Laser cordotomy versus radiotherapy: an objective cost analysis
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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
The use of endoscopic laser cordotomy and external beam irradiation (radiotherapy) for the treatment of early glottic carcinoma.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised a cohort of patients with early glottic cancer (T1N0). Patients with a diagnosis of carcinoma in situ, and those with any prior primary treatment of their glottic cancer elsewhere, were not included.

Setting
The setting was a hospital. The economic study was carried out in the USA.

Dates to which data relate
Some effectiveness and resource use data were gathered from 1989 to 1999. Other effectiveness data were derived from studies published between 1980 and 1997. The price year was presumably 1999.

Source of effectiveness data
The effectiveness evidence was derived from a single study and a synthesis of completed studies.

Link between effectiveness and cost data
The costing was carried out on a different sample of patients from that used in the clinical study.

Study sample
Power calculations were not performed. A sample of 74 patients was considered. There were 44 patients in the radiotherapy group (38 men and 6 women) and 30 patients in the laser group (27 men and 3 women). The median age of the patients was 63.2 years (age range: 33 - 88) in the radiotherapy group and 64.5 years (age range: 41 - 87) in the laser group. The patients were retrospectively identified and further details on the method of sample selection were not reported.

Study design
This was a retrospective cohort study that was carried out in a single centre, the University of Wisconsin Hospital and Clinics at Madison, Wisconsin. The patients were followed for a median period of 5.3 years (range: 1 - 11). No patient was lost to the follow-up assessment.

Analysis of effectiveness
All of the patients included in the initial study sample were accounted for in the analysis of effectiveness. The outcome measures used in the study were the rate of tumour recurrence, rate of laryngectomy for surgical salvage, and the ultimate survival rate. The baseline comparability of the study groups was not discussed.

Effectiveness results
In the radiotherapy group (n=44), the rate of tumour recurrence was 20.5%, the number of patients undergoing laryngectomy for surgical salvage was 6, and the ultimate survival rate was 95.5%.

In the laser group (n=30), the rate of tumour recurrence was 16.7%, the number of patients undergoing laryngectomy for surgical salvage was 1, and the ultimate survival rate was 100%.

Clinical conclusions
The rates estimated in the single study were combined with the rates observed in the literature, so as to increase the number of evaluable patients.

Outcomes assessed in the review
The outcomes estimated from the literature were the rate of tumour recurrence, rate of laryngectomy for surgical salvage, and the ultimate survival rate. Voice quality after laser surgery or radiotherapy was also compared using published evidence.

Study designs and other criteria for inclusion in the review
It was not stated whether a systematic review of the literature had been undertaken to identify primary studies. No information on the designs of the primary studies was provided.

Sources searched to identify primary studies
Not stated.

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Not stated.

Number of primary studies included
Twenty primary studies provided the clinical data.

Methods of combining primary studies
The primary studies were combined by calculating the average values for each outcome measure. The series of patients considered in the single study (44 patients in the radiotherapy group and 30 patients in the laser group) was also included.
Investigation of differences between primary studies
Not stated.

Results of the review
A total of 1,867 were identified for the radiotherapy group, while 386 were found for the laser group. In the radiotherapy group, the rate of tumour recurrence was 16%, the rate of laryngectomy for surgical salvage was 13.3%, and the ultimate survival rate was 95.3%. In the laser group, the rate of tumour recurrence was 12.9%, the rate of laryngectomy for surgical salvage was 3%, and the ultimate survival rate was 99.5%.

With respect to voice quality, the published evidence (that included 20 patients in the radiotherapy group and 11 in the laser group) suggested the following:

the airflow rate of laser patients was elevated compared with that of radiotherapy patients;
both groups demonstrated a reduced phonation time;
the values for jitter, shimmer, and signal-to-noise ratios were elevated in both groups;
breathiness was the predominant vocal feature after laser resection, while harshness and raspiness were the predominant vocal features after radiotherapy;
laryngovideostroboscopy showed a loss of vibration and stiffness at the site of laser resection, with a normal mucosal wave observed on the opposite vocal cord; and
in radiotherapy patients, the loss of vibration and stiffness were seen to involve both vocal cords.

Only 2 out of 20 patients in the radiotherapy group reported having no problems of fatigue, dryness, loudness, pitch, or hoarseness.

Measure of benefits used in the economic analysis
The health outcomes were left disaggregated and no summary benefit measure was used in the economic evaluation, because both cure rates and voice quality were comparable between groups. In effect, a cost-minimisation analysis was performed.

Direct costs
Discounting does not appear to have been relevant since the costs were incurred during less than 2 years. The unit costs were presented separately from the quantities of resources used for some items. The health services included in the economic evaluation were grouped according to hospital and professional costs. Laser treatment covered laser equipment, additional operating room time, laboratory expenses, and the laryngologist, anaesthesiologist and pathologist. Radiotherapy comprised computed tomography evaluation, treatment simulation, treatment aid block, dosimetry calculation, weekly port X-ray films, weekly in vivo dosimetry, weekly physics quality assurance, daily complex treatment delivery, oncologists and all professionals required for irradiation. The costs associated with diagnostic evaluation were not considered because they were comparable between the two treatment options. The cost/resource boundary of the study was unclear. The costs were obtained from the billing offices of University of Wisconsin Hospital and Clinics (hospital costs) and the University of Wisconsin Medical Foundation (professional costs). Charges were used to estimate treatment costs. Resource use was estimated considering the average value of 3 patients who underwent radiotherapy and the average value of 3 patients who underwent laser surgery. The price year was not explicitly reported, but it could have been 1999.

Statistical analysis of costs
The costs were treated deterministically.
Indirect Costs
The indirect costs were not considered.

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analyses were not carried out.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
In the laser group, the average hospital charges were $1,041, the average professional charges were $852, and the average total costs were $1,893.

In the radiotherapy group, the average hospital charges were $19,809, the average professional charges were $9,544, and the average total costs were $29,353.

Therefore, at the author's institution, radiotherapy was 15.5 times more costly than endoscopic laser surgery.

In a comparison with the costs of radiotherapy and laser surgery at the author's institution, which had been estimated using a similar approach in 1990, it was noted that over the period 1990-1999, the total charges for radiotherapy increased by 175%, while the total charges for laser surgery increased by 19.7%.

Synthesis of costs and benefits
A synthesis of the costs and benefits was not relevant because a cost-minimisation analysis was performed.

Authors' conclusions
Endoscopic laser cordotomy was as effective as radiotherapy for the management of early glottic cancer. However, laser surgery led to substantial cost-savings over radiotherapy.

CRD COMMENTARY - Selection of comparators
The selection of the comparators was clear since the author stated that radiotherapy represented a common procedure for the treatment of early glottic carcinoma, while endoscopic laser surgery was a newer treatment option. You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness evidence came mainly from the literature. It was unclear whether the review of the literature was systematic. Further, the author did not describe the design of the primary studies. The issues of the validity of the primary sources and differences between the studies were not addressed. Published data were integrated with a series of patients who had been evaluated at the author's institution. This was a small cohort, which was examined retrospectively. The comparability of the patients from this retrospective series with those derived from the literature was not discussed. Also, the issue of the comparability of the patients included in the review in the radiotherapy and laser groups was not addressed.
Validity of estimate of measure of benefit
No summary benefit measure was used in the analysis because a cost-minimisation analysis was conducted. Please refer to the comments above in the 'Validity of estimate of measure of effectiveness' field.

Validity of estimate of costs
The perspective adopted in the study was not stated clearly, although it could have been that of the hospital. Indeed, the costs were derived from the hospital database. However, charges were used as a proxy for the costs of the service and a cost-to-charge ratio was not applied. The costs were estimated based on the average of 3 patients for each treatment option. The author reported only the central (mean) estimate and no measure of variance was provided. No statistical analyses of the costs were carried out, which would have been helpful since costs are usually non-normally distributed. Similarly, the costs were specific to the study institution and the estimates were not varied in a sensitivity analysis. The price year was not explicitly reported, but the costs were presumably estimated in 1999 values, which makes reflation exercises in other settings easy. The unit costs were presented for most items. A detailed breakdown of the costs was provided. This enhances the possibility of replicating the study. The author compared the increase in charges associated with both treatments from 1990 to 1999 without any inflation adjustment.

Other issues
The author compared their findings with those from other studies, especially the clinical outcomes, and stated that similar results were observed. The issue of the generalisability of the study results to other settings was not explicitly addressed and sensitivity analyses were not performed. This reduces the external validity of the analysis. The study referred to patients with early glottic cancer and this was reflected in the author's conclusions.

Implications of the study
The study results supported the use of laser cordotomy for the initial treatment of early glottic tumours with laser surgery.

Source of funding
None stated.

Bibliographic details

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Aged; Aged, 80 and over; Carcinoma, Squamous Cell /economics /radiotherapy /surgery; Costs and Cost Analysis; Glottis /radiation effects /surgery; Humans; Laryngeal Neoplasms /economics /radiotherapy /surgery;
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