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EDITORIAL

# The Vanishing Frontiers of Therapeutic Enteroscopy

## O Desvanecer das Fronteiras da Enteroscopia Terapêutica

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The last years saw the dawn of a paradigm shift in small bowel investigation and management. Once difficult to approach through both endoscopic and radiologic studies, small bowel evaluation underwent a game-changing revolution with the recent advent of new endoscopic and radiologic technologies. The radiologic revolution came from the development of computed tomography enterography (CTE) and magnetic resonance imaging enterography (MRE). The advantages over the old small bowel follow-through rapidly became evident, as superimposed 2-dimensional bowel loops were replaced by the new multiplanar small bowel reconstructions.

Until recently, endoscopic techniques have been very limited either in the depth of insertion (push-enteroscopy), lack of therapeutic intervention or availability (probe-enteroscopy) or invasiveness (intra-operatory enteroscopy). Hence, radiologic techniques have long been the mainstay of small bowel investigation.

A little over a decade ago, another revolution in small bowel evaluation took place. Over a few years, two new endoscopic technologies emerged independently and the evaluation and management of small bowel pathologies have once again changed. Forever.

The first endoscopic revolution came with capsule endoscopy (CE), a disruptive technology that rendered a once inaccessible organ at the reach of a small swallowable endoscopic capsule.[1] Gastroenterologists have rapidly adapted to this new approach to small bowel endoscopy, akin to Richard Fleischer's ''Fantastic Voyage'' from 1966 (http://www.imdb.com/title/tt0060397/). Although CE has rapidly established its place in several diagnostic algorithms as a noninvasive endoscopic procedure that enables total enteroscopy, its pitfalls and limitations (mostly concerns about false negatives, lack of control and therapeutic capability) have also arisen.[2]

The second endoscopic revolution came with double-balloon enteroscopy (DBE).[3] This groundbreaking, and yet simple, adaptation of a long enteroscope to a balloon-overtube allowed pleating of the small bowel, overcoming the main limitation to deep small bowel endoscopic progression: the formation of small bowel loops preventing the continued use of linear forces to push the enteroscope through the small bowel. Two other forms of device-assisted enteroscopy (DAE) soon followed: single-balloon enteroscopy, similar to DBE, but lacking the balloon at the tip of the enteroscope; and spiral enteroscopy, in which a spiral-overtube is used to convert a rotational force applied to the overtube that pleats the small bowel into a linear force that advances the enteroscope.

These technologies were also promptly conquered by endoscopists eager for a direct endoscopic access to the small bowel. Although invasive and lengthy procedures, their role in small bowel management became established as complementary to CE and CTE/MRE, mostly for direct evaluation, biopsy or therapy of pathologies suspected or established with the previous examinations.

Most standard endoscopic therapies were adapted to the small bowel therapeutic repertoire, some after the development of dedicated accessories. Several hemostatic

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therapies such as argon–plasma coagulation, clipping or injection, either in routine or emergency settings,[4,5] have drastically changed the management of obscure gastrointestinal bleeding. Once suffering from multiple inevitable surgeries, patients with Peutz–Jeghers syndrome (PJS) and small-bowel polyps are currently managed almost exclusively endoscopically.[2,6] Dilation of benign stenoses, mostly Crohn's and NSAIDs strictures[7] and stenting of malignant tumors[8] are at present times also within the reach of DAE. Retained small-bowel foreign bodies are now generally an enteroscope and a Roth-Net away[9] and direct percutaneous endoscopic jejunostomy is nowadays usually performed with a balloon enteroscope.[10,11]

Its use has rapidly expanded beyond the boundaries of the small-bowel. Once inaccessible to endoscopic retrograde colangio-pancreatography (ERCP), patients with a surgically modified anatomy became manageable by DAE-ERCP.[12] Its use promptly extended from diagnosis to therapy, such as stone-extraction, balloon-dilation of bilioenteric strictures[13] or stenting with plastic or self-expandable metallic stents.[14,15] Combined *rendez-vous* procedures using DAE-ERCP and percutaneous transhepatic colangiography[16] have also been reported, either to assist difficult techniques or to manage complications.[17] Furthermore, the balloon-overtubes have found a role independent from the enteroscope, as for difficult stenting in the upper and lower gastrointestinal tract[18] or assisting difficult endoscopic submucosal dissection in the colon.[19]

In this issue of GE, Kröner PT et al present a case series of yet another therapeutic procedure enabled by DAE, small-bowel endoscopic mucosal resection (EMR).[20] The authors present a series of eight patients who underwent EMR of jejunal polyps. An inject-and-resect technique was used after evaluation and delimitation of lesions with FICE electronic chromoendoscopy and careful submucosal injection with diluted epinephrine. All procedures were successful, either *en bloc* or in piecemeal, and no complications were reported. The main limitation, as acknowledged by the authors, is that this is a retrospective series of only eight patients, but so are most other published series on new therapeutic procedures using DAE.

Although EMR in the small bowel using DAE has been previously reported and is probably underreported in several series on the endoscopic management of PJS,[2,6] this is the first series focusing in small bowel EMR using DAE. Moreover, apart from raising awareness to the addition of EMR to the therapeutic armamentarium of DAE, this article from Kröner PT et al provides important tips and tricks useful for a safe small bowel EMR. Once again, another frontier in therapeutic enteroscopy vanishes.

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