

Coblation: Ideal Tool for Benign Lesions of Larynx

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Background: Benign lesions of larynx are not uncommon they are significant in that they produce wide range of symptoms ranging from change in voice to lifethreatening stridore .These lesions can occur in any age group but has a higher incidence in 20-40 yrs age. Both cold instruments and powered tool are used in management of these lesions, various powered tools available for surgery are microdebridor, coblation, radiofrequency and laser. All aiming to improve results and, reduce operative time, morbidity and complications. The aim of this article is to study the merits and demerits of Coblation in management of benign laryngeal lesions

METHODS:A study of 30 patients aged between 18-70 yrs who attended our outpatient department with complaints of hoarseness of voice regularly at our secondary care centre from jan 2015 until Aug 2019. Preoperative assessment was done with rigid 70 degree endoscope .All patients underwent Coblation assisted micro laryngeal surgery .Post operatively patients were followed up surgical outcome and complications were noted

RESULTS :A total of 30 patients under went Coblation assisted micro laryngeal surgery during the period .sex ratio Male: female ratio 3:1 .12(40%) presented with polyps, 6(20%) cysts,4(13.3%) Angiomas, 4(13.3%) vocal nodules, 1(3.3%) Granulomas, 2(6.6%) solitary papillomas 1(3.3%) multiple papillomas. The hoarseness of voice is the common symptom in 24(80%) patients, while stridor was the predominant symptom in 1(3.3%) patient. No significant complications

CONCLUSION: Coblation is a wonderful tool that can be used in management of benign lesion of larynx has irrigation, suction, ablation as well as coagulation that can help in complete removal of these lesions with preservation of normal anatomy.

Keywords: - Coblation, benign, microscope, larynx, laryngoscope

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I. Introduction

Benign lesions of larynx (BLL) vocal cord nodules ,polyps ,granulomas and papillomas not uncommon they are significant in that they produce wide range of symptoms ranging from change in voice to life threatening stridore Various authors have defined benign neoplasms of the larynx differently, Hollinger defined in 1951, "as any mass of tissue in the larynx which does not present characteristics of malignancy"².Chopra et al studied 67 patients with various benign laryngeal lesions. The lesions were categorized and a correlation of clinical, micro laryngoscopic and histologic features was done, as well as evaluation of the age, incidence, occupational factors. They also described the effectiveness of micro laryngeal surgery and speech therapy in the management of these lesions³.

Dickers³ studied 74 patients (92 vocal folds). They found that benign lesion of vocal folds have various appearances and histopathological examination would provide the diagnosis. Single histological features did not differentiate between clinical entities, instead a combination was more likely to be seen. However an abnormal increase in layers of the basement membrane is seen in vocal polyps, nodules and in Angiomas.

New GB and Erich JD defined it as "an abnormal mass of tissue in the larynx, the growth of which exceeds and is uncoordinated with that of normal tissue and persists in the same excessive manner after cessation of stimuli which evoked the change"¹. The clinical evaluation of these benign laryngeal lesions employs a combination of history, physical examination, and videostroboscopy, all of which aid in evaluation of the anatomy and vibratory characteristics of the glottis. These lesions are more common in males ,in larynx vocal cord is most common site of origin. Various factors which contribute for benign vocal cord lesions are; allergy ,smoking ,vocal abuse,(singing, coaching, cheerleading) alcoholism , hypothyroidism ,acid reflux¹¹

Hoarseness of voice is broad term their exists evaluation method called An auditory-perceptual evaluation method .This method has GRBAS scale of the Japan Society of Logopedics and Phoniatics, which gives scores of 0, 1, 2, or 3 for the Grade of hoarseness; Roughness, Breathiness, Asthenia, and Strain, where 0 is normal, 1 is a slight degree, 2 is a medium degree, and 3 is a high degree by this scale we can diagnose type of lesion clinically^{4,5}.Histological differences in these lesions are the basis for their clinical classification as

:gelatinous(polyp), fibrous (nodules) or angiomatous (cysts). These histological characteristics can vary to a greater or lesser extent, thereby influencing their clinical presentation. The vocal fold consists body is formed by the vocalis muscle ,cover formed by epithelium.. The. Between these two layers is the transition zone composed of the intermediate (elastic) and deep(collagen) layers of lamina propria which together make up the vocal ligament.various changes ,alterations in these layers leads to development of benign lesions. The most widely used techniques to detect changes are periodic acid-Schiff (PAS) staining and immunochemistry to detect laminin and type IV collagen together which are better identified in basal membrane alterations and differentiate between polyps nodules and cysts allowing a more accurate diagnosis. There is a consensus regarding the main histological characteristics of polyps, nodules and cysts ,in polyp there is absence of epithelial alterations , the presence of swelling in the lamina propria, inflammation, and an increase in vascular aspects.In vocal nodule present consensus is alteration in surface epithelium and lamina propria ¹⁰

To diagnose a benign vocal cord lesion, various diagnostic techniques include videolaryngoscopy: A high-definition camera attached to the scope captures close-up images of vocal cords and other parts of the throat, Stroboscopy is a technique that uses fast flashes of light to illuminate the vocal cords. The strobe light is attached to an endoscope used during the laryngoscopy. The flashing light is first synchronized with the rate of vocal cord vibration, The result creates the illusion of your vocal cords moving in slow motion, allowing doctors to see even the fine structural features of your vocal cords. Multiple surgical techniques like micro laryngeal surgery ,endoscopic assisted surgery have been described and diverse instruments like Coblation , luminous lasers, radiofrequency have been evolved for this purpose. Advantages of coblation over other are Low risk of airway fire ,ability to control over bleeding, complete excision is possible, risk of scarring is very less ^{7 8}.

Coblation technology is based on non heat driven process of soft tissue dissolution which makes use of bipolar radio frequency energy 1. The Coblation process was invented by Philip E. Eggers and Hira V in 1993. This energy is made to flow through a conductive medium like normal saline. Coblation wand has two electrodes i.e. Base electrode and active electrode. These electrodes are separated by ceramic. Saline flows between these two electrodes. Current generated flows between these two electrodes via the saline medium saline gets broken down into sodium and chloride ions thereby forming active plasma which ablates tissue . These highly energized ions form a plasma field strong enough to break organic molecular bonds within soft tissue causing its dissolution. The effect of plasma on tissue is purely chemical and generates H and OH ions. . OH radical causes protein degradation and removal of tissue with minimal damage to adjacent tissue. Our coblation technology devices are able to create ,a temperature of 60 degree to 70 degrees and stable plasma layer of only 100µm-200µm thick around the active electrode at inter space The generated frequency from coblator is around 200 kHz this allows for the precise excision of tissue while minimizing the heat that is transferred to the surroundings ¹³.

Laryngeal wand are of two types. Normal laryngeal wand The PROCISE LW laryngeal wand which is used for ablating bulky laryngeal mass lesions like papillomas and Granulomas . Mini laryngeal wand The PROCISE MLW laryngeal wand is used to remove small polyps from vocal folds. The main advantage of mini laryngeal wand is its ability to reach up to the sub glottic area

II. Materials & Methods

A Prospective controlled study of 30 patients aged between 18-70 yrs who attended our out patient department with complaints of hoarsness of voice regularly at our secondary care centre from Jan 2015 until Aug. 2019 were selected. . Preoperative assessment was done with rigid 70 degree endoscope.

Consent of patient and ethical clearance were obtained .All the patients underwent Coblation assisted Micro laryngeal surgery by the same surgeon. Follow-up period ranged from 12 to 18 months..Table 1, Table 2

Inclusion criteria: The adult patients aged between 18 to 70 years presented with symptomatic hoarsness of voice. Vocal cord polyp, Cysts, Nodules which failed to respond to conservative treatment ,Garanulomas ,Angiomas ,solitary papillomas ,multiple papillomas.

Exclusion criteria: children below 18 years and above 70 years. Vocal cord paralysis cases,Tuberculosis ,Malignant growths,

Statistical analysis- Surgery time in minutes from incision to reposition of vocal cord flap, was noted. One month after surgery Post op video laryngoscope done and any complication recorded patients followed for a period 18 months. The data collected and statistical analysis was done using SPSS software 2007.

PROCEDURE

Coblation assisted Microlaryngeal surgery or phonomicrosurgery is a minimally invasive procedure used to r remove abnormal growths, such as polyp, nodules ,granulomas or benign cysts, in the larynx. It is usually performed to correct voice disorders .initially pre operative evaluation is done hypertension ,hypothyroidism if present is treated appropriately .Pt is educated regarding the diagnosis ,procedure and out

come. All cases operated under general anesthesia with endotracheal intubation this is usually accomplished by combination of IV medication and use of gases anaesthetic. pt in supine position with head slightly extended. Special attention should be directed to adequately protecting the patient's eyes and arms to prevent accidental injury, a tooth guard should be used routinely to prevent compression by heavy surgical instrumentation. It may be warned the patients in advance of the potential for dental trauma, and any previous dental damage should be carefully documented. Initially direct laryngoscopy done L shaped Kleinsasser laryngoscope held with left hand is inserted into mouth and passed down till vocal folds are visible then it is pushed further until it sits above vocal folds once vocal cords, vocal folds are visualised and ET tube in mid line suspension stand is attached to laryngoscope and fixed to operation table. Once suspension is attached both the hands of surgeon are free then operating microscope with focal length 400mm is focused to vocal cords use of microscope provides three dimension view of larynx these steps are same for cold instruments and powered instruments. Coblation wand held with left hand and micro forceps held with right hand inserted into laryngo scope and lesion dissected from underlying tissues. The power level settings set at 6 for Coblation and 3 for coagulation. Three instruments cup forceps, scissors and suction are commonly. Initially from the lesion small bit is taken for histopathological examination then using laryngeal wand lesion is ablated. Direct Laryngoscopy requires deep anesthesia as it causes strong stimulation of physiologic reflexes, and respiratory, cardiovascular, and neurologic adverse effects are possible. Hypertensive patients, patients with ischemic heart disease are particularly at risk. Deep anesthesia, application of topical anesthetic 4% xylocain spray, prevention of the sympathoadrenal response with drugs such as atropine or intravenous xylocain and minimizing mechanical stimulation can attenuate these adverse effects. Post operatively, each patient was given antibiotic, steroids, and anti-inflammatory for 1 week, antacid for one month, absolute voice rest for Two weeks. Post operative assessment of larynx done with 70° rigid video laryngoscopy at each visit. Patients were regularly followed up at interval of 1 week, 1 month, 3 months 6 months and one year.

III. Results

A total of 30 patients underwent coblation assisted microlaryngeal surgery during the period. Sex ratio Male: female ratio 3:1 mean age was 32 ± 9.2 , most patients were between age group 30-40 yrs. 12(40%) presented with polyps, 6(20%) cysts, 4(13.3%) Angiomas, 4(13.3%) vocal nodules, 1(3.3%) Granulomas, 2(6.6%) solitary papillomas 1(3.3%) multiple papillomas. Except for multiple papillomas all cases underwent conservative treatment prior to surgery, failure to respond for conservative treatment cases were taken for treatment for coblation assisted microlaryngeal surgery. Appearance of various benign lesions of larynx in our study vocal cord polyps 12(40%) : unilateral, translucent, red pedunculated arise in the free edge of anterior third of vocal fold. Vocal cord nodules 1(3.3%) appeared as symmetric bilateral mass lesions, white to opaque, firm and present at the junction of anterior and middle third of vocal folds. Vocal fold cysts 6(20%) unilateral in anterior third of vocal fold, is a sac that is typically filled with fluid or mucus pathologic entities that tend to occur at a slightly deeper plane of lamina propria. Granulomas 2(6.6%) appearance was polypoidal, nodular, fungating located in the posterior third of vocal folds. Measuring 12mm in diameter pale grey in color. One(3.3%) case of multiple papilloma larynx polypoidal fungating large size occupying posterior commissure of larynx this was revision case operated twice. This time it was operated by coblation technology preoperatively around 10 ml blood loss was noticed. post operative follow up done for 18 months, no recurrence was observed. There were no major complications in the present study, post operative pain observed for two days, noticeable voice change seen after two weeks, all patients had satisfactory voice during follow. The pressure of the laryngoscope caused pain or numbness to the tongue or lips or, tooth injury in few patients which was not related to coblation.

IV. Discussion

Coblation assisted microlaryngeal surgery in minimal invasive surgery for benign laryngeal lesions. A lot of changes have taken place in laryngeal lesions treatments over period of time but still cold steel instruments technique developed by Oskar Kleinsasser in 1968 are still used with little modification. BLL are more common in males of 30-40 yrs age group, vocal cord is most common site followed by false cords, lots of factors contribute for development of these lesions. In nodules, polyps, cysts conservative treatment should be going for surgery. In case of papillomas, Granulomas, Angiomas there is hardly any role of medical management.

In 1974, Hirano described the vocal folds as a layered structure according to a body cover concept. The cover consists of the overlying epithelium and superficial lamina propria. The body is formed by the vocalis muscle between these two layers is the transition zone composed of the intermediate (elastic) and deep (collagen) layers of lamina propria which together make up the vocal ligament. The preservation of the relationship between the cover, the transition zone and body is essential for favourable voice outcome.

Vocal fold polyps ,cysts, nodules ,Angiomas are generally unilateral can be classified as sessile or peduncular, The origin for these is phono traumatic other factors which contribute for these are smoking allergy, pollution aspiration and gastroesophageal reflux . In our study The coblation PROCISE MLW laryngeal wand which is ultra-slim has a working length of 19 cm with 16 degree angulations at the tip allows access to subglottis and trachea was used to remove polyps ,cysts and nodules . Single wire electrode at the tip provides improvised visualization of the field and precise dissection from under lying tissues. At the same time, the overlying layer must be preserved and draped over the area where the cyst was removed to minimize the chance of scar. This type of surgery, commonly called a “micro flap approach”, is technically challenging because the cyst, which is usually fragile. For polyps and Angiomas after elevation of surface cover epithelium just a touch with wand electrode desolves lesion completely, for vocal nodules incision along free margin of vocal cord is necessary to remove lesion The beauty of this tool is there is hardly any bleeding during surgery,no suction is needed, post operatively very less pain. Operating time is very less.The main drawback with these lesions is some times it is difficult to get tissue for biopsy when using coblation

In our study we encountered one multiple papilloma case operated twice , appearance was like a wartlike growth in posterior commissure of larynx, these lesions are cause generally by the Human Papilloma virus (HPV) The growth of the lesions of papilloma generally represents an interaction between the virus and the susceptibility in a given person’s immune system. Voice abuse has no bearing on the formation of papillomas For papillomas, Granulomas ,bulky laryngeal lesions coblation PROCISE LW laryngeal Wand was used it has a working length of 16.5 cm and 15-degree angulation at the tip allowing optimal access to larynx.The shaft of the wand is malleable which can be used to adapt to the patient anatomy . Peroperatively patient had bleeding because of fibrosis which was successfully managed by coblation post operatively patient had satisfactory voice ,followed for one year there was no recurrence There have been various studies that have shown coblation to be a promising tool in the treatment of recurrent laryngeal papillomas ¹⁴.

The numerous possibilities of clinical, surgical and speech therapy interventions preclude therapeutic consensus in these cases .Results of this small sample seems to support the previous small studies finding that coblation is a good tool in excision of benign laryngeal lesions

Nevertheless, there are very few studies on this topic, studies conducted with greater scientific rigor are needed to establish criteria for the most effective treatment of benign laryngeal lesions

V. Conclusion

Coblation is a wonderful tool that can be used safely in management of benign lesion of larynx like polyps, Angiomas ,cysts ,papillomas it has irrigation, suction, ablation as well as coagulation that helps in complete removal of these lesions with preservation of normal anatomy and good voice. Its use particularly in papillomas prevents recurrence, main drawback is cost and has long learning curve.

This research paper was approved by Ethical Committee of Mount Zion Medical College, Ezamkulum, Door Pathanamhitta (dist) Kerala

-No Conflict of Interest

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Diagnosis: Table 1

Diagnosis	Site of lesion	Number of patients N=30	Percentage
Polyps	Right vocal cord	4	13.3%
	Left vocal cord	8	26.6%
Cysts	Right vocal cord	4	13.3%
	Left vocal cord	2	13.3%
Nodules	Right vocal cord	3	10%
	Left vocal cord	1	3.3%
Angiomas	Right vocal cord	1	3.3%
	Left vocal cord	3	10%
Granulomas	Left vocal cord	1	3.3%
Solitary papilloma	Left vocal cord	2	6.6%
Multiple papillomas	Post commissure	1	3.3%

INCIDENCE OF SYMPTOMS Table 2

symptoms	Number of cases	percentage
Hoarseness of voice	24	80 %
Foreign body sensation	3	10 %
cough	2	6.6 %
dyspnoea	1	3.3 %

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