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INVITED ARTICLE

Transnasal esophagoscopy: A position statement from the American Bronchoesophagological Association (ABEA)

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OBJECTIVE: To review and summarize the current literature on transnasal esophagoscopy, and to compare information with conventional esophagoscopy.

DATA SOURCES: Medline (Ovid), book chapters.

REVIEW METHODS: A thorough review of the literature using the Medline database was performed with the following search terms: esophagoscopy, transnasal esophagoscopy, ultrathin endoscopy, and esophagoscope.

RESULTS: The literature seems to support the equivalence of transnasal esophagoscopy and conventional esophagoscopy in image quality and diagnostic capability. It also points to some potential advantages of transnasal esophagoscopy.

CONCLUSIONS: Transnasal esophagoscopy is a useful tool for accurate diagnosis and can be used in a variety of office procedures.

The distal-lighted, rigid esophagoscope was invented by Chevalier Jackson more than a century ago,[1] and until the 1960s, with the introduction and popularization of flexible fiberoptic endoscopy,[2,3] esophagology was the domain of the otolaryngologist. In the last 50 years, other medical specialties (eg, pulmonology, pediatric surgery, gastroenterology) have joined in the evolution of aerodigestive tract endoscopy.

Most esophagoscopy is now performed flexibly with endoscopes that use a charge-coupled device (CCD) to capture the images and display them on a video screen. Recent technological advances have led to further miniaturization of the CCD, allowing the production of thinner endoscopes. These newer "ultrathin" endoscopes have reached a size at which they can be passed comfortably through the nose and directed into the esophagus. In doing so, the gag reflex can be largely avoided, allowing patients to avoid sedation.

The introduction of transnasal esophagoscopy (TNE) has provided an important advance in the care of patients with reflux, dysphagia, and esophageal pathology. The TNE endoscope offers brilliant illumination and excellent image quality with air-insufflation and irrigation capability through a 2-mm working channel, which can also be used to obtain biopsies and/or to perform procedures. Since 2000, otolaryngologists have popularized TNE and expanded its diagnostic applications for globus, dysphagia, laryngopharyngeal reflux (LPR), and gastroesophageal reflux disease (GERD).[4-6]

In this paper, we will discuss the role of TNE in clinical practice and review the literature with regard to the utility of the TNE in diagnosing pathology in the esophagus.

Technique of TNE

The technique is an office-based procedure. The patient is seated in a standard ENT examining chair. No cardiac monitoring is necessary unlike with conscious sedation. The nose is topically anesthetized and vasoconstricted. Additional topical anesthetic spray is sometimes used in the oropharynx.

Following this preparation, the TNE scope is passed along the floor of the nose. Usually, a lubricating agent is applied to ease passage of the scope. The tip of the scope is placed in the ipsilateral pyriform sinus, and the patient is asked to lean forward, flex the neck fully, and swallow. At that point, the scope is advanced into the esophageal inlet.

Once inside the esophagus, the scope can be advanced gradually into the stomach. Since the esophagus is collapsed at rest, air insufflation or voluntary swallows by the patient may be necessary to allow for better visualization. Examination of the esophagus and stomach is carried out, with special attention paid to the gastroesophageal (GE) junction. The TNE scope also permits a retroflexed view from the stomach, allowing the endoscopist to perform a complete examination of the GE junction, which is done by flexing the tip fully (210 degrees) while the scope is positioned in

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the stomach. Biopsy specimens may be obtained with 1.8-mm cup forceps passed through the side channel of the endoscope.

Image Quality and Diagnostic Capability

Since the introduction of TNE, there have been inevitable comparisons with what has been viewed as the gold standard diagnostic technique—conventional esophagoscopy (CE), which is performed transorally with sedation. As mentioned below, TNE has several potential advantages to CE, but what about its diagnostic accuracy?

Several studies have compared the two techniques with regard to image quality and diagnostic capability. Older studies generally conclude that TNE is inferior to CE.[7,8] However, these studies use older-generation endoscopes, which are generally larger or do not have distal chip technology. Studies using newer small-caliber videoendoscopes have almost universally concluded that TNE image quality and diagnostic capability are equivalent to those of CE.[9-14]

One such study compared a prototype 4-mm transnasal videoesophagoscope to a standard 9.8-mm or 8.6-mm transoral videoendoscope.[10] The study was a prospective trial and examined diagnostic accuracy by using CE as the gold standard. Patients scheduled for CE had TNE performed immediately preceding their scheduled procedure. The diagnostic accuracy of TNE was found to be 100 percent in 44 patients. The authors also found overall tolerance was similar between the unsedated and sedated examinations.

Although image quality is important, it is equally, if not more important, to know whether newer techniques of assessment are capable of detecting Barrett esophagus (BE) with accuracy similar to that of standard techniques. BE is a tissue diagnosis and requires the endoscopist to obtain biopsy specimens. Two randomized crossover studies addressing this topic have been published.[12,13]

In both studies, patients underwent both CE and TNE, with the procedures separated by at least 1 week. The order of the procedures was randomized and endoscopists were blinded as to previous results. Biopsies were taken as indicated with 2.2-mm biopsy forceps for CE and 1.8-mm biopsy forceps for TNE.

In the study by Saeian et al,[12] the level of agreement between CE and TNE for detection of dysplasia in biopsy specimens was found to be 91 percent ($\kappa = 0.79$), which was thought to be in the "excellent" range. Jobe et al[13] examined several different endpoints including detection of hiatal hernia, esophagitis, and stricture, grading of GE junction abnormalities, and pathological diagnosis of Barrett esophagus. In this study, the correlation between CE and TNE was found to vary between 80 to 96 percent for the different endpoints ($\kappa = 0.60$-0.84). Interestingly, although both CE and TNE detected Barrett metaplasia and dysplasia at similar rates, there was only moderate concordance between the two. Each modality detected changes that were "missed" by the other. This finding likely has to do with sampling error with respect to selected biopsy sites.

Advantages over Conventional Esophagoscopy

Transnasal esophagoscopy provides a number of advantages over CE, which include improved safety, decreased overall costs, and patient preference.

Safety

The majority of complications during sedated endoscopy are related to sedation. Cardiopulmonary complications account for more than 50 percent of all adverse events; the majority are aspiration, oversedation, hypoventilation, and airway obstruction.[15] A 2007 national survey of endoscopists demonstrated that adverse cardiopulmonary events secondary to conscious sedation constitute the majority of endoscopic complications; in fact, 67 percent of complications and 72 percent of mortalities were cardiopulmonary-related.[16] Because of its very nature, unsedated TNE eliminates all sedation-related events.

One of the most feared complications of esophagoscopy is esophageal perforation. Among the thousands of TNE and TNEGD cases performed, there has been only a single case of esophageal perforation reported.[17] Minor complications are also uncommon. In the two largest series reported, 700 patients from the United States and 1100 patients from France, rates of epistaxis were between 0.85 to 2 percent and vasovagal events were 0.3 percent.[18,19]

Cost Savings

TNE is less expensive than CE. The increased *direct* costs of CE include longer procedure time, recovery room and recovery time, and the costs associated with the needed medications, monitoring, and nursing.[20] The difference in cost has been found to be greater than $2000 per procedure.[21] *Indirect* costs are also noteworthy. They include loss of work time by both the patient and caretaker. In contrast, with TNE, most patients are able to return to work or home shortly after completion of the examination and do not need a caretaker.

Patient Preference

Although initial patient anxiety is higher before unsedated TNE, studies have shown a very high patient satisfaction rate, often greater than with CE.[17,18,20,22] Crossover studies have shown that, in patients who had both sedated and unsedated examinations, the unsedated examination was better tolerated.[10] Ninety-one percent of TNE patients who had previously undergone conventional EGD preferred unsedated TNE.[19]

Role of TNE in Clinical Practice

The role of TNE continues to evolve in both the diagnostic and therapeutic realms, particularly because of a high yield of pathology found on unsedated TNE examinations performed in an otolaryngology practice, with rates of pathological findings approaching 50 percent.[18,23]

Indications for TNE can be divided into three major categories: esophageal, extraesophageal, and procedure-related. Esophageal indications include dysphagia, refractory or long-standing gastroesophageal reflux, evaluation of a radiological abnormality on barium swallow, and screening for Barrett metaplasia. Extraesophageal indications include globus pharyngeus, panendoscopy with biopsy for head and neck cancer, chronic cough, and moderate to severe laryngopharyngeal reflux.

TNE in Head and Neck Oncology

Panendoscopy is part of the standard evaluation of individuals with head and neck squamous cell carcinoma. Often, these patients possess comorbidities that increase the risk of general anesthesia. In-office TNE allows for an examination of the aerodigestive tract without the morbidity of anesthesia. In addition, as mentioned above, biopsies can also be obtained; studies have reported a very high congruence rate for biopsies using TNE compared with standard (operating room–based) panendoscopy.[24]

Barrett Esophagus

While most cancers in the United States are experiencing a decline in prevalence, esophageal adenocarcinoma is on the rise.[25] BE represents a premalignant condition for adenocarcinoma. TNE is a very useful screening tool for BE. In two studies[12,13] mentioned earlier, researchers have demonstrated the equivalence of TNE and CE (with biopsy) in the diagnosis of BE. Because of its safety, decreased costs, and equivalent findings, TNE may be the screening modality of choice for BE.

TNE-Assisted Procedures

TNE may be used to perform a wide variety of procedures, including biopsies of the laryngopharynx and esophagus, esophageal and neopharyngeal stricture balloon dilation,[26] secondary tracheoesophageal puncture,[27,28] the delivery of flexible lasers, and insertion of wireless pH-monitoring devices.[29]

Advantages of CE over TNE

Although TNE may be substituted for CE in most patients, there are certain instances in which one may prefer CE. In cases in which it is expected that significant time may be required to perform the procedure (including multiple biopsies, vessel ligation, etc), the surgeon may prefer the patient to be sedated. In addition, many of the therapeutic instruments are designed to fit through larger side channels, which are only available currently on standard CE systems; TNE may not allow for such intervention.

CONCLUSIONS

As discussed in this paper, recent studies demonstrate TNE's tolerability and patient preference over CE. Controlled studies also demonstrate its equivalence to CE in a variety of different measures, including, most importantly, in its ability to offer a comprehensive examination and assessment of the esophagus. Combined with its relative cost benefits and safety profile, TNE has become an important part of the diagnosis and management of patients with dysphagia, extraesophageal/gastroesophageal reflux disease, and head and neck cancer.

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