

Case Report

Navigating endoscopic challenges in situs inversus totalis: strategies for optimal procedure completion and patient safety

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ABSTRACT

Flexible endoscopy is a gold standard diagnostic test for the evaluation of the gastrointestinal tract and an accessible intervention in clinical practice. Completion rates are generally high while perforation rates are low in experienced hands. Situs inversus totalis (SIT) is a rare congenital abnormality that involves the complete transposition of all the viscera. In less-experienced hands, incompleteness and perforation rates may increase in patients with SIT due to unfamiliarity with anatomy. The purpose of this case report is to present methods such as reverse manoeuvres to assist in the safe completion of an endoscopy in SIT when technical difficulties arise. Using a case of a patient in a rural hospital who presented for a colonoscopy who had SIT, we discuss the use of adjuncts, variations in segment specific manoeuvres, traditional positioning and abdominal pressure points in-order to perform a safe and successful endoscopy in a patient with SIT.

Keywords: Endoscopy, Colonoscopy, SIT

INTRODUCTION

Flexible endoscopy is a gold standard diagnostic test for the evaluation of the gastrointestinal tract and an accessible intervention in clinical practice. Completion rates are generally high while perforation rates are low at 1 in 1 000 in experienced hands.¹ In less experienced hands, incompleteness and perforation rates increase in patients with SIT due to technical difficulties, unfamiliarity with anatomy or unawareness of reverse manoeuvres needed.²

SIT is a rare congenital abnormality that involves complete transposition of all of viscera. It is often diagnosed in childhood but when this malformation is unknown in adulthood, inversion of organs may be responsible for diagnostic difficulties especially during endoscopic examination.

CASE REPORT

We present a case of a 49-year-old Caucasian male who was referred for a screening colonoscopy. He was completely asymptomatic with no history of any altered bowel habits or other features of bowel pathology. A first degree relative under fifty-five years of age had recently been diagnosed with metastatic colorectal cancer and a second degree relative had passed away from colorectal cancer in their thirties, which prompted his general practitioner to refer him for a screening colonoscopy. His past medical history was significant for known SIT, being overweight with a body mass index of 28.5 kg/m² and a 40-pack year smoking history. His American society of anaesthesiologists (ASA) score was 3. He had a prior computed tomography (CT) to investigate nonspecific abdominal pain which was normal (Figure 1). His baseline investigations were normal. In anticipation of the altered anatomy, the incorporation of the magnetic endoscopic imaging (MEI) system was planned pre-

operatively. The MEI system was consistently employed throughout the entire procedure, accompanied by the application of controlled abdominal pressure for procedural optimisation. The colonoscopy revealed the colonic orientation to be consistent with SIT, where the orientation of the colon was completely inverted to that of a normally orientated colon (Figure 2). Polyps were identified in the caecum, transverse colon, sigmoid colon and recto-sigmoid colon and were resected and retrieved for histological examination. The histopathology reported tubular adenomas with low grade dysplasia.



Figure 1: CT in coronal view, the orientation of his internal organs in consistent with SIT.

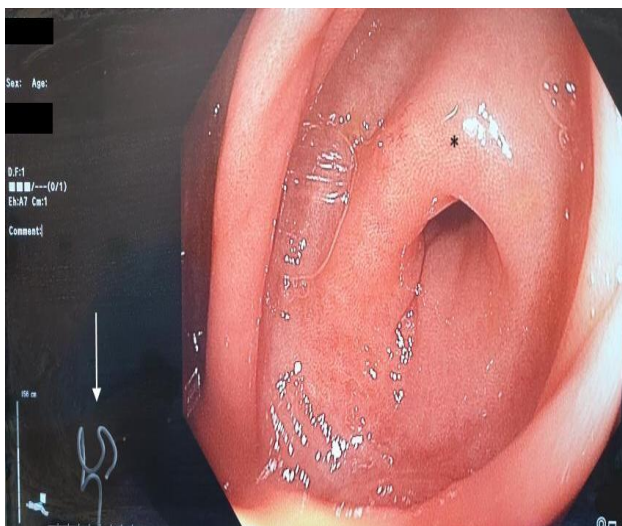


Figure 2: Screen showing endoscopic view of the colon. Magnetic endoscopic image guide in bottom left corner of screen demonstrates the complete inversion of the colonic orientation consistent with SIT. *appendiceal orifice; white arrow real-time MEI image showing complete inversion of the colon.

DISCUSSION

This case demonstrated the successful completion of a colonoscopy in a patient with SIT without any complications. There was adequate preparation to arrange adjuncts and plan for manoeuvres at the presence of SIT was known in this particular patient. In instances where patients with SIT are unaware of their condition and subsequently undergo colonoscopy in both the elective and emergency settings, endoscopists may encounter challenges in procedure completion and orientation, potentially elevating the risk of complications for the patient.

We will discuss here techniques and considerations in performing an endoscopy in patients with SIT.

Adjuncts

MEI systems have been shown to be of benefit in training and educating inexperienced endoscopists as it can improve caecal intubation rates.³ The use of MEI may reduce the risk of colon perforation, mucosal tear and bleeding especially at the splenic flexure. This is a useful adjunct in the navigation of unconventionally orientated bowel.⁴ The proposed advantage of MEI is that the real time view of intra-abdominal position of the endoscope may enable the endoscopist to detect loops as they are formed.

Endoscopists are given the opportunity to perform efficient and structured attempts of straightening the scope immediately, thereby minimising complications, reducing patient discomfort and time to complete the procedure.

Segment specific manoeuvres

Gastroscopy

Upon entering the second portion of the duodenum, a specific manoeuvre will assist the scope passage and minimize scope trauma to the duodenal mucosa and retraction of the scope back into the stomach. In a patient with SIT, leftward deflection of the tip (small wheel) end of the duodenal bulb, with anti-clockwise rotation of the scope handle, simultaneous upward tip deflection, and advancement of endoscope will be required to reveal the second portion of the duodenum.⁵

Colonoscopy

During colonoscopy, difficulties with non-progression may occur. When experiencing paradoxical motion at specific segments of the large bowel, alternations to normal practice will be required.⁶

Positioning

Traditionally, the endoscopist stands facing the patient with the endoscope connected to the scope tower behind

and to the right of the endoscopist's hip. The patient is positioned in the left lateral decubitus position.⁵ In our scenario, the scope was performed for diagnostic intent and a decision was made to position the patient conventionally to enable the endoscopist to manoeuvre the scope in the accustomed manner. However, during interventions, for example, in the management of gastric varices, the upper stomach may be obscured by blood and clot from massive bleeding.⁶ Rolling the patient to the left (instead of right) lateral position should provide better visualisation.

Abdominal pressure

The use of ancillary techniques can be used to address looping and prevent re-formation. Due to the anatomical differences, conventional abdominal pressure points must be varied. A left-right inversion of classic hand placement customarily used to negotiate alpha loops, N loop, looping at the splenic flexure, transverse colon, hepatic flexure and manoeuvres like Prechel pressure (use of the forearms for splinting) will be required.⁷

Alpha loop: when in the descending colon or hooked around the splenic flexure, an anti-clockwise torque and a slow withdrawal can be performed in order to straighten the scope. After reduction, a flat hand can be placed over the right lower quadrant (where the sigmoid colon lies) and downward pressure can be applied to splint the colon and prevent loop reformation.

N loop: a cupped hand can be placed over the sigmoid in the right lower quadrant, pushing in and downwards towards the pelvis. After reduction, prevention of reformation can be achieved by pressing down and up in a scooping fashion.

Splenic flexure: after reduction, a cupped hand can be placed parallel to the ribs. Gentle downward inward pressure across the transverse colon should be applied. This hand will block the scope from looping into the right upper quadrant where the splenic flexure lies.

Transverse colon: after reduction, prevention of loop reformation can be achieved by placing a cupped hand below the sternum and applying pressure towards the umbilicus and across to the left upper quadrant where the hepatic flexure lies.

Hepatic flexure: after reduction, a cupped hand can be placed below the ribs and gentle pressure can be applied down and towards to left lower quadrant where the caecum lies.

Other considerations

The gastroenterological society of Australia (GESA) recommends recording of distance from the anus with a straight scope (on withdrawal) for significant polyps in the left colon, this is especially important in a case of SIT

as it may facilitate easier location of lesions when attempting to localise them surgically or on follow up colonoscopies.

CONCLUSION

Endoscopic evaluation of the gastrointestinal system is a very common and important procedure that is carried out by general surgeons. These procedures are not without risk including the inability to complete the procedure due to technical difficulty as well as perforation of the bowel. Completion of such procedures can be made even more difficult when a patient presents with a variation in anatomy such as SIT. If it is known prior to the procedure, there can be a plan in place to use adjuncts such as MEI which was used in the case presented here. In instances where patients may undergo endoscopy without prior awareness of their altered anatomy, specifically in the context of SIT, it becomes imperative that, when encountering procedural challenges, endoscopists proactively consider and implement adjuncts and manoeuvres at an early stage to facilitate the progression of the procedure. We have reviewed the literature and present an up-to-date summary of methodologies aimed at optimising operative conditions when performing endoscopy in patients with rare variations in their anatomy such as SIT. By collating this information, we have produced a tool that advances the knowledge of the reader in this field. Understanding the technical obstacles in performing an endoscopy on a patient with SIT, will hopefully result in higher success rates of completion and lower rates of complications.

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