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Capsule endoscopy in the evaluation of small bowel tumors and polyps

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ABSTRACT

Small bowel tumors (SBTs) are rare. Their diagnosis by small bowel capsule endoscopy (SBCE) is usually made during the evaluation of obscure gastrointestinal tract bleeding or unexplained iron-deficiency anemia. SBCE has a good sensitivity for the detection of SBT. However, submucosal tumors, large or proximally located SBTs, have a higher risk of being missed by SBCE. SBCE should be considered in patients with complicated or refractory celiac sprue and those with advanced melanoma, as these patients are at risk for SBT. The retention rate of a video capsule in patients with SBT is slightly higher than in those with obscure gastrointestinal tract bleeding, but rarely causes obstruction and typically can be resolved during resection of the tumor. In patients with familial adenomatous polyposis and duodenal adenomas, SBCE is useful in detecting additional intestinal polyps, although a beneficial effect on clinical outcome has not yet been demonstrated. SBCE in the surveillance of Peutz-Jeghers syndrome is feasible and well tolerated, although MR enterography seems to have a higher accuracy.

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1. Introduction

Small bowel tumors (SBT) are rare when compared with colorectal cancer. In contrast, there is heterogeneity of histologic entities in SBTs, comprising benign and malignant tumors [1] (Figures 1 and 2). Owing to nonspecific or absent symptoms and difficulty exploring the small bowel (SB), these tumors are often diagnosed late. Additionally, investigation of the SB is often required in polyposis syndromes (Figure 3). The role of SB capsule endoscopy (SBCE) as a diagnostic modality in the search for SBT and polyps is discussed in the following sections.

2. Detection of SBT

Several studies retrospectively analyzed patients in whom a SBT had been seen with SBCE. The first study, from Australia, included 26 patients who had undergone investigations for a mean period of 27 months and had on an average 4.2 hospital admissions before the diagnosis of SBT [2]. Bleeding stopped in all patients who underwent curative resection. However, 10 patients with malignant SBT already had advanced disease at the time of SBCE.

A retrospective multicenter European study [3] included 124 tumors diagnosed during 5129 SBCEs. Capsule endoscopy (CE) was the first diagnostic modality performed after inconclusive upper and lower gastrointestinal (GI) endoscopy in 44%. Overall, 81% of SBTs detected at SBCE had not been anticipated. In 58 patients, SBCE directed treatment immediately, and in another 9 patients, consecutive tests failed to confirm the correct diagnosis of SBT made by SBCE.

A Korean multicenter study [4] included 57 patients with SBT. However, 17 tumors were not confirmed by histology (including 13 suspected leiomyomas). A mean of 3.2 tests had been performed before SBCE, which diagnosed 30 of 57 SBTs exclusively; 7 patients underwent surgery.

A single-center US series reported on 50 patients with SBT (8.9% of SBCEs), including 9 patients younger than 50 years [5]. In total, 40 tumors were confirmed by histology, and two-thirds of the tumors in this series were malignant. However, across these studies, there was heterogeneity in the distribution of histology. Although GISTs represented the most common malignant SBT in the European and Korean studies, adenocarcinoma (Figure 2A and B) and neuroendocrine tumors were more frequent in the Australian and US series [2–5]. Benign SBTs include a wide range of entities including inflammatory, heterotopic (gastric and pancreatic), and neoplastic epithelial (adenomas) or mesenchymal

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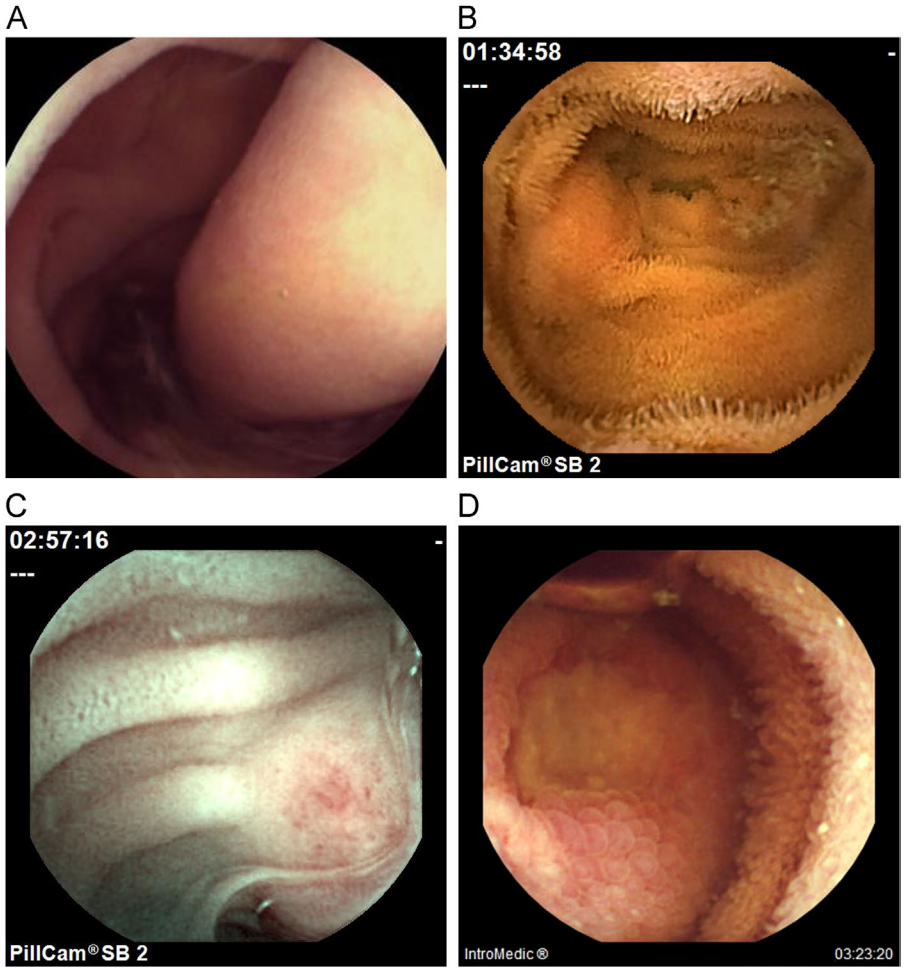

Fig. 1. Submucosal small bowel tumors. (A) Large, pedunculated lipoma (MiroCam). (B) Neuroendocrine tumor with bridging folds (PillCam SB2). (C) Metastasis of colon cancer to the mesentery (Flexible intelligent Color Mode, FICE) with pathologic vessels. (D) Ulcerated neuroendocrine carcinoma (MiroCam). (Color version of figure is available online.)

lesions (lipomas [Figure 1A], leiomyomas, and others). Ulceration of the mucosa may cause bleeding, and occasionally, polyps or tumors can lead to intussusception [6].

The age of patients with SBT in these studies ranged between 50 and 67 years. SBCE had been performed for obscure gastrointestinal bleeding (OGIB) in most patients (75%-87%).

A systematic review showed that in patients undergoing SBCE for iron-deficiency anemia, a SBT or mass was detected in 3.5% (range: 0%-14.3%) [7].

In a large Japanese registry, double-balloon enteroscopy (DBE) had a higher diagnostic yield for SBT, 13.9%. The indication for DBE in this group was suspected tumors in 42.4%. OGIB was the reason for referral in only 27.8% of patients with SBT vs 47.0% in those without SBT ($P < 0.001$) [8]. Similarly, in another (retrospective) Japanese series, patients with a SBT diagnosed by DBE were symptomatic in 90% vs 49% of patients without SBT [9].

Hence, SBCE is a useful first-line diagnostic tool in detecting the few patients with SBT out of the larger group with OGIB or unexplained iron-deficiency anemia (IDA).

3. Characterization of SBT by CE

In CE standard terminology [10], tumors or masses and polyps are grouped into the heading of protruding lesions. Lesions are further characterized by the following attributes: size (small, medium, and large), number (single, few, and multiple), and presence or absence of bleeding or bleeding stigmata. The type of tumor (submucosal, fungating, ulcerated, or frondlike or villous) or polyps (sessile or pedunculated) is further stated. Description of nodules (with a typical size of 2-3 mm) includes distribution pattern (localized, patchy, or diffuse) and longitudinal extent (short segment, long segment, or whole organ).

Localization of a tumor or polyp at SBCE can be described by anatomical landmarks (duodenum or terminal ileum), by the percentage of SB passed by the capsule until reaching the tumor. For practical reasons, the proximal half of the SB has been assigned as jejunum and the distal half as ileum [4]. If a capsule localization system is included in the capsule system, the quadrant of the abdominal wall to which the SBT is projected can further be reported.

The exact description of capsule findings is important for further classification of tumors or polyps found at SBCE. In the clinical context, capsule findings alone may be suggestive, for example, if a pedunculated polyp is found in a patient with Peutz-Jeghers syndrome (PJS) or by detection of a melanotic-appearing tumor in a patient with known melanoma. However, SBCE is not able to predict histologic diagnosis. Additionally, malignant diseases such as intestinal lymphomas may occasionally appear as nodules [11] or as flat ulcerations or weblike strictures [12].

A special issue in SBCE is differentiating submucosal tumors (Figure 1) from harmless bulges compressing from outside the bowel wall. A Chinese series reported 32 tumors detected by SBCE that were confirmed by DBE and further by surgery [13]. However,

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