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Review

Systematic review and meta-analysis of the complications of salvage total laryngectomy

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Abstract

Background and objectives: Management paradigms in laryngeal cancer have shifted to "organ preservation" chemoradiotherapy protocols. In the event of treatment failure, salvage total laryngectomy remains the only curative treatment option. However a comprehensive review of the complications of this procedure has not been reported.

Methods: A systematic review of the literature was performed using keywords "salvage laryngectomy" to retrieve relevant publications between January 2000 and August 2015.

Results: Of the 407 articles retrieved from the literature search, 50 studies encompassing 3292 patients were included. Forty-nine studies reported pharyngocutaneous fistula which occurred in 859 patients (pooled incidence 28.9%; 95% confidence intervals 25.5–32.5%). Twenty-four studies reported complications in addition to PCF and these included wound complications (infection, dehiscence and necrosis), dysphagia, bleeding, and pharyngeal and stomal stenosis.

Conclusions: Overall complication rate was 67.5%, Pharyngocutaneous fistula was the commonest complication with a pooled incidence of 28.9%.

Keywords: Laryngeal cancer; Laryngectomy; Salvage surgery; Pharyngocutaneous fistula; Complications; Head & neck surgery

Introduction

Management of laryngeal cancer in recent decades has shifted increasingly toward "organ preservation." This paradigm shift occurred in response to results from the Veterans Affairs Laryngeal Cancer Study Group and Radiation Therapy Oncology Group (RTOG 91-11) trial which demonstrated that organ preservation treatment protocols using radiotherapy/chemoradiotherapy provided equivalent survival outcomes as primary total laryngectomy (PTL) for advanced stage laryngeal cancer.[1,2] Given these findings, the trend towards non-surgical therapy is understandable in the context of the significant morbidity and mortality associated with total laryngectomy, an operation which is increasingly being relegated to the realm of "salvage" surgery. Salvage total laryngectomy (STL) is now being performed in many centres globally where tumour recurrence has occurred following radiotherapy or combination chemoradiotherapy. Understandably with laryngeal preservation protocols, the incidence of STL is gradually increasing while that of PTL is on a decline.

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It is also evident and well established that salvage laryngectomy in previously irradiated tissue carries significant morbidity. However overall complication rates in the literature are varied and not well reported. For example, reported rates of pharyngocutaneous fistula (PCF), the most serious and feared complication of total laryngectomy range between 2.6% and 65.5%.[3] Given the increased patient morbidity, prolonged hospitalization, potential need for reoperations and augmented treatment costs, knowledge of the incidence of this complication is crucial for pretreatment counselling and health economic considerations. In addition to PCF, other complications associated with STL are also important to recognize and a lack of data on the topic has been previously noted.[4] To overcome it this limitation authors performed a comprehensive contemporary systematic review and meta-analysis of complications associated with STL.

Methods

A systematic review of the published literature on STL was performed. The PUBMED, Medline, and EMBASE databases were searched using the keywords "salvage total laryngectomy". Inclusion criteria was articles published in the English language, having undergone STL for a biopsy proven recurrent or residual laryngeal squamous cell carcinoma (SCC), reporting at least 3 cases and published between January 1st 2000 and August 1st 2015. This time period was selected as it reflected the paradigm shift towards organ preservation in the management of laryngeal cancer and reflects current practices in STL. Articles were excluded if a partial or near-total laryngectomy was performed as a salvage procedure, underlying pathology was not SCC or reported data on STL was inseparable from other types of laryngectomy procedures. If this data was separable however, then articles were included in the review. Cross referencing of references was done and relevant articles were included in the review.

Full length manuscripts of publications were obtained and the relevant data was extracted including number of STLs, tumour characteristics and laryngeal cancer TNM stage, prior treatment, concurrent neck dissection, vascularized flap repair, incidence of PCF and other procedural complications. Systemic complications and complications not related to the procedure were not included.

Statistical analysis

Descriptive statistics were presented for patient and tumour characteristics. Pooled values were calculated for PCF incidence using the DerSimonian-Laird random-effects model.[5] Meta-analyses were performed using random-effects models to assess the impact of clinical variables on PCF incidence. The odds ratio (OR) was used as the summary statistic, and reported with 95% confidence intervals (CI). The I^2 statistic was used to estimate the percentage of total variation across studies due to heterogeneity rather than chance. Statistical analysis was conducted with Comprehensive Meta-Analysis v2.2 (Biostat Inc, Englewood, NJ, US). All p-value were two sided, and values <0.05 were considered statistically significant. Statistical analysis was not applied to other complications given the wide discrepancy and variability in which complications were reported and how they were reported across the studies included in this review.

Results

A thorough literature search retrieved 407 publications of which 277 were excluded following title and abstract review. The remaining 130 publications were retrieved and appraised in full. Following full text review, 50 articles[4,6–54] encompassing 3292 patients fulfilled the inclusion criteria of our study (Fig. 1). Studies varied in size from 3[7] to 472 patients[11] and all were retrospective case series, with the exception of one interventional study randomizing patients to chemotherapy followed by radiotherapy, concomitant chemoradiotherapy and radiotherapy only.[12]

Tumour characteristics

Twenty-three studies[8,9,11,12,16,22,23,25–28,30–32,34,39,41,44,45,48–50,54] comprising 1711 patients described the T stage of tumours; T1 or T2 (n = 810) and T3 or T4 (n = 898). Seventeen studies[8,11,12,16,22,25,26,28,30,34,41,44,45,48–50,54] including 1538 patients described cervical nodal disease; N0 (n = 1204) or N1, N2 or N3 (n = 331) (see Table 1). Finally, two studies[18,20] containing 51 patients reported the stage of tumours; I (n = 1), II (n = 5), III (n = 22) and IV (n = 23).

Fifteen studies[8,11,12,16,20,22,23,25,26,30,32,34,41,44,54] described the anatomical location of tumours in a total of 1376 patients (Table 2). The glottis was the most common primary tumour locality (n = 741), followed by supraglottic (n = 473),

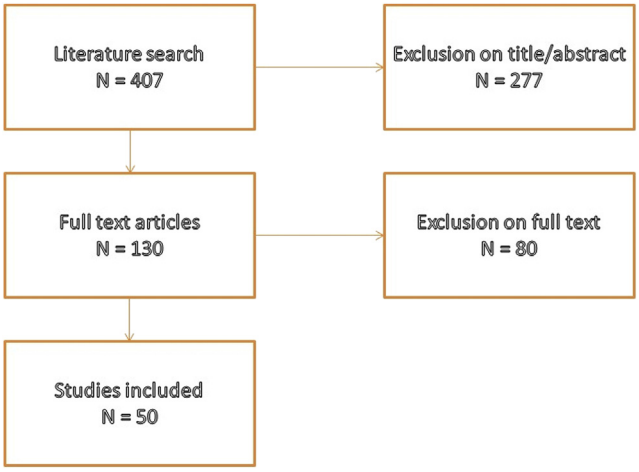

Figure 1. PRISMA flow chart of search strategy and included studies.