EDITORIAL

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Quality Indicators for Esophagogastroduodenoscopy: Need, Current Status and Challenges

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Esophagogastroduodenoscopy (EGD) is the second most common gastrointestinal (GI) endoscopic procedures in the United States, following colonoscopy [1]. An estimated 7.5 million EGDs were performed in the US in 2019, with rates increasing in the 18-74 years age group [1]. Esophagogastroduodenoscopy serve as important diagnostic tools for detection of upper GI cancers. Esophageal cancer and stomach cancer account for nearly 18,364 and 24,101 incident cases in the U.S. respectively, with prognosis associated with the stage of diagnosis [1-3]. Long term outcomes of upper GI cancers remain dismal, with an overall 5 year survival of esophageal adenocarcinoma <20% and gastric cancer around 36% [4].

Esophageal adenocarcinoma (EAC) development is preceded by chronic mucosal injury with acid reflux leading to metaplastic changes in the squamous mucosa, known as Barrett's transformation, followed by dysplastic changes. Similarly, gastric adenocarcinoma (GAC) development follows a stepwise cascade known as "Correa cascade" where chronic inflammation precedes development of precursor lesions including chronic atrophic gastritis, intestinal metaplasia and dysplasia before transformation to adenocarcinoma [5]. Early detection of precursor lesions allows for their removal or surveillance and is an effective strategy to reduce cancer incidence rates and related mortality. The American College of Gastroenterology guidelines on Barrett's esophagus (BE) recommends one time screening EGD in individuals at high risk of EAC, defined as those with chronic reflux symptoms with risk factors like male gender, age more than 50 years, White race, smoking, obesity and family history of EAC or BE [6]. Screening programs for BE, a well-established precursor to EAC, have demonstrated potential in early detection and prevention of EAC [7]. However, their implementation remains inconsistent, leading to missed opportunities in identifying at-risk individuals for EAC [8]. Unlike BE, there is no standardized screening protocol for GAC in the U.S., even though precursor lesions such as gastric intestinal metaplasia (GIM) elevate GAC risk. This lack of standardized screening protocols increases the challenges in prevention and early detection of GAC.

Esophagogastroduodenoscopy performed for any indication offers an opportunity to assess esophageal and gastric mucosa for optically visible lesions, thus, for detection of precursor lesions for EAC and GAC. For example, careful white light exam (WLE) combined with narrow band imaging (NBI) can detect dysplasia in BE or GIM even when EGD is performed for other indications. Endoscopic exam can detect changes including surface nodularity, ulcerations, thickened margins, or changes in underlying vascular pattern. American Gastroenterological Association (AGA) recommends image enhanced endoscopy along with use and documentation of standardized biopsy protocols to optimize evaluation of suspected pre-malignant lesion [9]. Despite its potential in prevention of upper gastrointestinal malignancy, interval cancers, i.e. those diagnosed after an endoscopy in which no cancer was identified, can occur due to missed lesions or rapidly growing tumors [10]. Post endoscopy EAC comprise 22% of EAC, suggesting a critical need for quality indicators in EGD [11]. Limited data for interval gastric adenocarcinoma from Western population shows 7-8% of GAC can occur within 3 years after a negative EGD [12, 13]. Adequate mucosal cleansing and insufflation are pre-requisites for optimal visualization [9]. A recent multi-center study from Italy, demonstrated mucosal cleansing was performed in only 7.1% centers and virtual chromoendoscopy was frequently utilized in only 3.6% centers, highlighting areas for improvement [14]. Adequate gastric mucosal sampling was performed by less than one-fourth endoscopists [14]. In a survey

of 392 gastroenterologists in Italy, only 18% recorded timing of procedure with accurate photo documentation in 51% [15].

The success of quality metrics in colonoscopy offers valuable lessons for establishing EGD quality indicators. In colonoscopy, parameters like adenoma detection rate (ADR), withdrawal time, and bowel preparation quality have proven effective in reducing interval colorectal cancers [16]. Applying similar rigor to EGD could significantly improve outcomes by reducing missed lesions and enhancing the detection of early neoplasia.

Previously quality indicators have been proposed for BE endoscopy. The matrices should include intra-procedural characteristics like systematic examination of complete length of BE, appropriate sampling and post-procedural factors such as appropriate recommendations for surveillance intervals [17].

Neoplasia Detection Rate

Analogous to ADR in colonoscopy, neoplasia detection rate (NDR) has been proposed as a quality metric for upper GI endoscopy [18]. Neoplasia detection rate is defined as prevalence of EAC or high grade dysplasia among patients with BE patients undergoing EGD. Evidence indicates that adherence to biopsy protocols, such as the Seattle protocol for BE, can improve dysplasia detection [19]. Neoplasia detection rate has been shown to be associated with decreased rates of missed dysplasia [20].

Mucosal Inspection Time

Increasing mucosal inspection to 6 minutes during EGD is strongly associated with improved focal lesions detection [21]. Shorter observation time (<3 minutes) is associated with interval advanced GAC [22]. AGA recommends sufficient mucosal inspection time in both anterograde and retroflexed view to optimize lesion detection [9]. The European Society of Gastrointestinal Endoscopy recommends a minimum of seven minutes for the upper gastrointestinal tract and mucosal inspection time of ≥1 minute/cm of the circumferential extent of metaplastic changes in the esophagus [23]. This approach parallels findings in colonoscopy, where extended withdrawal times have been associated with a higher ADR [24].

Advanced Imaging Techniques

The use of advanced imaging modalities such as chromoendoscopy can improve the visualization of subtle mucosal and vascular abnormalities. Combining NBI with conventional WLE can markedly increase sensitivity of gastric intestinal metaplasia detection from 53% to 87% and dysplasia from 74% to 92% [25]. Similarly, chromoendoscopy combined with conventional endoscopy is associated with significantly higher detection of EAC/high grade dysplasia compared to conventional endoscopy alone in BE population [10]. The American Society for Gastrointestinal Endoscopy (ASGE) Preservation and Incorporation of Valuable Endoscopic Innovations (PIVI) recommends ≥90% sensitivity and ≥80% specificity for detection of EAC or high grade dysplasia if advanced imaging techniques are adopted for BE biopsies [26]. Chromoendoscopy using acetic acid, narrow band imaging or endoscope based confocal laser endomicroscopy utilization meets ASGE PIVI standards for BE surveillance [27].

Adherence to Surveillance Protocols

Adherence to BE biopsy guidelines is low in community, which can be associated with decreased dysplasia detection rates [10, 19]. Barrett surveillance programs lead to tumor detection at earlier stage, longer survival and decreased cancer related mortality [28]. Adherence to established surveillance recommendations for high-risk populations, such as those with BE or GIM, is essential for timely detection of progression to dysplasia or adenocarcinoma. Documentation of surveillance endoscopy need and interval is cornerstone of high quality endoscopy [9].

Challenges and Opportunities

There are several challenges that exist prior to implementation of quality indicators for EGD. For any quality indicator to be adopted as benchmark, there needs to be adequate evidence to support its association with important patient related outcomes including incidence of interval cancers and related mortality. Studies have shown that quality indicators for colonoscopy are strongly associated with post colonoscopy colorectal cancer (PCCRC) incidence and mortality [29]. Definition of PCCRC and methodology for calculation of PCCRC rates have been standardized by the World Endoscopy Organization [30]. Recently, Post-Endoscopy Esophageal Neoplasia Expert Consensus Panel standardized the definition of post endoscopy esophageal adenocarcinoma (PEEC) [10]. However, there's no recommendation regarding utilization of "look forward" versus "look backward" methodology to calculate the PEEC rates. Also, the incidence rates of interval GAC are unknown in the Western population.

Rates of EAC and GAC differ significantly with race and ethnicity. Standardization of PEEC rates and interval GAC rates across healthcare settings while factoring in local population rates of cancer itself will be challenging. However, these challenges also present opportunities for innovation and standardization. Leveraging technology, such as artificial intelligence (AI), can streamline quality monitoring and reduce the burden on healthcare providers. For example, preliminary studies show computer aided detection systems may have sensitivity >95% and specificity >85% for diagnosis of esophageal neoplasms [31, 32]. Benchmarking and auditing processes are also critical. National and international registries can facilitate the collection of quality data, enabling continuous improvement and accountability.

In conclusion, the implementation of standardized quality indicators for EGD is essential to optimize its potential in prevention and early diagnosis of upper gastrointestinal cancers. As the incidence of upper gastrointestinal cancers continues to rise, there is a need to prioritize these measures as the foundation for high-quality evidence-based care.

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