Reconstructive Laryngectomy: An update

Thesis

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List of Abbreviations

APA	Auditory Perceptual Assessment
CHEP	Crico Hyoido Epiglotto Pexy
CHP	Crico Hyoido Pexy
CT	Computerized Tomography
MR fluoroscopy	Magnetic Resonance Fluoroscopy
MRI	Magnetic Resonance Imaging
MRL	Modified Reconstructive Laryngectomy
PE	Pharyngo Esophageal
RL	Reconstructive Laryngectomy
SCL	Supracricoid Laryngectomy
SLN	Superior Laryngeal Nerve
TCHEP	Tracheo Crico Hyoido Epiglotto Pexy
THEP	Tracheo Hyoido Epiglotto Pexy
THP	Tracheo Hyoido Pexy
TL	Total Laryngectomy
UES	Upper Esophageal Sphincter
VFSS	Video Fluorographic Swallowing Study

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Aim of the work

This study was designed to describe a modification of the standard reconstructive laryngectomy procedure, in order to address problems related to aspiration, and to improve functional results.

Assessment will be made regarding preservation of speech, avoidance of permanent tracheotomy, and safe resumption of oral alimentation. The aim is to spare patients scheduled for total laryngectomy the undesirable effects of this surgery.

Abstract

Objective: The present work describes a modification of the standard reconstructive laryngectomy procedure, in order to address problems related to aspiration, and to improve functional results.

Study Design and Setting: The study was conducted in Cairo University Hospital. Modified reconstructive laryngectomy (MRL) was performed on twelve patients who were scheduled for total laryngectomy. This technique allows for preservation of the superior laryngeal nerves, by fashioning folds of the pharyngeal mucosa to replace the arytenoids. This is followed by reconstruction of the airway through elevation and attachment of the remaining tracheal rings and/or cricoid to the hyoid bone and epiglottis.

Results: MRL was successful in all of the twelve patients included in this preliminary study. All of the patients maintained comprehensible speech and were tracheotomy independent. Only one patient required total laryngectomy after eight months for local recurrence.

Conclusion: MRL with excision of both arytenoid cartilages will expand the range of indications for conservative surgery in the management of cancer of the larynx.

Key Words: Total Laryngectomy - Reconstructive Laryngectomy - Supracricoid Laryngectomy - Aspiration.

Contents

Introduction

Total laryngectomy (TL) is the key stone in the surgical management of cancer larynx. However, the necessity of permanent tracheotomy and the resultant loss of phonation are the end results. There is no doubt that TL is a severely mutilating operation, second only, perhaps, to total blindness. This is why the pre- and post-operative psychological situation takes on such a great importance in patients suffering from laryngeal cancer ***(Arslan, 1974).***

Voice preservation in patients with glottic carcinoma and fixed true vocal cords presents a difficult challenge. Modified and extended vertical partial laryngectomy or radiation therapy with salvage TL has little chance to succeed ***(Harwood et al., 1980).*** Therefore the most widely accepted treatment for glottic carcinoma with a fixed true vocal cord remains TL with primary tracheoesophageal puncture ***(Desanto, 1984) and (Yuen et al., 1984).***

TL has considerably improved the prognosis of patients affected by malignant neoplasms of this organ, but from the start there has been the problem of the rehabilitation of laryngectomized patients and their reinsertion in a normal social life. Although orthophonic reeducation has made it possible for operated patients to express themselves clearly enough with their esophageal voices, the characteristics of their phonation (decidedly unpleasant), the abnormal noisy breathing and the esthetic damage due to the presence of the tracheostoma represent a serious handicap for a normal social life.

The need for a surgical technique which would preserve a passage for

respiration by natural airways after radical excision of the larynx has long been felt by those interested in this kind of pathology ***(Arslan, 1972).***

Surgeons worked hard to introduce an alternate surgery that saves patients the undesirable postoperative consequences of such a procedure. Various conservative laryngeal resection procedures with the aim of preserving phonation, respiration, and deglutition have been described in the medical literature ***(Tucker et al., 1989) and (Laccourreye et al., 1994).***

Endolaryngeal carcinomas extending to the subglottic region are difficult to manage conservatively ***(Tucker et al., 1989) and (Laccourreye et al., 1994).***

In summary, complete recovery of laryngectomized patients can only be achieved by an operation which allows restoration of the elementary functions of the larynx and permanent abolition of the tracheotomy. This result can be achieved by surgical reconstruction of a simplified but functionally adequate organ. The objectives of reconstruction are:

1. Maintenance of respiration through nose and mouth.
2. Satisfactory swallowing without aspiration of food and saliva into the lower respiratory tract.
3. Restoration of spontaneous phonation using the pulmonary expiratory air stream ***(Arslan and Serafini, 1972).***

Conclusion

Modified reconstructive laryngectomy exceeds by far the limits of partial surgery. Preliminary report of the twelve patients operated upon was satisfactory. Complications of the original reconstructive laryngectomy ***(Arslan and Serafini, 1972)*** were minimized by adopting three major measures; preserving the superior laryngeal nerve and its supply to the hypopharyngeal mucosa, narrowing the airway passage using myomucosal flaps and elevation of the larynx.

Only lesions widely extending outside the larynx, to the suprahyoid epiglottis with involvement of the prepiglottic space, base of the tongue or reaching lower down in the trachea beneath the first tracheal ring are not covered by this operation. Such extensive malignancies are only suitable for total laryngectomy.

Reconstructive laryngectomy not only allows for a radical oncological control but also permits creation of a neolarynx adequate for swallowing as well as for speaking. Furthermore, the tracheotomy can be closed. Modified reconstructive laryngectomy provides a new hope for patients who would have otherwise lost their larynx.

Discussion

Total Laryngectomy (TL) has always been the keystone in the surgical management of cancer of the larynx. However, this procedure necessitates a permanent tracheotomy, which results in the loss of phonation. Surgeons have long sought of an alternative surgical treatment that would spare patients this undesirable postoperative consequence. Alternative procedures have included the creation of tracheo-esophageal shunts for speech, partial laryngeal surgeries, and endoscopic laser surgery.

Despite the efforts of surgeons and radiotherapists, there are still certain stages in cancer larynx that are not amenable to conservation surgery.

The development of SCL greatly reduced the range of indications for TL in T3 larynx cancer lesions. However in the SCL procedure, at least one arytenoid cartilage must be preserved to avoid aspiration, while the MRL technique described allows for excision of both arytenoids. This extends the range of indications for SCL, and consequently further reduces the indications for TL. Tracheohyoidopexy involves excision of the anterior arch of the cricoid short of the cricoarytenoid joints, while sparing the posterior plate to support the preserved arytenoids. With excision of both arytenoids, which is possible in the MRL method, the whole cricoid can be included in the excision.

Eighteen patients suffering from squamous cell carcinoma of the larynx over a period of 30 months, and scheduled for TL, were treated using this technique. All of the patients had T3 N0 M0 lesions, and they all had bilateral involvement of the

arytenoids. Six patients had subglottic extension, and four of them had tumor extension to the epiglottis without involvement of the pre-epiglottic space.

In the present study, six patients were subjected to RL as described by ***Arslan and Serafini (1972),*** including five males and one female. One patient developed aspiration, which necessitated a total laryngectomy, but all of the other five patients retained good voice quality. Two patients resumed oronasal breathing without tracheotomy, while the other three had severe edematous mucosa at the tracheal inlet. Subsequent attempts at correction using endoscopic laser dilatation resulted in marked fibrotic stenosis. The resultant opening was sufficient to initiate speech, but the patients had to live with permanent fenestrated tracheotomy tubes.

Results of the original reconstructive laryngectomy are identical to those described by ***Arslan and Serafini (1972).*** These were quite unsatisfactory in terms of long time needed for removal of the nasogastric tube, high grades of postoperative aspiration, inability to resume oronasal breathing without tracheotomy due to severe edematous mucosa at the tracheal inlet and the high incidence of postoperative complications.

Based on our observations and the experience of ***Arslan and Serafini (1972),*** the complications of this surgery could be controlled through the following three measures:

1) Preserving the superior laryngeal nerve (SLN) and its supply to the hypopharyngeal mucosa, thus preserving its reactive function to the passage of food.

According to ***Kronenberger and Meyers (1994),*** sacrifice of the superior

laryngeal nerve results in a sensory deficit in the ipsilateral hypopharynx and the remaining supraglottic larynx, that interferes with the patient's ability to sense secretions and food particles. ***Brasnu et al. (2000)*** also stated that transaction of one or both superior laryngeal nerves would compromise and delay swallowing rehabilitation, and in such cases a temporary gastrostomy is indicated.

2) Narrowing the airway passage with a myomucosal flap, by using part of the inferior constrictor muscle to strengthen the mucosal flap.

3) Ensuring maximal elevation of the larynx to allow the base of the tongue to close the airway in conjunction with the myomucosal flap; this reaction, consequent to the passage of food, is initiated by the preserved SLN.

Functional results can be measured in terms of quality of phonation, average delay in decannulation and removal of nasogastric tube, also in terms of complications necessitating permanent tracheotomy or completion total laryngectomy. All patients subjected to MRL finally had their tracheotomy tubes removed; they all resumed oral feeding and oronasal respiration.

MRL was carried out on 12 patients; all of them were males. The ages ranged from 41 to 66 years with mean age of 52.3 years.

Two patients were more than 60 years, the oldest was 66 years. No pulmonary complications were reported in any of these patients. As long as the pulmonary function was good, no age related complications were noticed. Aging impairs the oropharyngeal motor command and laryngopharyngeal sensitivity. The aging process also affects the esophageal motility. Modifications of the pulmonary