Entrapment is an essential feature of sigmoid volvulus

The current understanding of volvulus of the sigmoid colon emphasizes torsion of the bowel around its mesentery axis. This is also how the mechanism is described in the recently published volvulus treatment guidelines by the American Society for Gastrointestinal Endoscopy. However, rotation of 180° or even 360° is commonly seen without strangulation or symptoms. So, the ability to rotate cannot alone explain the occurrence of volvulus.

Given the anatomical prerequisites for sigmoid torsion, that is, a bowel long enough for twisting around a narrow mesentery axis, and the observation that rotation around the mesentery axis occurs randomly without necessarily manifesting as a volvulus, what precipitates decompensation? The movement of the dilated sigmoid colon is confined by the abdominal wall and retroperitoneum, and the two adjacent segments of sigmoid colon will therefore not be amenable to reduction of the volvulus once they are dilated, because the two segments are too large to pass anteriorly/posteriorly to each other (Fig. 1). This entrapment of the sigmoid is the main new feature of our proposed model. The mechanism is thus a sequence of (i) rotation (required by definition), (ii) a precipitating event of distension and/or vascular impingement, (iii) entrapment preventing derotation and (iv) progressive strangulation.

The concept of entrapment is not entirely new, but has not been part of the common explanation of the mechanism of sigmoid volvulus, and it gives a set of predictions which are supported in the available literature:

1. That increments of rotation of 180° should be more common than other orientations, because those configurations fit in the abdomen. The typical findings on plain anteroposterior abdominal radiography which identifies 57–90% of cases are a consequence of the two sigmoid segments being adjacent in the coronal plane. Other rotations are possible, for example, if part of the distended loops fit the pelvis.

2. That decompression will be key to derotation, as decompression reduces the bowel diameter and enables segments to cross in the anterior/posterior plane. The support for endoscopic or fluoroscopy-guided decompression and non-operative management is strong, and the direct consequence of the intervention is decompression, not derotation which is further supported by similar success rates of fluoroscopy-guided rectal tubes, and rigid and flexible sigmoidoscopies.

3. That situations with further limits of available space (like pregnancy) would predispose to entrapment (and not necessarily rotation), in accordance with increased incidence of volvulus in pregnancy.

4. That entrapment is more likely with an already distended bowel. It is well appreciated that situations of ileus, prolonged constipation, institutionalization or neurological dysfunction predispose sigmoid volvulus. Thus, the model supports modes of chronic or subacute volvulus.

5. That sigmoid mesocolon foreshortening and adhesions due to chronic inflammation in recurrent volvulus could further permanent the rotation and exacerbate the degree of entrapment by posterior fixation.

Adding entrapment as a step in pathophysiology is thus compatible with known epidemiological, imaging and anatomical features of sigmoid volvulus, but also avoids the shortcomings of a model based on torsion as the only driver of symptomatic volvulus.

References

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Hyperthermic intraperitoneal chemotherapy for colorectal peritoneal metastases: still a necessity?

The management of peritoneal metastases (PM) remains one of the greatest challenges in patients with metastatic colorectal cancer. While systemic chemotherapy renders good results in the treatment of colorectal liver metastases, it is poorly efficacious in the management of colorectal PM (CRPMs). When treated with chemotherapy alone, the 5-year survival in patients with CRPM is less than 5%.1 Verwaal et al.2 demonstrated in a randomized controlled trial (RCT) that cytoreductive surgery (CRS) with mitomycin C-based hyperthermic intraperitoneal chemotherapy (HIPEC) offered a significantly improved survival compared to systemic chemotherapy alone (22.3 versus 12.0 months). Subsequent studies utilized oxaliplatin as the HIPEC agent. Oxaliplatin had proven efficacy as first-line systemic treatment in metastatic colorectal cancer,3 and was found to be safe intraperitoneally.4 Studies reported a median survival of 27–32 months in selected patients when treated with CRS and oxaliplatin HIPEC.5,6 To date, there are no prospective studies comparing the efficacy of different HIPEC agents. With no accepted consensus on the preferred HIPEC agent, the choice of oxaliplatin or mitomycin C is based largely on country and institutional preference.7

Recent evidence from three RCTs has raised significant doubts about the efficacy of HIPEC, particularly oxaliplatin HIPEC. The PRODIGE 7 RCT compared outcomes following complete cytoreduction alone, and with the addition of oxaliplatin HIPEC. It reported no survival benefit with oxaliplatin HIPEC in addition to successful complete cytoreduction (41.7 versus 41.2 months). Subgroup analysis did suggest potential benefit with HIPEC in patients with a peritoneal carcinoma index of 11–15. Worriingly, however, those receiving oxaliplatin HIPEC had a significantly higher complication rate (24.1% versus 13.6%, P = 0.03). In the prophylactic setting, the ProphyloChip trial (NCT01226394)8 compared the utility of ‘second-look’ CRS with oxaliplatin HIPEC versus standard surveillance for asymptomatic patients 6 months following primary tumour resection deemed high risk for peritoneal recurrence. High risk was defined as minimal CRPM resected with the primary, ovarian metastases or perforated primary tumour. While CRPM was found in 52% of patients undergoing second-look surgery, there was no difference in 3-year disease-free survival or overall survival between the two arms (79% versus 80%). The COLOPEC RCT (NCT02231086)9 compared the use of adjuvant oxaliplatin HIPEC with adjuvant systemic chemotherapy versus adjuvant systemic chemotherapy alone after pT4 or perforated primary tumour resections. There was no difference in PM-free survival (77% versus 81%) by diagnostic laparoscopy at 18 months in either group, with no difference in disease-free survival and overall survival.

Despite their limitations, these RCTs are landmark studies in a field with paucity of high-quality evidence. These trials have led to significant debate on the role of HIPEC, with some experts calling for CRS alone to become standard treatment, with HIPEC to be abandoned altogether.10

These studies highlight a number of salient points. First, given these studies utilized oxaliplatin, it suggests that oxaliplatin is likely suboptimal as a HIPEC agent. Unlike mitomycin C, there are no randomized data supporting the use of CRS with oxaliplatin HIPEC. In the early 2000s, the use of oxaliplatin as a HIPEC agent coincided with its implementation as first-line systemic therapy,3 as oncologists were possibly more confident in its efficacy. In addition, 30 min of intraperitoneal exposure with oxaliplatin compared to 90 min with mitomycin C perhaps made it more appealing to surgeons.

While the results of these studies support discontinuation of oxaliplatin as a HIPEC agent, they do not translate to abandoning HIPEC altogether. CRS with mitomycin C-based HIPEC should still remain as the recommended treatment for resectable low-volume CRPM. It does however highlight the urgent need for further high-quality research in this field. Advances in translational oncology and collaborative research would allow exploration into identifying other potential intraperitoneal agents, and evaluating other forms of intraperitoneal delivery of drugs to complement high-quality CRS.

References

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