

Original Article

Usage of KTP Laser in Posterior Transverse Cordotomy a Sri Lankan Experience

Perera M. B., Daminda D. A. D. G., Jayasuriya C., Kulasiri R. de S., Rupasinghe S.

Keywords

KTP Laser, Cordotomy, Vocal cord paralysis.

Introduction

Bilateral abductor vocal cord palsy has a wide range of etiologies while the treatment often could be challenging to the surgeon, considering the numerous procedures with their own benefits and pitfalls. The commonest cause for bilateral abductor cord palsy is iatrogenic injury (44%) to recurrent laryngeal nerves following surgical trauma. Malignancies (17%), endotracheal intubation (15%), neurological disorders (12%) and idiopathic causes (12%) are described in decreasing frequency¹.

Numerous procedures have been described in the literature regarding treatment for abductor vocal cord palsy². External and endoscopic approaches have been practiced for many decades. CO₂ Laser usage for arytenoidectomy was described first by ossaf et al (1983)³ and Laser cordotomy by Kashima et al (1989)⁴. Many studies had been published regarding the efficacy of CO₂ Laser, but limited data are available regarding usage of KTP Laser in posterior transverse cordotomy with promising outcomes^{5,6,7}, comparable with outcomes of CO₂ Laser cordotomy. No literature has been published on the technical details of laser usage.

Methods

Ethical approval was obtained by the Ethical committee of The National Hospital of Sri Lanka, Colombo. The study period was between 11/3/2013 to 9/6/2014 at the National Hospital of Sri Lanka, where 12 patients ranging from 23 years to 78 years were selected for the study.

All were female subjects. The inclusion criteria were bilateral vocal cord palsy while exclusion criteria being having any concomitant glottic or subglottic stenosis.

A patient administered questionnaire and clinical records were used for data collection. The demography, etiology, decannulation rate, post-operative complication rate, post-operative subjective voice assessment, post-operative pain and the metabolic equivalent of task (MET) scores were assessed. Technical details of energy consumption were also obtained. The visual analog scale of 0 to 10 was used for post-operative pain assessment. A subjective voice assessment was used for the satisfaction of voice outcome, as no validated scoring system was available in the vernacular language.

All patients presented to us with long-term tracheostomy for over 6 months. Preoperative assessment of vocal folds was done with Stroboscopy or Fiberoptic laryngoscopy and the side of the vocal fold for surgery was selected. The procedure was performed under general anesthesia and a suspension micro laryngoscope and LASER safe microscopic technique was used. 532nm KTP Laser was used in a continuous mode with the assistance of a 0.3mm fiberoptic cable. A posterior transverse cordotomy was performed while extending the wedge resection to the lateral border of thyroid cartilage and dividing the false cord too.

Post-operative antibiotics and dexamethasone were administered for 3 days. All patients underwent an examination under anaesthesia one week post operatively and were followed up every month for 3 months and annually. All patients underwent voice rehabilitation.

Results

Bilateral vocal cord palsy was due to thyroidectomy in 10 patients, while cerebrovascular accident was the cause of one patient and the other due to a mediastinal mass diagnosed with chronic myeloid leukemia.

10 patients (83%) were successfully decannulated, while 2 patients (17%) failed decannulation. One person (8%) developed chronic aspiration as the only serious complication.

The median pain score according to the numeric pain intensity scale was 1. The mean MET scores for effort tolerance pre-operative and post-operative were respectively 2.6 and 4.2 (P=0.018) (table 1) . 6 patients were satisfied with the regained voice while 4 were moderately satisfied and 2 patients were disappointed with their voice outcome. The overall satisfaction of the procedure was good in 70%. Mean wattage was 8 watts. The energy used ranged from 1175J to 4465J with a mean of 2126J (Table 2).

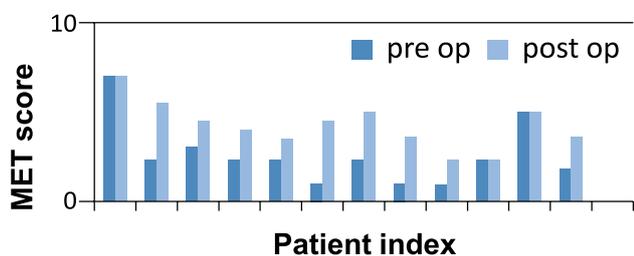


Table 1: Pre-op and post-op MET scores

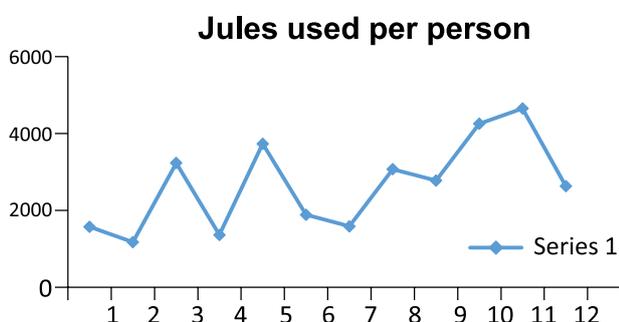


Table 2: Energy consumption in KTP Laser cordotomy

Discussion

Bilateral vocal cord palsy has been traditionally treated by performing a tracheostomy⁸. One

should not underestimate the social stigma and burden carried along with the procedure. Hence many procedures have been tried from vocal cord excision, arytenoidectomy, reinnervation surgery and cord lateralization procedures with limited success compared to cordotomy¹². Patients are willing to undergo these procedures just as a method of decannulation despite the poor outcome of quality of voice in some of these methods.

Posterior transverse cordotomy has been performed by using diathermy, Coblation, CO2 laser and KTP Laser. Few studies are published with comparisons between the techniques¹¹. Surgery following diathermy has considerable post-operative pain and chance of scarring, while Coblation is relatively painless, but little published data is there on its efficacy¹¹.

Laser cordotomy has added advantages than other procedures such as arytenoidectomy⁵. It has a decreased operative time and lesser hospital stay, relatively simple procedure where technique is easily acquired. Cordotomy is considered a minimally invasive procedure. The vocal ligament and vocal muscle is released from the vocal process of the arytenoid. The tissue retraction followed by this procedure produces an adequate air space for ventilation. Since the anterior two third of the vocal cord is unharmed and the arytenoid spared, the voice quality is hardly impaired, as even seen in our subjects⁵. The cut segment of the vocal fold remains in the midline to vibrate well to produce sound. Thus it is recommended even for professional voice users. It is now proposed as an alternative to tracheostomy and may be used even in cases which may spontaneously recover.

The advent of KTP Laser with a wave length of 532nm in the visible range of light has made it possible to deliver through a fiber optic Laser delivery system. This makes handling much easier than CO2 Laser, where targeted therapy is done with ease with the use of a specialized wand. KTP Laser is known to have minimal complications with regard to glottic oedema,

granuloma and scar tissue formation. This was confirmed in all our patients when they have reviewed our serial follow-ups. Haemostasis is easily achieved with KTP Laser. There was a common arterial bleeder from a branch from the superior laryngeal artery, near the proximity of the thyroid cartilage which was easily controlled with KTP laser.

Of the two patients who failed decanulation, one patient was suffering from a cerebrovascular accident and pulmonary complications hence benefited from keeping the tracheostomy. The other patient who failed decanulation was subjected to a repeat procedure 6 months later and successfully decanulated. The only complication we encountered was a chronic aspiration in one patient. We had no record of glottic oedema, haemorrhage, granuloma formation or posterior glottic scarring

Voice assessment in our patients were performed on a subjective basis due to the non-availability of a validated voice assessment score. The MET scores had statistically significant improvements post operatively, which resulted in better quality of life. The overall voice improvement, decanulation and improvement in physical activity, all contributed to the overall satisfaction of this procedure in our subjects.

Study	Year of publish	No. of cases	De-canulation rate	Complication rate
Hazarika et. al. (India) ⁵	2002	3	100%	0%
Segas J et.al (Athens) ⁷	2001	5	100%	0%
Manolopoulos L. Et.al ⁶	1999	4(+14CO2)	80%	30%
Our study	2017	12	83%	8%

Table 3: comparative data on patients undergone KTP Laser cordotomy. Note Manolopoulos (1999) reported a collective data series along with CO2 Laser surgeries.

Comparative data published as shown in table 3 Are limited in number but are comparable with the results in our study^{5,6,7}.

Conclusion

Usage of Laser has been a well-established practice in treating bilateral vocal cord palsy. The usage of KTP Laser has been described, but only a few published data are available for comparison. Our results in 12 patients are satisfactory and comparable with other data. Limitations of this study include a small sample size, limited literature review and no other centre in Sri Lanka performing KTP Laser cordotomy to compare results with.

References

1. Benninger MS, Gillen JB, Altman JS. Changing etiology of vocal fold immobility. *Laryngoscope*. 1998 Sep. 108(9):1346-50
2. Li Y, Garrett G, Zelear D. Current Treatment Options for Bilateral Vocal Fold Paralysis: A State-of-the-Art Review. *Clin ExpOtorhinolaryngol*. 2017 Sep. 10 (3):203-212.
3. Ossoff RH, Sisson GA, Duncavage JA, et al. Endoscopic laser arytenoidectomy for the treatment of bilateral vocal cord paralysis. *Laryngoscope*. 1984 Oct. 94(10):1293-7.
4. Dennis DP, Kashima H. Carbon dioxide laser posterior cordectomy for treatment of bilateral vocal cord paralysis. *Ann OtolRhinolLaryngol*. 1989 Dec. 98(12 Pt 1):930-45.
5. Hazarika P, Nayak DR, Balakrishnan R, Raj G, Pujary K, Mallick SA. KTP-532 laser cordotomy for bilateral abductor paralysis. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2002;54(3):216-220. doi:10.1007/BF02993106.

6. Manolopoulos L, Stavroulaki P, Yiotakis J, Segas J, Adamopoulos G. CO2 and KTP-532 laser cordectomy for bilateral vocal fold paralysis. *The Journal of Laryngology & Otology*. 1999;113(07).
7. Segas J, Stavroulakis P, Manolopoulos L, Yiotakis J, Adamopoulos G. Management of Bilateral Vocal Fold Paralysis: Experience at the University of Athens. *Otolaryngology-Head and Neck Surgery*. 2001;124(1):68–71.
8. Brigger MT, Hartnick CJ. Surgery for pediatric vocal cord paralysis: a meta-analysis. *Otolaryngol Head Neck Surg*. 2002 Apr. 126(4):349-55.
9. Anand V, Kumaran BR, Chenniappan S. Cordoplasty: a new technique for managing bilateral vocal cord paralysis and its comparison with posterior cordotomy and external procedure in a large study group. *Indian J Otolaryngol Head Neck Surg*. 2015 Mar. 67:40-6.
10. Lagier A, Nicollas R, Sanjuan M, Benoit L, Triglia JM. Laser cordotomy for the treatment of bilateral vocal cord paralysis in infants. *Int J Pediatr Otorhinolaryngol*. 2009 Jan. 73(1):9-13
11. El-Anwar M. Comparison between laser and diathermy assisted posterior cordotomy for bilateral vocal cord abductor paralysis. <http://isrctn.com/>. 2013;
12. Bilateral Vocal Fold Paralysis Treatment & Management [Internet]. *Bilateral Vocal Fold Paralysis Treatment & Management: Medical Therapy, Surgical Therapy, Intraoperative Details*. 2017 [cited 2017Oct12]. Available from: <http://emedicine.medscape.com/article/863885-treatment>