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Retained biopsy specimens: Are they a major issue in endoscopy?

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In endoscopy, it is an all-too-common occurrence to have a mismatch between the number of biopsies taken by the endoscopist and the number recorded by the assistant that is sent for histopathology. This discrepancy often leads to the assistant frantically attempting to tease apart samples while the endoscopist applies restraint to avoid confrontation. Although possible explanations include endoscopist technique and compression of multiple bites into one inseparable sample, another possibility is the concept of a retained biopsy specimen, that is, one that has been lost or fragmented within the endoscope. This phenomenon is so common that many endoscopists would not give this a second thought and it is often unnoticed. However, "tissue is the issue" and the integrity of biopsies is essential for histological assessment to guide patient management. There is a complete paucity of data on this issue, which leaves one to ponder the fate of these lost specimens and whether they affect patient outcomes.

In this issue, Toy and colleagues attempt to shed light on this topic [1]. Their study examined the frequency of retained biopsy specimens in the biopsy channel and suction cap immediately after standard endoscopy procedures with biopsy (N = 105). Of these, a specimen was found in either the cap or the channel in 48% (19% in cap; 6% in the biopsy channel; 23% in both the cap and channel). Despite 50 retained biopsies, only a small percentage (2%) could have changed the patient's management.

This study has a number of important implications. First, biopsy specimens are often lost or fragmented in the channel and/or cap. These sites could be checked in the event of missing specimens, especially polyps removed via cold biopsy forceps. One idea is to flush the accessory channel to increase yield, and this could be particularly relevant with biliary brushings.

Second, lost or fragmented biopsies have the potential to affect diagnosis and may contribute to missed cancer due to false-negative histology. In this study, 8% of lost biopsies (4/50) could have resulted in a change of diagnosis, with only 2% (1/50) potentially affecting further management (missed histological diagnosis of Barrett's esophagus). Considering the scale of endoscopies worldwide, this 2% can have far-reaching consequences. We must be mindful that histology is not always the gold standard as the quality is also endoscopist-dependent (site, number, biopsy technique) and may be fragmented through the biopsy channel and/or cap. This has been seen in a study involving small polyps [2], reinforcing the need for attention to endoscopic assessment and photo documentation, which could be enhanced with computer-aided diagnosis (CADx), and consideration of repeat endoscopy if there is clinical concern.

Third, this is a sobering reminder that once a malignant sample has been biopsied, there is a high risk of malignant contamination of the biopsy channel. This is corroborated by a Dutch study, which estimated a tumor seeding risk of 0.3% to 0.6% for metachronous colorectal cancer [3]. Moreover, the authors showed that these tumor cells were potentially viable and implanted elsewhere [3]. Another study from Hamburg found viable cells in the cap/biopsy channel after biopsy of advanced esophageal neoplasia in a subgroup of patients [4]. Therefore, interventions such as biopsies, tattoos, and polypectomy should ideally be prioritized before the channel becomes contaminated with carcinoma specimens, and avoided thereafter if possible.

Fourth, in this study, retained biopsy samples were more common with gastroscopy vs. colonoscopy (58% vs. 36%). Consistent with Pouseille's law, a working channel of 2.8 mm vs 3.7 mm would lead to three times more resistance to flow and may increase the risk of specimen retention within the channel. Furthermore, borescope studies of biopsy channels suggest that nearly all reusable scope channels will have visible defects over time, including scratches, dents, staining, debris, glue, etc., which can introduce resistance and shearing of biopsy specimens [5]. Squeezing more tissue within a biopsy cup could lead to overspill and contribute to fragmentation within the channel. A Canadian study from 2007 found that double-bite biopsies were more vulnerable to "specimen loss" and reduced histological quality compared to single-bite biopsies [6], although more recent studies dispute this [7]. Single bites may be preferred to reduce specimen loss/fragmentation, and based on Poiseuille's law, reducing the speed at which the specimen is pulled through the channel may reduce resistance and specimen loss/fragmentation.

Last, this study highlights the importance of adequate scope cleaning and decontamination of both the channel and the cap as per European Society of Gastrointestinal Endoscopy/European Society of Gastroenterology and Endoscopy Nurses and Associates standards [8]. However, it must be stressed that this study did not assess biopsy specimen retention after reprocessing and, to the best of our knowledge, tissue retention is not an issue if the robust endoscope reprocessing protocols are followed.

This study does raise several other questions. Should the endoscopist withdraw the forceps slowly or perhaps open the biopsy cap as critical samples are withdrawn? Does the phenomenon of lost biopsies vary with forceps design, such as the presence of a spike, size (jumbo vs. regular forceps), biopsy cup shape and profile [9]? Is this affected by other factors within Poiseuille's equation, such as enteroscope (longer length), superslim gastroscopes (thinner accessory channel), older endoscopes (scope channel damage) or with lubrication of the biopsy channel (by lowering viscosity)? Further studies on this topic are needed and will help to validate the study findings.

To summarize, the study by Gregory Toy and colleagues prompts us to consider biopsy retention as a major issue in endoscopy. This is a reminder for clinicians to prioritize endoscopic assessment over biopsies and to consider malignant contamination of the biopsy channel. Pragmatically, if a biopsy specimen is lost, look under the cap - there is an over 50% chance it may be found there. On a final note, the knowledge that biopsies are routinely lost in the channel may avoid any precipitating arguments, after all, it was nobody's fault but that of the scope!

Conflict of Interest

The authors declare that they have no conflict of interest.

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