Has radiotherapy become too expensive to be considered a treatment option for early glottic cancer?

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
External beam radiotherapy, transoral endoscopic surgery and partial vertical laryngectomy for early glottic cancer.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients with early glottic cancer.

Setting
Hospital. The economic study was performed in the USA

Dates to which data relate
Effectiveness and resource use data were collected during the period 1976 and 1995. 1995 prices were used.

Source of effectiveness data
The evidence for final outcomes was derived from a single study.

Link between effectiveness and cost data
The costing was undertaken retrospectively and not on the same patient sample as that used in the effectiveness analysis.

Study sample
57 patients were treated with external-beam radiotherapy. An earlier series of 106 patients with carcinoma in situ or T1 glottic cancers had undergone transoral endoscopic surgery (during the period 1976-1986). During the same period, 159 patients with carcinoma in situ or T1 glottic cancers underwent open laryngeal procedures. Power calculations did not determine the sample size.

Study design
Non-randomized controlled trial. The study was carried out in four centres and patients were followed up till death or for a minimum of 9.6 months.
Analysis of effectiveness
The analysis of the clinical study was based on treatment completers only. The primary health outcomes used were recurrence rate, length of postoperative recovery period, local tumour control, larynx preservation, voice quality and survival.

Effectiveness results
For all 57 radiotherapy patients, the 5-year initial local control rate was 91% when the anterior commissure was involved and 100% when the anterior commissure was not involved (p=0.21). Overall, 54 of the 57 patients treated with radiotherapy (95%) benefited from long-term laryngeal preservation with the use of radiotherapy alone. One of the three recurrences was successfully treated with a partial vertical laryngectomy, resulting in an overall larynx preservation rate of 96% (55 of 57). For patients who underwent radiotherapy, the voice quality was subjectively determined by a physician to be excellent in 9%, good in 70%, fair in 18% and poor in 4%. Relapse-free survival for all tumour-stages was 83%. For those patients who underwent transoral endoscopic removal, the procedure was performed on an outpatient basis in 16%. There was a 1- to 2-week postoperative recovery period before the patients returned to work. Twenty-four of the 106 patients (23%) required one or more courses of re-treatment for recurrence of the original tumour or the development of a second primary cancer within the larynx. The local control rate was 88% and the larynx preservation rate was 92%. For those patients who underwent partial vertical laryngectomy, there was a 1- to 2-week postoperative recovery period before the patients returned to work. Fifteen of the 159 patients (9%) required one or more re-treatment procedures. Forty-two re-treatment procedures were performed in these 15 patients, resulting in an average of 2.8 re-treatment procedures per patient. The local control rate was 93% and the larynx preservation rate was 94%. Relapse-free survival was 91%.

Clinical conclusions
Radiotherapy provides at least equivalent, if not superior, local tumour control, larynx preservation, voice quality and survival, compared with the surgical options.

Measure of benefits used in the economic analysis
No summary benefit measure was identified in the economic analysis and only separate outcomes were reported.

Direct costs
Charges and medical costs were determined using three distinct methods:

(1) charges associated with operation and radiotherapy were estimated by totalling the billing fees associated with procedures used in evaluation and treatment;

(2) the actual outpatient and inpatient bills for all patients undergoing either operation or radiotherapy for early-stage glottic cancer were reviewed and a median and range determined;

(3) all costs associated with a patient’s encounter with the medical centre were tracked using an existing system.

1995 prices were used.

Indirect costs
Employment status, and associated transportation and housing costs were determined for those patients undergoing radiotherapy.

Currency
No currency was used in the results; the median charge or cost of the least expensive treatment was set at 100 as a
Sensitivity analysis
No sensitivity analysis was performed.

Estimated benefits used in the economic analysis
Not applicable.

Cost results
The medical charge analysis using the charge estimates and actual patient bills revealed that for the Medicare patient, the least expensive initial treatment option was transoral endoscopic removal (assigned a median of 100 for both costing methods). The most expensive initial treatment option was partial vertical laryngectomy (289 and 339 respectively). Radiotherapy was intermediate in expense (137 using charge estimates and 156 using actual patient bills). For the non-Medicare patient, the charge estimates indicate that the least expensive initial treatment option was transoral endoscopic removal (170); partial vertical laryngectomy was the most expensive initial option (391) and radiotherapy was intermediate (316). The use of patient bills indicated that the median charge for transoral endoscopic removal, radiotherapy and partial vertical laryngectomy would be 174, 409 and 532 respectively. The medical cost analysis using the total standard costs revealed that the least costly treatment was transoral endoscopic removal, which was assigned a median 1995 health care cost value of 100 (range: 75 - 298, n=13). Partial vertical laryngectomy was the most costly treatment, with a median 1995 health care cost value of 397 (range: 219 - 538, n=10). Radiotherapy was intermediate, with a median cost of 220 (range: 107 - 358, n=18).

Taking into account the charges and costs of re-treatment, and using the overall charge estimates for the Medicare patient, resulted in radiotherapy being the least expensive treatment (137), compared to transoral endoscopic removal (150) and partial vertical laryngectomy (310). For the non-Medicare patient, transoral endoscopic removal remained the least expensive treatment (260) but was closer to the expense of radiotherapy (316). Partial vertical laryngectomy remained the most expensive (435).

Using the overall actual patient bills for the Medicare patient, transoral endoscopic removal and radiotherapy had the same charge value of 156. Partial vertical laryngectomy was the most expensive at 362. For the non-Medicare patient, transoral endoscopic removal remained the least expensive treatment, at 286, followed by radiotherapy (409) and partial vertical laryngectomy (587). When considering overall resources used or overall total standard costs, transoral endoscopic removal remained the least costly treatment (168) but was closer to the cost of radiotherapy (220). Partial vertical laryngectomy remained the most costly treatment (427).

Synthesis of costs and benefits
Not applicable.

Authors' conclusions
Radiotherapy for early glottic cancer results in better local tumour control, better larynx preservation, better voice quality, and fewer cancer deaths at an overall expense and cost comparable to transoral endoscopic removal and less than partial vertical laryngectomy in both Medicare and non-Medicare patients.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparators used: all the technologies have been shown to produce equivalent long-term survival and tumour control. Radiotherapy can result in superior voice quality compared with the surgical options, but the cost of radiotherapy has been challenged, especially when the patient is eligible for outpatient surgery.
Validity of estimate of measure of benefit
The internal validity of the study must be doubtful given the lack of randomization, power calculations, and sensitivity analysis.

Validity of estimate of costs
Adequate details of cost estimation were given but resource quantities were not reported separately from prices.

Other issues
Randomized controlled trials are needed in order to assess the cost-effectiveness of the intervention.

Source of funding
None stated.

Bibliographic details

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MeSH
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