EPEC-O

Education in **P**alliative and **E**nd-of-life **C**are - **O**ncology

Participant's Handbook

Module 3e:

Symptoms – Bowel Obstruction

Emanuel LL, Ferris FD, von Gunten CF, Von Roenn J.
EPEC-O: Education in Palliative and End-of-life Care for Oncology.

ISBN: 0-9714180-9-8

The EPEC Project™ was created with the support of the American Medical Association and the Robert Wood Johnson Foundation. The EPEC-O curriculum is produced by The EPEC Project™ with major funding provided by the National Cancer Institute, with supplemental funding provided by the Lance Armstrong Foundation. The American Society of Clinical Oncology partners with the EPEC-O Project in dissemination of the EPEC-O Curriculum. Acknowledgment and appreciation are extended to Northwestern University's Feinberg School of Medicine, which houses The EPEC Project.

Special thanks to the EPEC-O Team, the EPEC-O Expert Panel, and all other contributors.

Accreditation Statement

The Northwestern University Feinberg School of Medicine is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

Visit **www.epec.net** to order EPEC materials, access On-line Distance Learning, or for further information.

Contact EPEC by E-mail at **info@epec.net**, or

The EPEC Project™
750 N. Lake Shore Drive, Suite 601
Chicago, IL 60611
USA

Phone: +1 (312) 503-EPEC (3732)

Fax: +1 (312) 503-4355

Case*

C. J. is a 57-year-old woman with stage IV ovarian cancer who is admitted with both continuous and colicky abdominal pain, nausea and vomiting, and abdominal distension. The diagnosis of bowel obstruction is established on clinical signs and symptoms and confirmed with abdominal radiographs demonstrating air-fluid levels. An exploratory laparotomy demonstrates the presence of mechanical obstruction and peritoneal carcinomatosis. Surgical intervention is technically impossible due to adhesion of the tumour to the abdomen wall and the presence of carcinomatosis.

* This case is not on an EPEC-O Curriculum trigger tape.

Introduction

Malignant bowel obstruction is *the mechanical or functional obstruction of the progress of food and fluids through the gastrointestinal tract*. It causes misery from nausea, vomiting, and abdominal pain.

Compression of the bowel lumen develops slowly and often remains partial. Gastrointestinal symptoms caused by the sequence of distension, secretion, and motor activity of the obstructed bowel, occur in different combinations and intensity, depending on the site of obstruction, and tend to worsen over time. Continuous abdominal pain related to an intra-abdominal mass is present in about 90% of the patients. Superimposed intestinal segmental activity in the small or large bowel that tries to surmount the obstacle may cause intermittent colic in about 75% of the patients. With the large bowel, the pain is generally less severe, deeper, and occurs at longer intervals. Abdominal distension may be absent in high obstruction of the duodenum or proximal jejunum, and when the bowel is 'plastered' down by extensive mesenteric spread. Vomiting develops early and in large amounts in proximal obstruction in the stomach, duodenal, and small intestine. Vomiting develops later in colorectal obstructions.[1,2,3]

Prevalence

Malignant bowel obstruction is a common complication in patients with abdominal or pelvic cancers, eg, those arising from colon, ovary and stomach. The prevalence of bowel obstruction is 4 to 25% in ovarian carcinoma or colorectal cancer. In patients with advanced ovarian cancer the frequency can be as high as 42% and is a major cause of death in women with gynaecologic disease. Bowel obstruction can be partial or complete, single or multiple, due to benign causes (ranging from 6.1% in ovarian and other gynecological cancers to 48% in colorectal cancer) or malignant causes. The small bowel is more commonly involved than the large bowel (61% vs. 33%) and both are involved in over 20% of ovarian cancer patients.[1,2,3,4,5]

Prognosis

One retrospective study carried out in end-stage cancer patients with malignant bowel obstruction showed that the mean time interval from the first diagnosis of cancer and the

onset of inoperable malignant bowel obstruction was 13.1 +/- 6.4 months (range 6-24 months).[6]

The prognosis of patients with both mechanical and functional obstruction due to advanced cancer who have received maximal surgical, chemotherapeutic, and radiological treatment is very poor, with survival ranging from a few weeks to few months.[1,5,6,7] Parenteral nutrition does not affect this prognosis.

Pathophysiology

Several mechanisms may be involved in the onset of bowel obstruction and there is variability in both presentation and etiology.

Primary cancer, relapse after surgery, chemotherapy or radiotherapy, associated pathologies, adhesions, post-irradiation fibrosis, polypoidal lesions, infiltration of the intestinal muscle and diffuse carcinomatosis may cause or precipitate the partial or complete occlusion of the gastrointestinal tract. Different mechanisms such as extrinsic, intraluminal, and intramural occlusion of the lumen may be responsible for the occlusion.

Functional obstruction (or adynamic ileus), is a disorder of intestinal motility. It can be caused by tumor infiltration of the mesentery (carcinomatosis), malignant involvement of the celiac plexus, paraneoplastic pseudo-obstruction, paraneoplastic neuropathy, chronic intestinal pseudo-obstruction due to diabetes mellitus, previous gastric surgery, and other neurological disorders. Inflammatory edema, fecal impaction, dehydration and constipating medications, eg, opioids and anticholinergics, are all likely to contribute to the development of gastrointestinal obstruction or to worsening of the clinical picture.[1,2,3,4,5]

Assessment

A history of crampy abdominal pain, abdominal fullness, and postprandial nausea with or without vomiting or hiccups is suggestive of obstruction. A history of a gastrointestinal or genitourinary malignancy or a previous abdominal operation increases the likelihood. The color or smell of the vomitus does not correlate with the site of obstruction. However, time of vomiting after eating does correlate. Nausea and vomiting about 45 minutes after meals suggests a gastric outlet or duodenal obstruction. Nausea with or without vomiting that is several hours after eating correlates with large bowel obstruction. Passage of gas or stool per rectum argues against obstruction, as some peristalsis must be present.

Physical examination of complete bowel obstruction shows an absence of bowel sounds (when auscultated for several minutes). High pitched or rushing bowel sounds have traditionally been associated with impending obstruction, although the sounds are neither sensitive nor specific when compared with radiographic ‘gold standard’ assessments.

Radiological investigations

An abdominal x-ray taken in a supine or standing position is the first investigation in patients with suspected small bowel obstruction to document the dilated loops of bowel, air-fluid interfaces, or both. Contrast radiography can help to evaluate dysmotility, partial obstruction, and to define the site and extent of the obstruction. Retrograde transrectal radiographic contrast studies can be used to diagnose isolated or concomitant obstruction of the large bowel. An abdominal computed tomography scan is useful for evaluating the global extent of disease, to perform staging, and to assist in the choice of surgical, endoscopic, or pharmacological intervention for the management of the obstruction.[2,5]

Management

Place choices for the management of malignant bowel obstruction in the context of the clinical situation. Patients with good performance status and localized tumor may benefit from treatments that require some patient discomfort for their administration, eg, surgery. Patients with far advanced disease and a short time to live should be spared extensive evaluation and treated medically.

Surgery

Palliative surgery can reverse malignant bowel obstruction. However, published data show that, in advanced cancer, the operative mortality is 30-40% and complication rates vary from 27-90%. The type of obstruction (partial vs. complete) and the method of surgical treatment (bypass vs. resection and reanastomosis) has no significant effect on the outcome. More recently published results are no better than those published in the past, improvements in surgical techniques and perioperative care appears not to influence the outcome. Not all patients are fit for surgery. According to different authors, the rate of inoperable patients ranges from 6.2% to 50%.[1,2,3]

Several authors have emphasized that prognostic criteria are needed to select patients who are likely to benefit from surgical intervention.[7] The available data suggest that poor prognostic factors that preclude a surgical approach include the following: 1) intestinal motility problems due to diffuse intraperitoneal carcinomatosis; 2) patients over 65 (particularly if cachectic); 3) ascites requiring frequent paracentesis; 4) advanced cachexia; 5) previous radiotherapy of the abdomen or pelvis; 6) palpable intra-abdominal masses and liver involvement, or distant metastases, pleural effusion or pulmonary metastases; 7) multiple partial bowel obstruction with prolonged passage time on radiograph examination; and 8) poor general performance status.[1,2,3,4,5,6,7]

Stents

The newest intervention for palliative care of malignant bowel obstruction is stent placement.[8,9,10,11,12,13] Radiologic or endoscopic enteral stent placement has been reported to be an effective alternative for palliation of high risk surgical candidates with malignant gastric outlet, small bowel, large bowel, and rectal obstruction. Most reports are

retrospective single institution studies of highly selected patients. Significant complications include stent migration, perforation, biliary obstruction, and need for subsequent endoscopic, radiologic and surgical interventions.[8,9,11] There are no comparisons of method of stent placement.[12] In one randomized study, endoscopic stenting required less operative time, faster restoration of bowel function and oral intake and shorter median hospitalization than colostomy. However, ultimate symptom control, morbidity and mortality were the same.[13]

Nasogastric suction and intravenous fluids

Nasogastric suction decompresses the stomach and/or intestine and intravenous fluids correct fluid and electrolyte imbalance before surgery, or while a decision is being made. The tube often becomes occluded and requires flushing and/or replacement. During long-term drainage, a nasogastric tube interferes with coughing to clear pulmonary secretions and may be associated with nasal cartilage erosion, otitis media, aspiration pneumonia, esophagitis, and bleeding. This treatment can also create considerable discomfort in patients who are already distressed by previous anticancer and surgical therapies. Only consider the long-term use of a nasogastric tube when pharmacological therapy for symptom control is ineffective or when gastrostomy cannot be carried out.[1,2,3] It is no longer the principal therapy to manage malignant bowel obstruction.

Pharmacological management

The pharmacological management of malignant bowel obstruction due to advanced cancer focuses on the treatment of nausea, vomiting, pain, and other symptoms without the use of a nasogastric tube. Continuous subcutaneous infusion of medications using a portable syringe driver allows the parenteral administration of different medication combinations, produces minimal discomfort for the patient, and is easy to use in a home setting. If a central venous catheter has been previously inserted, this can be used to administer medications for symptom control, but venous access is not necessary.

Medications used for controlling pain and/or vomiting

Analgesics

Opioids are usually used to control continuous abdominal pain. The dose is gradually increased using standard opioid dosing guidelines until symptom control is achieved (see EPEC-O Module 2: Cancer Pain Management).[1,2,3,4,5]

Antinauseants

Haloperidol is an effective antidopaminergic antiemetic. It can be combined with scopolamine and an opioid in the same solution for simpler administration parenterally. A standard dosing regimen is:

- Haloperidol, 1 mg IV/SC q 6-8 h

Metoclopramide is a both an antidopaminergic antiemetic and a gastrointestinal prokinetic agent. In the United Kingdom, it has been advocated even in the setting of obstruction because vomiting is due to reverse peristalsis. In the United States, experts have advised against its use in complete obstruction because it might increase intestinal colic. A standard dosing range is:

- Metoclopramide, 10-20 mg IV/SC q 6 h or 2-4 mg/hour continuous infusion

Scopolamine butylbromide, also known as hyoscine butylbromide, decreases the tonus and peristalsis in smooth muscle, decreases the secretions in the gastrointestinal tract, and lessens the resulting pain. Scopolamine butylbromide is preferred over atropine and scopolamine hydrobromide as it is much less lipid soluble, does not penetrate the blood-brain barrier and produces less adverse effects, eg, somnolence and hallucinations, when administered in combination with opioids.[14,15,16,17,18] Dry mouth is reported to be the most significant adverse effect, but the patients tolerated it by sucking ice cubes and drinking small sips of water. Standard dosing regimens include:

- Scopolamine, 0.1-0.4 mg SC q 6 h
- Scopolamine, 0.1 mg/hour SC/IV continuous infusion

Glycopyrrolate can be used with similar effects and properties.[19] It is a quaternary ammonium anticholinergic agent that also has limited lipid solubility and less risk of both central nervous system and ocular effects. The onset of its action is 35-45 minutes when given subcutaneously and 1 minute when given intravenously. Glycopyrrolate cannot be mixed with diazepam, methylprednisolone, dexamethasone, dimenhydrinate, or Phenobarbital.[20] A common dosing range is:

- Glycopyrrolate, 0.2-0.4 mg SC q 6 h or 0.02 mg/hour continuous infusion

Octreotide

Octreotide is a synthetic analogue of somatostatin. Somatostatin and its analogues have been shown to inhibit the release and activity of gastrointestinal hormones, modulate gastrointestinal function by reducing gastric acid secretion, slow intestinal motility, decrease bile flow, increase mucous production, and reduce splanchnic blood flow. It reduces gastrointestinal contents and increases absorption of water and electrolytes at intracellular level, via cAMP and calcium regulation. It has a more potent biological activity and a longer half-life than somatostatin, and has been used to successfully manage the symptoms of bowel obstruction.

Submucosal somatostatin-containing neurons, activated by octreotide, inhibit excitatory nerves, mainly by an inhibition of acetylcholine output. Muscle relaxation ensues, ameliorating the spastic activity responsible for colicky pain. The inhibitory effect of octreotide on both peristalsis and gastrointestinal secretions reduces bowel distension and the secretion of water and sodium by the intestinal epithelium, thereby reducing vomiting

and pain. As a result, the medication may break the vicious circle represented by secretion, distension, and contractile hyperactivity.

Octreotide may be administered by subcutaneous bolus or continuous subcutaneous infusion. Its half-life is about 1.5 hours after intravenous or subcutaneous administration, and its kinetics are linear. The recommended starting dose is 0.3 mg/day subcutaneously. The dose can be titrated upward until symptom control is achieved, usually at 0.6-0.9 mg/day. Octreotide is significantly more effective and faster than hyoscine butylbromide in reducing the amount of gastrointestinal secretions in patients with a nasogastric tube and in reducing the intensity of nausea and the number of vomiting episodes in patients without a nasogastric tube.[15,16] Moreover octreotide may prevent the development of irreversible bowel obstruction in patients with recurrent episodes of obstruction.[21]

As octreotide is an expensive medication, consider its cost-benefit ratio, especially for prolonged treatment. However, interpret the cost of the medication in the widest possible sense. If the use of a medication results in a more rapid improvement of gastrointestinal symptoms, this may reduce the need for admission or the length of stay in the inpatient unit and improve the patient's quality of life. Common dosing regimens include:

- Octreotide, 50-100 micrograms SC q 8 h
- Octreotide, 10 micrograms/hour IV/SC continuous infusion

Corticosteroids

Several authors recommend the use of corticosteroids to manage the symptoms of bowel obstruction because they can reduce peri-tumoral inflammatory edema and improve intestinal motility. To date, no controlled clinical trials have been carried out and the various administration routes and dosing of these medications have not been standardized.[2,5,19]

Percutaneous gastrostomy

When obstructive symptoms cannot be controlled by medications, percutaneous gastrostomy is believed to be a more effective and acceptable alternative to the prolonged use of a nasogastric tube when obstructive symptoms cannot be controlled by medications.[1,2,3,5]

Hydration and total parenteral nutrition

In patients with inoperable bowel obstruction carefully assess the amount of fluid you will administer. High levels of oral or parenteral fluids may result in more bowel secretions. As a result, keep a balance between the efficacy of the treatment and the risk of adverse effects such as increased vomiting, abdominal distension, and pain.

The intensity of dry mouth and thirst are independent of the quantity of both oral and parenteral hydration.[22] However, the intensity of nausea is significantly lower in patients treated with more than 1 liter/day of fluids. As intravenous hydration can be difficult and

uncomfortable for end-stage cancer patients, reserved it for patients who have a central venous catheter. Hypodermoclysis is a simple technique for rehydration that offers many advantages over the intravenous route.[22] Some patients with a distal bowel obstruction with tolerate and find some oral fluid intake to be pleasurable. Limit daily oral intake to a volume equal to the volume of urine output in 24 hours plus 500 ml for insensible losses, ie, perspiration and respiration.

The role of total parenteral nutrition in the management of patients with inoperable bowel obstruction has been controversial.[23] Its use persists despite data on survival rates and quality of life. Total parenteral nutrition is effective for patients with short gut syndrome, but not for patients with advanced progressive cancer.

Summary

The optimal treatment of bowel obstruction in patients with advanced cancer is still a debated issue. Patients are usually considered suitable candidates for surgery when survival is expected to be more than two months. Although surgery has been the primary treatment for malignant obstruction, it is now recognized that some patients with advanced disease or those in a general poor condition are unfit for surgery and require alternative management to relieve distressing symptoms. A number of treatment options are now available for patients with advanced and terminal cancer who develop intestinal obstruction. Studies of prognostic indicators of survival in advanced cancer patients are necessary to assist doctors in making appropriate therapeutic decisions, together with the patient and his family members. Medical treatment by continuous subcutaneous or intravenous administration of opioids, corticosteroids, anticholinergic medications, octreotide, and antiemetic medications can be an effective approach in controlling pain, nausea, and vomiting in patients with inoperable gastrointestinal obstruction. Consider nasogastric suction or percutaneous gastrostomy for patients with refractory symptoms and/or upper bowel obstruction who do not respond satisfactorily to pharmacological measures alone. Aim efforts of the doctor/nurse team at both symptom control as well as the care of other aspects of the patient's suffering, including psychological distress and spiritual concerns.

Key take-home points

1. First, evaluate a patient with malignant bowel obstruction for an operative solution.
2. Stent placement is successful in highly selected patients.
3. If the patient is inoperable, satisfactory symptom control is possible with medications.
    a. Antisecretory agents, such as octreotide, may be effective alone.
    b. Antidopaminergic antiemetics in combination with anticholinergics and opiates are an alternative.
4. Diverting procedures may be needed for refractory symptoms.

Pearls

1. Titrate the doses of medications to symptom control or adverse effects.
2. Long-acting intramuscular depot forms of octreotide may provide long-term control without injections or infusions.

Pitfall

1. Just because surgeons have always treated bowel obstruction with 'suck and drip' approaches doesn't mean it always has to be treated that way.

References

[1] Baines M. The pathophysiology and management of malignant intestinal obstruction. In: Doyle D, Hanks GWC, MacDonald N, eds. *Oxford Textbook of Palliative Medicine*. 2nd ed. Oxford: Oxford University Press. 1998:526. ISBN: 0192620282.

[2] Ripamonti C. Malignant bowel obstruction. In: *Gastrointestinal symptoms in advanced cancer patients*. Ripamonti C & Bruera E (Editors). Oxford University Press. 2002;12:235. ISBN: 0192632841.

[3] Ripamonti C and Mercadante S. Pathophysiology and management of Malignant Bowel obstruction. In: Doyle D, Hanks G et al. (Editors). *Oxford Textbook of Palliative Medicine.* 3rd Edition, Oxford University Press. 2003;8:496. ISBN: 0192620282.

[4] Krebs HB, Goplerud DR. Mechanical intestinal obstruction in patients with gynecologic disease: A review of 368 patients. *Am J Obstet Gynecol*. 1987;157:577. PMID: 3631159.

Of 368 patients with acute intestinal obstruction, most (83%) had gynecologic malignancies. Obstruction of the small intestines was more common than obstruction of the large intestines (77% versus 23%). Major causes of mechanical small bowel obstruction included extrinsic neoplasms (62%, mostly ovarian carcinomas), radiation therapy-associated strictures and adhesions (17%), postoperative adhesions (14%), and inflammatory strictures and adhesions (3%). Gastrointestinal intubation successfully relieved 81% of small bowel obstructions caused by postoperative adhesions. Tube suction alone was rarely successful when the obstruction was caused by malignant neoplasms.

[5] Ripamonti C, Twycross R, et al. Clinical-practice recommendations for the management of bowel obstruction in patients with end-stage cancer. *Supportive Care in Cancer*. 2001;9(4):223-233. PMID: 11430417.

A systematic review provides the basis for clinical practice guidelines.

[6] Krouse RS. Surgical management of malignant bowel obstruction. *Surg Oncol Clin N Am*. 2004;13(3):479-490. Review. PMID: 15236730.

Review of surgical indications and outcomes.

[7] Feuer DJ, Broadley KE, Shepherd JH, Barton DP. Surgery for the resolution of symptoms in malignant bowel obstruction in advanced gynaecological and gastrointestinal cancer. *Cochrane Database Syst Rev*. 2000;(4):CD002764. Review. PMID: 11034757.

Systematic review of mostly retrospective scientific studies on intestinal obstruction due to advanced gynaecological and gastrointestinal cancer, in order to assess the efficacy of surgery. Control of symptoms varies from 42% to over 80%; re-obstruction ranges from 10-50%; wide range of postoperative morbidity and mortality.

[8] Mosler P, Mergener KD, Brandabur JJ, Schembre DB, Kozarek RA. Palliation of gastric outlet obstruction and proximal small bowel obstruction with self-expandable metal stents: a single center series. *J Clin Gastroenterol*. 2005;39(2):124-128. PMID: 15681907.

Retrospective single institution study of 52 stents were placed in 36 patients with nonesophageal upper gastrointestinal stenosis. Initial stent placement was successful in 92% and clinical improvement documented in 75%. Mean survival of patients who eventually died was 3.5 months. Seven patients are alive (mean follow-up, 5.0 months). Stent dysfunction occurred in 36% and required subsequent interventions. Biliary obstruction was documented in 50% of patients, 12 of whom had previously undergone biliary stenting and 5 who needed subsequent biliary decompression

[9] Hunerbein M, Krause M, Moesta KT, Rau B, Schlag PM. Palliation of malignant rectal obstruction with self-expanding metal stents. *Surgery*. 2005;137(1):42-47. PMID: 15614280.

Of 521 patients undergoing surgery for rectal neoplasms, stents were successful placed in 33 of 34 patients with malignant rectal obstruction and incurable disease. Early failure occurred in 7 patients (21%) because of stent migration, pain, or incontinence. Long-term success with a mean patency of 5.3 months was observed in 26 patients (79%), but restenting was required in 2 patients. Despite the initial success of stenting, a colostomy was created in 2 other patients after 3.4 months and 9.2 months because of incontinence and rectovesical fistula. Overall, 6 of 33 patients (18%) underwent palliative surgery because of early complications (n = 4) or long-term failure of stent treatment (n = 2). CONCLUSIONS: Self-expanding metal stents are useful to avoid a colostomy in selected patients with incurable rectal cancer and limited life expectancy. Nonetheless, a considerable number (18%) of patients will require surgical palliation because of failure of stent treatment.

[10] Okorie MI, Hussain SA, Riley PL, McCafferty IJ. The use of self-expandable metal stents in the palliation of malignant bowel obstruction. *Oncol Rep*. 2004;12(1):67-71. PMID: 15201961.

Retrospective study of 35 consecutive patients in single institution. Thirty-two stents were successfully placed in 30 patients. Technical success rate was 86% (30/35 patients). Of the patients who had successful insertion, 83% had complete relief of symptoms. In 1 patient the stent failed to expand. There was no procedure related mortality. Median survival was 1.6 months (range, 0-14.8).

[11] Suzuki N, Saunders BP, Thomas-Gibson S, Akle C, Marshall M, Halligan S. Colorectal stenting for malignant and benign disease: outcomes in colorectal stenting. *Dis Colon Rectum*. 2004;47(7):1201-1207. PMID: 15164246.

36 patients with malignant obstruction and 6 patients with benign obstructive disease underwent placement of self-expandable stents using a combined endoscopic and fluoroscopic technique over a 6 year period. Stent placement was successful in 36 of 42 patients (86 percent). Complications occurred in 16 of 36 patients (44 percent): migration (n = 7), reobstruction (n = 5), perforation (n = 2), fistula formation (n = 1), and stent fracture (n = 1). Stent placement was successful in 100 percent of patients with benign strictures but poststent migration was frequent (2/6).

[12] Baron TH, Kozarek RA. Endoscopic stenting of colonic tumours. *Best Pract Res Clin Gastroenterol*. 2004;18(1):209-229. Review. PMID: 15123093.

This chapter reviews the types of expandable metal stent used for treatment of colonic obstruction, the indications for their insertion, their methods of insertion, and outcomes following insertion

[13] Fiori E, Lamazza A, De Cesare A, Bononi M, Volpino P, Schillaci A, Cavallaro A, Cangemi V. Palliative management of malignant rectosigmoidal obstruction. Colostomy vs.endoscopic stenting. A randomized prospective trial. *Anticancer Res*. 2004;24(1):265-268. PMID: 15015606.

Twenty-two patients with malignant obstruction of the rectosigmoid region presenting an advanced unresectable stage, were randomly assigned to endoscopic stenting vs colostomy. The median length of stent placement procedure was 36 minutes. No death was observed. None of the patients reported complications. All patients resumed bowel function within 24 hours. The restoration of oral intake was achieved one day after stent placement. The median hospital stay was 2.6 days. The median length of the colostomy operation was 75.4 minutes. No mortality was reported. In 1 patient (9.1%) stoma prolapse was observed 3 days after the operation. Canalization of the gastrointestinal tract was restored when colostomy was opened (on postoperative day 3). All patients were able to resume oral feedings on postoperative day 3. The median hospital stay was 8.1 days. There were no statistically significant differences between the 2 groups concerning morbidity and mortality.

[14] Ripamonti C, Mercadante S, Groff L, Zecca E, De Conno F, Casuccio A. Role of octreotide, scopolamine butylbromide and hydration in symptom control of patients with inoperable bowel obstruction having a nasogastric tubes: a prospective, randomized trial. *J Pain Symptom Manage.* 2000;19:23. PMID: 10687323.

In a prospective trial that involved 17 inoperable bowel-obstructed patients octreotide significantly reduced the amount of GI secretions. Parenteral hydration over 500 ml/day may reduce nausea and drowsiness.

[15] Mercadante S, Ripamonti C, Casuccio A, Zecca E, Groff L . Comparison of octreotide and hyoscine butylbromide in controlling gastrointestinal symptoms due to malignant inoperable bowel obstruction. *Support Care Cancer.* 2000;8(3):188-191. PMID: 10789958.

Eighteen patients with inoperable bowel obstruction randomly received octreotide 0.3 mg daily (n = 9) or hyoscine butylbromide (HB) 60 mg daily (n = 9) s.c. Octreotide treatment induced a significantly rapid reduction in the number of daily episodes of vomiting and intensity of nausea compared with HB treatment at the different time intervals examined.

[16] Ventafridda V, Ripamonti C, Caraceni A, et al. The management of inoperable gastrointestinal obstruction in terminal cancer patients. *Tumori.* 1990;76(4):389-393. PMID: 1697993.

Twenty-two symptomatic patients, who were judged as inoperable, were treated with a pharmacologic association of morphine hydrochloride and scopolamine butylbromide as analgesics and haloperidol as an antiemetic. There was a significant decrease in the pain score (p less than 0.001). Vomiting was controlled in all patients, with the exception of three patients with upper abdomen obstruction who required nasogastric tube placement.

[17] Fainsinger RL, Spachynski K, Hanson J, et al. Symptom control in terminally ill patients with malignant bowel obstruction. *J Pain Symptom Manage.* 1994;9(1):12-18. PMID: 7513332.

In a review of 100 consecutive patients who died, 15 required medical management for bowel obstruction. Intensive medical management provided good symptom control without using intravenous lines and with minimal use of nasogastric tubes.

[18] Baines M, Oliver DJ, Carter RL. Medical management of intestinal obstruction in patients with advanced malignant disease. A clinical and pathological study. *Lancet.* 1985;2(8462):990-993. PMID: 2414614.

A clinical and pathological study was made of 40 patients with intestinal obstruction due to far-advanced abdominal and/or pelvic malignant disease. Surgical intervention was feasible in only 2 cases. The remaining 38 patients were managed medically without intravenous fluids and nasogastric suction. Obstructive symptoms such as intestinal colic, vomiting, and diarrhea were effectively controlled by medications.

[19] Davis MP, Furste A. Glycopyrrolate: a useful drug in the palliation of mechanical bowel obstruction. *J Pain Symptom Manage.* 1999;18(3):153-154. PMID: 10517034. Full text

[20] Twycross R, Wilcock A, Thorp S. *Palliative Care Formulary*. Oxford, UK: Radcliffe Medical Press. 1998;175-188. ISBN: 1857752643.

[21] Mercadante S, Kargar J, Nicolosi G. Octreotide may prevent definitive intestinal obstruction. *J Pain Symptom Manage*. 1997;13(6):352-355. PMID: 9204656.

Octreotide was used in two patients with chronic intestinal obstruction, resulting in good control of intestinal symptoms and maintenance of a prolonged adequate intestinal transit.

[22] Fainsinger RL, MacEachern T, Miller MJ et al. The use of hypodermoclysis for rehydration in terminally ill cancer patients. *J Pain Symptom Manage.* 1994;9(5):298-302. PMID: 7963780.

Of 100 patients who died, 69 received hypodermoclysis for an average of 14 ± 18 days during an average admission of 35 ± 41 days. Average volume of 1203 ± 505 ml/day.

[23] Bozzetti F, Amadori D, Bruera E, Cozzaglio L, Corli O, Filiberti A, et al. Guidelines on artificial nutrition versus hydration in terminal cancer patients. *Nutrition.* 1996;12(3):163-167. PMID: 8798219.

Step 1: define the eight key elements necessary to reach a decision; Step II: make the decision; and Step III: reevaluate the patient and the proposed treatment at specified intervals.