Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 10, Issue, 03, pp.66658-66661, March, 2018

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

ACUTE ABDOMEN AFTER OESOPHAGO-GASTRIC CANCER RESECTION SECONDARY TO 'PNEUMATOSIS INTESTINALIS': AN APPRAISAL OF THIS INFREQUENT POST-SURGICAL COMPLICATION

Olatunbode, O., *Viswanath, Y.K.S., Ahmed, I. and Davis, P.

Consultant Surgeon (Upper GI and Laparoscopic Surgeon), Visiting Fellow and Honorary Lecturer Teesside University, MCh Programme Director, James Cook University Hospital, Marton Road, Middlesbrough, Cleveland, UK

ARTICLE INFO

Article History:
Received 14th December, 2017
Received in revised form
21st January, 2018
Accepted 05th February, 2018
Published online 28th March, 2018

Key words:
Pneumatosis Intestinalis
Cancer resection
Upper GI.

ABSTRACT

Aim: Pneumatosis intestinal is (PI) is a radiological finding that usually portends untoward outcomes and often warrant aggressive surgical interventions, as it could signify ischaemia. When it occurs as a post-operative complication of surgery, it creates a management dilemma. Our aim was to assess the clinical outcomes of conservatively managed post-operative pneumatosis following upper gastrointestinal (UGI) cancer resection in a tertiary Upper GI cancer centre.

Methods: Patients who developed an acute abdomen and had a computed tomography (CT) diagnosis of PI following an UGI cancer resection, between 2008 and 2016 were identified. We analysed contributing factors and clinical outcomes of its operative and non-operative management.

Results: Of 717 oesophagogastric resections in the eight-year period, there were nine (1.25%) patients with pneumatosis. Four had oesophageal cancer and five had gastric adenocarcinomas. Four had two-stage oesophagectomies, two had sub-total gastrectomies, two had total gastrectomies and one was attempted resection inoperable. All had jejunostomy feeding tubes (JFT) and four had neo-adjuvant chemotherapy. Post-operatively, CT scans revealed six patients with small bowel pneumatosis, two with colonic pneumatosis, and one had pneumatosis in both small and large bowels. Of the six patients with small bowel pneumatosis, two had portal venous gas and one each occurred at the site of JFT insertion and at the jejuno-jejunal anastomosis. Eight patients recovered from PI with three needing re-operations and 1 died within 24 hrs with PI and acute coronary syndrome.

Conclusion: PI is an uncommon complication and can manifest as acute abdomen following UGI cancer resections. Most patients can be managed conservatively when carefully selected and assessed.

Citation Olatunbode, O., Viswanath, Y.K.S., Ahmed, I. and Davis, P. 2018. "Acute abdomen after oesophago-gastric cancer resection secondary to 'pneumatosis intestinalis': an appraisal of this infrequent post-surgical complication.", *International Journal of Current Research*, 10, (03), 66658-66661.

INTRODUCTION

Pneumatosis intestinal is (PI) is the pathological presence of extra-luminal gas within the bowel wall (Knechtle *et al*., 1990; Braumann *et al*., 2005). It can be caused by a wide range of benign, malignant or life-threatening conditions such as diverticular disease, COPD, intestinal obstruction, gastrointestinal neoplasms, inflammatory conditions, chemotherapy, radiotherapy, immunosuppressive disease or therapy, trauma, and mesenteric thrombo-embolic disease amongst others (Rha *et al*., 2000; Amrein *et al*., 2011; Lassandro *et al*., 2010). It is also a known but uncommon complication of surgery, especially those involving bypasses, anastomoses and insertions of jejunostomy feeding tubes (JFT) (Knechtle *et al*., 1990; Amrein *et al*., 2011; Wandtke *et al*., 1977). Largely, PI is considered benign, could be asymptomatic and requiring conservative or no treatment (Knechtle *et al*., 1990; Amrein *et al*., 2011; Bilici, 2009). However, PI is an uncommon complication suggestive of bowel ischaemia, though, it is not pathognomonic of it (Rha *et al*., 2000; Lassandro *et al*., 2010). As a result, its presence could portend untoward outcomes and warrant aggressive surgical interventions. This creates a management dilemma when PI presents as an acute abdomen following an upper gastrointestinal (UGI) cancer resection in patients whose morbidity could increase significantly with another operation. Our aim is to assess the clinical outcomes of conservatively managed post-operative PI following UGI cancer resection.

METHODS

We obtained the details of all patients who had a computed tomography (CT) diagnosis of PI and/or intramural gas (Figure 1), and matched it with a prospectively maintained UGI cancer

Corresponding author: **Viswanath, Y.K.S.,**
Consultant Surgeon (Upper GI and Laparoscopic Surgeon), Visiting Fellow and Honorary Lecturer Teesside University, MCh Programme Director, James Cook University Hospital, Marton Road, Middlesbrough, Cleveland, UK.

Figure 1. Arrow mark pointing at pneumatosis Intestinalis (with air-pockets with in the wall of the bowel)

resection database to identify patients who developed features of acute abdomen and had a CT diagnosed PI following an UGI cancer resection. We retrieved the medical notes of the identified patients and carried out a retrospective analysis of the clinical presentations, contributing factors and clinical outcomes of their management.

RESULTS

Of 717 oesophagogastric resections in the eight year period, there were nine (1.25%) patients with a diagnosis of pneumatosis. Amongst the nine, there were eight males and one female. Their ages ranged from 52 to 80 years. Four patients had oesophageal cancer [two squamous cell carcinomas (SCC) and two adenocarcinomas (AC)] and five had gastric AC. Four patients had two-stage oesophagectomies, two had sub-total gastrectomies, two had total gastrectomies and one was inoperable. All nine had JFT's inserted and four had neo-adjuvant chemotherapy (NAC) as per the multi-disciplinary team recommendation. All patients presented with abdominal pain and/or distension. Other associated signs and symptoms included abdominal tenderness, no bowel output, bilous or feaculent vomiting and increased aspirates from nasogastric tubes (NGT). Post-operatively, the onset of symptoms varied from four to 25 days.

All patients had a CT scan within 24 hours of the onset of symptoms. Six patients had small bowel pneumatosis, two had colonic pneumatosis, and one had pneumatosis in both small and large bowels. Of the six patients with small bowel pneumatosis, two had portal venous gas (PVG), one occurred at the site of JFT insertion and one at the jejuno-jejunal (JJ) anastomosis. Three patients also had features suggestive of small bowel obstruction (SBO) while one had features suggestive of a colonic perforation. Three patients were on vasopressors post-operatively but only one was still on it at the time of diagnosis. Lactate levels were normal ranging from 0.7 to 1.4. Four patients had amylase levels recorded and they were all normal. Only one patient had preoperative hypoalbuminaemia, however eight patients developed it post-operatively. Four patients had a raised white cell count (WCC), while one was neutropenic. Conservative management was instituted for all patients. This included being nil by mouth or discontinuing JFT feeds, placing a NGT if not already in-situ, intravenous fluids and antibiotics, and parenteral nutrition as indicated.

Five patients improved with conservative management. Their symptoms gradually resolved over a period ranging between one to ten days. The patient with the inoperable tumour had an oesophageal stent inserted and then developed epigastric pain for which he had a CT scan which showed jejunal pneumatosis. Ischaemia was deemed unlikely and he required prolonged pain management by the palliative team. Two patients required a laparotomy five days following diagnosis of pneumatosis. One had drainage of paracolic abscess and defunctioning loop ileostomy for a associated colonic perforation. The other had removal of his abdominal drain which was causing SBO. He also had small bowel decompression and removal of his JFT. One of the patient who improved with conservative management developed another episode of acute abdomen two months later. CT scan revealed portal venous thrombus and SBO. She had a laparotomy, small bowel resection and ileo-ileal anastomosis for a chronically ischaemic segment of small bowel. One patient died with PI., that occurred within 24 hours of being diagnosed with pneumatosis. He was unlikely to survive a re-operation as he had significant co-morbididties, so a decision was made for palliative care prior to his death. All other eight recovered after diagnosis of PI following oesophago-gastric cancer surgery including those who underwent re-operations.

DISCUSSION

PI is known to present with symptoms such as abdominal pain, diarrhoea, constipation, weight loss, bleeding and ileus[2,7]. It is therefore an uncommon cause of an acute abdomen. PI can be diagnosed using barium studies, angiography, biopsies, x-rays and CT scans (Braumann *et al*., 2005; Rha *et al*., 2000; Amrein *et al*., 2011). CT is the most useful as it is the most sensitive and could provide information about the underlying cause and extent of PI (Amrein, 2011; Jacob *et al*., 2014). Therefore, if all patients are routinely scanned after an UGI resection, the incidence of PI will be significantly higher than 1.25%, however, most will be benign and not life threatening (Braumann *et al*., 2005; Lassandro, 2010). When the CT scan shows PI in the setting of an acute abdomen, questions such as "Is the PI responsible for the acute abdomen?", "Is the PI due to bowel ischaemia?" and "Should I treat conservatively or surgically?" must be contemplated by the surgeon. In this patient group, surgery can significantly increase morbidity and mortality if the indications are not clear (Braumann *et al*., 2005).

Certain vital clinical, biochemical and radiologic information will have to be pieced together to make a decision. Clinically, the more common causes of an acute abdomen such as peritonitis, bowel perforation and obstruction should be ruled out. Of the three patients who eventually had an operation, one had a perforation, the other had bowel obstruction and only one patient actually had ischaemia. Notably, PI can occur at bowel sites not involved in the initial surgery and can cause perforation or obstruction requiring further surgery (Wandtke *et al*., 1977; Jacob *et al*., 2014). Biochemically, metabolic acidosis and an increased lactate is predictive of ischaemia and necessitates surgery (Knechtle *et al*., 1990; Braumann *et al*., 2005). A normal lactate is therefore reassuring as was the case with our patients, thereby allowing a trial of conservative management. Raised serum amylase levels could also be predictive of ischaemia but it is not a reliable marker (Knechtle *et al*., 1990; Jacob *et al*., 2014).

Table 1.

Cancer location (type)	Age	Gender	Surgery	NAC	Pneumatosis site	Lactate	Amylase	Albumin (Pre-op)	Vasopressors	Re-operation	Outcome
Oesophagus (SCC)	52	M	Oesophagectomy	Yes	Caecum & Transverse colon	Normal	Normal	Normal	No	Laparotomy, drainage of paracolic abscess (perforation)	Discharged
Stomach (AC)	70	M	Sub-total gastrectomy	No	JJ anastomosis, distal small bowel & PVG	Normal	Normal	Low	No	None	Discharged
Oesophagus (AC)	70	M	Inoperable.	No	Jejunum	Normal	-	Normal	Yes	None	Discharged
Stomach (AC)	73	M	Total gastrectomy	Yes	Small bowel	Normal	-	Normal	No	None	Discharged
Stomach (AC)	74	M	Sub-total gastrectomy	Yes	Jejunostomy site	Normal	Normal	Normal	No	Laparotomy (SBO), removal of FJT, bowel decompression and lavage (anastomosis intact)	Discharged
Stomach (AC)	80	M	Total gastrectomy	No	Proximal & mid small bowel	Normal	Normal	Normal	Yes	None	Recovered
Oesophagus (AC)	77	M	Oesophagectomy	No	Small and large bowel	Normal	-	Normal	Yes	None	Deceased
Oesophagus (SCC)	68	F	Oesophagectomy	No	Small bowel & PVG (PV thrombus later)	Normal	-	Normal	No	Laparotomy, small bowel resection (ischaemia) & ileo-ileal anastomosis	Discharged
Gastric (AC)	75	M	Oesophagectomy	Yes	Colon	Normal	-	Normal	No	None	Discharged

A prospective study revealed that pre-operatively low levels of albumin are predictive of JFT complications (Nussbaum *et al*., 2014). All our patients had JFT's inserted and only one required removal of the JFT. Notably, he had normal preoperative albumin levels. Following UGI cancer resections, JFT's could prove a lifeline for nutrition. When costs and complications are considered, JFT is better than TPN[10]. Hence, JFT's are still used widely. Its associated complications can be conservatively managed and more common/sinister causes of PI should be considered before JFT's (Nussbaum *et al*., 2014; North *et al*., 1995).

Radiologically, CT scans can reveal the pattern and spread of PI but more importantly it can suggest the likely underlying cause (Amrein et al., 2011). The underlying cause is a better predictor of severity (Braumann *et al*., 2005; Wang *et al*., 2012). Additionally, a CT scan will assess all other intra-abdominal organs and can reveal more common causes of an acute abdomen[8]. In our study, the patients who had a re-operation, had a CT scan showing either bowel perforation or obstruction in addition to the finding of PI. In two patients, the CT report wrongly suspected an ischaemic cause. However, in two other patients, it categorically ruled out ischaemic causes and this can be reassuring when it fits the clinical picture. PVG is uncommon and depicts propagation of intra-mural gas (Rha et al., 2000). Although its significance is controversial, it could signify a worse prognosis (Lassandro *et al*., 2010; Wang *et al*., 2012). Nevertheless, conservative management remains an option.
In our study, CT scans revealed two patients with PVG, one was successfully managed conservatively, while the other eventually required surgery to resect the ischaemic portion of bowel.

Conservative management includes oxygen therapy, NGT for drainage, withholding JFT feeds, intravenous fluids, intravenous antibiotics, and endoscopic puncture/cysts sclerotherapy for gastric PI (Braumann *et al*., 2005; Jacob *et al*., 2014). The simple conservative measures identified in our study proved effective as five patients improved on them. Additionally, the underlying cause of the PI should be identified and treated where possible (Bilici, 2009).

Following UGI resections, patients are often placed on vasopressors and this can cause potentially reversible mesenteric vasoconstriction and subsequently bowel ischaemia[3]. Where all parameters point to an ischaemic cause rather unconvincingly, there might be a role for diagnostic laparoscopy following a cancer resection to rule out full thickness ischaemia (Shah *et al*., 2013); thereby minimising the risk of surgery and enabling confident delivery of conservative measures.

Conclusion

Pneumatosis intestinalis should be viewed as an uncommon radiological sign that can manifest clinically as an acute abdomen following major UGI cancer resections. It should be considered alongside other clinical, biochemical and radiological parameters to determine its underlying cause. Majority of patients can be managed conservatively without further re-laparotomy when carefully selected and assessed.

REFERENCES

Amrein K, Hogenauer C, Spreizer C, Spuller E, Langner C. 2011. Pneumatosis coli - an underrecognised lesion mimicking neoplastic disease. *Wiener klinische Wochenschrift*.123(15-16):515-518.

Bilici A. 2009. Gastric pneumatosis intestinal is associated with malignancy: An unusual case report. *World Journal of Gastroenterology*.15(6):758.

Braumann C, Menenakoa C, Jacobi C. 2005. Pneumatosis Intestinalis - A Pitfall for Surgeons?. *Scandinavian Journal of Surgery*. 94(1):47-50.

Jacob T, Paracha M, Penna M, Arul D, Wilson J. 2014. Pneumatosis Coli Mimicking Colorectal Cancer. *Case Reports in Surgery*. 1-4.

Knechtle SJ, Davidoff AM, Rice RP. 1990. Pneumatosis intestinalis. Surgical management and clinical outcome. *Annals of Surgery*. 212(2):160-165.

Lassandro F, di Santo Stefano M, Maria Porto A, Grassi R, Scaglione M, Rotondo A. 2010. Intestinal pneumatosis in adults: diagnostic and prognostic value. *Emergency Radiology*.17(5):361-365.

North JH, Nava HR. 1995. Pneumatosis intestinalis and portal venous air associated with needle catheter jejunostomy. *American Surgery*. 61(12):1045-1048

Nussbaum D, Zani S, Penne K, Speicher P, Stinnett S, Clary B *et al*. 2014. Feeding Jejunostomy Tube Placement in Patients Undergoing Pancreaticoduodenectomy: An ongoing dilemma. *Journal of Gastrointestinal Surgery*. 18(10):1752-1759.

Rha S, Ha H, Lee S, Kim J, Kim J, Kim J *et al*. 2000. CT and MR Imaging Findings of Bowel Ischaemia from Various Primary Causes. *RadioGraphics*.20(1):29-42.

Shah N, Dossick D, Madura J, Heppell J. 2013. Use of Diagnostic Laparoscopy in a Patient with Gastric Pneumatosis and Portal Venous Gas. *Case Reports in Gastroenterology*.7(2):261-265.

Wandtke J, Skucas J, SPataro R, Bruneau R. 1977. Pneumatosis intestinalis as a complication of jejunoileal bypass. *American Journal of Roentgenology*. 129(4):601-604.

Wang J, Furlan A, Kaya D, Goshima S, TublinM, Bae K. 2012. Pneumatosis intestinalis versus pseudo-pneumatosis: review of CT findings and differentiation. *Insights into Imaging*. 2(1):85-92.

****