Ann Surg Oncol (2020) 27:1798–1804
https://doi.org/10.1245/s10434-020-08323-x

Annals of
SURGICAL ONCOLOGY
OFFICIAL JOURNAL OF THE SOCIETY OF SURGICAL ONCOLOGY

ORIGINAL ARTICLE – PERITONEAL SURFACE MALIGNANCY

The Chicago Consensus on Peritoneal Surface Malignancies: Palliative Care Considerations

Chicago Consensus Working Group

Chicago, IL

ABSTRACT The Chicago Consensus Working Group provides multidisciplinary recommendations for palliative care specifically related to peritoneal surface malignancies. These guidelines are developed with input from leading experts including surgical oncologists, medical oncologists, gynecologic oncologists, pathologists, radiologists, palliative care physicians, and pharmacists. These guidelines recognize and address the emerging need for increased awareness in the appropriate management of peritoneal surface disease. They are not intended to replace the quest for higher levels of evidence.

THE CHICAGO CONSENSUS ON PERITONEAL SURFACE MALIGNANCIES: PALLIATIVE CARE CONSIDERATIONS

This article provides multidisciplinary recommendations for palliative management of peritoneal surface malignancies and constitutes 1 article in a series composed by the Chicago Consensus Working Group for the Management of Peritoneal Surface Malignancies.[1–10] Information regarding formation of the Chicago Consensus Group and explanation of the working group's consensus methodology is discussed elsewhere.[1,2]

The collaborators for the Chicago Consensus Working Group are listed in the acknowledgments.

Correspondence to: K. Turaga, MD
Department of Surgery, University of Chicago, Chicago, IL
e-mail: kturaga@surgery.bsd.uchicago.edu

First Received: 4 July 2019;
Published Online: 13 April 2020

Principles of Management of Malignant Bowel Obstruction

Malignant bowel obstruction (MBO) is a frequent presentation of patients with peritoneal metastases and in a high percentage of these cases is the cause of death. Medical management of MBO has the potential to relieve clinical symptoms and resolve the underlying obstructive process. The goals of therapy include reducing pain, nausea, vomiting, and aspiration risk while potentially allowing the patient to regain oral nutrition support and ultimately allowing for a patient's transition to care in the home setting. Pharmacologic therapies include the use of antiemetics, antisecretory medications, and anti-inflammatory medications with the goal of reducing the intestinal obstruction.

The role of gastric antisecretory therapies, including histamine-2 receptor blockers (H_2RBs) and proton pump inhibitors (PPIs), has not been formally studied in the management of MBO. However, because of their ability to reduce gastric secretions, H_2RB and PPI therapies are recommended to reduce clinical symptoms and volume loss from nasogastric tube decompression. When used in a preoperative setting, both H_2RB and PPI therapies have demonstrated reductions in gastric fluid production.[11]

Various anticholinergic therapies are used for symptomatic management of gastrointestinal symptoms, including abdominal pain and gastrointestinal secretions. Often used as a comparator in randomized studies, scopolamine (hyoscine butylbromide) has anticholinergic properties that can reduce gastrointestinal secretions.[12,13] No formal studies on the use of dicyclomine or hyoscyamine as smooth muscle relaxants in the management of MBO exist.

The anti-inflammatory properties of corticosteroids reduce gastrointestinal wall and mesenteric edema in the setting of MBO; therefore, their use is an accepted standard practice in the management of MBO.[14] A Cochrane review

analyzing the role of corticosteroids in the resolution of MBO in both advanced gynecologic and gastrointestinal cancers demonstrated a trend toward resolution of MBO without an impact on overall survival. The number needed to treat was 6 patients to resolve 1 MBO.[15] Furthermore, an analysis of a national commercial health care database demonstrated increased odds of nasogastric tube removal within 4 days of insertion in patients with MBO when corticosteroids were used along with antisecretory therapy (octreotide), as compared with octreotide therapy alone.[16]

Octreotide is a synthetic peptide mimicking the natural effects of somatostatin, thereby reducing gastrointestinal secretions and gastrointestinal motility. In multiple studies, octreotide has been demonstrated to reduce vomiting episodes and gastrointestinal symptoms.[17,18] In addition, quality-of-life scores have improved with the use of octreotide in nonrandomized clinical studies.[19,20] When compared with anticholinergic therapies, octreotide has demonstrated benefits with respect to gastrointestinal secretions[13,21] and vomiting.[22] For individuals with an expected survival of greater than 4 weeks, a monthly intramuscular depot formulation of octreotide has demonstrated a reduction in gastrointestinal symptoms and vomiting.[23]

If medical therapies fail to relieve the clinical symptoms or allow for successful removal of a nasogastric tube, placement of a decompressive gastrostomy tube allows for independent management of gastrointestinal secretions and potentially a resumption of recreational oral intake of liquids or soft foods.[24,25] A decompressive gastrostomy tube can be placed by using endoscopic, radiologic, or surgical techniques with an acceptable risk profile.[26] Studies of decompressive gastrostomy tubes have demonstrated benefits with respect to gastrointestinal symptoms,[27,28] vomiting episodes,[29] and quality of life.[30] Although no improvement in overall survival has been demonstrated with decompressive gastrostomy tubes, earlier placement can allow for improved palliation of clinical symptoms.[31] In the setting of ascites, decompressive gastrostomy tubes can be safely placed following paracentesis or placement of an intraperitoneal drainage catheter, albeit with a higher risk of complications, including leakage and peritonitis.[32]

Surgical Management

The initial management of patients presenting with MBO should include medical management to palliate symptoms (nasogastric tube decompression, intravenous fluid resuscitation, antiemetics, and antisecretory medications) and evaluation as to whether surgical or procedural intervention is a viable option. To help determine the level of obstruction, disease burden, and evidence of perforation, a computed tomography (CT) scan of the abdomen and pelvis should be obtained. In the absence of peritonitis, perforation, or closed-loop obstruction, the patient can be admitted with serial abdominal examinations and continued medical management of the MBO with the hope that it will resolve.

If the obstruction persists and the patient is deemed a suitable surgical candidate, preparation should be made for an operation. When considering surgery, the patient's functional status, primary tumor biology, nutritional status, advanced health directive, and available therapeutic options must all be assessed.

For patients who are surgical candidates, options include resection of the obstructing segment, bowel resection or ostomy for acute perforation, surgical bypass, surgically placed gastrostomy tube, or complete cytoreductive surgery with or without intraperitoneal chemotherapy. It is important to note that indications for an emergency operation in patients with disseminated cancer carries a high incidence of associated morbidity and mortality, with high rates of 30-day mortality and discharge to an institution.[33,34] This needs to be considered and clearly communicated to patients and their family members when deciding whether to operate in this situation. Early involvement of palliative care providers can be instrumental in providing education and support for patients and their family members during this process.[35]

Principles of Nutrition Support in MBO Malnutrition is increasingly recognized in the setting of cancer and increases in incidence with metastatic disease.[36]Malnutrition is associated with a number of adverse outcomes, including longer hospital stays, postoperative complications, and a reduction in overall survival.[37,38] After a patient develops MBO, medical therapies are initiated with the aim of reducing clinical symptoms and promoting independent oral intake. Should a patient fail to achieve adequate oral or enteral caloric intake, the decision to proceed with parenteral nutrition (PN) support can be considered.

In the absence of randomized clinical trials in MBO, PN has been evaluated as a means of reversing cancer cachexia and nutritional deficits. However, the potential benefits of improved caloric intake have to be balanced with the risks of PN, including central line infections/thrombosis, electrolyte abnormalities, and concerns about increased tumor growth.[39,40]

Regarding PN in the management of MBO, retrospective studies provide divergent results with respect to overall survival.[41–44] However, survival greater than 1 year has been reported in up to 10% of individuals.[45] Among individuals receiving PN support, a Karnofsky score of greater than 50 has been associated with improved survival,[46–49] as was receipt of new chemotherapy[50,51] and radiographic

response to chemotherapy.[51] However, a meta-analysis of survival and quality of life in patients with MBO receiving home PN demonstrated the high associated costs of PN therapy.[52] A formal Cochrane review for the use of home PN in individuals with inoperable MBO found that the benefits of PN are uncertain. Among 13 observational studies, mean survival ranged from 3 to 1278 days, and adverse effects of therapy occurred in 12% of patients.[53]

Parenteral nutrition can be considered when the risk of death from starvation or malnutrition is higher than the risk from disease progression. As recommended by the European Society for Clinical Nutrition and Metabolism, PN should be offered if expected survival with tumor progression is longer than 2 to 3 months.[54] This recommendation is based on the knowledge that micronutrient starvation often results in death within 2 months among healthy individuals and that the mean survival in MBO without nutritional support is approximately 48 days.[54,55] Additionally, improvements in quality of life have been demonstrated in individuals receiving PN who survived longer than 3 months.[47]

Synthesizing the above studies, we propose the use of PN in select patients with MBO. Factors predicting improved outcomes and survival include the availability of chemotherapeutic options, sufficient functional status (Karnofsky score > 50 or Eastern Cooperative Oncology Group score < 2), and expected survival with tumor progression of greater than 2 to 3 months.

Management of Malignancy-Related Ascites

Portal hypertension related to liver cirrhosis is the most common cause of ascites in the United States. However, in approximately 10% of patients presenting with ascites, the underlying diagnosis is related to cancer, and in some patients ascites is the only manifestation of neoplastic disease. Ascites is commonly caused by ovarian, endometrial, breast, esophageal, gastric, colorectal, lung, pancreatic, hepatobiliary, and primary peritoneal carcinomatosis.[56] In most cases its pathophysiology is related to peritoneal metastasis resulting in blockage of the draining lymphatic channels and increased capillary permeability. However, it can also be caused by large liver metastasis causing portal hypertension with or without peritoneal disease, or chylous ascites related to lymphoproliferative disorders.

Patients with suspected malignancy-related ascites should undergo a thorough history and physical examination; any previous oncologic disease and/or risk factors should be recorded, and specific signs and symptoms regarding a primary tumor should be investigated. Other conditions that can cause ascites, such as liver cirrhosis or infectious diseases like peritoneal tuberculosis, must be ruled out. In patients with no known history of cancer, initial tests should include at minimum diagnostic abdominal paracentesis with cytology, esophagogastroduodenoscopy, colonoscopy, contrast-enhanced CT/MRI of the abdomen and pelvis, and pelvic ultrasound (female patients). If no tumor is identified, diagnostic laparoscopy with biopsy and tumor burden assessment (peritoneal cancer index [PCI] score) is encouraged. Together with diagnostic studies, performance and nutritional status must be assessed and advanced directives and goals of care should be discussed. It is recommended that palliative care physicians, medical and surgical oncologists, and other specialists in cancer care (nutritional support specialists, physical therapists, psychologists, etc) be involved early in the management of malignancy-related ascites because of its indication of advanced disease.

The cornerstone of treatment planning for these patients is primary tumor biology because this will define patient prognosis and survival rate. Patients presenting with a favorable tumor biology (appendiceal or ovarian cancer) and good overall status will benefit from more advanced therapeutic modalities, including chemotherapy, cytoreduction surgery, and/or intraperitoneal chemotherapy. On the other hand, patients with aggressive disease (pancreatic or gastric cancer) and poor performance status will probably be treated with palliative chemotherapy, best supportive care, or enrollment in a clinical trial. One supportive measure is the use of diuretics, which should be administered with caution because they may cause systemic blood volume depletion, electrolyte abnormalities, and renal dysfunction.[57] No randomized trials have evaluated the effectiveness of diuretics for malignancy-related ascites, but their value appears to be more consistent in patients with ascites and portal hypertension (from liver metastasis). Another method to palliate malignancy-related ascites is paracentesis, which is effective in relieving symptoms. The drawbacks are that it requires repeated treatments, leads to recurrent hospitalizations, depletes the patient of protein and electrolytes, and has a risk of peritonitis. The use of peritoneovenous shunts has been described to reduce the need of repeated paracentesis in patients receiving palliative care. Candidates for this procedure have to be selected carefully because mortality and high morbidity have been reported.[56] In general, the use of peritoneovenous shunts is discouraged in patients with malignancy-related ascites.

Laparoscopic intraperitoneal chemotherapy can offer a palliative pathway for improving ascites. No prospective clinical trials have addressed this method, but a variety of small series have demonstrated its benefit for some patients.[58,59] Intraperitoneal chemotherapy has been shown to reduce malignant ascites and improve related symptoms, improving quality of life in patients who are not candidates

for extensive cytoreduction. This technique is also minimally invasive, resulting in reduced postoperative stays for patients.[60] Intraperitoneal chemotherapy regimens differed depending on tumor biology, prior treatments, and toxicity of the intraperitoneal chemotherapy agent.

ACKNOWLEDGMENT Collaborators: **Alejandro Plana,** BA, Department of Surgery, University of Chicago, Chicago, IL; **Francisco J. Izquierdo,** MD, Department of Surgery, Clínica Santa María, Providencia, Chile; **Darryl Schuitevoerder,** MBBS, Department of Surgery, University of Chicago, Chicago, IL; **Laura A. Lambert,** MD, General Surgery, Huntsman Cancer Institute/University of Utah, Salt Lake City, UT; **Dejan Micic,** MD, Department of Gastroenterology, University of Chicago, Chicago, IL; **Jeremiah L. Deneve,** DO, Surgery, University of Tennessee Health Science Center, Memphis, TN; **Steven A. Ahrendt,** MD, Department of Surgery, University of Colorado, Aurora, CO; **Mazin Al-kasspooles,** MD, Department of Surgery, Division of Surgical Oncology, University of Kansas Medical Center, Kansas City, KS; **Farin Amersi,** MD, Cedars-Sinai Medical Center, Los Angeles, CA; **Wilbur B. Bowne,** MD, Surgery, Drexel University College of Medicine, Philadelphia, PA; **Charles Komen Brown,** MD, PhD, Surgery, AMITA Health, La Grange, IL; **Andrea Hayes-Jordan,** MD, Department of Surgery, Division of Pediatric Surgery, University of North Carolina School of Medicine, Chapel Hill, NC; **John M. Kane III,** MD, Surgical Oncology, Roswell Park Comprehensive Cancer Center, Buffalo, NY; **Kaitlyn J. Kelly,** MD, Surgery, University of California San Diego, La Jolla, CA; **Timothy J. Kennedy,** MD, MBA, GI Surgical Oncology, Rutgers Cancer Institute of New Jersey, New Brunswick, NJ; **Ugwuji N. Maduekwe,** MD, MMSc, Department of Surgery, Division of Surgical Oncology and Endocrine Surgery, University of North Carolina at Chapel Hill, Chapel Hill, NC; **Grace Z. Mak,** MD, Department of Surgery, Section of Pediatric Surgery, University of Chicago, Chicago, IL; **Marcovalerio Melis,** MD, Surgery, NYU School of Medicine, New York, NY; **Richard Royal,** MD, MD Surgical Oncology, Anderson Cancer Center, Houston, TX; **Daniel E. Abbott,** MD, Department of Surgery, University of Wisconsin, Madison, WI; **Sherif Abdel-Misih,** MD, Surgery, Stony Brook University, Stony Brook, NY; **Amanda K. Arrington,** MD, Surgery, University of Arizona, Tucson, AZ; **Brian Badgwell,** MD, MS, MD Surgical Oncology, Anderson Cancer Center, Houston, TX; **Robert M. Barone,** MD, MS, UCSD School Medicine Division Surgical Oncology, Surgery, Sharp HealthCare, La Jolla, CA; **Joel M. Baumgartner,** MD, MAS, Surgery, University of California San Diego, La Jolla, CA; **Richard N. Berri,** MD, Surgical Oncology, Ascension St. John Hospital, Grosse Pointe Woods, MI; **Lana Bijelic,** MD, Surgical Oncology, Inova Schar Cancer Institute, Fairfax, VA; **Dan G. Blazer III,** MD, Surgery, Duke University, Durham, NC; **Daniel V. Catenacci,** MD, University of Chicago, Medicine, Chicago, IL; **Carlos H. F. Chan,** MD, PhD, Department of Surgery, University of Iowa Hospitals and Clinics, Iowa City, IA; **Clifford S. Cho,** MD, Department of Surgery, University of Michigan Medical SchoolAnn Arbor, MI; **M. Haroon A. Choudry,** MD, Surgical Oncology, University of Pittsburgh, Surgery, Pittsburgh, PA; **Callisia N. Clarke,** MD, MS, Surgery, Medical College of Wisconsin, Milwaukee, WI; **James C. Cusack Jr,** MD, Department of Surgery, Massachusetts General Hospital, Boston, MA; **Abraham H. Dachman,** MD, Radiology, UChicago Medicine, Chicago, IL; **Sean P. Dineen,** MD, GI Oncology, Moffitt Cancer Center, Tampa, FL; **Oliver S. Eng,** MD, Surgery, University of Chicago, Chicago, IL; **Leopoldo J. Fernandez,** MD, Surgical Oncology, Virginia Commonwealth University Massey Cancer Center, Hunter Holmes McGuire VAMC, Richmond, VA; **James Fleshman,** MD, Department of Surgery, Baylor University Medical CenterDallas, TX; **T. Clark Gamblin,** MD, MS, MBA, Department of Surgery, Medical College of Wisconsin, Milwaukee, WI; **Alexandra Gangi,** MD, Department of Surgery, Cedars-Sinai Medical Center, Surgical Oncology, Los Angeles, CA; **Georgios V. Georgakis,** MD, PhD, Department of Surgery, Division of Surgical Oncology, Stony Brook UniversityStony Brook, NY; **Erin W. Gilbert,** MD, Department of Surgery, Portland,Oregon Health and Science University, OR; **Martin D. Goodman,** MD, Tufts Medical Center, Surgical Oncology, Boston, MA; **Anand Govindarajan,** MD, MSc, Division of General Surgery, Sinai Health System, University of Toronto, Toronto, ON, Canada; **Travis E. Grotz,** MD, Department of Surgery, Mayo Clinic, Rochester, MN; **Vadim Gushchin,** MD, Surgical Oncology, Institute for Cancer Care at Mercy, Baltimore, MD; **Nader Hanna,** MD, Surgery, University of Maryland School of Medicine, Baltimore, MD; **Carla Harmath,** MD, Radiology, University of Chicago, Chicago, IL; **Aliya N. Husain,** MD, Pathology, University of Chicago, Chicago, IL; **Kamran Idrees,** MD, MSCI, MMHC, Department of Surgery, Vanderbilt University Medical Center, Nashville, TN; **Chukwuemeka Ihemelandu,** MD, Surgical Oncology, MedStar Georgetown University Medical Center, Washington, DC; **Haejin In,** MD, MBA, MPH, Surgery, Montefiore Medical Center, Bronx, NY; **Fabian M. Johnston,** MD, MHS, Surgery, Johns Hopkins University, Baltimore, MD; **David Jiang,** MD, Department of Surgery, University of Chicago, Chicago, IL; **Giorgos Karakousis,** MD, Surgery, Hospital of the University of Pennsylvania, Philadelphia, PA; **Xavier M. Keutgen,** MD, Surgery, Division of Surgical Oncology, Endocrine Surgery Research Program, University of Chicago, Chicago, IL; **Hedy Lee Kindler,** MD, Section of Hematology/Oncology, University of Chicago, Chicago, IL; **Michael D. Kluger,** MD, MPH, Division of GI and Endocrine Surgery, Columbia University College of Physicians and Surgeons, New York, NY; **Byrne Lee,** MD, Division of Surgical Oncology, City of Hope, Duarte, CA; **Nita Karnik Lee,** MD, MPH, Obstetrics and Gynecology, University of Chicago, Chicago, IL; **Chih-Yi Liao,** MD, BA, Section of Hematology/Oncology, Department of Medicine, University of Chicago, Chicago, IL; **Lloyd A. Mack,** MD, MSc, Departments of Surgery and Oncology, University of Calgary, Calgary, AB, Canada; **Monica Malec,** MD, Medicine, University of Chicago, Chicago, IL; **Joshua M. V. Mammen,** MD, PhD, Department of Surgery, University of Kansas, Kansas City, KS; **Melvy Sarah Mathew,** MD, Department of Radiology, University of Chicago, Chicago, IL; **Nelya Melnitchouk,** MD, MSc, Harvard Medical School, Department of Surgery, Brigham and Women's Hospital, Boston, MA; **Ryan P. Merkow,** MD, MS, Feinberg School of Medicine, Department of Surgery, Northwestern University, Evanston, IL; **Harveshp Mogal,** MD, MS, Surgery, Medical College of Wisconsin, Milwaukee, WI; **Mecker G. Möller,** MD, Department of Surgery, Division of Surgical Oncology, University of Miami Miller School of Medicine, Miami, FL; **Garrett M. Nash,** MD, MPH, Surgery, Memorial Sloan Kettering, New York, NY; **Aytekin Oto,** MD, MBA, Radiology, University of Chicago, Chicago, IL; **Colette R. Pameijer,** MD, Department of Surgery, Penn State College of Medicine, Hershey, PA; **Sam G. Pappas,** MD, Surgery, Rush University Medical Center, Chicago, IL; **Patricio M. Polanco,** MD, Department of Surgery, Division of Surgical Oncology, University of Texas Southwestern Medical CenterDallas, TX; **Blase N. Polite,** MD, MPP, Department of Medicine, University of Chicago, Chicago, IL; **Sanjay S. Reddy,** MD, Department of Surgery, Fox Chase Cancer Center, Philadelphia, PA; **George Salti,** MD, Edward-Elmhurst Health and University of Illinois at Chicago, Surgical Oncology, Chicago, IL; **Armando Sardi,** MD, Surgical Oncology, Mercy Medical Center, Baltimore, MD; **Carol Semrad,** MD, Department of Gastroenterology, University of Chicago, Chicago, IL; **Maheswari Senthil,** MD, Surgical Oncology, Loma Linda University Health, Loma Linda, CA; **Namrata Setia,** MD, Deaprtment of Pathology, University of Chicago, Chicago, IL; **Scott K. Sherman,** MD, University of Chicago, Surgery; **Lucas Sideris,** MD,

FRCSC, Surgery, University of Montreal; **Scott K. Sherman,** MD, Surgery, University of Chicago, Chicago, IL; **Joseph Skitzki,** MD, Department of Surgical Oncology, Roswell Park Comprehensive Cancer Center, Buffalo, NY; **Jula Veerapong,** MD, Surgical Oncology, University of California San Diego, La Jolla, CA; **Konstantinos I. Votanopoulos**, MD, PhD, Wake Forest, Surgery, Winston-Salem, NC; **Michael G. White,** MD, MSc, Department of Surgery, University of Chicago, Chicago, IL; **Joshua H. Winer,** MD, Division of Surgical Oncology, Emory University, Atlanta, GA; **Shu-Yuan Xiao,** MD, University of Chicago, Chicago, IL, and Department of Pathology, Wuhan University Zhongnan Hospital, Wuhan, China; **Rhonda K. Yantiss,** MD, Pathology and Laboratory Medicine, Weill Cornell Medicine, New York, NY; **Nita Ahuja,** MD, MBA, Yale University, Surgery, New Haven, CT; **Andrew M. Lowy,** MD, Department of Surgery, UC San Diego Health, La Jolla, CA; **H. Richard Alexander Jr,** MD, Division of Surgical Oncology, Rutgers Cancer Institute of New Jersey, New Brunswick, NJ; **Jesus Esquivel,** MD, Surgical Oncology, Frederick Memorial Hospital, Frederick, MD; **Jason M. Foster,** MD, Surgery, Division of Surgical Oncology, University of Nebraska/Nebraska Medicine, Omaha, NE; **Daniel M. Labow,** MD, Department of Surgery, Icahn School of Medicine at Mount Sinai, New York, NY; **Edward A. Levine,** MD, Surgical Oncology, Wake Forest University, Winston-Salem, NC; **Charles Staley,** MD, Department of Surgery, Emory University School of Medicine, Atlanta, GA; **Paul H. Sugarbaker,** MD, MedStar Washington Hospital Center, Washington, DC; **David L. Bartlett,** MD, University of Pittsburgh, Surgery, Pittsburgh, PA; **Kiran Turaga,** MD, MPH, Department of Surgery, University of Chicago, Chicago, IL.

FUNDING The Irving Harris Foundation and the University of Chicago

DISCLOSURES James C. Cusack reports grants from Lumicell Inc. outside the submitted work. Carla Harmath serves on the medical advisory council of Accumen. Hedy Kindler reports personal fees and non-financial support from Inventiva, AstraZeneca, Boehringer Ingelheim, Merck, and Paredox; personal fees from Aldeyra Therapeutics, Bayer, BMS, Erytech, Five Prime Therapeutics, Ipsen Pharmaceuticals, Kyowa, and MedImmune; and funds to support clinical trials at her institution from Aduro, AstraZeneca, Bayer, BMS, Deciphera, GSK, Lilly, Merck, MedImmune, Polaris, Verastem, and Blueprint, all outside the submitted work. Chih-Yi Liao reports personal fees from Eisai, Exelixis, and Klus Pharma outside the submitted work. Garrett M. Nash reports non-financial support from Intuitive, outside the submitted work. Aytekin Oto reports grants from Philips Healthcare, Guerbet, and Profound Healthcare, and serves as a medical advisory board member for Profound Healthcare, all outside the submitted work. Nita Ahuja reports grant funding from Cepheid and Astex, has served as a consultant to Ethicon, and has licensed methylation biomarkers to Cepheid. Jesus Esquivel reports personal fees from Eight Medical. The remaining authors disclosed no conflicts of interest.

REFERENCES

1. Chicago Consensus Working Group. The Chicago Consensus Guidelines for Peritoneal Surface Malignancies: Introduction. *Ann Surg Oncol*. 2020. https://doi.org/10.1245/s10434-020-08318-8.
2. Chicago Consensus Working Group. The Chicago Consensus on Peritoneal Surface Malignancies: Methodology. *Ann Surg Oncol*. 2020. https://doi.org/10.1245/s10434-020-08317-9.
3. Chicago Consensus Working Group. The Chicago Consensus on Peritoneal Surface Malignancies: Standards. *Ann Surg Oncol*. 2020. https://doi.org/10.1245/s10434-020-08325-9.
4. Chicago Consensus Working Group. The Chicago Consensus on Peritoneal Surface Malignancies: Management of Appendiceal Neoplasms. *Ann Surg Oncol*. 2020. https://doi.org/10.1245/s10434-020-08316-w.
5. Chicago Consensus Working Group. The Chicago Consensus on Peritoneal Surface Malignancies: Management of Colorectal Metastases. *Ann Surg Oncol*. 2020. https://doi.org/10.1245/s10434-020-08315-x.
6. Chicago Consensus Working Group. The Chicago Consensus on Peritoneal Surface Malignancies: Management of Gastric Metastases. *Ann Surg Oncol*. 2020. https://doi.org/10.1245/s10434-020-08320-0.
7. Chicago Consensus Working Group. The Chicago Consensus on Peritoneal Surface Malignancies: Management of Peritoneal Mesothelioma. *Ann Surg Oncol*. 2020. https://doi.org/10.1245/s10434-020-08324-w.
8. Chicago Consensus Working Group. The Chicago Consensus on Peritoneal Surface Malignancies: Management of Ovarian Neoplasms. *Ann Surg Oncol*. 2020. https://doi.org/10.1245/s10434-020-08322-y.
9. Chicago Consensus Working Group. The Chicago Consensus on Peritoneal Surface Malignancies: Management of Neuroendocrine Tumors. *Ann Surg Oncol*. 2020. https://doi.org/10.1245/s10434-020-08321-z.
10. Chicago Consensus Working Group. The Chicago Consensus on Peritoneal Surface Malignancies: Management of Desmoplastic Small Round Cell Tumor, Breast, and Gastrointestinal Stromal Tumor. *Ann Surg Oncol*. 2020. https://doi.org/10.1245/s10434-020-08319-7.
11. Clark K, Lam L, Currow D. Reducing gastric secretions—a role for histamine 2 antagonists or proton pump inhibitors in malignant bowel obstruction? *Support Care Cancer.* 2009;17(12):1463–68.
12. De Conno F, Caraceni A, Zecca E, Spoldi E, Ventafridda V. Continuous subcutaneous infusion of hyoscine butylbromide reduces secretions in patients with gastrointestinal obstruction. *J Pain Symptom Manage*. 1991;6(8):484–86.
13. Peng X, Wang P, Li S, Zhang G, Hu S. Randomized clinical trial comparing octreotide and scopolamine butylbromide in symptom control of patients with inoperable bowel obstruction due to advanced ovarian cancer. *World J Surg Oncol.* 2015;13:50.
14. Mittal DL, Mittal A, Brosnan EA, Landman WJ. Nonopioid pharmacological management of malignant bowel obstruction: a New Zealand-wide survey. *J Palliat Med.* 2014;17(11):1249–55.
15. Feuer DJ, Broadley KE. Corticosteroids for the resolution of malignant bowel obstruction in advanced gynaecological and gastrointestinal cancer. *Cochrane Database Syst Rev*. 2000. https://doi.org/10.1002/14651858.CD001219.
16. Minoura T, Takeuchi M, Morita T, Kawakami K. Practice patterns of medications for patients with malignant bowel obstruction using a nationwide claims database and the association between treatment outcomes and concomitant use of H2-blockers/proton pump inhibitors and corticosteroids with octreotide. *J Pain Symptom Manage*. 2018;55(2):413–19.
17. Currow DC, Quinn S, Agar M, et al. Double-blind, placebo-controlled, randomized trial of octreotide in malignant bowel obstruction. *J Pain Symptom Manage*. 2015;49(5):814–21.
18. Khoo D, Hall E, Motson R, Riley J, Deaman K, Waxman J. Palliation of malignant intestinal obstruction using octreotide. *Eur J Cancer.* 1994;30A(1):28–30.
19. Hisanaga T, Shinjo T, Morita T, et al. Multicenter prospective study on efficacy and safety of octreotide for inoperable malignant bowel obstruction. *Jpn J Clin Oncol.* 2010;40(8):739–45.

20. Shima Y, Ohtsu A, Shirao K, Sasaki Y. Clinical efficacy and safety of octreotide (SMS201-995) in terminally ill Japanese cancer patients with malignant bowel obstruction. *Jpn J Clin Oncol.* 2008;38(5):354–59.
21. 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 and nasogastric tubes: a prospective randomized trial. *J Pain Symptom Manage.* 2000;19(1):23–32.
22. Mercadente 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;8:188–91.
23. Matulonis UA, Seiden MV, Roche M, et al. Long-acting octreotide for the treatment and symptomatic relief of bowel obstruction in advanced ovarian cancer. *J Pain Symptom Manage.* 2005;30(6):563–69.
24. Herman LL, Hoskins WJ, Shike M. Percutaneous endoscopic gastrostomy for decompression of the stomach and small bowel. *Gastrointest Endosc.* 1992;38(3):314–18.
25. Pothuri B, Montemarano M, Gerardi M, et al. Percutaneous endoscopic gastrostomy tube placement in patients with malignant bowel obstruction due to ovarian carcinoma. *Gynecol Oncol.* 2005;96(2):330–34.
26. Kawata N, Kakushima N, Tanaka M, et al. Percutaneous endoscopic gastrostomy for decompression of malignant bowel obstruction. *Dig Endosc.* 2014;26(2):208–13.
27. Issaka RB, Shapiro DM, Parikh ND, et al. Palliative venting percutaneous endoscopic gastrostomy tube is safe and effective in patients with malignant obstruction. *Surg Endosc.* 2014;28(5):1668–73.
28. Vashi PG, Dahlk S, Vashi RP, Gupta D. Percutaneous endoscopic gastrostomy tube occlusion in malignant peritoneal carcinomatosis-induced bowel obstruction. *Eur J Gastroenterol Hepatol.* 2011;23(11):1069–73.
29. Dittrich A, Schubert B, Kramer M, et al. Benefits and risks of a percutaneous endoscopic gastrostomy (PEG) for decompression in patients with malignant gastrointestinal obstruction. *Support Care Cancer.* 2017;25(9):2849–56.
30. Zucchi E, Fornasarig M, Martella L, et al. Decompressive percutaneous endoscopic gastrostomy in advanced cancer patients with small-bowel obstruction is feasible and effective: a large prospective study. *Support Care Cancer.* 2016;24(7):2877–82.
31. Pinard KA, Goring TN, Egan BC, Koo DJ. Drainage percutaneous endoscopic gastrostomy for malignant bowel obstruction in gastrointestinal cancers: prognosis and implications for timing of palliative intervention. *J Palliat Med.* 2017;20(7):774–78.
32. Shaw C, Bassett RL, Fox PS, et al. Palliative venting gastrostomy in patients with malignant bowel obstruction and ascites. *Ann Surg Oncol.* 2013;20(2):497–505.
33. Cauley CE, Panizales MT, Reznor G, et al. Outcomes after emergency abdominal surgery in patients with advanced cancer: opportunities to reduce complications and improve palliative care. *J Trauma Acute Care Surg.* 2015;79(3):399–406.
34. Pameijer CR, Mahvi DM, Stewart JA, Weber SM. Bowel obstruction in patients with metastatic cancer: does intervention influence outcome? *Int J Gastrointest Cancer.* 2005;35(2):127–133.
35. Lambert LA, Hendrix RJ. Palliative management of advanced peritoneal carcinomatosis. *Surg Oncol Clin N Am.* 2018;27(3):585-602.
36. Hébuterne X, Lemarié E, Michallet M, de Montreuil CB, Schneider SM, Goldwasser F. Prevalence of malnutrition and current use of nutrition support in patients with cancer. *JPEN J Parenter Enteral Nutr.* 2014;38(2):196-204.
37. Vashi PG, Gupta D, Lammersfeld C, et al. The relationship between baseline nutritional status with subsequent parenteral nutrition and clinical outcomes in cancer patients undergoing hyperthermic intraperitoneal chemotherapy. *Nutr J.* 2013;12:118.
38. Kwag SJ, Kim JG, Kang WK, Lee JK, Oh ST. The nutritional risk is a independent factor for postoperative morbidity in surgery for colorectal cancer. *Ann Surg Treat Res.* 2014;86(4):206-11.
39. Harrison LE, Brennan MF. The role of total parenteral nutrition in the patient with cancer. *Curr Probl Surgery.* 1995;32(10):833-917.
40. Koretz RL, Lipman TO, Klein S; American Gastroenterological Association AGA technical review on parenteral nutrition. *Gastroenterology.* 2001;121(4):970-1001.
41. Abu-Rustum NR, Barakat RR, Venkatraman E, Spriggs D. Chemotherapy and total parenteral nutrition for advanced ovarian cancer with bowel obstruction. *Gynecol Oncol.* 1997;64:493-95.
42. Brard L, Weitzen S, Strubel-Lagan SL, et al. The effect of total parenteral nutrition on the survival of terminally ill ovarian cancer patients. *Gynecol Oncol.* 2006;103(1):176-180.
43. Diver E, O'Connor O, Garrett L, et al. Modest benefit of total parenteral nutrition and chemotherapy after venting gastrostomy tube placement. *Gynecol Oncol.* 2013;129(2):332-35.
44. Rath KS, Loseth D, Muscarella P, et al. Outcomes following percutaneous upper gastrointestinal decompressive tube placement for malignant bowel obstruction in ovarian cancer. *Gynecol Oncol.* 2013;129(1):103-106.
45. Fan BG. Parenteral nutrition prolongs the survival of patients associated with malignant gastrointestinal obstruction. *JPEN J Parenter Enteral Nutr.* 2007;31(6):508-10.
46. Chermesh I, Mashiach T, Amit A, et al. Home parenteral nutrition (HTPN) for incurable patients with cancer with gastrointestinal obstruction: do the benefits outweigh the risks? *Med Oncol.* 2011;28(1):83-88.
47. Cozzaglio L, Balzola F, Cosentino F, et al. Outcome of cancer patients receiving home parenteral nutrition. Italian Society of Parenteral and Enteral Nutrition (S.I.N.P.E.). *JPEN J Parenter Enteral Nutr.* 1997;21(6):339-42.
48. Pasanisi F, Orban A, Scalfi L, et al. Predictors of survival in terminal-cancer patients with irreversible bowel obstruction receiving home parenteral nutrition. *Nutrition.* 2001;17(7-8):581-84.
49. Soo I, Gramlich L. Use of parenteral nutrition in patients with advanced cancer. *Appl Physiol Nutr Metab.* 2008;33(1):102-106.
50. Aria Guerra E, Cortés-Salgado A, Mateo-Lobo R, et al. Role of parenteral nutrition in oncologic patients with intestinal occlusion and peritoneal carcinomatosis. *Nutr Hosp.* 2015;32(3):1222-27.
51. Chouhan J, Gupta R, Ensor J, et al. Retrospective analysis of systemic chemotherapy and total parenteral nutrition for the treatment of malignant small bowel obstruction. *Cancer Med.* 2016;5(2):239-47.
52. Naghibi M, Smith TR, Elia M. A systematic review with meta-analysis of survival, quality of life and cost-effectiveness of home parenteral nutrition in patients with inoperable malignant bowel obstruction. *Clin Nutr.* 2015;34(5):825-37.
53. Sowerbutts AM, Lal S, Sremanakova J, et al. Home parenteral nutrition for people with inoperable malignant bowel obstruction. *Cochrane Database Syst Rev.* 2018;8:12.
54. Bozzetti F, Arends J, Lundholm K, Micklewright A, Zurcher G, Muscaritoli M; ESPEN. ESPEN Guidelines on Parenteral Nutrition: non-surgical oncology. *Clin Nutr.* 2009;28(4):445-54.
55. Mercadante S, Casuccio A, Mangione S. Medical treatment for inoperable malignant bowel obstruction: a qualitative systematic review. *J Pain Symptom Manage.* 2007;33(2):217-23.
56. Saif MW, Siddiqui IA, Sohail MA. Management of ascites due to gastrointestinal malignancy. *Ann Saudi Med.* 2009;29(5):369-77.

57. Sangisetty SL, Miner TJ. Malignant ascites: a review of prognostic factors, pathophysiology and therapeutic measures. *World J Gastrointest Surg.* 2012;4(4):87-95.
58. Randle RW, Swett KR, Swords DS, et al. Efficacy of cytoreductive surgery with hyperthermic intraperitoneal chemotherapy in the management of malignant ascites. *Ann Surg Oncol.* 2014;21(5):1474-79.
59. Ba MC, Cui SZ, Lin SQ, et al. Chemotherapy with laparoscope-assisted continuous circulatory hyperthermic intraperitoneal perfusion for malignant ascites. *World J Gastroenterol.* 2010;16(15):1901-07.
60. Valle SJ, Alzahrani NA, Alzahrani SE, Liauw W, Morris DL. Laparoscopic hyperthermic intraperitoneal chemotherapy (HIPEC) for refractory malignant ascites in patients unsuitable for cytoreductive surgery. *Int J Surg.* 2015;23(Pt A):176-180.