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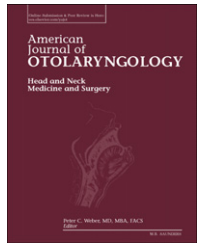

Post-surgical and oncologic outcomes of frontal anterior laryngectomy with epiglottic reconstruction: a review of 68 cases

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ABSTRACT

Objective: To report post-surgical and oncological outcomes of 68 patients treated with frontal anterior laryngectomy with epiglottic reconstruction.

Study design: Demographic data and all information regarding histopathological grade, initial tumor stage and neck status, follow up time, postoperative complications, nasogastric tube removal time, decannulation time and recurrences were collected from the database and follow-up forms.

Setting: All patients between 1994 and 2014 who were treated with frontal anterior laryngectomy with epiglottic reconstruction for early glottic carcinoma at Ege University Otolaryngology Clinic were included in the study.

Subjects and methods: Sixty-six of the patients were male and 2 were female with a median age of 57.5 years (IQR 53–63.75, range 44–75). Four patients had a tumor stage of T1a, 43 had T1b and 21 had T2. Median nasogastric tube removal time, decannulation time, overall and disease free survival rates were calculated.

Results: Median nasogastric tube removal time was 10 days. Median decannulation time was 12 days. Median N/G tube removal and decannulation times were higher in T2 patients but this did not reach statistical significance ($p > 0.05$). Median follow-up time was 68.5 months (6–222 months). Five year disease free survival was 93.5%. There were 6 oncologic failures which were salvaged with total laryngectomy, neck dissection and adjuvant radiotherapy.

Conclusion: According to our results, which is one of the largest reported FAL with epiglottic reconstruction series in the English literature, this procedure's local control and survival rates are high with good functional results.

1. Introduction

Frontal anterior laryngectomy (FAL) is a surgical treatment option in early glottic laryngeal carcinoma involving the anterior commissure. Other than involving the anterior commissure, one or both of the vocal folds can be involved. This technique is grounded on the anatomic and oncologic principles defined by Broyles [1]. Vocal ligament and their

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overlying mucosa adhere to the posterior thyroid cartilage and the inner perichondrium is lacking in the attachment point. Cartilage's resistance against tumor invasion is lower due to this relationship. This weak point is accused for the high incidence of recurrence and cartilage adjacent to the tumors involving the anterior commissure must be resected [2].

It is oncologically safe to resect a 4–5 mm vertical segment of thyroid cartilage in tumors involving only the anterior commissure or involving anterior portion of the vocal folds and the anterior commissure. It is usually possible to achieve satisfactory functional outcomes after applying primary closure for a laryngeal defect secondary to a simple FAL. However vertical cartilage resection in surgeries requiring the removal of more than half of the vocal folds with anterior commissure is typically larger due to oncologic reasons. Primary closure for laryngeal defects after those kinds of larger cartilage resections are difficult and can cause undesired outcomes like stenosis. Large defects need appropriate reconstruction techniques according to the surgeon's choice and expertise. Epiglottic reconstruction is one of the most widely used techniques. Despite first being defined in Europe, it did not gain popularity and became widespread until being reported by Tucker in 1979 with modification of the previous techniques [3]. Also called Tucker's operation, it gained wide acceptance by many surgeons because of the relatively easy technique, low complication rates and favorable oncologic outcomes. Since the early 1980's, we have applied this technique for the surgical treatment of glottic carcinoma. We would like to report our post-surgical and oncological outcomes after FAL with epiglottic reconstruction.

2. Methods

This study was carried out at Ege University Otolaryngology Clinic in concordance with international ethical standards and World Health Organisation Helsinki Declaration. It was approved by Ege University Research Ethical Committee.

2.1. *Study group*

The medical records of patients who were treated with frontal anterior laryngectomy with epiglottic reconstruction from 1994 to 2014 were included in the study. Age, gender, initial tumor stage and neck status, histopathologic grade, postoperative complications, decannulation time, nasogastric tube (N/G) removal time and videolaryngoscopic records of the patients were recorded. Tumor stages were classified according to the TNM classification according to the laryngeal cancer staging designated by the American Joint Committee on Cancer [4].

2.2. *Preoperative evaluation*

Initial examination is done with videolaryngoscopy. Extent of the tumor and the mobility of the vocal folds are noted. Examination with direct laryngoscopy is crucial in determining the extent of the tumor and deciding to apply this technique. Because of this, biopsies for histopathological examination were performed under general anesthesia. Neck status is evaluated with manual palpation and ultrasound. Although not routinely performed unless there is massive cartilage involvement, thin-section CT helps in decision making before the surgery by providing information about the involvement of the thyroepiglottic space, paraglottic space, anterior commissure and thyroid cartilage [5]. We evaluated each patient for chronic pulmonary diseases, cardiovascular diseases, diabetes, and hepatic insufficiency before making a decision for a definite treatment option.

2.3. *Surgical technique*

Surgical technique can be divided into two steps: resection and reconstruction. FAL is a vertical laryngectomy technique which thyroid cartilage is incised vertically and paraglottic space is approached and resected [6]. Both of the vocal folds, a part of the thyroid cartilage with the anterior commissure, anterior portion of the vestibular folds, subglottic 1 cm and under some circumstances one of the arytenoids are resected with this technique. The defect occurring after the resection is closed with epiglottic laryngoplasty.

The head is extended with a shoulder roll and tracheotomy is performed under general anesthesia. Horizontal neck incision passing over the midpoint of the thyroid cartilage is planned. If a neck dissection is planned the incision must be planned with respect to the dissection. After reaching the larynx, the outer perichondrium of the thyroid cartilage is incised in midline in order to create two perichondrial flaps. These flaps are raised beyond the planned thyrotomy line. Two vertical parallel cuts are made on both sides of the thyroid cartilage (Fig. 1). Thyrotomy can be closer to the midline on the side that is less involved with tumor [5]. Thyrotomies can be equally distant from the midline in bilateral tumors whereas a 3–4 mm cartilage can be left posteriorly on the side that is more involved with tumor. Thyrotomy cuts can be made with either a blade or an oscillating saw but one must be very precautious not to disturb the inner perichondrium. Inner perichondrium is incised from the posterior border of the tumor. First incision has to be made on the side that is less involved with tumor. Endolarynx is examined under direct vision and the tumor is removed after incising the side that is more involved with it.

It is possible to remove arytenoid cartilage on the more involved side if it is necessary but in this case the other arytenoid cartilage and cricoarytenoid joint must be preserved. Tumor free surgical margins are confirmed with frozen sections. After the resection is complete (Fig. 2), the surgery is continued with reconstruction. Epiglottis is freed

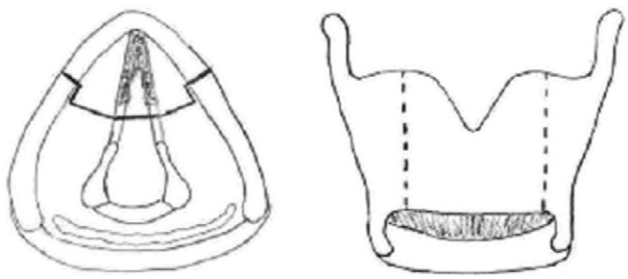

Fig. 1 – Planned thyrotomy incisions.