TITLE: Transnasal Esophagoscopy
SOURCE: Grand Rounds Presentation, UTMB, Dept. of Otolaryngology
DATE: May 25, 2005
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Rigid esophagoscopy has long been an established method for evaluation and treatment of esophageal disorders commonly used by otolaryngologists. This procedure requires general anesthesia and provides a means to examine the full extent of the esophagus, however the view is not magnified, the esophagus is not distended, and the procedure caries both the risks of general anesthesia and the rigid esophagoscopy. Conventional flexible esophagoscopy passed transorally has used scopes with diameters approaching 1cm which provide a magnified view, suction, irrigation, and biopsy ports. The use of these scopes usually requires intravenous sedation. In the past decade manufacturers have produced flexible esophagoscopes with diameters around 5mm with digital video chip technology. These scopes provide a quality image and include the ability to suction, irrigate and biopsy. The smaller size allows their passage through the nasal cavity and the use of topical anesthesia. Without the need for intravenous sedation the examination may be performed easily in the clinic. Other advantages are no long post procedure recovery period and no need for the patient to miss an entire day of work.

Endoscopic examination of the esophagus requires knowledge of esophageal anatomy to maintain orientation and safely perform the procedure. The esophagus begins in the hypopharynx at the upper esophageal sphincter. This is located at the junction of the lower pharyngeal constrictor and the cricopharyngeus muscle. The esophagus then extends in the posterior mediastinum 18-26cm to the stomach. Structures extrinsic to the esophagus make indentations which are noted during endoscopy. These include the trachea anteriorly, the arch of the aorta, the left mainstem bronchus, and the diaphragmatic hiatus. The esophagus is normally collapsed. One benefit of flexible esophagoscopy is that it allows the insufflation of air to distend the esophagus and more easily see all of the mucosa. Pulsations from the left atrium of the heart can be seen on the anterior esophageal wall. At the inferior extent there is the lower esophageal sphincter. This is a 2-4cm segment of tonically contracted, hypertrophied smooth muscle.

The esophageal wall is made of four layers including the mucosa, submucosa, muscularis propria and adventitia. The esophagus is lined with stratified squamous epithelium. The start of the stomach may be recognized by the start of the rugae which are lined with columnar epithelium. This junction of the squamous epithelium and columnar epithelium (squamocolumnar junction) is called the Z-line because of its irregular appearance. The abnormal cephalad movement of this junction is referred to as Barrett's esophagus.

Aviv et al in 2001 reported their experience with transnasal esophagoscopy. They

explained that although flexible pharyngolaryngoscopy had long been considered an office-based procedure for otolaryngologists, flexible esophagoscopy had not been performed in the office setting. This limited the otolaryngologist's ability to examine the esophagus below the level of the piriform sinus. They performed exams on 14 consecutive patients with dysphagia. Patients were asked to avoid aspirin, aspirin-like compounds, and vitamin E for two weeks prior to the procedure in case biopsies were necessary. The exams were performed in the otolaryngologist's office with the patient in a standard examining chair. A 4.9mm outer diameter endoscope was used. Topical anesthesia was obtained by placing a cotton tipped applicator with 1% lidocaine with epinephrine 1:100,000 on one side of the nasal cavity. Aerosolized 20% benzocaine was used to anesthetize the oropharynx. The scope was advanced through the nose into the oropharynx. Velopharyngeal closure, anatomy of the base of the tongue and hypopharynx, vocal cord motion, status of the pharyngeal musculature, and patient's ability to manage their own secretions was noted. With the scope above the cricopharyngeus the patient was asked to burp or swallow to allow passage of the scope. The scope was then advanced to the gastroesophageal junction taking care to note any abnormalities. The scope was then withdrawn again examining the entire circumference of the esophagus. Biopsies were then performed if necessary. They had patients rate the discomfort of the exam on a scale from one to ten (with one being no discomfort). Overall tolerance was rated as a 2 by the patients. All patients stated they would be willing to repeat transnasal esophagoscopy if recommended by their physician.

Authors from the Department of Otolaryngology at Wake Forest University have published several articles on their experience with transnasal esophagoscopy. Postma et al in 2005 published their review of 711 consecutive patients examined with transnasal esophagoscopy. Their description of their technique is similar to that of the authors above except in the area of anesthesia. They used a spray combination of 0.05% oxymetazoline and 4% lidocaine in the nasal cavity. Early in their series they used two Tessalon Perles dissolved in the oropharynx for anesthesia, however they felt this caused too much hypopharyngeal sedation with aspiration of saliva and coughing. Their modified technique uses one or two sprays of 20% in the oropharynx. If biopsy or a longer procedure is required, one Tessalon Perle is used. Seventeen of 711 procedures (3%) were terminated due to a tight nasal vault and 2 due to a self-limited vasovagal response. 100 of the patients were included in a prior report. Of the 592 completed exams in the newest series of patients, there was a 50% incidence of significant findings. Their reported indications and findings are found in the tables below reproduced from their article:

TABLE I.
Indications for TNE (N_1 = 100 and N_2 = 611 attempted examinations).

Indication	N_1 (%)	N_2 (%)
Screening examination in patients with reflux/globus/dysphagia	79 (79)	490 (80)
Screening examination in head and neck cancer patients	5 (5)	45 (7)
Biopsy of known lesion in laryngopharynx	8 (8)	42 (7)
Evaluation of possible esophageal foreign body	2 (2)	12 (2)
Tracheoscopy	4 (4)	10 (2)
Dilation of esophageal stricture	1 (1)	6 (1)
Replacement of tracheoesophageal puncture under direct vision	1 (1)	6 (1)

TNE = transnasal esophagoscopy.

TABLE II.
TNE Findings (N_1 = 96 and N_2 = 592 completed examinations).

Finding	N_1 (%)	N_2 (%)
Esophagitis	19 (20)	98 (17)
Hiatal hernia	4 (4)	47 (8)
Barrett's metaplasia	6 (6)	27 (5)
Candidiasis	1 (1)	27 (5)
Stricture	4 (4)	24 (4)
Carcinoma	5 (5)	22 (4)
Abnormal motility	3 (3)	17 (3)
Esophageal polyp	1 (1)	13 (2)
Patulous gastroesophageal junction	3 (3)	8 (1)
Esophageal diverticulum	2 (2)	3 (1)
Esophageal web	3 (3)	2 (1)
Foreign body	1 (1)	6 (1)
Tracheoesophageal fistula	2 (2)	0 (0)

In 2002, Postma et al evaluated the role of transnasal esophagoscopy in head and neck cancer. They examined 17 patients with known lesions of the upper aerodigestive tract with transnasal esophagoscopy with biopsies followed by conventional panendoscopy with biopsies. The findings were entirely congruent between the two methods. Biopsy findings were 12 of 12 diagnostic of cancer and 5 of 5 negative for malignancy in the TNE biopsies when compared to the conventional panendoscopy biopsies. They did not specify the location of these tumors in the upper aerodigestive tract. In this article they also described some therapeutics possible with the transnasal esophagoscope including stricture dilation with Savory dilators used over a guide wire placed endoscopically, secondary tracheoesophageal puncture performed under local anesthesia with direct vision, excision or ablation of tissue with a flexible Nd-YAG or pulse dye laser fiber passed through the biopsy port, and the ability to perform percutaneous endoscopic gastrostomy although they did not perform this procedure.

The finding of Barrett's esophagus is believed to increase the risk of adenocarcinoma of the esophagus 30 to 125 fold. Established care of patients with this finding includes ongoing esophagoscopy and biopsies at regular intervals to evaluate for dysplasia. Saeian et al examined the use of unsedated transnasal esophagoscopy in surveillance of Barrett's esophagus. They reported on the annual cost of surveillance on approximately 700,000 patients with Barrett's esophagus in 1994 using conventional sedated flexible esophagoscopy as $350 million dollars. Thirty-two patients with Barrett's esophagus were examined with transnasal esophagoscopy and conventional endoscopy and biopsies. Transnasal esophagoscopy and biopsy detected Barrett's metaplasia in 31 of 32 patients. The level of agreement between specimens for dysplasia was excellent. They argued that unsedated transnasal esophagoscopy as a screening modality for Barrett's esophagus was attractive and warranted further evaluation.

Dumortier et al in 2003 reported their experience with transnasal esophagogastroduodenoscopy. Their study includes 1100 patients. The exam was feasible in 93.4% of patients. The most common reasons for failure were unsuccessful transnasal insertion (62.7%), patient refusal (19.4%), and nasal pain (17.9%). Side effects included epistaxis (2.3%), nasal pain (1.6%), and vasovagal reaction (0.3%). Of those patients who completed the exam 95% were willing to undergo the procedure again if recommended by their physician.

Transnasal esophagoscopy can be a diagnostic and therapeutic tool for otolaryngologists. The ability to examine the full extent of the esophagus in a clinic setting can help in the diagnosis and treatment of problems commonly seen in otolaryngology patients.

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