoid joint inervation, which is of enormous significance for the proper function of the neolarynx.

Key words: supracricoid laryngectomy; recurrent nerve; neuromonitoring

Introduction

Any kind of laryngeal conservation surgery is based on two principles, namely: oncollogical reliability and preservation of the protective and vocal function as much as possible. Supracricoid laryngectomy with cricohyoidopexy (SCLCHP) is one of the most wide subtotal resections of the larynx, which spares the hyoid, the cricoid and at least one cricoarythenoid unit. This is why it offers broad indications and good survival.1,2,3,4,5,6 The preservation of the laryngeal function depends exclusively on the function of the cricoarythenoid unit, the last being constituted of cartilages, muscles, mucosa and neurovascular bundle.7 In this setting the function of the neoglottis is realized by the tongue base anteriorly and the cricoarythenoid unit posteriorly. During surgery the last can be impaired in variety of ways rendering it immobile and hindering rehabilitation. The consequences are chronic aspiration and a breathy weak voice.

Crucial stage of the operation is the desarticulation of the cricothyroid joint, whereby working in close proximity to the recurrent nerve that latter is at risk of injury.(fig.1)

Fig. 1 desarticulation of the cricothyroid joint and the recurrent nerve at close proximity

Aim: to compare the function of the cricoarythenoid unit after removal of the surgical specimen intraoperatively and a month after surgery, thereby establishing the cause of any loss of function of the cricoarythenoid – injury to the recurrent nerve, or failure of the rehabilitation protocol.

Materials and methods

Neuromonitoring of the recurrent nerve was performed in 15 patients undergoing SCLCHP. In 8 cases the two arytenoids were spared and in 7 only one. Neurosign 100 Magstim Company Ltd Wales; UK was used and the mobility of the cricoarythenoid joint was observed. In cases of preservation of both arytenoids bilateral monitoring was done, thereby comparing the mobility on either side. With the recording electrodes positioned in place the recurrent nerve was stimulated with 1mA; 3 and 30Hz, 200ms stimulus. The nerve was identified by light and sound

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confirmation and the movement of the arythenoid was observed. (fig. 2, 3)

**Fig. 2 Monitoring of the recurrent nerve during SCLCHP**

Postoperatively a standard rehabilitation protocol was followed. After decanulation and feeding tube removal endoscopy was performed and arythenoid function was assessed.

**Results** In all cases the recurrent nerve was readily identified. In all cases the arythenoid proved to be mobile, but in two of the cases with both arythenoids spared some difference was noted between the two sides. This was attributed to distension of the recurrent nerve while bluntly desarticulating cricothyroid joint. The control endoscopy revealed one case of an immobile arythenoid which had impaired mobility already intraoperatively.

**Discussion**

The main problem following SCLCHP is restoration of deglutition. In majority of cases patients are able to resume oral feeding by the end of the first month postoperatively. However, most investigators report that referral to common diet is possible by the end of the first year. In cases of severe disturbance of deglutition gastrostomy or total laryngectomy is needed. Bron performed 4 (5,79) total laryngectomies in a series of 69 patients with SCLCHP and Karasalihoglu - 1 (1,47%) in a series of 68 patients. The incidence of aspiration pneumonia ranges from 0 to 21,7%. Whether sparing of both arythenoids gives superior results is controversial. However, majority agrees that functional results are better when mobility of arythenoids is preserved. The reason is that they take part in the sphincteric function of the neolarynx. Another reason for aspiration is dehiscence of pexy and downward shift of the cricoid.

Although the recurrent nerve is never really visualized during surgery, and many state that identifying it is not necessary it is advisable to carefully and gently handle the cricothyroid joint. The observation of impaired mobility already in the course of surgery, which we refer to the distension of the recurrent nerve seem to confirm the latter.

**Conclusion**

Careful and gentle desarticulation of the cricoarythenoid joint is crucial for preserving a functional arythenoid. The monitoring of the recurrent nerve intraoperatively and the observation of the arythenoid movement could help to some extent identify the reason for an immobile arythenoid postoperatively. This could also help to improve surgical technique and revise rehabilitation protocol.

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