Critical appraisal of guidelines for screening and surveillance of Barrett's esophagus

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Abstract: Esophageal adenocarcinoma (EAC) arising on Barrett esophagus (BE) has become the most frequent type of esophageal malignancy in the Western world. BE is a frequent condition but progression to EAC is rare. Scientific societies publish guidelines in order to improve patients' care. However, there are fields where evidence is lacking or there are many controversies. We aimed to spotlight the most important changes, as well as the points of controversy in the recently published guidelines for BE. For most, a length ≥1 cm of a salmon-pink mucosa extending above the eso-gastric junction is required in order to define BE, accompanied with the presence of intestinal metaplasia (IM) at histology. Screening with endoscopy for the general population is not recommended while there is no proof of the efficacy of screening for targeted high risk populations. New techniques permitting a cytologic examination are under evaluation and may change this strategy. The use of high-resolution endoscopes coupled with a careful inspection of the mucosa are required during surveillance of BE. New studies are necessary in order to clarify the real benefit from the use of advanced techniques, such as virtual chromoendoscopy. Length of non-dysplastic BE plays a role for the interval time determination between endoscopies during surveillance. Indefinite for dysplasia and even more low grade dysplasia (LGD) are debatable issues in the matter of BE. There are compelling data suggesting that a definite LGD, defined as a permanent lesion confirmed by a specialist pathologist in BE, has a more dismal prognosis than previously reported and an ablative intervention may be offered in this case. However, most (75–85%) cases with LGD were downstaged in published studies and it remains unknown if in real life, percentages of downstaging are approaching those of studies or there is an over-treatment of pseudo-LGD. Biomarkers such as p53 immunohistochemistry may aid better identification of patients at higher risk. For high grade dysplasia (HGD) visible lesions should be resected with Endoscopic Mucosal Resection (EMR) while flat lesions ablated, for most, nowadays, with radiofrequency ablation (RFA). Endoscopic submucosal dissection (ESD) has not proved superior compared to EMR in BE. It has to be underlined that most studies leading to the new guidelines for BE are not considered of high quality and new guidelines may emerge in the near future.

Keywords: Barrett esophagus (BE); dysplasia; surveillance; treatment; guidelines

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Gastroesophageal reflux disease (GERD) is a very common condition. Barrett's esophagus (BE), characterized by a replacement of normal esophageal squamous epithelium to a columnar-lined intestinal metaplasia (IM), is diagnosed in 10–15% of patients with GERD. Esophageal adenocarcinoma (EAC) arising on BE has become the most frequent type of esophageal malignancy in the Western world, especially among men who have a much higher incidence than women (1). The increase of the EAC incidence has stimulated interest in screening BE with the advent of new technologies (2). In addition, because all lesions T1 or less are receptive to endoscopic treatment

but on the other hand, not all BEs have the same malignant potential and time period to progression, surveillance strategies have been revaluated.

Practice guidelines are used, at least in theory, to homogenize and improve patients' care. Medical societies consider them as an important service to endorse the standards of good medical practice. Multiple guidelines concerning BE have recently been published by many national and almost all internationally recognized scientific societies. However, the lack of solid scientific data in many fields on screening and surveillance has led to statements with low levels of evidence, underlying the need for further work in order to better stratify the risks. In this article we will try to spotlight the most important changes, as well as the points of controversy in the recently published guidelines.

Screening for Barrett's esophagus

None of the most important Scientific Societies recommend screening for the general population. Although BE is an identifiable lesion with a malignant potential, fulfilling the first criterion for a screening strategy to be applied, there are some caveats impeding the application of such a strategy to the entire population. BE is not very rare, estimated in 10% of patients with GERD, representing an estimated prevalence of 1.5% in the general population. However, the initial estimations for progression of the non-dysplastic BE to EAC are considered exaggerated, with a current estimation of 0.12% per year or even less (3). A large proportion of the population to be screened will never have an upper endoscopy but even if they were to, it is very uncertain whether it would decrease the burden of EAC. All models evaluating endoscopy for screening BE in the entire population concluded that this is not cost effective. Other methods such as "cytosponge" permitting a cytologic examination are promising and under evaluation (4).

The American Gastroenterological Association (AGA) recommends screening for BE in individuals older than 50 years with symptomatic GERD and at least 1 additional risk factor for EAC (5). Given that 10–20% of the Western populations experience GERD symptoms, a substantial number of patients will be targeted for screening. However, a substantial proportion of patients with EAC report no GERD symptoms and this strategy will miss an important number of patients who will be presented for diagnostic evaluation only in advanced stages of cancer (6). Most guidelines recommend screening for targeted populations but as mentioned above the efficacy of this screening remains controversial, with low level of scientific evidence (7-10). Differences on BE definitions between Britain and USA persist. Both the AGA and the American College of Gastroenterologists (ACG) insist that IM is required for the diagnosis of BE (5,9). The British Society of Gastroenterology (BSG) and the ACG require a length ≥1 cm of a salmon-pink mucosa extending above the eso-gastric junction in order to define BE endoscopically but IM is not required in BSG as in USA (7). The new European Society of Gastroenterology (ESGE) guidelines also require a length ≥1 cm and the presence of IM in order to make the diagnosis of BE (10). However, it is very correctly underlined that biopsies should not be taken for lengths <1 cm unless there is a visible abnormality. Although those differences in IM do not probably have a great impact on the everyday medical practice, they remain a matter of controversy all the same. In the ESGE guidelines it is stated that IM is a prerequisite for surveillance to be justified (10). An international BOB CAT (Benign Barrett's and CancerTaskforce) consensus group, in an attempt to merge the two definitions of BE, stated that "*BE is defined by the presence of columnar mucosa in the esophagus and it should be stated whether IM is present above the gastro esophageal junction*." (11).

Surveillance of non-dysplastic BE

Once the diagnosis of BE is established the management depends on several parameters; the presence or absence of dysplasia is the most important for the large majority of experts. All four aforementioned Scientific Societies deal with this problem in their guidelines but it has to be underlined that in many issues there is no unanimous acceptance among experts. Surveillance aims to detect dysplasia in order to intervene and stop the progression towards EAC. Although all guidelines propose surveillance for all patients with BE and a logical expectancy of life, it is not clearly demonstrated that this practice reduces mortality. However, even if scientific data are not very robust it would be very difficult for patients with a lesion related to a known potential for cancer development, no matter how small it is, to be remained unconcerned about this issue, especially if he/she is young. In this sense, all guidelines correctly stratify the intervals of surveillance according to the risk of EAC, mainly driven by the degree of dysplasia. Whether those intervals are correct, especially for the non-dysplastic BE patients who are the large majority and who have a very

low risk for progression to EAC, is debatable.

Surveillance for BE is synonymous with endoscopy. However, in order to detect minor lesions the use of high-resolution endoscopes is the minimum requirement and must be coupled with a careful inspection of the mucosa. It seems that the longer the total time of BE inspection the more probability there is of an endoscopically suspicious lesion being detected (12). If no mucosal abnormality is detected random four-quadrant biopsies must be obtained every 2 cm and in case of dysplasia every 1 cm (13). When adherence to the biopsy protocol was evaluated, it was very low in the everyday community practice, leading to a significant decrease of dysplasia detection and automatically raising the question about the implementation of the guidelines which is essential in order to get the expected results (14). Eventually the new advanced techniques will help in order to better target our biopsies but this has not been incorporated in the guidelines until now. A meta-analysis found that with the use of advanced techniques there is an increased diagnostic yield for dysplasia and that this yield does not differ between chromoendoscopy and virtual chromoendoscopy (15). However, new studies are necessary in order to clarify the real benefit from the use of those techniques.

Although there are many controversies concerning surveillance of non-dysplastic BE, most opinions converge towards a surveillance of high risk patients with non-dysplastic BE. Male sex, age over 50 years, white race, obesity, chronic symptomatic GERD and eventually alcohol and tobacco use are recognized as aggravating factors for progression to EAC (16). However, there are no stringent criteria which can be used for the surveillance of those patients and there are no strong data supporting that a more intense surveillance will lead to a real benefit. Almost all patients with BE are taking proton pump inhibitors (PPIs) irrespective of their GERD symptoms, assuming that less acid will lead BE to a less noxious exposure and consequently decelerate the pathway towards EAC. However, there are not solid data demonstrating that PPIs or any other agent such as nonsteroidal anti-inflammatory drugs, aspirin, or statins lead to a reduction of EAC or mortality (17,18). The results of two large randomized trials (AspECT and BOSS) examining the role of chemoprevention in BE are awaited. Intervals between the recommended gastroscopies with biopsies for the non-dysplastic BE are not identical in all guidelines, five years considered as the maximum period. The new BSG guidelines introduce the BE length as a parameter for tightening surveillance, suggesting that for a length less than 3 cm without IM, surveillance may be stopped based on recent data raising the question, not only about ultra-short but even for short (<3 cm) segment BE (19). The ESGE guidelines define, even more precisely, the time of surveillance according to length: every 5 years for BE <3 cm, every 3 years for BE ≥3 cm and <10 cm while for BE ≥10 cm it is advised to refer patients to expert centers (10). In ESGE guidelines, it is suggested stopping surveillance in patients >75 years old with non-dysplastic BE. We believe that an honest presentation of the available data to the patient including the minimal but real risk related to endoscopies in conjunction with a thorough discussion with him may lead to a more consensual and acceptable attitude awaiting new more solid data.

Indefinite for dysplasia—low grade dysplasia (LGD)

An uncomfortable situation for both the patient and the clinician occurs when histology reports 'indefinite for dysplasia'. Guidelines from ACG deal with this issue, recommending an intense antireflux therapy with double dose of PPIs in order to minimize inflammation and repeat endoscopy with a larger number of biopsies taken every 1 cm (9). If the degree of dysplasia does not change, most advocate a new endoscopy in 6 months, a reevaluation of biopsies from a second pathologist of another institution ,a specialist in BE and if it persists, the initiation of a follow-up with biopsies every 1 cm once a year.

LGD is among the most debatable issues in the matter of BE. Accumulated data, mainly during the last decade, corroborate that there is a great discrepancy among pathologists concerning the definition of LGD. Most recent studies found that, when pathologists specialized in BE, revaluated biopsies by "average pathologists" which reported LGD, they down staged the large majority of them to a non-dysplastic BE. For the remaining "real LGD" the natural history was much more aggressive, towards a progress of an almost high grade dysplasia (HGD) biopsy (20,21). Those findings have led scientific societies to change their guidelines when a LGD is encountered. Recently, BSG has reformulated the LGD statement as follows: "*Patients with LGD should have a repeat endoscopy in 6 months' time. If LGD is found in any of the follow-up oesophagogastroduodenoscopy sets of biopsies, the patient should be offered endoscopic ablation therapy, preferably with radio frequency ablation (RFA), after review by the specialist multidisciplinary team (MDT). If ablation is not*

undertaken, *6-monthly surveillance is recommended*" (22). For the same subject ACG advocates that "*endoscopic therapy is considered the preferred treatment modality*, *although endoscopic surveillance every 12 months is an acceptable alternative*" (9). However, those balanced approaches put as prerequisite the unequivocal decision of an expert pathologist or a panel of pathologists. This prerequisite may have serious impacts when implemented in the everyday practice: (I) there are data showing that the inter and intra-observer variability for LGD is important even among expert pathologists (23); (II) a recent meta-analysis has shown that the major cause of mortality in patients with BE and LGD is not related to esophageal disease. In addition it has been shown that the pooled annual incidence rates of progression to HGD and/or EAC were not very high for the whole population and they were related to the LGD/BE ratio, the lower the ratio the higher the annual incidence (24) and (III) all downstagings of the initial LGD diagnosis to a non-dysplastic BE have been reported in the context of academic centers and medical studies. There are no data evaluating if the percentage of downstaging LGD in the everyday practice approaches the 75–85% as in the studies. In the real world this ideal image maybe not the existing one and the percentage of LGD downstagings may be much lower considering the weight put on the expert pathologist when a very specific patient carries with him a written report by another pathologist which mentions "LGD", due to eventual medicolegal or other issues that would be involved if the progress of this individual patient case proved he was wrong in his reevaluation. This must be even more difficult in countries where the regulatory and legal system do not cover these kinds of approaches. Another problem which can be unveiled in many institutional or regional structures concerns the process of nomination and the acceptance by the medical community of the "expert pathologist". What would the criteria be for this process? Would it be just the confidence of the gastroenterologist sending him the biopsies, the number of patients with BE he/she has already seen or a minimum number of publications on the matter of BE?

Biomarkers have been proposed as tools to identify patients at increased risk for progression. Among them *p53* immunohistochemistry seems to be the most, although not unanimously accepted (5,7,9). In a recent study examining the circulating cell-free DNA (cfDNA) of BE patients, it is reported that map nearby TP53 gene showed a higher frequency of genetic alterations which were the most discriminant between metaplastic and dysplastic BE (25). Those data are supporting for the eventual usefulness of *p53* staining, in order to discriminate the patients with LGD and higher neoplastic potential. For all these reasons there is a necessity of less subjective markers in order to predict the malignant potential of those patients. Although, a cost-effectiveness analysis concluded that radiofrequency ablation (RFA) might be the preferred strategy for stable LGD we have to be cautious in generalizing these conclusions to all patients, taking into account the differences between the assumptions made in the decisions analytical models and the implementation of those conclusions in the real world (26).

HGD—endoscopic interventions

For HGD or *in situ* carcinoma (T1am1) there is, as in non-dysplastic BE, less discrepancy among pathologists compared to LGD. Nevertheless, the confirmation of HGD by a second pathologist, specialized in BE is still necessary. All new guidelines consider that all T1 EAC are theoretically amenable for endoscopic treatment because the risk of lymph node invasion is minimal when submucosa and especially its deeper third is not invaded (27). Endoscopy with high definitions endoscopes, eventually the use of chromoendoscopy, enough time for careful inspection and endoscopy performed by an experienced endoscopist are the basic steps in order to detect subtle lesions as mentioned above. This is crucial because there is a big difference in the choice of an accurate treatment to be applied between a flat BE and the existence of a nodular lesion. Visible lesions should be resected with Endoscopic Mucosal Resection (EMR), if possible in one piece, in order to have the better histology and consequently the better medical decision according to the depth of invasion. Flat lesions without visible abnormalities should be treated with other ablative methods, for most nowadays RFA. However, when patients referred for RFA were reevaluated in centers with high expertise before the procedure, a large number of them were reclassified as having visible abnormalities and consequently changing the therapeutic plan completely (28). An additional advantage of endoscopic resection is the availability of large tissue specimens which is recommended for a better pathologic evaluation and staging (8). The presence of a confirmed HGD is related to an increased risk of synchronous EAC. Although, most of those cancers were non-invasive and consequently endoscopically manageable a 12.7% were invasive (29). Biopsies are prone to sampling error and additionally can lead to fibrotic lesions making the endoscopic resection

(ER) difficult (30). Stepwise radical endoscopic resection (SRER) for endoscopic removal of the whole BE area has been proved equally effective to RFA but with a much higher percentage of strictures (31). For this reason RFA is preferred to SRER and it is recommended by all published guidelines despite the most accurate histology that SPER could offer. However, when a young patient with BE and multifocal HGD is presented for treatment an individualized approach is needed which takes into account all the possible parameters of cancer risk. A discussion in a multidisciplinary care team would be preferable and the eventuality of SRER may not be excluded even when an obvious endoscopic abnormality is not seen. With the new RFA catheters for circumferential ablation the phase of esophageal sizing in order to make the right choice of the catheter is not necessary. There are data from a randomized trial suggesting that the cleaning phase between the two ablations in the same session can be omitted but those results must be confirmed by larger studies (32). In addition, there are some recent data showing that this new simplified RFA protocol may have a greater percentage of stenosis, especially if it follows an EMR procedure (33). Other ablative methods such as cryoablation or hybride argon plasma coagulation (APC) are less evaluated but may play an alternative or additional role in the future. However, if after RFA ablation for large BE, small BE islets or small tongues remain, the use of APC for their ablation may not be wrong, considering the high cost of RFA catheters. For large lesions, whether endoscopic submucosal dissection (ESD) is preferable to EMR is debatable in the matter of BE. Although Japanese studies have shown less local recurrences for squamous cell carcinomas with ESD in patients with BE and EAC, ESD has not shown an advantage compared to EMR (34,35). In the future this recommendation may change but for the time being EMR remain the preferable method for BE endoscopic resection.

Notwithstanding that BE was and still is a subject of interest for the scientific community and many physicians and scientists have shed great amounts of ink, for many decades, on the issue of enlightenment of some aspects of its pathophysiology, clinical importance and treatment, it still remains a matter of controversies and debates. Scientific societies have tried to analyze the up to date evidence and formulate guidelines in order to facilitate good medical practice. However, many questions remain unresolved. The main problem of all guidelines is the level of evidence of the statements and recommendations proposed. In a systematic analysis using the AGREE II format for practice guidelines evaluation it was found that most of the recommendations for BE guideline were of level B or C for quality evidence and that they failed to meet the AGREE II domains (36). Although the new guidelines are more convergent that the previous ones, there are still many studies to be carried out evaluating the correct management of BE concerning the best technique to be used and avoiding the over or the under-treatment of the patients.

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Footnote

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