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ARTÍCULO ORIGINAL

Predictors of adverse surgical outcome in the management of malignant bowel obstruction

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ABSTRACT

Introduction. Malignant bowel obstruction (MBO) is a common problem in patients with advanced colorectal or ovarian cancer. The management of this group of patients is complex and controversial. **Objective.** To analyze the factors associated with morbidity and mortality in patients who underwent surgery for MBO in a tertiary referral center in Mexico City. **Material and methods.** Hospital records of patients who underwent surgery for malignant bowel obstruction from January 1987 through December 2005 were retrospectively analyzed. Demographic data, clinical and surgical variables were recorded. Morbidity and mortality within 30-day of surgical procedure were registered. Factors associated with outcome were analyzed with the chi-square test. Survival curves were constructed with the Kaplan-Meier method. **Results.** One-hundred and thirty patients were included. Primary neoplasm was the cause of bowel obstruction in 51 (39.2%) patients. Resection and anastomosis was performed in 45 patients (34.6%); in 30 cases (23.1%) a palliative estoma was constructed. Hospital mortality rate was 10.8%, and major postoperative morbidity was 16.2%. Factors associated with a significant increase in surgical mortality were: advanced patient age 17.2% (p = 0.009), hipoalbuminemia 14.45% (p = 0.027) and surgery performed for neoplasms different from those of gastrointestinal origin 17.6% (p = 0.005). Surgical morbidity was significantly higher in patients with poor performance status 16.2% (p = 0.017), advanced age 18% (p = 0.04), and low albumin levels 13.5% (p = 0.03). Median survival for the entire cohort was nine months (95% CI 5-13). Actuarial one, three and five year survival were 38.4, 27.5 and 25.4%, respectively. The most significant predictor of survival was performance status. **Conclusions.** When surgical management of MBO is considered, a careful assessment of the factors shown here to predict an adverse surgical outcome and poor prognosis is required.

Key words. Gastrointestinal cancer. Cancer of ovary. Intestinal malignant obstruction. Carcinomatosis. Surgical treatment.

Predictores evolución quirúrgica adversa de pacientes con obstrucción intestinal maligna.

RESUMEN

Introducción. *La oclusión intestinal maligna es un problema común, principalmente en pacientes con cánceres avanzados de ovario y colorrectal. El manejo de este grupo de pacientes es complejo y controversial.* ***Objetivo.*** *Analizar los factores asociados con mortalidad y morbilidad en los pacientes que fueron sometidos a cirugía para obstrucción intestinal maligna en un centro terciario de referencia en la Ciudad de México.* ***Material y métodos.*** *Se realizó un estudio retrospectivo analizando los expedientes de pacientes sometidos a cirugía con el diagnóstico de oclusión intestinal maligna de enero de 1987 a diciembre del 2005. Se registraron datos demográficos, clínicos y quirúrgicos, así como morbilidad y mortalidad dentro de los primeros 30 días después de la cirugía. Se analizaron los factores asociados con morbimortalidad mediante la prueba de T de Student. Las curvas de supervivencia se construyeron con el método de Kaplan y Meier.* ***Resultados.*** *Se incluyeron 130 pacientes. Se encontró que una neoplasia primaria era la causa de la obstrucción en 51 (39.2%) pacientes. Se realizó resección y anastomosis en 45 (34.6%) pacientes. En 30 casos (23.1%) se realizó un estoma paliativo. Se registró una mortalidad hospitalaria de 10.8%, y morbilidad postoperatoria mayor de 16.2%. Factores asociados significativamente con mortalidad quirúrgica fueron: edad avanzada 17.2% (p = 0.009), hipoalbuminemia 14.45% (p = 0.027) y cirugía realizada por neoplasias de origen diferente al tracto gastrointestinal 17.6% (p = 0.005). La morbilidad quirúrgica fue más elevada en pacientes con mal estado general 16.2% (p = 0.017), edad avanzada 18% (p = 0.04%) y niveles bajos de albúmina sérica 13.5% (p = 0.03). La mediana de sobrevida para toda la cohorte fue de nueve meses (95% IC 5-13). La supervivencia actuarial a uno, tres y cinco años fue de 38.4, 27.5 y 25.4%, respectivamente. El factor predictivo de mortalidad más importante fue el estado general del paciente.* ***Conclusiones.*** *Al considerar el manejo quirúrgico para pacientes con oclusión intestinal maligna es importante realizar una evaluación cuidadosa de los factores que han demostrado estar asociados a un mal pronóstico.*

Palabras clave. *Cáncer gastrointestinal. Cáncer de ovario. Obstrucción intestinal maligna. Carcinomatosis. Tratamiento quirúrgico.*

INTRODUCTION

Bowel obstruction represents a common surgical problem in cancer patients.[1,2] Malignant bowel obstruction (MBO) is most often seen in patients with cancers of intra-abdominal or gynecological origin. The percentage of patients with advanced colorectal cancer who develop bowel obstruction ranges from 5 to 42% depending on the series. There is scarce objective data to aid in the planning strategy for patients with bowel obstruction and cancer. Conventional policy is to perform surgery in patients with a reasonable performance status. Along with medical options, surgical options should be considered in all patients with bowel obstruction.[3] However, the role of surgical treatment in malignant bowel obstruction is still controversial because the significant mortality and morbidity rates associated with the surgical procedure in this group of patients.[4]

The purpose of this study was to analyze the factors associated with morbidity and mortality in patients who underwent surgery for MBO.

MATERIAL AND METHODS

Hospital and surgical records of patients who underwent surgery for malignant bowel obstruction in a tertiary referral center in Mexico City from January 1987 through December 2005 were retrospectively examined. The study group included patients who presented bowel obstruction due to the primary neoplasm, local recurrence or peritoneal carcinomatosis. Intestinal obstruction was diagnosed by history, physical examination and radiologic studies. Diagnosis was confirmed by the presence of typical air fluid levels in distended bowel loops on plain abdominal radiogram and in some cases confirmed by tomography and/or barium studies. The malignant origin of bowel obstruction was determined at laparotomy and confirmed by pathology reports.

Demographic, pathologic, clinical and surgical data were recorded. Poor performance status was defined as Karnofsky score ≤ 70; anemia as hemoglobin levels < 12 g/dL and low albumin levels as those < 3 g/dL. Advanced patient age was considered as those ≥ 70 years old. Perioperative morbidity and mortality were defined as those occurred within 30-day of hospital admission or until hospital discharge. Factors associated with morbidity and mortality were analyzed with the Pearson chi-square test and Student's *t* test. Overall survival curves were constructed with the Kaplan-Meier method and compared with the log-rank test. Significance was considered at $P < 0.05$.

RESULTS

During the study period, 130 patients underwent surgical treatment for malignant bowel obstruction. All the patients were admitted to the emergency department and given appropriate medical treatment for at least 24 hrs before surgery was performed. Seventy-three patients (56.2%) were female with median age of 62.5 years (range 21-88 years). Primary neoplasm was the cause of bowel obstruction in 51 (39.2%) patients, whereas obstruction was due to recurrence or metastasis of primary cancer in 79 (60.8%) cases. Tumor locations are summarized in table 1.

The duration of presenting symptoms was shorter than three days in 54 patients (41.5%); 52 patients (40%) had anemia at admission, and 47 (36.2%) had hypoalbuminemia. In all the patients an open surgical approach was used. Resection and anastomosis was performed in 45 patients (34.6%). Palliative surgery with a construction of a stoma was performed in 30 cases (23.1%). Including 10 patients (7.6%) in whom a gastrostomy was realized; a cecostomy was never constructed, table 2 summarizes the type of surgeries performed. In-hospital mortality rate was 10.8%. There was a greater risk of mortality for older (23.5%) than for younger patients (6.3%) (p = 0.009). Patients with hypoalbuminemia had a mortality rate of 19.15%, compared with those with normal albumin levels (4.7%) (p = 0.027). Obstructing gastrointestinal cancers had significantly higher resections and curability rates compared with the other type of obstructing cancers. Mortality rates were lower for patients with

Table 1. Site of primary neoplasm producing bowel obstruction.

Site of primary neoplasm	Frequency	%
Colon	50	38.5
Gastric	20	15.4
Carcinomatosis; unknown primary	12	9.2
Ovarian	11	8.5
Uterine	11	8.5
Pancreatic	9	6.9
Rectum	5	3.8
Small bowel	5	3.8
Sarcoma	3	2.3
Bladder	2	1.5
Kidney	1	0.8
Prostate	1	0.8
Total	130	100.0

primary gastrointestinal cancer (5.5%) compared with those with other type of neoplasm (23.1%) (p = 0.005).

Surgical morbidity rate was 16.2%. Main complications are summarized in tables 3 and 4. Factors associated with morbidity were poor performance status (25.5% *vs*. 9.3% for Karnofsky > and > 70, respectively; p = 0.017); hypoalbuminemia (21.3% *vs*. 7.8% for albumin < and > 3 g/dL, respectively (p = 0.03) and advanced patient's age (29.4% *vs*. 11.4%, for patients older or younger than 70 years old, respectively; p = 0.04). Gender and cancer type did not result in any statistically significant impact in surgical morbidity. Patients with any complication had significantly higher periopertaive mortality (71.4%), than those with no morbidity (9.5%) (p = 0.0001).

Median survival for the entire cohort was nine months (95% CI 5-13). Actuarial one, three and five year survival were 38.4, 27.5 and 25.4%, respectively. Older patients had significantly shorter survival (median five months; 95% CI 0-10) than younger patients (median 11 months; 95% CI 8-14) (p = 0.013). Patients with low albumin levels had a significantly shorter survival (median three months; 95% CI 0-3) compared with those with normal serum albumin (median survival 18 months; 95% CI 4-32) (p = 0.014). However, the most significant factor associated with long-term survival was performance status: median survival times were 24 months (95% CI 4-44) for those with Karnofsky score > 70 *vs*. 2 months (95% CI 0-4), for those with performance status ≤ 70 (p = 0.00001). There was a trend for higher survival for patients with gastrointestinal cancers (median 14 months) compared with other primary sites (median five months), but this did not reach statistical significance (p = 0.07).

Table 2. Type of procedure performed per number of patients.

Surgery performed	Number
Exploratory laparotomy	47
Resection and anastomosis	45
Construction of a stoma	30
Adhesiolysis	8
Total	130

Table 3. Surgical morbidity of patients treated for MBO.

Morbidity	Number
Fistula	5
Persistent bowel obstruction	4
Abdominal Sepsis	4
Pneumonia	3
Arrhythmia	2
Delirium	1
Gastrostomy disfunction	1
Urinary tract infection	1
Surgical site infection	1
Mesenteric thrombosis	1
Athelectasia	1
Eventration	1

Table 4. Surgical complications according to the classification of Clavien.[23]

Grade	Number
Grade I	3
Grade II	10
Grade III a	5
Grade III b	6
Grade IV a	None
Grade IV b	1
Grade V	14

DISCUSSION

Bowel obstruction represents a common surgical emergency[2] it is a frequent difficult problem for surgeons caring for cancer patients[5] and continues to be a serious cause of morbidity and mortality in this population. The timing and extent of surgical treatment is still a problem for surgeons. Current controversy concerns the benefits and possible harmful effects of surgery. The ultimate aim of surgery is to remove the neoplasm and thus relieve the obstruction. Unfortunately, definitive surgical treatment is only possible in a minority of patients. Many factors affect operability and outcomes of surgery in this group of patients.[1] Surgical options can be helpful in the setting of MBO as long as reasonable goals and realistic outcomes are clear.[5]

Malignant bowel obstruction can be a consequence of primary neoplasms mainly from small or large bowel or due to tumor recurrence or metastatic disease, with dismal prognosis for this last group of patients. In the literature, the most common cancers associated with MBO are ovarian (5.5-51%) and colorectal (10-28 %).[6-8] In the present series there was a slightly higher incidence of cancer of colorectal origin (37.7%). The median survival of patients with MBO is short, from four to nine months, and most of them die as a consequence of disease progression.[9]

In general, surgery should be considered in those patients who do not respond to conservative management after three to five days, but decision is complicated because of the high rate of benign causes of bowel obstruction in patients with malignant neoplasms.[10,11] In ovarian and other gynecologic cancers adhesions represent only 6.1% of the causes of bowel obstruction,[6] and it has been reported to be much higher in patients with colorectal cancer, up to 48%.[12] In our series, there were no cases of adhesions as the cause of obstruction in patients with cancers different from those of colorectal origin. It has been suggested that one-stage primary resection and anastomosis of the large bowel is a feasible option in cases of emergency surgery for cancers of colorectal origin whenever general status of the patient is not a contraindication.[2] In the present series, resection was performed in 45 (34.6%) patients. This higher resectability rates comparing with other reported in the literature, could be explained for the relatively larger number of primary colorectal neoplasms producing MBO presented in our series.[7,8] Palliative surgery (colostomy, iliostomy) was performed in 30 patients (23.1%). For patients with unresectable rectal or sigmoid cancer, colostomy is the treatment of choice, however, endoscopic treatment for malignant rectosigmoid obstruction by endoluminal self-expanding metallic stents is currently a well-established procedure,[13,14] but high costs make it a difficult option in developing countries.

Not all patients are candidates for surgical procedure, actually depending on the series, from 6.2% to 50% of those with MBO are not surgical candidates.[15] The main reasons were tumor extension, multiple partial obstructions or non possible surgical correction. Some authors had proposed that patients who benefit less from a surgical intervention are:

1. Patients with gastrointestinal motility problems due to diffuse carcinomatosis.
2. Patients older than 70 years and caquexia.
3. Ascitis managed with multiple paracenthesis in the presence of low albumin levels.
4. Previous abdominal or pelvic radiotherapy.
5. Intraabdominal palpable masses with hepatic involvement.
6. Patients with several levels of obstruction.[11]

Even when those criteria could be taken as a guide, every single case must be individually evaluated by a surgical oncologist. Because we reviewed surgical records, we do not have the number of patients admitted with MBO who were not adequate surgical candidates. However, we tried to identify those factors in surgical patients associated with morbidity and mortality, so they can help to guide the best option between palliative medical management *vs.* surgical intervention. It has been reported a 30-day surgical mortality rate between 9%[9] and 49%,[16] and the complications rate has been reported up to 80%.[17] In our series the rates were 11 and 16% respectively, which compares favorably with those reported in the literature. However, it must be taken into account we have a larger number of primary colorectal cancer patients who have a more favorable prognosis.

In the present study, hypoalbuminemia was one of the most important markers of surgical outcome. Albumin levels have been associated with surgical outcome in the short term,[18] as well as a prognostic factor for survival in cancer patients.[19,20] Morbidity and in-hospital mortality rates for this group of patients were 21.3% and 19.15% respectively. We found that advanced patient age was associated with a poor outcome in the short and the long-term. It has been described that emergency bowel operations have a poor outcome in the elderly. The nature and extent of disease, presence of coexisting cardiopulmonary comorbidities, late admission and presence of peritonitis significantly affect management and outcome of elderly patients with bowel emergencies.[21]

It is rather difficult to find a reasonable performance status for emergency surgical treatment for patients with advanced obstructing cancer.[1] Several authors have reported that patients' general condition could affect the surgical outcomes and operative strategy.[1,14] In our review, 55 (42.3%) of the patients had a poor performance status (Karnofsky ≤ 70). Morbidity and in-hospital mortality rate for this group of patients were 25.5% and 16.4% respectively. Moreover, performance status was the most significant predictor of long term outcome too.

The origin of the primary tumor has been reported to have a considerable effect on surgical strategy and outcomes. Colorectal, ovarian and gastric carcinomas are the most common intra-abdominal neoplasms that lead to obstruction.[1] Gallick, *et al*. reported that intestinal obstruction caused by ovarian cancer had a better than average outcome.[1] Woolfson, *et al*. reported that obstruction caused by colorectal carcinomatosis have a slightly better prognosis than those caused by carcinomatosis from other types of tumors.[9] Parker and Baines reported the

lowest operative mortality rate of 13% for colorectal carcinoma and 30% for gynecologic and pancreaticobiliary primary tumors which lead to obstruction.[1] In our population, colorectal, retroperitoneal and ovarian cancers comprised the majority of the obstructing primary neoplasms. Obstructions caused by primary colorectal cancers have better outcomes than those caused by other types of tumors;[22] however this trend did not reach statistical significance, probably because of the small number of patients.

We acknowledge the limitations of our study. As an observational retrospective series the amount of information we can collect from the files is limited. We lack information regarding the type of obstruction (partial or complete), when and if the patients were able to take adequate food by mouth, and about those patients who were lost for follow up. As a national referral center, our patients are more likely to have an advanced stage disease and to present an increased number of complications than those treated in smaller centers, so the conclusions reach on this study could not be generalized for every center.

In summary, surgical management of patients with MBO requires careful assessment. The most important factors to consider are the site of origin of the neoplasm and the general condition of the patient. These factors must be taken into account to determine if the patient is an adequate surgical candidate. According to our study, surgical candidates are patients younger than 70 years old, with no hypoalbuminemia and good performance status, however, every case should be considered individually.

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Recibido el 1 de agosto de 2007.
Aceptado el 25 de abril de 2008.