CRD summary
This review assessed the outcomes of primary transoral robotic surgery for early throat cancer and concluded that early results suggested good disease control rates and good functional outcomes with low surgical morbidity and mortality. However, further research was needed. The authors’ conclusions were suitably cautious (considering the limited evidence available) and their recommendations for research were appropriate.

Authors' objectives
To assess outcomes of primary transoral robotic surgery for early throat cancer.

Searching
EMBASE and MEDLINE/PubMed databases were searched from 1947 to September 2013 for relevant articles in English. Search terms were reported. Reference lists of included articles were screened manually.

Study selection
Studies were eligible for inclusion if they were of transoral robotic surgery for the primary treatment of early stage (T1 to T2) throat cancer (oropharyngeal squamous cell carcinoma). Eligible studies had to report sufficient data on patient outcomes. Case reports were excluded from the review.

Included studies were published between 2009 and 2013. Some patients also underwent elective neck dissections. Some patients received additional treatment with chemotherapy, radiation therapy or chemoradiation therapy.

Two reviewers independently screened studies for inclusion.

Assessment of study quality
Quality was assessed using the Newcastle-Ottawa quality assessment scale for cohort and case-control studies. The maximum score of 9 indicated highest quality.

Three reviewers assessed studies for quality and bias; disagreements were resolved through discussion and consensus between all four reviewers.

Data extraction
Event rates and their 95% confidence intervals (CI) were extracted for the outcomes: oncological (recurrence rates, survival), functional (long-term gastrostomy tube and tracheostomy tube dependence rates) and surgical (surgical margin assessments and complication rates and types).

Three reviewers independently extracted data. Disagreements between reviewers were resolved through discussion and consensus between all four reviewers.

Methods of synthesis
A random-effects model was used to pool event rates and their 95% CIs. Statistical heterogeneity was assessed using the I² statistic and X² test.

Results of the review
Eleven studies (190 patients; range six to 42) were included in the review. Studies scored seven or eight on quality assessment. Follow-up ranged from one to 51 months (where reported).

Oncologic outcomes (seven studies, mean follow up of 20 months): pooled event rates were low for local recurrence (0.038, 95% CI 0.015 to 0.092) and regional recurrence (0.09, 95% CI 0.05 to 0.16). Rates were high for both disease-free survival (0.90, 95% CI 0.83 to 0.95) and overall survival (0.95, 95% CI 0.50 to 1.00).
Functional outcomes (nine studies): A small proportion of patients (5%) were dependent on a gastrostomy tube at 12 months (pooled event rate 0.05, 95% CI 0.02 to 0.11) while none required a tracheostomy tube at 12 months.

Surgical outcomes (10 studies): None of the patients had their operation stopped or converted to an alternative intervention. Positive margins were reported on final pathology for five of 173 patients (2.9%). Sixteen patients (9.2%) experienced postoperative complications; the most common was postoperative haemorrhage (10 of 16 patients).

There was no evidence of statistical heterogeneity for any outcome ($I^2=0\%$).

**Authors' conclusions**

Early results suggest good disease control rates and good functional outcomes with low surgical morbidity and mortality when using transoral robotic surgery for early stage throat cancer, but further research is needed to compare transoral robotic surgery to chemoradiation therapy or radiation therapy alone.

**CRD commentary**

The review question and supporting inclusion criteria were broadly stated. The literature search was limited to two electronic databases and restricted by language, which means that potentially relevant data may have been missed. Study quality was assessed and all studies appeared to be of higher quality but this was difficult to confirm as individual criteria were not reported for each study. The lack of control groups in the included studies reduced the reliability of the evidence. Each stage of the review process was performed in duplicate which reduced potential for reviewer error and bias.

Study and patient details were somewhat limited but some variations in treatment were highlighted. There was no evidence of statistical heterogeneity but several key results were based on very small numbers of events. The authors acknowledged the small number of patients and variable and often insufficient follow-up. This suggested that the included studies may have been underpowered to detect outcomes. The authors also highlighted potential for bias in selection of patients and surgeons and financial investments.

The authors’ conclusions were suitably cautious (considering the limited evidence available) and their recommendations for research were appropriate.

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

**Practice:** The authors stated that the promising early results suggested further research may reveal positive support for the adoption of transoral robotic surgery as primary therapy for early throat cancer.

**Research:** The authors stated that further clarification was needed to determine optimal management of the neck in early throat cancer and added that a suitable randomised trial is ongoing (see Other Publications of Related Interest).

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