Open conservation partial laryngectomy for laryngeal cancer: a systematic review of English language literature

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CRD summary
The review concluded that partial laryngectomy was a safe surgical option for patients with laryngeal cancer; it had good oncological outcomes with acceptable morbidity and mortality. The limited study quality, high degree of statistical variation, absence of comparative data, and lack of evaluation of statistical significance mean that the reliability of the authors' conclusions is uncertain.

Authors' objectives
To evaluate the oncological and functional outcomes after open conservation partial laryngectomy (performed as a primary intervention with curative intent) in patients with laryngeal squamous carcinoma.

Searching
MEDLINE, EMBASE, Zetoc and Conference Proceedings Citation Index were searched for articles published from 1980 up to September 2009. References were checked. Experts in the field were contacted. Studies were filtered so that only data from centres that had published about at least ten partial laryngectomies were included. Papers not in English were excluded.

Study selection
Studies of conservation laryngeal procedures (excluding near total laryngectomy) with a clear description of tumour stage and treatment selection criteria were eligible for inclusion. Description of tumour stage was based on the TNM cancer staging system (extent of primary tumour - T, whether cancer has spread to regional lymph nodes - N, and whether distant metastasis - M - has occurred). The primary outcome was local control rate at 24 months. Only studies with a minimum of two years follow-up were considered.

In the included studies, the surgical procedures were laryngofissure cordectomy, vertical partial laryngectomy, frontolateral vertical partial laryngectomy, supraglottic laryngectomy, supracricoid laryngectomy, and extended supraglottic laryngectomy. Three studies included a small number of participants who had radiotherapy prior to the index surgery; the results could not be separated out. Most participants had T stage 1 and 2 tumours, but a number of participants with T stage 3 and 4 tumours were included. In addition to the primary outcome, local control, survival, procedure specific outcomes (disease-free survival, instance of crico-hyroid/crico-hyo-epiglottic pexy rupture necessitating total laryngectomy), perioperative mortality and morbidity, and functional outcomes were reported.

Studies were selected independently by two reviewers; any disagreements were resolved by consensus.

Assessment of study quality
Two reviewers independently assessed the quality of the included studies using the NICE scoring scale for retrospective case series. This scale included eight items. Each item scored 0 or 1 based on study methods. Scores of 6 points or more were considered to indicate studies of good quality; scores of 3 points or less were considered to indicate studies of poor quality.

Data extraction
Two reviewers independently extracted data on rates (percentages) for all the outcomes of interest. An arcsine square-root was used to transform the data to stabilise the variances.

Methods of synthesis
The meta-analysis was conducted using fixed-effect and random-effects models. Pooled estimates, with associated 95% confidence intervals (CIs), using the random-effects model were presented for all forest plots shown. Statistical heterogeneity was investigated using I² (with high percentages indicating greater between-study heterogeneity in the data). A separate analysis was performed for oncological outcomes of a subset of patients who had supracricoid partial
laryngectomy.

Publication bias was assessed visually using a funnel plot.

**Results of the review**

Fifty-three studies were included in the review (5,196 patients). Follow-up ranged from 24 to 120 months (median 60 months). Twenty-one studies scored 6 or above on the NICE scale for retrospective case series, 29 studies scored 4 to 5, and three studies had a score of 3.

**Oncological outcomes**: The local control pooled estimate was 89.8% (95% CI 88.3 to 91.2; I²= 75.6%; 54 comparisons from 50 studies; 5,061 patients), overall survival was 79.7% (95% CI 76.5 to 82.8; I²=86.2%; 42 comparisons from 38 studies; 3,967 patients), disease-free survival was 84.8% (95% CI 80.6 to 88.7; I²=88.5%; 28 studies; 2,344 patients), and operative mortality was 0.7% (95% CI 0.7 to 0.7; I²=0%; 23 studies; 1,453 patients). The pooled estimate for the subset of patients who had supracricoid partial laryngectomy was 93.5% (95% CI 91.6 to 94.9; 12 studies; 873 patients) for local control, and 80.5% (95% CI 71.4 to 87.8; 12 studies; 89 patients) for disease-free survival. Three cases of crico-hyoid or crico-hyo-epiglottic pexy rupture requiring total laryngectomy were reported.

**Functional outcomes**: The tracheostomy decannulation rate pooled estimate was 96.3% (95% CI 94.9 to 97.6; I²=84.1%; 42 studies; 3,955 patients), laryngectomy function was 1.7% (95% CI 1.2 to 2.2; I²=53.9%; 29 studies; 2,496 patients), laryngectomy salvage was 6.0% (95% CI 4.6 to 7.6; I²=73.4%; 36 studies; 2,705 patients), larynx preservation was 90.9% (95% CI 88.8 to 92.7; I²=78.9%; 39 studies; 3,171 patients), permanent feeding gastrostomy was 2.0% (95% CI 0.9 to 3.6; I²=82.4%; 20 studies; 2,000 patients), and laryngeal stenosis was 2.7% (95% CI 1.8 to 3.8; I²=56.5%; 16 studies; 1,453 patients).

**Authors’ conclusions**

Partial laryngectomy was a safe surgical option for laryngeal cancer with good oncological outcomes and acceptable morbidity and mortality.

**CRD commentary**

The review question was supported by clear inclusion criteria. Several sources were searched to identify relevant articles, although only papers in English were included in the review. The procedures undertaken for study selection, data extraction and quality assessment were likely to have minimised the possibility of reviewer error and bias.

Appropriate criteria were considered in the assessment of study quality but detailed results were not reported; this limited interpretation of results. Significant heterogeneity was found across the analyses, but no investigation of the possible sources was reported. The implications for practice (for comparisons with radiation therapy, and in specific tumour groups) did not appear to be supported by the evidence presented.

Given the limited study quality, the high degree of statistical heterogeneity, the absence of comparative data, and the lack of evaluation of statistical significance, the reliability of the authors' conclusions is uncertain.

**Implications of the review for practice and research**

**Practice**: The authors stated that partial laryngectomy was a safe surgical option for laryngeal cancer and should be considered as a treatment option where indicated. With proper case selection, local control rates were comparable or even better than radiation therapy, and it could be used in selected T3 and T4 tumours, where the only other organ preservation option was chemoradiation.

**Research**: The authors stated that further prospective studies with standardised methods of function assessment compared with non-surgical cohorts, that report relevant oncological outcomes (not just overall survival), were needed.

**Funding**

The George Titley Memorial Fund, Freeman Hospital, UK.

**Bibliographic details**

PubMedID
21764220

DOI
10.1016/j ctrv.2011.05.010

Original Paper URL

Indexing Status
Subject indexing assigned by NLM

MeSH
Disease-Free Survival; Humans; Laryngeal Neoplasms/mortality/surgery; Laryngectomy/methods; Survival Rate; Tracheostomy; Treatment Outcome

AccessionNumber
12012013350

Date bibliographic record published
14/06/2012

Date abstract record published
04/02/2013

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.