Use of Carbon Dioxide Insufflation During Double Balloon Enteroscopy in a Patient with Bleeding in the Mid-Small Bowel

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Introduction
The use of carbon dioxide (CO$_2$) instead of air for insufflation during endoscopic procedures has been demonstrated in their randomized trial to significantly reduce abdominal pain and discomfort for patients.

Since its introduction in May 2006, the CO$_2$ EFFICIENT® endoscopic insufflator has become a standard tool for a wide range of therapeutic procedures performed in the Endoscopy Unit at Fox Chase Cancer Center. In particular, all of our cases of Double Balloon Enteroscopy (DBE) are performed utilizing carbon dioxide.

DBE is a new procedure that utilizes a flexible 145 cm overtube preloaded on a 230 cm enteroscope developed by Dr. Hironori Yamimoto and the Fujinon Corporation. Both the overtube and the endoscope have distally mounted, pressure-controlled balloons designed to inflate and “hold” the small intestine. Using a push-and-pull technique of manipulating the enteroscope and overtube, together with the balloons holding onto the small bowel, nearly complete small bowel enteroscopy can be accomplished in many patients.

The drawback of the technique is the long duration of the procedure (up to 90 minutes) coupled with the degree of insufflation required to visualize up to 400-600 cm of the small bowel. In this facility’s experience, the use of carbon dioxide insufflation facilitates the examination by not over-distending the small intestine. Furthermore, by reducing the abdominal distention and discomfort post-procedure, we have found that patient recovery time is reduced. The following case illustrates how this marriage of two new technologies has improved this facility’s ability to evaluate patients with small bowel disorders.

Patient History
The patient was a 69-year-old woman found to have iron deficiency anemia in September 2006. She denied usage of any ASA or NSAIDs, but her past medical history was significant for surgery for resection of ovarian cancer in 1999 and diverticulosis. Her evaluation included; a negative upper endoscopy, and colonoscopy to the descending colon terminated secondary to patient discomfort. Subsequent barium enema only reveal diverticulosis. Pill camera study revealed bleeding in the mid-small bowel without a clear source, which prompted a push enteroscopy examination into the jejunum, which was unremarkable.

Diagnostic Goal
The patient was referred to the Fox Chase Cancer Center for a DBE examination to determine the source of bleeding in the mid-small bowel. The patient resided in North Carolina, however, and she hesitated at the thought of enduring the approximately nine-hour drive. An ongoing need for intravenous iron, and subsequent blood transfusion, prompted the patient to be driven up by her family on the day prior to the procedure.

Exam Procedure
DBE with Carbon Dioxide Endoscopic Insufflator: During a 65-minute procedure, the patient was sedated with meperidine 125 mg, midazolam 8 mg, and diphenhydramine 50 mg, with insufflation provided by the CO$_2$ EFFICIENT insufflator. The examination was terminated at 190 cm distal to the Ligament of Trietz.
Findings
At 175 cm distal to the ligament, a 2 cm ulcerated non-bleeding mass was seen (Figure 1). The lesion was tattooed with India ink (Figure 2) and the placement of an endoscopic clip (Figure 3). The patient spent 40 minutes in the recovery room and felt comfortable enough to undertake the nine-hour drive home that same day.

Conclusion
Biopsies taken during the procedure confirmed metastatic ovarian cancer. The patient was referred to her surgeon in North Carolina for resection.

Dr. Haluszka and colleagues have observed no adverse effects of CO\textsubscript{2} insufflation in any of the cases they have performed. Despite the long duration of many of the procedures, patients have minimal abdominal distention following their examinations. This facility’s experience suggests that CO\textsubscript{2} insufflation is a valuable tool to help minimize patient discomfort following prolonged endoscopic procedures.