Radiologic gastrojejunostomy and percutaneous endoscopic gastrostomy: a prospective randomized comparison

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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
Radiologically guided (fluoroscopic) placement of percutaneous gastrojejunostomy (PGJ) was compared with percutaneous endoscopic gastrostomy (PEG) to establish access for long-term enteral nutrition.

Type of intervention
Treatment.

Economic study type
Cost effectiveness analysis.

Study population
The study population comprised patients over 18 years of age, requiring long-term enteral nutrition, and referred for gastrostomy placement.

Setting
The setting was secondary care. The economic study was carried out in the Kings County Hospital Centre in Brooklyn, New York, USA.

Dates to which data relate
The effectiveness and resource data were collected between January 1992 and December 1993. The price year was 1997/1998.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
Retrospective cost data were collected from the same patient sample as that used to collect effectiveness evidence.

Study sample
The authors did not report any calculations to estimate the sample size required to detect statistically significant differences in effects or costs. The study sample comprised patients aged at least 18 years, mean age 53 years, who were referred for gastrostomy placement at the Kings County Hospital Centre between January 1992 and December 1993. Sixty-nine patients were randomly assigned to the PEG group (control group) and sixty-six patients were randomly assigned to the PGJ group (intervention group). The authors reported that patients who required tube replacements through existing tracts were excluded from the study.
Study design
The study was a randomised controlled trial carried out in a single centre, the Kings County Hospital Centre in Brooklyn. Patients were assigned by random numbers to receive PEG or PGJ. Follow-up was obtained at physical examination within 24 hours and at 7 days. The mean duration of follow-up was 202 days, and 30-day follow-up was obtained for 85% of patients (54 patients in the PGJ group and 55 patients in the PEG group).

Analysis of effectiveness
The analysis was conducted on an intention to treat basis. The primary outcome used in the economic analysis was technical success. Technical success was defined as when the feeding tube was successfully placed into the stomach during the initial procedure.

Secondary outcomes recorded were the duration of the procedure, complications resulting from the procedure, morbidity and mortality. The authors reported that the two patient groups were largely comparable with no statistically significant differences in relation to the mean age, sex, indications of gastrostomy, antibiotic coverage, fever at the time of the procedure or alkalisation of the stomach fluid. However, the authors stated that there was a statistically significant difference between the two patient groups in terms of the incidence of pre-existing tracheostomy, (p=0.02).

Effectiveness results
The authors reported that the initial procedures were technically successful in obtaining gastric access in 100% (66/66) of PGJ and 91% (63/69) of PEG procedures and this difference was statistically significant, (p=0.014).

The duration of the procedure for PGJ was 52.7 (+/- 17.2) minutes and for PEG was 23.8 (+/- 13.2) minutes, (p=0.01).

Using criteria defined by Shellito and Malt (1985), the authors stated that there were no statistically significant differences between PGJ and PEG in terms of the number of complications. However, using less specific criteria of 30-day adverse event definition of complications, there were more complications; 45 in 34 patients in the PEG group than in the PGJ group, 33 complications in 32 patients, (p=0.013).

There was no procedure related mortality in the PGJ or PEG groups. The procedure unrelated mortality at 30 days was 6.7% for the PGJ group and 7.8% for PEG group, (non significant).

Clinical conclusions
The authors concluded that PGJ had a higher success rate and fewer complications, due to a lower incidence of pneumonia. However, the authors stated that PEG took less time to perform and required less tube maintenance.

Measure of benefits used in the economic analysis
No summary measure of health benefit was used in the economic analysis and the outcomes were reported in a disaggregated fashion. The study should therefore be categorised as a cost-consequences study.

Direct costs
Resource use and unit costs were not reported separately.

The following direct costs from the hospital perspective were included in the analysis:

- procedure room (PGJ = $322 and PEG = 0);
- technician (PGJ = $34 and PEG = $22);
- nurse (PGJ = $47 and PEG = $50);
physician (PGJ = $110 and PEG = $50);
tray (PGJ = $30 and PEG = $30);
endoscope (PGJ = $0 and PEG = $20);
gastrostomy kit (PGJ = $181 and PEG = $159).

The authors also included two undefined variables in the list of direct costs: cost per successful access (PGJ = $724 and PEG = 375) and cost of complications (PGJ = $763 and PEG = $1,266). It was not clear what the components of these two costs were.

Direct costs were calculated from Medicare reimbursement charges, the total cost of PGJ being $1,322 and of PEG $848. Reimbursements were calculated from the Medicare Part B physician payment schedule, which identifies hospital components, and Ambulatory Centre Surgery Center rates. The itemised costs for procedure and complication calculations were pre-markup hospital costs or best estimates from the financial officer for room charges. It is not clear whether prices or charges were used in the estimate of total cost. Discounting was not undertaken because of the short-time frame of the study. The price year was 1997/1998.

**Statistical analysis of costs**
No statistical analysis of costs was conducted.

**Indirect Costs**
No indirect costs were included in the analysis.

**Currency**
US dollars ($). No currency conversions were reported.

**Sensitivity analysis**
No sensitivity analysis was reported.

**Estimated benefits used in the economic analysis**
The reader is referred to the effectiveness results reported previously.

**Cost results**
The total PGJ cost was $1,487, compared to a total PEG cost of $1,641.

**Synthesis of costs and benefits**
No synthesis of costs and benefits was carried out and no incremental analysis was reported.

**Authors' conclusions**
The authors concluded that PEG cost less than the PGJ but that this cost advantage was offset by the cost of complications. PGJ had a higher success rate and fewer complications due to a lower incidence of pneumonia but PEG took less time to perform and required less tube maintenance.
A justification was given for the choice of comparator used, namely that it represented common practice in the authors' setting. You, as a user of this database, should decide if this is a widely used health technology in your own setting.

**Validity of estimate of measure of effectiveness**

The analysis was based on a randomised controlled trial that was appropriate for the study question. The study sample was representative of the study population. The patient groups were shown to be largely comparable at analysis in relation to age, sex, indicators, antibiotic coverage, fever at the time of the procedure and alkalisation of the stomach fluid. However, the authors stated that the PEG group had a statistically significantly higher incidence of pre-existing tracheostomy but they did not explain the clinical implications for this difference. The study did not report a power calculation but there was still a statistical difference between the intervention group (PGJ) and comparator group (PEG), which implies that the sample size was large enough to detect a statistically significant difference for the primary outcome measure.

**Validity of estimate of measure of benefit**

The authors did not derive a summary measure of health benefit. The analysis was therefore categorised as a cost-consequences study. The authors referred to a cost per successful access but did not define this variable or describe how it was calculated.

**Validity of estimate of costs**

Costs and quantities were not reported separately. The authors stated that the assessment of costs was imprecise and reported that the itemised costs for procedure and complications were based on pre-mark-up hospital costs and best estimates from the financial officer for room charges. Furthermore, the approach used to calculate the quantities or type of resources used was unclear. In particular, it was not clear whether the costs of anaesthesia were included in the calculation of direct costs. Therefore, it is not possible to assess whether all categories of cost relevant to the perspective adopted were included in the analysis. No statistical analysis of costs was performed. Furthermore, the authors did not report any sensitivity analysis, which limits the generalisability of the study findings. The authors reported no currency conversions and, appropriately, no discounting was undertaken because of the short time frame of the study. It was not clear whether charges or prices or both prices and charges were used to estimate the total cost of procedures. The use of charges to estimate total cost further limits the generalisability of the study's findings to other settings.

**Other issues**

The authors made appropriate comparisons of their findings with those from other studies and reported that the success and complication rates reported in this study were similar to those reported in the literature. However, they did not address the issue of generalisability to other settings due to the omission of a sensitivity analysis and the use of charges in some instances. The authors did not present their results selectively. The study enrolled patients who required long-term access for enteral nutrition and this was reflected in the authors’ conclusions. The main limitation reported by the authors in relation to the study was that the assessment of costs was imprecise and that Medicare reimbursement for inpatient procedures could not be extracted from diagnosis related group calculations. The authors reported a number of further limitations to their study namely that it was more comfortable for the patient to place the PGJ at the first visit and a gastrojejunostomy tube of equal calibre to the PEG tube was not available at the time of the study. The authors explained that the different methods of access, PEG or PGJ, could not be assessed independently of the different tube sizes and tip locations available at the time of the study.

**Implications of the study**

The authors reported that procedure related morbidity and mortality are similar for both endoscopy (PEG) and fluoroscopy (PGJ) guided percutaneous access. The significant differences in failure were the incidence of technical failure and pneumonia, which were higher in the endoscopy (PEG) group. The authors suggested that PGJ, performed with the use of fluoroscopic guidance, has broader clinical application, fewer contraindications and more liberal anatomic requirements, and requires lesser levels of anaesthesia.
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