



## Best evidence topic

## Oral feeding following laryngectomy: Early or delayed?

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## ABSTRACT

A best evidence topic in otolaryngology was written according to a structured protocol. The question addressed was: In patients having undergone laryngectomy, does the timing of oral feeding lead to a higher post-operative complication rate? 172 papers were found using the described protocol. Five of these papers were chosen to describe the best evidence to address the question. The authors, date and country of publication, study type, patient group, outcomes and key results of these papers have been represented in a table. All of these studies demonstrate that initiation of early feeding in patients post-laryngectomy provides no increased risk of development of pharyngocutaneous fistulas than delayed initiation of feeding. One study demonstrated a statistically significant reduction in hospitalisation of patients after early post-operative feeding. Therefore despite problems with study design, the literature concludes that early feeding is as safe as delayed feeding and may reduce the hospitalisation period. Further powered studies are required before recommendations on explicit inclusion criteria and feeding regimen details can be made.

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## 1. Introduction

A best evidence topic was constructed according to a structured protocol, as described in the International Journal of Surgery [1].

## 2. Clinical scenario

A 58-year-old man has undergone laryngectomy for stage IV carcinoma of the larynx. The operation was performed without complication and he has been taken back to the specialist ward from recovery. In his first post-operative week the patient becomes proficient at his tracheostomy care and both himself and nursing staff are enquiring whether oral feeding can commence, with the patient anxious to return home at the earliest safe opportunity. Senior clinical staff prefer to wait until the second week of recovery until commencing feeding due to the perceived risk of complications, such as a pharyngocutaneous fistula. You decide to assess the literature to resolve this question.

## 3. Three-part question

In [patients after laryngectomy], does the [timing of oral feeding] lead to a [higher post-operative complication rate]?

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## 4. Search strategy

Search strategy using Medline from inception to June 2013: (((pharyngo-laryngectomy) OR (pharyngolaryngectomy) OR (laryngectomy) OR (pharyngectomy)) AND ((feeding) OR (enteral))),ti,ab. Titles and abstracts were scrutinized by two independent reviewers and full texts of related articles were retrieved. Only English language articles analysing the direct comparison between early feeding and delayed feeding in patients who have undergone laryngectomy were selected. Reference lists of key articles were cross-referenced to identify additional articles.

## 5. Search outcome

A total of 172 papers were identified using the reported search strategy. From these, 155 publications were excluded following screening of titles and abstracts. Full text reviews of the remaining 17 articles were performed with 12 subsequently excluded: 4 articles were retrospective case series with/without a lack of control group and 4 articles were non-English language. The remaining 4 exclusions were inappropriate for inclusion due to either the design of the study (e.g. questionnaire-based ( $n = 1$ ), technical review ( $n = 1$ ) or correspondence ( $n = 1$ )) or due to inclusion of partial laryngectomy only ( $n = 1$ ). The remaining 5 articles directly compared early and delayed feeding and therefore were found to

represent the best available evidence to answer the clinical question.

## 6. Results

3 randomized controlled trials, 1 retrospective and 1 prospective observational study were included in the BET article. These are tabulated in Table 1.

## 7. Discussion

Total laryngectomy remains an important operation in the head and neck surgeon's armamentarium against laryngeal cancer, whether for salvage surgery, large volume tumours or functional reasons [2]. However with thorough consideration of the consequences to the patient, any interventions to improve the patient's recovery and quality of life in the post-operative period, as well as shortening their time to discharge home, should be examined. The protracted time to oral feeding after laryngectomy has become an unwritten rule in surgery since the 1920s [3] despite a lack of

evidence on the risk of earlier introduction other than anecdotal. Indeed some authors even recommended a longer delay than the traditional 7–10 days until initiating feeding [4] due to the feared complication of pharyngocutaneous fistula, which can significantly impact on a patient's recovery. The oft cited study [5] that demonstrated a high complication rate actually examined nasogastric feeding versus intravenous nutrition, together with suction drainage and therefore early oral feeding was not directly analysed. Most laryngectomy patients begin swallowing saliva within the first twenty-four hours postoperatively – this is as potentially harmful as clear fluids, and is alluded to in a number of the studies reviewed here.

Aswani et al. [6] undertook a prospective cohort study comparing early feeding with conventional delayed feeding of patients following laryngectomy, with or without partial pharyngectomy. A group of 40 patients were included in the prospective early feeding group and subsequently compared to a retrospective historical control group of 39 patients who received delayed feeding of more than 7 days post-operatively. Details on the operative technique and the early feeding regimen are well

**Table 1**  
Summary of all articles comparing evidence for early and delayed feeding post laryngectomy. Information on each study, key outcome measures and a brief critique are shown.

Author, date and country, study type (level of evidence)	Patient group [days post laryngectomy]	Outcomes [PC:Pharyngo-cutaneous]	Key results	Comment
Aswani et al. 2009 J Laryngol Otol. South Africa Historically controlled study (Level evidence 4)	79 patients in total Early feeding [day 2]: <i>n</i> = 40 • Prospective  Delayed feeding [day 7]: <i>n</i> = 39 • Historical controls	PC fistulae Median hospital stay Median fistula diagnosis day	20% early vs. 15.4% delayed feeding ( <i>p</i> = 0.825) 13 days early vs 14 days delayed feeding ( <i>p</i> = 0.153) Day 11 early vs day 14 delayed feeding ( <i>p</i> = 0.389)	<ul style="list-style-type: none"> <li>No significant differences in outcomes between groups</li> <li>No associations between other potential risk factors</li> <li>Unmatched, historical controls with potential for selection bias</li> <li>Basic meta-analysis included but lacks weighting or testing of heterogeneity between studies</li> </ul>
Medina et al., 2001 Laryngoscope USA Prospective cohort study (Level evidence 3)	73 patients in total • Part 1: <i>n</i> = 38 early feeding [<48 h] ( <i>n</i> = 20) vs delayed feeding [day 7–10] ( <i>n</i> = 18). • Part 2: <i>n</i> = 35 additional cohort of early feeding [<48 h]	PC fistulae Pharyngeal stricture Hospital stay	Combined results: 3.6% early vs 11% delayed feeding ( <i>p</i> > 0.4) 5.5% early vs 11% delayed feeding ( <i>p</i> > 0.4) 7 days early vs 11.8 days delayed feeding ( <i>p</i> < 0.0001)	<ul style="list-style-type: none"> <li>No increased complications after early feeding with benefits to patient comfort and reduced hospital stay</li> <li>Haematological inclusion criteria likely to exclude higher risk patients</li> <li>Explicit surgical technique with leak test</li> <li>Lack of randomisation (sequential design) leading to non-matched groups</li> <li>Long delay until part 2 cohort and lack of second control group raises concerns about direct comparisons</li> </ul>
Prasad et al., 2006 Ann Otol Rhinol Laryngol. India Prospective cohort study (Level evidence 3)	78 patients in total • Early feeding: <i>n</i> = 40 [day 2] • Delayed feeding: <i>n</i> = 38 [day 7–10]	PC fistulae formation	Patients: 1 vs 2 (2.5% vs 5.2%)	<ul style="list-style-type: none"> <li>Heterogenous collection of procedures although reasonably well matched between study groups</li> <li>Sequential patient selection</li> <li>Haematological inclusion criteria likely to exclude higher risk patients</li> <li>Explicit exclusion criteria including intra-operative observations (e.g. mucosa for reconstruction (&lt;2.5 cm))</li> <li>Post-operative reflux prophylaxis</li> <li>No statistical analysis</li> </ul>
Rodríguez-Cuevas et al., 1995 Eur Arch Otorhinolaryngol. Mexico Prospective randomised trial (Level evidence 3)	35 patients in total • Early feeding: <i>n</i> = 18 [day 7] • Delayed feeding: <i>n</i> = 17 [day 14]	PC fistulae Median hospital stay	5.7% early vs 0 delayed feeding ( <i>p</i> = 0.49) 7 days early vs 14 days delayed feeding ( <i>p</i> = 0.01)	<ul style="list-style-type: none"> <li>No significant differences in complications between groups</li> <li>Early feeding reduces hospital stay</li> <li>Well matched patient groups but no description of randomisation method</li> <li>Small sample size with limited power</li> <li>Timing of feeds markedly different from other reported studies.</li> </ul>
Seven et al., 2003 Laryngoscope Turkey Randomised controlled Trial (Level evidence 2)	65 patients in total • Early feeding: <i>n</i> = 32 [day 1] • Delayed feeding: <i>n</i> = 33 [>day 7]	PC fistulae Mean hospital stay	6.2% early vs 9% delayed feeding 7.6 days vs 8.2 days (not significant)	<ul style="list-style-type: none"> <li>No significant difference in PC fistula development and hospital stay between the groups</li> <li>Only patients suitable for tracheoesophageal puncture included</li> <li>Well-matched and randomised patient groups</li> <li>However post-surgical allocation to feeding groups could lead to selection bias</li> </ul>

documented. No significant difference was found in incidence or day of pharyngocutaneous fistula formation between early and delayed feeding groups (20% versus 15.4%,  $p = 0.825$ ; day 11 [early] vs. day 14 [delayed];  $p = 0.389$ ). Furthermore, comparison of the median durations of hospital stay for the early and delayed feeding groups showed no significant difference ( $p = 0.153$ ). However, the comparison of the prospective early feeding cohort to historical controls may have resulted in selection bias. Comparison of these two groups must therefore proceed with caution as there appears to be no attempt at matching and the authors do not provide demographic or any disease status of the control group. The overall high fistula rate is of concern but not of direct relevance to this review. A basic meta-analysis calculation has been provided, showing an overall comparison of 8.8% early vs 11.7% fistula rate ( $p = 0.442$ ). However again the lack of inclusion criteria, weighting and testing of heterogeneity between the referenced studies limits the usefulness of this calculation. The authors initially state their aim to analyse a cost-benefit ratio of these two post-operative approaches, which would be a key outcome internationally but no cost analysis has been addressed in the article.

An interesting study first initiated back in 1984 and not published until 2001 was a two part prospective study by Medina et al. [7]. The first part involved a sequential comparison of a control group of 18 patients fed 7–10 days after total laryngectomy with a group of 20 patients who received oral feeding within 48 h. The second part of the study involved a prospective analysis of 35 additional patients also receiving early feeding of 48 h post-laryngectomy. The measured outcomes were PC fistula and pharyngeal stricture formation as well as length of hospital stay. No significant difference was found for PC fistula formation (3.6% early versus 11% delayed feeding) and pharyngeal stricture formation (5.5% early versus 11% delayed feeding  $p = 0.4$ ). However the length of hospital stay was found to be significantly lower in the early feeding group (6.9 days for the entire early feeding group from part I and II of the study versus 11.8 days for the delayed feeding group  $p = 0.0001$ ). The fistula rate in this study in those patients receiving early oral feeding is the lowest in any of the papers reviewed, a likely consequence of the strict exclusion and inclusion criteria. This screening of haemoglobin, albumin and total protein is highly likely to have excluded those patients most at risk of complications, as was the exclusion of those patients with any significant prior radiotherapy treatment or pharyngeal involvement by the disease. This is acknowledged by the authors and the importance of using strict criteria to maximise the safety of a new post-operative approach to management should be noted. Also the meticulous surgical technique and use of a leak test to ensure integrity of the closure are highly recommended given the low fistula rates. Of more concern is the unusual study design, meaning that the second cohort of early feeding patients were treated years later, limiting the validity of comparisons to the previous control group. In addition, the sequential nature of recruitment and lack of randomisation led to imbalances in the patient groups and lack of matching.

Another study with both a sequential patient selection method and strict inclusion criteria was Prasad et al.'s [8] study published in 2006. This prospective cohort study comparing 40 patients in an early feeding group (2 days post laryngectomy) with 38 patients in a delayed feeding group (10 days post laryngectomy), analysing both fistula formation and length of hospital stay as the primary outcome measures. Although there was no statistical analysis carried out in this study, it was evident that there was no obvious difference in development of fistulae between the groups (2.5% vs 5.2% respectively), despite a quite heterogeneous list of operations performed. There was also a shorter hospitalisation period for patients in the early feeding group. Emphasis again was placed on a

meticulous closure technique, as well as minimising any potential confounding factors, such as routine use of anti-reflux measures.

The final two articles included in this review include randomised trial designs, therefore reducing the risk of bias. Rodríguez-Cuevas et al. [9] reported a prospective trial involving 18 patients receiving relatively early feeding (introduced on the 7th day post laryngectomy) and 17 patients in receiving relatively delayed feeding (14th day post laryngectomy), following removal of the nasogastric tube. The main outcome measure of the study was fistula formation. Subsequently it was found that there was no significant difference in the development of fistula formation between early and delayed feeding groups (5.7% versus 0%  $p = 0.49$ ). However this study utilised only a small sample size providing a limited power. In addition, this study varies considerably from the others, with the “early feeding group” timing more akin to the “delayed feeding group” in all other studies. Furthermore, further limitations include a lack of description of the methodology and randomisation used.

Seven et al. [10] presented a more recent randomised controlled trial comparing 32 patients receiving early feeding (1 day post laryngectomy) with 33 patients receiving delayed feeding via transoesophageal puncture until 7 days post laryngectomy. The main outcome measures of this study included fistula formation as well as mean length of hospital stay. It was found that there was no significant difference in PC fistula development between the two groups (6.2% versus 9%,  $p > 0.5$ ) and no difference in mean length of hospital stay. Limiting the patients to those suitable for primary tracheoesophageal puncture will have excluded those patients requiring more extensive surgery but both control and intervention groups are well matched and randomised. However, the post-surgical allocation to the groups may have resulted in significant selection bias. The introduction of feeding on day 1 was also earlier than any other study, and the 25% incidence of failure due to dysphagia calls into question such early introduction within the first 24 h.

### 7.1. Clinical bottom line

The evidence on this topic is beset with problems of heterogeneous patient groups and poor study design. However, this review can conclude that contrary to historical opinion, the best evidence currently available fails to demonstrate any increased rate of pharyngocutaneous fistula formation when initiating an early oral feeding regimen. Timing of this intervention by consensus would appear optimal at 48 h. In appropriately selected patients, there is no evidence against early feeding.

### Ethical approval

Ethical approval was not required.

### Sources of funding

There was no funding.

### Author contribution

L. Kishikova and J Fleming had equal contribution in (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.

## Conflict of interest statement

There are no conflicts of interest.

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