Spiral enteroscopy: an alternative method for deep small bowel enteroscopy?

L’entéroscopie par scanner spiralé est-elle une autre méthode pour l’entéroscopie profonde de l’intestin grêle ?

P. A. Akerman · D. L. Cantero

Abstract Spiral enteroscopy is a new technique and a viable option for deep small bowel intubation. Currently, more than 3,500 cases have been performed worldwide. The Discovery SB device has been approved by the Food and Drug Administration and has been granted a CE mark. The technique is safe and effective for the management and detection of small bowel pathology. Recent studies of spiral enteroscopy have demonstrated diagnostic yield, total time of procedure, and depth of insertion that compare favorably with double- and single-balloon enteroscopy. Spiral enteroscopy can be performed in postgastric surgery patients including Roux-en-Y patients requiring endoscopic retrograde cholangiopancreatography. Retrograde spiral enteroscopy can also be performed successfully. The strengths of spiral enteroscopy are rapid advancement in the small bowel and controlled, stable withdrawal that facilitates therapy. Future studies will be needed to compare competing technologies.

Keywords Spiral enteroscopy · Bowel enteroscopy · Endoscopic retrograde cholangiopancreatography

Résumé L’entéroscopie par scanner spiralé est une nouvelle technique et une option viable pour l’intubation profonde de l’intestin grêle. Plus de 3 500 cas ont été réalisés à travers le monde. Le dispositif, Discovery SB, est approuvé par le Food and Drug Administration des États-Unis et a été octroyé par la marque CE. La technique est sans danger et efficace pour la prise en charge et la détection des maladies de l’intestin grêle. Des études récentes sur l’entéroscopie par scanner spiralé ont démontré une rentabilité diagnostique, un temps total du procédé et une profondeur d’insertion qui se comparent favorablement avec l’entéroscopie à double et à simple ballon. L’entéroscopie par scanner spiralé peut être réalisée chez les patients avec une chirurgie post-gastrique ainsi que chez les patients avec une anse en Y nécessitant une cholangiopancréatographie rétrograde endoscopique. Une entéroscopie spiralée rétrograde peut aussi être réalisée avec succès. La force de l’entéroscopie spiralée se trouve dans la progression rapide dans l’intestin grêle et le retrait stable et contrôlé du dispositif qui facilitent ainsi la thérapie. Des études plus poussées seront utiles afin de comparer les technologies en concurrence.

Mots clés Entéroscopie par scanner spiralé · Entéroscopie de l’intestin grêle · Cholangiopancréatographie rétrograde endoscopique

Introduction

Spiral enteroscopy is the newest method developed for deep small bowel enteroscopy. The concept was first proposed by Dr. Paul Akerman and the first case was performed by Dr. Paul Akerman and Dr. Daniel Cantero in 2006. Currently, over 3,000 cases have been performed worldwide. The device used for spiral enteroscopy is the Discovery SB by Spirus Corporation, Stoughton, MA, USA. The Discovery SB is an overtube with a raised spiral
on the distal end and is FDA cleared and been granted CE mark. The concept of spiral enteroscopy is the rotating spiral will convert rotational energy into linear energy and pleat the small bowel on the Discovery SB and the enteroscope.

Other methods of deep small bowel endoscopy have been developed and each has its strengths and weaknesses. Sonde enteroscopy allowed the first endoscopic visualization of the entire or near entire small bowel. Unfortunately, the Sonde enteroscope lacked a therapeutic capability and had poorly controlled withdrawal. Sonde enteroscopy is no longer performed. The breakthrough for deep small bowel enteroscopy came with the work of Yamamoto et al. [1]. Using a double-balloon technique, Yamamoto was able to visualize the entire small bowel. The technique uses a repetitive pulling technique to pleat the small bowel on the overtube and enteroscope. Although double-balloon enteroscopy is highly effective, complete small bowel examinations have been relatively uncommon in the USA. In addition, long procedure times and occasional difficulty with controlled withdrawal have led to a search for alternative methods to visualize the small bowel. The single-balloon enteroscopy technique is relatively new and simple. The single-balloon enteroscopy technique uses one on the overtube to pleat the small bowel.

Spiral enteroscopy occurs when the spiral is advanced past the Ligament of Treitz and the overtube is rotated. When the Discovery SB overtube rotates around the enteroscope the small bowel is pleated on the enteroscope and overtube. Unpleating of the small bowel occurs with slow counterclockwise rotation of the Discovery SB overtube. The advantages of spiral enteroscopy are the apparent speed of advancement, controlled withdrawal, and the overall decreased time of procedure with estimated depths of insertion comparable to DBE.

Current device

The current device is called the Discovery SB overtube from Spirus Corporation. The Discovery SB has been approved by the Food and Drug Administration (FDA) and has been granted a CE mark. The device specifications are overall length 118 cm, internal diameter 9.8 mm, outer diameter 14.5 mm, spiral height 5.5 mm, and spiral length 22 cm. Significantly, the new version of the Discovery SB has a soft hollow spiral. The device has a variable stiffness distal end and a locking device that fixes the Discovery SB overtube to the enteroscope but still allows rotation of the overtube on the other end. The proximal end of the Discovery SB has two foam handles to assist rotation. The Discovery SB is designed to accommodate an endoscope that is 9.4 mm in diameter or less. Specifically, the Discovery SB accommodates the 9.2 mm 200 cm Olympus SIF-Q180 and the 9.4 mm 200 cm Fujinon EN-450T5 enteroscopes. They are also known as the single- and double-balloon enteroscopes, respectively.

Spiral enteroscopy technique

The Discovery SB overtube is a sterile single-use device. Two operators are required to perform the technique. Prior to use, the internal liner of the Discovery SB is well lubricated with the proprietary lubricant supplied with the device. After careful lubrication, the Discovery SB is installed on the enteroscope (Fujinon EN-450T5 or Olympus SIF-Q180). Typically, the device is locked on the enteroscope at 145 cm to begin the procedure leaving approximately 27 cm of enteroscope past the distal tip of the Discovery SB and assuring that the enteroscope will retain its flexibility as it passes through the fixed portions of the upper gastrointestinal tract to the Ligament of Treitz (LOT).

The fixed Discovery SB and enteroscope are advanced slowly with gentle rotation of the overtube until the enteroscope typically reaches past the LOT. It is important to minimize insufflations of air and CO₂ may offer some advantages. Minimizing air reduces the formation of a loop in the stomach and allows better apposition of the spiral threads to the bowel wall to initiate spiral advancement.

To begin spiral enteroscopy advancement, the spiral must be past the LOT whereby the mobile small bowel can be pleated on the enteroscope. The Discovery SB functions most efficiently when the overtube is straight and rotating easily to pleat small bowel. Early resistance to rotation is almost always due to a loop in the stomach. A loop may be formed in the stomach from the gentle forward pressure when advancing the spiral past the LOT. Often it is helpful to slowly rotate the overtube while pulling back gently on the overtube. This causes a paradoxical forward motion of the enteroscope and often initiates spiral enteroscopy. If this maneuver is repeated with abdominal pressure and if it still does not work, shortening and straightening the Discovery SB is recommended. The Discovery SB is then unlocked from the enteroscope, and it is maximally advanced into the small bowel. Next, the overtube is advanced over the enteroscope with gentle slow rotation. This usually installs the spirals past the LOT and the overtube can be straightened and rotated to begin spiral advancement. It is a general principle that rapid or forceful rotation is never the solution to initiating spiral enteroscopy.

Once the maximal depth of insertion has been reached with spiral advancement, it is sometimes possible to pleat additional small bowel using the following maneuver. The enteroscope is unlocked and advanced to maximal depth.