ABSTRACT

Objective: CO2 laser arytenoidectomy is an effective surgery for widening the posterior glottis in patients who suffer from dyspnea due to bilateral vocal fold paralysis. Twenty-six cases who received CO2 laser arytenoidectomy against bilateral vocal fold paralysis were reviewed. We have experienced during the period from 1984 to 2010. They were 11 male and 15 female and the distribution of age ranged from 6 to 75 years old.

Method: The voice functions (MPT, F0 range, SPL range, PPQ, APQ, and NNEa) before and after the surgery in 18 cases who received CO2 laser arytenoidectomy are reviewed. And the occurrence rates of postoperative granuloma after the two surgical techniques in 26 cases, submucosal cartilage vaporization and internal posterior glottal mucosa + cartilage vaporization was compared.

Results: After the surgery MPT, F0 range, and SPL range decreased significantly after the surgery. MFR and PPQ increased significantly after the surgery. However, APQ and NNEa did not show statistically change between the pre-and post-operation. The occurrence rate of postoperative laryngeal granuloma for submucosal cartilage vaporization was 24%. However, occurrence rate for mucosa and cartilage vaporization cases was 80%.

Conclusion: The most important point of this surgery is to perform the laser arytenoidectomy submucosally. So that it will be prevent granuloma formation or scar tissue formation after the surgery. CO2 laser arytenoidectomy is an effective surgery for widening the posterior glottis in patients and preserve some voice function.

INTRODUCTION

Many surgical procedures have been established to improve airway insufficiency for patients with bilateral vocal fold paralysis (BVFP). The purpose of this surgical treatment is to restore an adequate airway without disturbing voice quality and swallowing.

Laser arytenoidectomy can be performed through an intralaryngeal approach which preserve the airway and voice quality without aspiration. This method is only slightly invasive and is useful for bilateral median vocal fold fixation in BVFP and bilateral cricoarytenoid joint ankylosis as well. Thornell 1 was the first to conduct arytenoidectomy by an intralaryngeal approach. Ossoff 2 introduced the CO2 laser for endoscopic arytenoidectomy. At this department, Dr. Hirano pioneered endoscopic CO2 laser arytenoidectomy in 1984.

However, there are almost no report regarding pre and post operative voice examination of the CO2 laser arytenoidectomy. The purpose of this study is clarify the vocal deterioration after the CO2 laser arytenoidectomy. And clarify the necessity to preserve the internal posterior glottal mucosa (submucosal arytenoidectomy) during the CO2 laser arytenoidectomy.

METHODS AND MATERIALS

Period: 1984–2010
Case : Bil. recurrent laryngeal nerve paralysis: 26 cases
Treatment: unilateral CO2 laser arytenoidectomy with submucosal approach
Gender: male: 11, female: 15
Age: 6 ~ 75 Y/O (median: 60 Y/O)

Causes

| Thyroid cancer operation | 12 (46%) |
| Idiopathic | 6 (23%) |
| Neuromuscular disease | 2 (8%) |
| Cardiovascular operation | 2 (8%) |
| Brain disease | 2 (8%) |
| Laryngeal cancer post CCRT | 1 (4%) |
| Post esophageal operation | 1 (4%) |

RESULTS

Maximum phonation time (MPT sec)
Mean air flow rate (MFR ml / s)
Fundamental frequency level range (SPL range dB)

Sound pressure level range
(F0 range ransemitone)
Pitch perturbation quotient (PPQ%)
Amplitude perturbation quotient (APQ%)

Granuloma (+) Granuloma (-) total
Submucosal cartilage vaporization
5 (24%) 16 (76%) 21 (100%)
(p<0.05)
Mucosa & cartilage vaporization
4 (80%) 1 (20%) 5 (100%)
Chi-square test

DISCUSSION

Vocal deterioration after the CO2 laser arytenoidectomy was significantly observed with MPT, MFR, SPL range, F0 range and PPQ. However, According to maintain the free edge epithelium of the vocal fold in some patients, MPT, MFR, SPL range, F0 range, PPQ, APQ and NNEa did not change. In fact, APQ and NNEa did not show statically change between the pre-and post operation.

We think that acoustic analysis by APQ and some roughness factor of hoarseness did not appear statistically after surgery because of successfully performing the submucosal laser arytenoidectomy in many patients. I have summarized the occurrence rate of postoperative laryngeal granuloma between two surgical techniques. Occurrence rate for submucosal cartilage vaporization was 24%. However, occurrence rate for mucosa and cartilage vaporization cases was 80%.

Submucosal cartilage vaporization will be recommended as a safety technique in comparison to mucosa & cartilage vaporization.

CONCLUSIONS

The unilateral CO2 laser arytenoidectomy with submucosal approach preserves an intact laryngeal mucosa, which prevents the formation of granulation tissue. The resulting airway is good, with minimal compromise of phonation. The unilateral CO2 laser arytenoidectomy with submucosal approach is an important addition to the arsenal of many surgical procedures for the treatment of bilateral vocal fold paralysis.

REFERENCES