OBJECTIVE: To study the safety and efficacy of percutaneous fluoroscopic gastrostomy tube placement in patients with head and neck cancer.

RESULTS: The major complication rate was 1%; the minor complication rate was 8%; and the tube malfunction rate was 13%. The rate of successful tube placement was 98%. None of the patients required hospitalization as a result of the procedure.

Conclusions: Percutaneous fluoroscopic gastrostomy tube placement is a safe, economical, and comfortable method that has distinct advantages over other gastrostomy tube placement methods. It is recommended for enteral feeding and nutritional supplementation in patients with head and neck cancer.


 Patients with head and neck cancer are at particular risk for malnutrition before, during, and after their treatment as a result of a combination of local and systemic factors. Alcoholism, tobacco use, and poor diet are prevalent in this population and lead to decreased uptake of protein, vitamins, and minerals, resulting in malnutrition. Local tumor effects impair nutritional intake by causing dysphagia, odynophagia, distortion of taste and smell, and aspiration. Systemic effects of cancer such as increased metabolic rate and accelerated protein catabolism lead to increased nutrient requirements. Surgery can cause anatomical alterations, pain, and dysmotility, and can predispose a patient to aspiration, further impairing a patient’s ability to consume adequate calories. Radiation therapy and chemotherapy can cause mucositis, pain, edema, thickened secretions, and nausea, all of which can decrease a patient’s appetite and motivation for intake. Severe constipation, a common adverse effect of narcotic analgestics, can further impair a patient’s appetite. All of these factors can lead to severe weight loss, which potentially affects prognosis, quality of life, ability to heal, length of hospitalization, and cost of care. For these reasons, patients with head and neck cancer require frequent nutritional assessment and intervention during all phases of treatment beginning at diagnosis. Education in proper nutrition and oral administration of high-calorie and -protein supplements are often not adequate to stabilize nutritional status. Therefore, intervention in the form of enteral or parenteral supplementation may be required. Enteral nutritional support is preferred over parenteral methods as it is easier to administer, is associated with a lower rate of sepsis, is more physiologic, and is more cost effective than parenteral methods. Current methods of obtaining enteral access include placement of a nasogastric tube, transcervical miniesophagostomy, open gastrostomy, laparoscopic gastrostomy, percutaneous endoscopic gastrostomy, and percutaneous fluoroscopic gastrostomy. Nasogastric tubes are associated with a high incidence of reflex aspiration, nasal alar ulceration, acute rhinosinusitis, pharyngeal irritation, and patient discomfort. Esophagostomy tubes,
PATIENTS AND METHODS

We reviewed the records of 92 consecutive patients (59 men and 33 women) with head and neck cancer who underwent percutaneous fluoroscopic gastrostomy tube placement between January 1996 and July 1996. The mean age was 63.7 years (range, 19-90 years). The patients' charts were retrospectively reviewed for site of tumor; history of radiotherapy; immediate, delayed, and long-term complications of tube placement; tube malfunction rate; and tube placement failure.

while more comfortable for patients than the nasogastric tubes, are aesthetically displeasing to the patient and family. Surgically placed gastrostomy tubes are more comfortable and convenient than nasogastric or esophagostomy tubes but require general anesthesia for placement and are associated with a fairly high morbidity rate of 6% to 25%.4,5 Percutaneous endoscopic gastrostomy tube placement is a safe procedure that can be performed in the ambulatory care setting with the patient under intravenous and local sedation. Because general anesthesia is not needed, the procedure is less expensive and less risky than surgical gastrostomy, and recovery time is shorter. Complication rates for the endoscopic technique range from 4% to 20% in patients with head and neck cancer.6,7 Rates of tube placement failure in patients with head and neck cancer are high because of the location of their disease. Esophageal stricture, supraglottic or glottic edema, and tumor mass can all interfere with tube placement by the endoscopic method. In 1 series, there was a 7% failure rate due to the tumor obstructing passage of the endoscope.8 In addition, with the percutaneous endoscopic technique, the gastrostomy tube traverses tumor and oral flora before it is placed in the gastric wall, which can lead to tract infection and seeding of the abdominal wall with tumor.9,10

Since 1992, The University of Texas M. D. Anderson Cancer Center, Houston, has been using fluoroscopically guided percutaneous gastrostomy tube placement to obtain enteral access in cancer patients. This placement method has proved to be efficient and safe: the rate of successful tube placement is 98% to 100%; the minor complication rate is 1% to 12%; and the major morbidity rate is 3% to 6%.11-13 The Section of Interventional Radiology at The University of Texas M. D. Anderson Cancer Center currently places an average of 40 gastrostomy tubes a month. There are no absolute contraindications to this procedure and it can be performed using local anesthesia alone. This review was conducted to determine the safety and efficacy of percutaneous fluoroscopic gastrostomy tube placement for patients with head and neck cancer who require enteral nutritional support.

TECHNIQUE

The technique for tube placement was as follows: Oral intake was held beginning at midnight on the evening before the tube placement. Any available preexisting imaging studies of the abdomen were reviewed before the procedure. The patient was brought into the fluoroscopy suite, and intravenous sedation consisting of morphine and diazepam was administered as necessary. No antibiotics were administered. If the patient did not have a preexisting Dobhoff or nasogastric tube, a 5.0F to 6.5F Judkin catheter with a 0.035 Bentson guidewire (Cook Inc, Bloomington, Ind) was used for nasogastric intubation under fluoroscopic guidance. A contrast agent (diatrizoate sodium) was injected when necessary to traverse esophageal or pharyngeal obstruction. Under fluoroscopic observation, the stomach was then insufflated with air, bringing the anterior gastric wall in apposition to the abdominal wall and displacing the colon and small bowel inferiorly. After preparation of the skin overlying the stomach and infiltration of subcutaneous tissues with 10 to 15 mL of 1% lidocaine, the stomach was punctured in the area of the horizontal portion of the greater curvature with a 7-cm, 18-gauge needle (Cook Inc) using a subcostal approach and fluoroscopic guidance (Figure 1).

Reduction of gastric wall tenting and aspiration of air suggested intragastric location of the needle tip (Figure 2). A 0.038-in Bentson guidewire (Cook Inc) was then passed through the needle, and the needle was withdrawn. Confirmation of the wire to the gastric outline confirmed the guidewire’s intragastric location. A 12F to 14F peel-away dilator (Cook Inc) was then introduced over the wire and the tract was dilated. Finally, a 12F Cope self-retaining loop catheter (Cook Inc) was placed into the stomach, and its position was confirmed by injecting a small amount of contrast agent through the catheter (Figure 3). The Cope loop-locking suture was tied (Figure 4). Gastropexy was not
performed in any cases. The nasogastric tube was re-
moved at completion of the procedure. No skin retaining
device was used. In some patients the tube was marked cir-
cumferentially 2.5 cm from the skin entry site to monitor
tube migration. Povidone ointment and sterile dressing were
applied to the site.

RESULTS

The most common tumor locations for patients needing
percutaneous fluoroscopic tube placement were the oral
cavity and oropharynx.

<table>
<thead>
<tr>
<th>Site of Tumor</th>
<th>No. (%)</th>
</tr>
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<tbody>
<tr>
<td>Oropharynx</td>
<td>37 (40)</td>
</tr>
<tr>
<td>Oral cavity</td>
<td>25 (27)</td>
</tr>
<tr>
<td>Hypopharynx</td>
<td>10 (11)</td>
</tr>
<tr>
<td>Supraglottis</td>
<td>6 (6)</td>
</tr>
<tr>
<td>Thyroid gland</td>
<td>4 (4)</td>
</tr>
<tr>
<td>Parotid gland</td>
<td>4 (4)</td>
</tr>
<tr>
<td>Esophagus</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Other</td>
<td>4 (2)</td>
</tr>
</tbody>
</table>

Seventy-two patients (78%) had been treated with ex-
ternal beam radiotherapy within 6 months of the gas-
troscopy tube placement. Twenty patients (22%) had gas-
troscopy tube placement for other reasons, including
extensive surgery, exchange for an existing tube, aspira-
tion or dysphagia, and end-stage disease.

There was one major complication of misplace-
ment of the tube into the peritoneum. This resulted in
intraperitoneal injection of contrast agent. The patient
eventually required exploratory laparoscopy and place-
ment of an open surgical gastrostomy tube. This event
accounted for the major complication rate of 1%. The rate
of minor complications was 4%: 2 site infections were
treated with antibiotics, and 2 instances of site bleeding
were controlled with local pressure. No operative inter-
vention was necessary for these procedure-related com-
lications. There were no long-term complications. Other
tube-related problems included migration of the tube into
the duodenum, which caused cramping and diarrhea (9%)
(Figure 5), tube dislodgment (13%), delayed leakage
at the insertion site (4%), and inadvertent tube removal
by the patient (2%). All malfunctions or dislodged tubes
were successfully replaced or repositioned with an ad-
ditional fluoroscopic procedure performed through the
preexisting tube or tract. Aspiration did not occur in any
of the patients. There were no deaths associated with tube
placement. The rate of successful tube placement was 98%.

COMMENT

Percutaneous fluoroscopic gastrostomy tube placement
has several advantages over the endoscopic technique for
patients with head and neck cancer. With the fluoro-
oscopic technique, a small-bore (5F to 6F) nasogastric tube is passed into the stomach for insufflation. Since this tube is much smaller than an endoscope, most obstructing lesions can be traversed using small amounts of injected water-soluble contrast agent and fluoroscopic guidance. The site infection rate is lower with this technique, presumably because the gastrostomy tube is not pulled through oral and pharyngeal flora.12,13 Reported rates of site infection for the endoscopic technique range from 8.8% to 20%.8 In this study in which no antibiotics were administered before the procedure, the site infection rate was 2%. With fluoroscopically guided tube placement, antibiotics are not necessary and are not routinely used. With this procedure, there is also a reduced chance for seeding of the tract with tumor as the gastrostomy catheter does not traverse the tumor. Furthermore, the radiologist can directly visualize the relevant anatomy during the procedure and can thus ensure accurate tube placement. Also, because passing a large-bore endoscope through the pharynx and esophagus is not necessary, placement in patients with bulky tumors is easier, deep sedation is obviated, and the risk of airway difficulties during the procedure is lower. One of the patients in this study who underwent successful fluoroscopic gastrostomy tube placement had a failed endoscopic placement secondary to a large pharyngeal tumor that obstructed the lumen and prevented passage of the endoscope. The complication rate of the fluoroscopic technique is comparable to the endoscopic technique and is well suited to the head and neck patient population. The practice of marking gastrostomy tubes to keep track of intragastric length was recently introduced to prevent tube migration, the most frequent tube malfunction. The patients can monitor intragastric length at home, and adjust the catheter themselves if necessary.

In conclusion, percutaneous fluoroscopic gastrostomy tube placement is a safe, effective, and appropriate way to provide enteral access for nutritional support of the patient with head and neck cancer.

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REFERENCES