



An audit of percutaneous endoscopic gastrostomy insertion in patients undergoing treatment for head and neck cancer: reducing the incidence of peri-operative airway events by the introduction of a tumour assessment protocol

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ABSTRACT

INTRODUCTION The presence of a malignancy of the upper aerodigestive tract introduces the potential for iatrogenic complications additional to those usually associated with percutaneous endoscopic gastrostomy. Specifically, seeding of tumour from the upper aerodigestive tract creating abdominal wall metastases, and airway obstruction due to tumour directly occluding the airway when a patient is sedated for percutaneous endoscopic gastrostomy.

PATIENTS AND METHODS We report an audit of our experience of gastrostomy placement for patients under going treatment for head and neck cancer in our institution from September 2003 to October 2006.

RESULTS Of 33 patients who had percutaneous endoscopic gastrostomy insertion under sedation in the first cycle of the audit, two (6%) experienced major airway complications resulting in one fatality. A tumour assessment protocol was introduced. In the second cycle, 96 patients had percutaneous endoscopic gastrostomies, of whom 16 (13%) underwent gastrostomy insertion under general anaesthetic and five (4.5%) under radiological guidance. No patients had airway complications or abdominal wall metastases.

CONCLUSIONS A formal tumour assessment protocol eliminated airway obstruction as a complication of percutaneous endoscopic gastrostomy insertion and may reduce the potential for abdominal wall metastases at the gastrostomy site when using the pull technique.

KEYWORDS

Percutaneous endoscopy – Gastrostomy – Aerodigestive tract – Head and neck cancer

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Maintenance of adequate nutritional status in patients undergoing treatment for head and neck cancer is essential.¹ The paradigm shift in treatment of patients with head and neck cancer due to broader indications for the use of chemoradiation protocols has resulted in an increased dependence on long-term enteral feeding.² Feeding gastrostomies are well-established as a method of providing satisfactory nutritional support,^{3,4} but are not without complications.⁵ Feeding gastrostomies can be inserted percutaneously under direct vision using an endoscope (percutaneous endoscopic gastrostomy)^{6,7} under radiological guidance,⁸ or using a conventional open/laparoscopic surgical

approach.⁹ The presence of a malignancy of the upper aerodigestive tract introduces the potential for iatrogenic complications additional to those usually associated with percutaneous endoscopic gastrostomy placement. Specifically, seeding of tumour from the upper aerodigestive tract creating abdominal wall metastasis,¹⁰ and airway obstruction due to the presence of tumour directly occluding the airway when a patient is sedated for the procedure.¹¹ We report an audit of our experience of percutaneous gastrostomy for patients under going treatment for head and neck cancer in our institution from September 2005 to October 2006.

Patients and Methods

Guy's and St Thomas' Hospital head and neck unit sees over 400 new head and neck cancers a year and serves a population of 1.5 million people. All patients are managed by a multidisciplinary head and neck oncology team. Formal nutritional assessment and specifically consideration of the need for prolonged enteral feeding forms an integral part of each patient's preparation for treatment. Data are collected on a proforma prior to treatment and at each subsequent review. A retrospective review of all data relating to complications of gastrostomy insertion was made prior to and following the introduction of a tumour assessment protocol. All head and neck oncological patients in our unit who had a gastrostomy inserted between January 2005 and October 2006 were included in this study.

A tumour assessment protocol was introduced in September 2004 following two episodes of acute airway obstruction during percutaneous endoscopic gastrostomy placement under sedation. This involved the formation of a working party consisting of two members of each of the following specialties (oncology, dietetics, head and neck surgery, clinical oncology, and gastroenterology) to define best practice and, in particular, minimise the risk of peri-operative airway obstruction. After review of the two cases which had resulted in airway obstruction and reflection upon acute airway situations in head and neck cancer patients in general, the T-stage and origin of tumours most likely to predispose to airway embarrassment under sedation were defined. Tumours considered likely to cause contamination during percutaneous endoscopic gastrostomy insertion were similarly defined. A protocol was introduced. This required the findings of formal systematic tumour and airway assessment by flexible nasendoscopy (dynamic assessment) and panendoscopic examination under general anaesthetic (static assessment) to be reviewed alongside the patients' imaging within the confines of the multidisciplinary team meeting prior to placement of any gastrostomy.

In addition to the well-recognised general contra-indications to percutaneous endoscopic gastrostomy placement (Table 1), tumour-specific contra-indications to percutaneous endoscopic gastrostomy placement as defined by T-stage and origin of the tumour (Table 2) were included. Prior to the introduction of the airway assessment protocol, percutaneous endoscopic gastrostomies were placed by a variety of endoscopists with different levels of experience. The protocol specified that percutaneous endoscopic gastrostomies were only placed by endoscopists of consultant grade or under consultant supervision. The risk of abdominal wall metastases was reviewed and a decision made to continue using the pull technique of percutaneous endoscopic gastrostomy placement using a sheath to shield the endoscope from the upper aerodigestive tract.

Table 1 Contra-indications for percutaneous endoscopic gastrostomy

- Ascites
- Oesophageal and gastric varices
- Portal hypertension
- Oesophageal strictures
- Previous gastric surgery
- Acute pancreatitis
- Clotting disorders

Following the introduction of the protocol in September 2004, prospective data collection continued until October 2006 at which point the data of the second cohort of patients were analysed. The audit methodology employed followed The Royal College of Surgeons of England guidelines for audit.¹²

Results

First cycle

A review of complications during percutaneous endoscopic gastrostomy insertion in patients undergoing treatment for head and neck cancer between January 2003 and September 2004 was performed. Percutaneous endoscopic gastrostomies were inserted by a variety of endoscopists under sedation using the pull technique. The contra-indications for percutaneous endoscopic gastrostomy insertion are summarised in Table 1.

A review of 33 patients who had percutaneous endoscopic gastrostomy insertion under sedation identified two cases (6%) of major airway complications resulting in one fatality. One patient with a T4N0M1 of the tongue base died of airway obstruction and another patient with a T4N2bM1 of the larynx had a respiratory arrest. No cases of tumour seeding at the site of percutaneous endoscopic gastrostomy placement were detected.

Table 2 Tumour-specific contra-indications for percutaneous endoscopic gastrostomy placement

- Risk of airway obstruction
 - T3/T4 oropharyngeal tumours with tongue-base extension
 - T3/4 hypopharyngeal tumours with exophytic component
 - T4 Laryngeal tumours with extralaryngeal extension
- Risk of tumour seeding
 - T3/T4 hypopharyngeal tumours
 - T3/T4 cervical oesophageal tumours

Table 3 Gastrostomies performed following the introduction of a tumour assessment protocol

Number of cases	Technique employed for gastrostomy placement	Rationale
96 (82.5%)	Percutaneous endoscopic gastrostomy	8 (6.6%)
16 (13%)		1 (0.8%)
		7 (5.6%)
5 (4.5%)	Radiological guidance insertion	Airway control
		Fear of endoscopy
		At the time of tumour resection
		1 (0.8%)
		2 (1.8%)
		2 (1.8%)
117 Total		Airway control
		High risk of tumour seeding
		Failed percutaneous endoscopic gastrostomy insertion

Intervention

A working party was formed to define best practice and, in particular, minimise the risk of peri-operative airway obstruction. This led to the development and introduction of a protocol for systematic tumour assessment by flexible nasendoscopy (dynamic assessment) followed by panendoscopic examination under general anaesthetic (static assessment). This, supplemented by imaging review to define the origin of the tumours, allowed the classification of tumours most likely to cause airway embarrassment and, therefore, tumour-specific contraindications for percutaneous endoscopic gastrostomy (Table 2).

Percutaneous endoscopic gastrostomies were only placed by endoscopists of consultant grade or under consultant supervision. An additional sheet highlighting the need for airway assessment was added to the pre-procedural percutaneous endoscopic gastrostomy protocol (Appendix 1). The risk of abdominal wall metastases was reviewed and a decision made to continue using the pull technique of percutaneous endoscopic gastrostomy placement using a sheath to shield the endoscope from the upper aerodigestive tract, unless contra-indicated as per protocol.

Second cycle

From September 2004 to October 2006, 117 feeding gastrostomies have been inserted. Ninety-six patients had percutaneous endoscopic gastrostomies, 16 patients (15%) have undergone elective feeding gastrostomy insertion under general anaesthetic and five patients (4.5%) under radiological guidance (Table 3). No patients had airway complications or abdominal wall metastases.

Discussion

Feeding gastrostomy placement allows long-term enteral nutrition in patients undergoing treatment for head and neck

cancer; however, it is not without risk.^{15,14} Percutaneous endoscopic gastrostomy is generally the preferred method of placement.¹⁵ This audit highlights the potential for major peri-operative complications, in particular acute airway obstruction. This significant complication has not been documented in the literature for over a decade.¹¹ Large tumours of the upper aerodigestive tract have obvious implications for airway management although we were unable to establish a formal classification describing high-risk tumours. In our audit, the two patients who experienced airway embarrassment had locally advanced tumours of the larynx and tongue base. Following the introduction of a protocol which defined T3/T4 oropharyngeal tumours with tongue-base extension, T3/T4 hypopharyngeal tumours with an exophytic component and T4 laryngeal tumours with extralaryngeal extension as contra-indications for percutaneous endoscopic gastrostomy placement, no further episodes of airway obstruction occurred in a further 96 procedures. Airway assessment is an implicit part of the diagnostic pathway of a head and neck cancer patient. We feel that initial assessment by awake, flexible nasendoscopy followed by rigid endoscopy at the time of a biopsy and staging allows a full assessment of the risk of airway collapse during percutaneous endoscopic gastrostomy placement under sedation.

No patients in this audit developed abdominal wall metastases as a complication of percutaneous endoscopic gastrostomy placement. Between 1989 and 2005, 41 cases of abdominal wall metastases following percutaneous endoscopic gastrostomy placement using the pull technique have been described in the literature, approximately two a year.¹⁶ In our small series of 117 percutaneous endoscopic gastrostomies using the pull technique, we have yet to experience this complication. A number of different mechanisms have been suggested as being responsible. Exfoliation and implantation of tumour cells from the primary site appears the mostly likely mechanism,¹⁷ although

seeding from haematogenous or lymphatic spread has not been discounted.¹⁸ The push technique for percutaneous endoscopic gastrostomy placement along with radiological guidance have strong advocates in the belief that there is no potential for malignant cells from the primary tumour to contact the abdominal wall.^{19,20} There is evidence of increased morbidity in gastromies inserted under radiological guidance when compared with percutaneous endoscopic gastrostomy.²¹ In view of the low incidence of abdominal wall metastases, large multicentred randomised controlled trials would be required to quantify the exact reduction in metastatic risk versus procedural risk. Given our experience, we continue to use the pull technique for percutaneous endoscopic gastrostomy placement as our preferred method of gastrostomy insertion. As per protocol, we acknowledge the potential for exfoliation and implantation of cells from large primary tumours (T3/T4) of the hypopharynx and cervical oesophagus where percutaneous endoscopic gastrostomy is contra-indicated and radiological guidance the technique of choice.

Conclusions

Airway complications during percutaneous endoscopic gastrostomy insertion are rare but a potential cause of mortality. Identification of patients at risk of airway obstruction prior to percutaneous endoscopic gastrostomy insertion is essential and requires a multidisciplinary team approach. Patients at most risk are those with locally advanced tumours involving the tongue base, larynx and hypopharynx. These patients should be identified during initial assessment and their percutaneous endoscopic gastrostomy inserted under general anaesthetic once the airway has been secured or have a gastrostomy inserted under radiological guidance. The introduction of a formal tumour assessment protocol eliminated airway obstruction as a complication of percutaneous endoscopic gastrostomy insertion.

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Appendix 1

PROTOCOL FOR HEAD AND NECK CANCER PATIENTS REQUIRING GASTROSTOMY INSERTION

Airway assessment

All patients must have a two-part airway assessment prior to insertion of percutaneous endoscopic gastrostomy or radiologically inserted gastrostomy.

Dynamic assessment

A dynamic airway assessment performed in out-patients with the aid of a fibre-optic nasendoscopy. This must have been carried out by a consultant, senior SpR or fellow attached to the head and neck firm.

Static assessment

A static airway assessment performed at the time of diagnostic endoscopy in the operating theatre. This must have been carried out by a consultant, senior SpR or fellow attached to the head and neck firm.

The outcome of both parts of the airway assessment should be clearly documented in the patient's medical records. Please do not proceed in the absence of documentation.

The following are contra-indications for percutaneous endoscopic gastrostomy/radiological guidance insertion in head and neck cancer patients

Airway contra-indications

- T3/T4 oropharyngeal tumours with tongue base extension
- T3/T4 hypopharyngeal tumours with exophytic component and fixation of at least one hemilarynx
- T4 laryngeal tumours with extralaryngeal extension

Tumour seeding risk contra-indications

- T3/T4 hypopharyngeal tumours with exophytic component and fixation of at least one hemilarynx
- T3/T4 cervical oesophagus tumours

Gastrostomy insertion in head and neck cancer patients must have been approved in the Multidisciplinary Head and Neck Oncology Meeting (MDT) as part of the patient's management plan. (Contact Dietary Oncology (ext 84129) if clarification is required) All percutaneous endoscopic gastrostomies referred by the MDT must be sited by, or under the direct supervision of, a consultant gastroenterologist.

PERCUTANEOUS ENDOSCOPIC GASTROSTOMY PROTOCOL

General absolute contra-indications

- Coagulopathy
- Anticoagulation
- Sepsis
- Peritonitis
- Acute pancreatitis
- Ileus
- Large active gastric ulcer
- Portal hypertension

General relative contra-indications

- Ascites
- Gastrectomy
- Peritoneal dialysis
- Gastric tumours
- Oesophageal varices

Patient preparation

- INR and FBC within 24 h of percutaneous gastrostomy placement
- Venflon in right hand
- Cefuroxime 750 mg i.v. to be given in endoscopy
- Nil by mouth and/or feeding tube for 6 h prior to procedure
- Airway assessment (head and neck patients)
- Consent to be obtained by gastroenterology team
- **LFTs and liver ultrasonography may be required if patient has a history of high alcohol intake**

If there is any doubt regarding a patient's suitability for percutaneous endoscopic gastrostomy insertion, contact the Gastroenterology SpR on Bleep 1060.

(continued on next page)

PERCUTANEOUS ENDOSCOPIC GASTROSTOMY PROTOCOL (continued)

POST INSERTION PROTOCOL

Type of tube inserted: _____

Date of insertion: _____

Time of insertion/return to ward: _____

MONITOR PULSE, TEMPERATURE AND BLOOD PRESSURE EVERY:

- 15 min for 2 h then
- Hourly for 4 h then
- 4 hourly for 12 h

FEEDING GUIDELINES

0–6 h post insertion	Nil by mouth and percutaneous endoscopic gastrostomy (consider i.v. fluids)
6–12 h post insertion	Sterile water via percutaneous endoscopic gastrostomy (30 ml/h). Resume oral intake if safe
12–18 h post insertion	Standard feed via percutaneous endoscopic gastrostomy (30 ml/h)
18–24 h post insertion	Standard feed via percutaneous endoscopic gastrostomy (50 ml/h)

Any pain, fever or change in observations, contact Gastroenterology SpR on Bleep 1060.

**Patient to be reviewed by Gastroenterology team the day following insertion.
Continue with daily dressings post insertion.**