Transoral Laser Excision of Cancer Larynx

Essay

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Michael Mounir Kamel

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List of Abbreviations

AJCC	American Joint Committee on Cancer
Ar Laser	Argon Laser
CO2 Laser	Carbon Dioxide Laser
CT	Computed tomography
CW	Continuous wave
Er:YAG Laser	Erbium:YAG Laser
Ho:YAG Laser	Holmium:YAG Laser
KTP Laser	Potassium-Titanyl-Phosphate Laser
Laser	light amplification by the stimulated emission of radiation
Maser	microwave amplification by the stimulated emission of radiation
MRI	Magnetic resonance imaging
Nd:YAG Laser	Neodymium: Yttrium-Aluminum-Garnet Laser
PDI	Photo Diagnostic Imaging
PDL	Pulsed-Dye Laser
PDT	Photo Dynamic Therapy
PES	pre-epiglottic space
PGS	paraglottic space
SCC	Squamous cell carcinoma
TEM	Transverse electromagnetic mode
TLM	Transoral Laser microsurgery
TNM system	Tumor-node-metastasis system
UADT	Upper aerodigestive tract
UICC	International Union Against Cancer

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Introduction

Laryngeal cancer is the most common head and neck cancer representing roughly 30% of all cases. The standard treatment for locally advanced laryngeal cancer is total laryngectomy and postoperative radiotherapy. Laryngectomy may be associated with impairment in smell, taste, and swallowing abilities, but unquestionably, the major problem relates to the loss of natural speech. Laryngeal cancer patients are often willing to make tradeoffs between quality and quantity of life in order to preserve their larynx **(Hong, Lippman and Wolf, 1993).**

In the treatment of laryngeal cancer, equal emphasis is laid on maximizing cures and preserving laryngeal functions **(Pradhan et al., 2003).**

The decision to treat patients suffering from glottic cancer with either radiotherapy or surgery is both complex and controversial. Transoral Laser microsurgery is a surgical technique that offers an attractive alternative therapy for laryngeal cancer. In addition to excellent oncologic outcomes and organ preservation, the benefits of transoral Laser microsurgery include low morbidity and mortality, shorter periods of hospitalization and exceptional functional results **(Grant et al., 2010).**

Since their development in 1960, Lasers as surgical tools have evolved and now play an important role in the diagnosis and treatment of cancer **(Werner et al., 2002).**

In the last decade, transoral Laser surgery has become an important tool in the treatment of laryngeal cancer and has become the standard approach in many institutions **(Preuss et al., 2009).**

Several Laser systems have been used for treating various diseases. However, the argon and CO2 Lasers were the first Laser systems to be clinically used in the otorhinolaryngology. The CO2 Laser currently has the greatest significance in otorhinolaryngology especially in the treatment of carcinomas of the upper aerodigestive tract **(Werner et al., 2002).**

Utilized endoscopically, CO2 Laser has been of help in establishing the proper staging, in diagnosing recurrence after radiation therapy, in re-establishing airways blocked with tumor, in debulking tumor mass prior to radiation and/or chemotherapy, and as a primary mode of excisional therapy, all accomplished with minimal morbidity. Most patients may return home the first postoperative day, eating, with serviceable voice, and requiring no tracheostomy or analgesics. This provides a significant cost benefit **(Jeong et al., 2012).**

Aim of the work

To review role of transoral Laser in treatment of both early and late stages cancer larynx and to review its advantages, as a part of laryngeal preservation techniques, over conventional methods of treatment such as surgery.

Surgical And Endoscopic Laryngeal Anatomy

The larynx is part of the respiratory system and is located at the upper level of the airway. Because of its strategic and unique position, in relation to the crossover between the air and food passages, it is often referred to as part of the upper aerodigestive tract. It is also known as the organ of phonation, owing to special modifications of its anatomy during evolution that have rendered it able to produce voice. Indeed, from a physiologic point of view, it is essentially a valve or sphincter with a triple function: (1) that of an open valve in respiration; (2) that of a partially closed valve whose orifice can be modulated in phonation; (3) that of a closed valve, protecting the trachea and bronchial tree during deglutition **(Piazza et al., 2010).**

The larynx is divided anatomically into the supraglottis, glottis and subglottis by the false and true cords . The supraglottis consists of superiorly the epiglottis and aryepiglottic folds as they sweep down to the arytenoids. Its lower border is the ventricular bands (false cords) which form the upper border of the glottis. The glottis includes the vocal cords and anterior commissure and posterior commissure. The definition of the junction between the glottis and the subglottis has been debated at some length and is either defined as at the level of the vocal folds or 5-10 mm below. The subglottis becomes the trachea at the lower border of the cricoid (Fig.1) **(Beasley, 2008).**

The framework of the larynx consists of the hyoid bone and a number of cartilages connected by ligaments, membranes and intrinsic and extrinsic muscles to give it stability. It is lined with a mucous membrane that is continuous above with the pharynx and below with that of the trachea. The spaces around the larynx are filled with adipose tissue and loose connective tissue and are key to understanding the spread of tumors within the larynx **(Beasley,2008).**

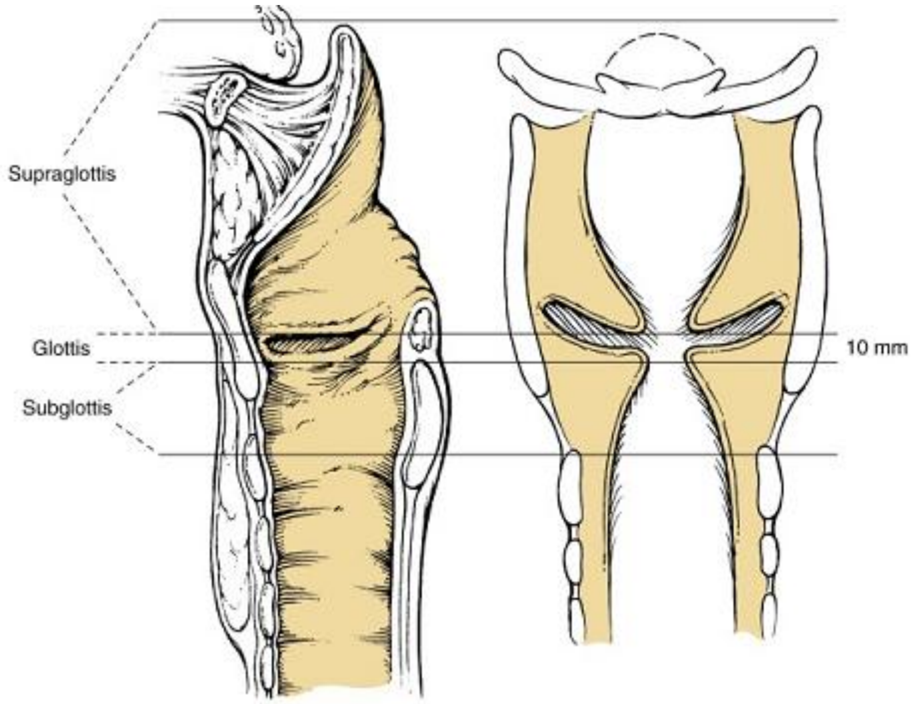

Fig.(1): Classification of laryngeal lesions by the anatomic site involved (Ogura and Biller, 1971).

In the adult, the larynx is located on the ventral side of the bodies of the fourth, the fifth and the sixth cervical vertebra (usually more cranially in women, and more caudally in men), whereas in the child it is usually positioned somewhat cranially, reaching the second cervical vertebra with its superior aspect at birth. In any case, the larynx is separated from the vertebral column by the dorsal wall of the oropharynx and hypopharynx. The position of this organ is influenced by movements of the head and neck and it also moves during deglutition and phonation. It is elevated when the head moves posteriorly (extension) and is depressed when the head is displaced anteriorly (flexion). This fact has profound clinical and surgical implications. The ideal position for every open-neck surgical procedure on the larynx, in fact, is the extended position, with the organ being stretched upward by the suprahyoid muscles, well above the sternal notch. By contrast, during microendoscopic laryngeal surgery, in the case of difficult exposure of the endolarynx (particularly when the anterior commissure must be accurately assessed or manipulated), the flexed position is of help owing to the tension of the prelaryngeal strap muscles and posteroinferior drop of the whole laryngopharyngeal complex. For the passage of the rigid laryngoscope, endotracheal tube or bronchoscope, it is also essential to know the position which brings the axes of the mouth, oropharynx and laryngeal inlet into line; this is achieved by bringing the neck forward (in a flexed position) and at the same time extending the head fully at the atlanto-occipital joint **(Piazza et al., 2010).**

Supraglottis

The clinical term ‘supraglottis’ refers to that part of the larynx which lies above the glottis. It includes the laryngeal inlet, or ***aditus*** (the aperture between the larynx and the pharynx) (Fig.2), the laryngeal ventricle (the space between the false and true vocal folds), the false vocal folds, the laryngeal (or posterior) surface of the epiglottis, the arytenoid cartilages and the laryngeal (or medial) aspects of the aryepiglottic folds.

The vestibules or false vocal folds are composed of the thickened lower border of the quadrangular membrane, covered by respiratory mucosa. The ventricle presents a fusiform, cranial recess which is called the ***‘saccule’***. It is a pouch which ascends forwards from the ventricle, between the vestibular fold and the thyroid cartilage, and occasionally reaches the upper border of the cartilage. Laterally, the saccule is separated from the thyroid cartilage by the thyroepiglottic muscle, which compresses the saccule, expressing its secretion onto the vocal cords, which lack glands, to lubricate and protect them against desiccation and infection **(Piazza et al., 2010).**