Microdebrider versus CO2 laser removal of recurrent respiratory papillomas: a prospective analysis
Pasquale K, Wiatrak B, Woolley A, Lewis L

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 a carbon dioxide (CO2) laser and microdebrider for the removal of recurrent respiratory papillomatosis (RRP).

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised young patient requiring the removal of RRP.

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

Dates to which data relate
The dates during which the effectiveness and resource use data were gathered were not reported. The price year was not given.

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

Link between effectiveness and cost data
The costing was conducted prospectively on the same sample of patients as that used in the effectiveness study.

Study sample
The use of power calculations was not reported. The authors stated that a sample of 19 patients was enrolled and they underwent 32 procedures in all. The average age was 6.2 years (age range: 2.5 - 20). However, the number of patients actually included in each group was unclear, as the authors stated that there were 12 male and 7 female patients in the microdebrider group (mean age 5.96 years), and 9 male and 6 female patients in the CO2 laser group (mean age 7.1 years).

Study design
This was a prospective, randomised clinical trial that was, presumably, conducted at a single institution. The patients were randomly selected by birth year to undergo CO2 laser or microdebrider procedures. The patients were evaluated for 24 hours after the procedure. No loss to follow-up was reported. No blinding was used.

Analysis of effectiveness
The analysis of the effectiveness appears to have been conducted on an intention to treat basis, as all the patients included in the initial study sample were accounted for in the final analysis. The primary outcome measures used were:

- the duration of the procedure, measured from the initial time the larynx was suspended until the last papilloma was removed;
- pain after 24 hours, assessed on a scale ranging from 1 (minimal) to 5 (severe); and
- improvement in voice quality after the procedure, assessed on a scale ranging from 1 (minimal voice improvement) to 10 (significant voice improvement).

The study groups were comparable at baseline in terms of age, but pre-operative disease severity was significantly different. The average score was 10.42 in the microdebrider group and 6.57 in the CO2 laser group. Therefore, all of the outcomes were estimated in sub-groups defined according disease severity.

Effectiveness results
The estimated outcome measures were all reported in graphical format and no actual figures were provided. All comparisons were made among children with similar disease severity scores. The duration of the procedure was significantly shorter in the microdebrider group. The pain scores were equivalent. There was a tendency towards greater improvements in voice quality after the procedure among microdebrider patients, but the difference between the groups did not reach the statistical significance.

Clinical conclusions
The effectiveness analysis showed that the clinical outcomes were generally comparable between the groups, although the duration of the procedure was significantly shorter for the microdebrider.

Measure of benefits used in the economic analysis
The health outcomes were left disaggregated and no summary benefit measure was used in the economic analysis. In effect, a cost-consequences analysis was conducted.

Direct costs
Discounting was not relevant since the costs were incurred during a short time. The unit costs and the quantities of resources used were not presented separately. The health services included in the economic evaluation were equipment, supplies, operating room (OR) time, and specialised nurses. The cost/resource boundary of the hospital appears to have been adopted. Resource use was estimated using actual data derived from the sample of patients who were involved in the effectiveness study. The source of the data was not explicitly stated. The price year was not reported.

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 conducted.

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

Cost results
The total costs (excluding OR, e.g. time and specialised nurse) were $284.25 in the microdebrider group and $554.45 in the CO2 laser group.

When OR services were considered, the total costs were $614.90 in the microdebrider group and $892.40 in the CO2 laser group.

Synthesis of costs and benefits
Not relevant since, in effect, a cost-consequences analysis was conducted.

Authors' conclusions
The use of the microdebrider led to cost-savings and shorter procedural time in comparison with patients treated with a carbon dioxide (CO2) laser. A tendency towards greater improvements in voice quality was also observed in the microdebrider patients. The pain scores were comparable across the groups.

CRD COMMENTARY - Selection of comparators
The authors justified the choice of the comparators. The CO2 laser represented a standard approach for the treatment RRP and had been in wide use since the early 1990s. The microdebrider was an alternative approach, developed for endoscopic sinus surgery, for the removal of laryngeal lesions. You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The analysis of effectiveness was based on a clinical trial, which was appropriate for the study question. The method of randomisation was described, as was the length of follow-up. The analysis was conducted on an intention to treat basis. Some limitations to the validity of the analysis should be noted. The method used to select the sample was not reported. In addition, it was not stated whether any patients refused to participate, or were excluded for any reason from the study sample. The number of patients included in each group was unclear. The study groups were not comparable at baseline since patients in the microdebrider group had significantly more severe disease. As this could have represented a confounding factor, all outcomes were compared in sub-groups of patients with comparable disease severity. The outcome assessment was not blinded, which could have introduced some bias. The main limitation was the small sample size and the fact there was no evidence of whether the sample size was appropriate. The power of the analysis was further reduced on account that sub-group analyses were conducted. Moreover, the follow-up was very short. These issues tend to limit the internal validity of the analysis.

Validity of estimate of measure of benefit
No summary benefit measure was used in the analysis because, in effect, a cost-consequences analysis was conducted.
Validity of estimate of costs
The perspective adopted in the study was unclear and only those costs strictly related to the procedure were considered. The unit costs were not presented separately from the quantities of resources used, but the items considered in the analysis were listed. The price year was not given, which makes reflation exercises in other settings difficult. The cost estimates were specific to the study setting and no sensitivity analyses were conducted. Similarly, no statistical tests were carried out on the costs or quantities. The source of the data was not reported clearly although, presumably, it was derived from the study institution. Overall, the possibility of replicating the study was reduced since, as the authors noted, procedure times and costs could vary across institutions and they depended on individual factors.

Other issues
The authors did not make extensive comparisons of their findings with those from other studies, stating that their study was the first to compare clinical and economic outcomes associated with microdebrider versus CO2 laser. In terms of the generalisability of the study results, the authors acknowledged that the cost estimates might vary substantially across settings. Since no sensitivity analyses were conducted, the external validity of the analysis was low. The study involved paediatric patients and this was reflected in the authors’ conclusions.

Implications of the study
The study results suggested that the use of a microdebrider for the removal of respiratory papillomas could be a cost-effective alternative to standard CO2 laser in some settings. However, future studies, based on larger samples of patients and longer follow-up, should be conducted to corroborate the results of the current analysis.

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Other publications of related interest


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MeSH
Adolescent; Adult; Biopsy, Needle; Carbon Dioxide; Child; Child, Preschool; Debridement /methods; Female; Follow-Up Studies; Humans; Laryngeal Neoplasms; Laryngoscopy; Laser Therapy /instrumentation /methods; Male; Neoplasm Recurrence, Local /pathology /surgery; Neoplasm Staging; Papilloma /diagnosis /surgery; Prospective Studies; Sensitivity and Specificity; Severity of Illness Index; Tracheal Neoplasms /pathology /surgery; Treatment Outcome

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