

MANAGEMENT OF BOWEL OBSTRUCTIONS – 3 YEARS’ EXPERIENCE OF A GENERAL SURGERY DEPARTMENT

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Abstract: The bowel obstruction represents a challenge for the surgeon, both from the point of view of finding the obstructive mechanism and from the point of view of establishing the therapeutic plan. We conducted a 3-year study of patients diagnosed and operated for bowel obstruction in the General Surgery Department of the “Bagdasar-Arseni” Clinical Emergency Hospital from Bucharest. There were analyzed a number of general parameters (age, gender, days of hospitalization), clinical manifestations at presentation, preoperative and postoperative biological parameters, medical and surgical history, bowel obstruction mechanism, type of performed surgical procedure, as well as postoperative outcome and occurred complications.

INTRODUCTION

Bowel obstruction is defined as a syndrome characterized by persistent and pathological stoppage of the intestinal transit, which may have multiple etiologies and whose consequences affect both the digestive tract and the systemic level through a multiorganic involvement.⁽¹⁾

This pathology is a disorder commonly encountered in general surgery departments, often representing a challenge, both from the point of view of finding the obstructive mechanism and from the point of view of establishing the therapeutic plan.

MATERIALS AND METHODS

The performed study was a prospective, observational, descriptive one. The group was represented by the patients admitted to the General Surgery Department of the “Bagdasar-Arseni” Clinical Emergency Hospital from Bucharest over a period of time of 3 years, between 2014-2016, in whom the diagnosis of bowel obstruction was established and who have been subjected to surgery.

The criteria for inclusion into the study were represented by:

- patients admitted to the General Surgery Department of the “Bagdasar-Arseni” Clinical Emergency Hospital from Bucharest between 2014-2016, either by presenting in the emergency room, or by transferring from one of the hospital’s departments;
- patients who were diagnosed with bowel obstruction, either mechanically or dynamically, and have undergone surgery for this pathology;
- obstruction to the digestive tract was made distally to the angle of Treitz;
- patients who have accepted inclusion in the study, or, in the case of a very severe general condition at their presentation, with an alteration in the consciousness, to which their family has agreed to the inclusion in the study.

Exclusion criteria from the study were:

- patients diagnosed with digestive obstruction in the esophagus, stomach or duodenum, proximal to the angle of Treitz, patients diagnosed with the so-called “high digestive stenosis”;
- patients who, after clinical examination and radiological investigations, were suspected preoperatively of bowel obstruction, diagnosis who was later denied intraoperatively, the intraabdominal lesion explaining the intestinal paresis;
- patients presented with obstruction symptoms in whom the conservative treatment was successful, with restoration of the intestinal transit, even if they eventually required a surgical procedure in another admission, away from the obstructive moment;
- patients diagnosed with bowel obstruction, but who refused a surgical procedure or requested discharge on their own responsibility;
- the refusal of the patients or their families to be included in the study (we mention that we did not have such cases).

From each patient, a series of parameters were gathered, including general characteristics (gender, age, number of days of hospitalization), clinical manifestations at presentation in the emergency room, biological results, associated medical pathology, previous surgeries, drugs taken at home or other related procedures, mechanism of the bowel obstruction, performed surgical procedure, postoperative outcome, as well as occurred complications.

The obtained data was centralized into a working model in the Microsoft Office Excel program, which was later used for the statistical analysis of the study group, using the IBM SPSS Statistics program.

RESULTS

During the 3 years of the study, we hospitalized 209 patients who were diagnosed with bowel obstructions and

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CLINICAL ASPECTS

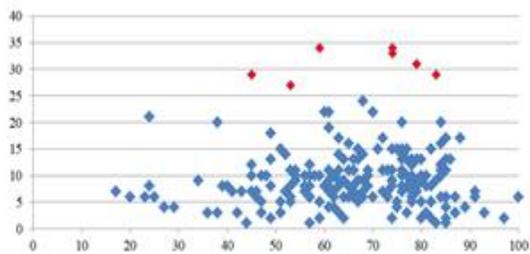
underwent a surgical procedure. Of the total admissions during this period in the department, 9504, the number in our study group represented 2.19%. Also, the total number of surgical interventions during this period was 6998, the patients operated for bowel obstruction accounting for 2.98%.

In terms of gender, of the 209 patients in our group, 112 patients were females, representing 53.58%, while 97 patients were males, representing a proportion of 46.41% of the total number of patients.

The mean age of the patients group was 66.07 years, with a median of 67 years, minimum age being 17 years, while the maximum age was 100 years. The modal value of this parameter (the most common age) was 78. The mean age among female patients was 64.72 years, with a minimum age of 20 years and a maximum age of 100 years in this subgroup. Among male patients, the mean age was 75.62 years, with a minimum age of 17 years and a maximum age of 97 years.

The average number of days of hospitalization among the entire group of patients was 9.68 days. The minimum number of days of hospitalization was 1 day, in this case a patient who died in the first day postoperatively, while the maximum number of days of hospitalization was 34 days (figure no. 1). The average number of days of hospitalization was 9.72 days in the female subgroup and 9.65 days in the male subgroup. The value of the curvature (kurtosis) is greater than 3, indicating a significant number of patients with a number of hospitalization days close to 10. The asymmetry (skewness) value is positive, indicating a distribution inclined to the left, having several extreme values to the right. Pearson parametric correlation coefficient regarding the age of the patients and the number of hospitalization days has a value of 0.045, therefore there was no statistically significant correlation between these two parameters.

Figure no. 1. Graphic representation of the patients' age (horizontal axis) and number of days of hospitalization (vertical axis)



The most common symptoms on the time of admission were pain (89.47%) and nausea (66.50%). Statistically, there was not any connection between the symptoms of a patient at the time of admission and his subsequent development.

Regarding the imagistic investigations, the patients received pulmonary radiography as well as simple abdominal radiography performed in orthostatism or, when the patient could not maintain this position, in lateral decubitus. In the vast majority of cases, the abdominal radiography has revealed air-fluid levels. In 21 cases of the studied patient group (10.04%), the uncertainty of a diagnosis determined us to perform an abdominal and pelvic CT-scan (Computer Tomography), without being a routine investigation for this pathology. Sometimes, when the situation allowed, we also performed examinations such as barium enema or colonoscopy, the latter to resolve lesions like sigmoid volvulus or to visualize a possible tumor.

As for the biological parameters, on the blood count, preoperative leukocytosis was found in 53.58% of the patients and anemia was observed in 23.44% of the patients. Thrombocytosis was found in 11.48% of the cases, while thrombocytopenia was revealed in 5.26% of them.

In case of the renal function, a total of 92 patients showed serum values of urea and creatinine within normal range. In 108 patients (51.67%), elevated serum urea levels were seen, while 76 patients (36.36%) had elevated serum creatinine levels. Increased liver transaminases were observed in 23 patients (11%), increased serum total bilirubin was observed in 25 patients (11.96%), and in 121 patients (57.89%) preoperative hyperglycemia was observed.

Serum potassium, sodium and chlorine serum levels have also been dosed. A total of 9 patients (4.30%) experienced hyperkalaemia, while 29 patients (13.87%) had hypokalaemia. In contrast, only 4 patients (1.91%) experienced hypernatraemia and 43 patients (20.57%) had hyponatraemia. As for serum chlorine, hyperchloraemia was observed in 14 patients (6.69%), and in 48 patients (22.96%), hypochloraemia was noticed.

Spearman and Kendall correlation coefficients were calculated to measure the intensity of the relationship between patient's age and various biological parameters (potassium, sodium, chlorine serum levels or glycemia). The value of the Kendall coefficient is small (-0.002 and 0.123) and the value of the Spearman coefficient is similar (between -0.003 and -0.152), indicating generally a direct correlation, but of low intensity, between the patients' age and the rest of the considered parameters. The Levene test shows a significance level of 0.004 (<0.05), statistically significant, on the correlation between the presence of anemia at admission and the number of days of hospitalization.

The most common associated medical pathologies of the patients in the study were heart diseases (54.06%) and genital disorders (16.26%), with obesity among 24.4% of the patients.

Regarding the surgical history, 16.74% of the patients had been operated for a parietal abdominal defect, while 15.31% of them had been operated for gynecological disease. The history of neoplastic pathology was found in only 12.91% of the patients with bowel obstruction, instead representing the largest percentage of the patients in our study group that died later during the present admission (21.4%).

From the medications administered at home, the most common was the one prescribed for cardiac pathology (antihypertensives – 33.01%, antiaggregants – 19.61%, anticoagulants – 8.61%).

A proportion of 7.17% of the patients had a history for chemotherapy and 2.87% had previous radiation therapy for neoplastic disease.

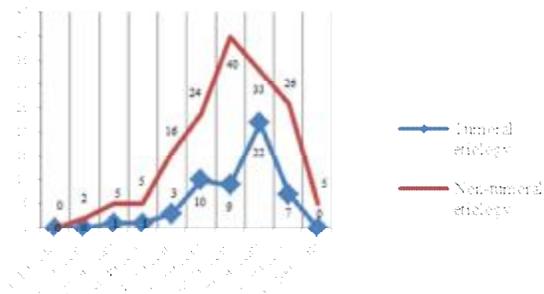
In terms of the bowel obstruction mechanism, 53 tumoral causes and 156 non-tumoral causes were identified.

The sex distribution of tumoral/non-tumoral cases revealed the following data: in case of tumor obstruction etiology, we found 31 male patients (58.49% of all tumor cases) and 22 female patients (41.50% of all tumor cases); in contrast, in non-tumor cases, we found 67 male patients (42.94% of this subgroup), respectively 89 female patients (57.05% of all non-tumoral cases).

Involving distribution by age group, most tumoral cases were found in the 8th decade of life, while most cases of non-tumoral etiology of bowel obstruction were found in the 7th decade of life (figure no. 2). The average number of days of hospitalization was 12.01 for patients with tumors and 8.73 days for patients with other causes of bowel obstruction.

CLINICAL ASPECTS

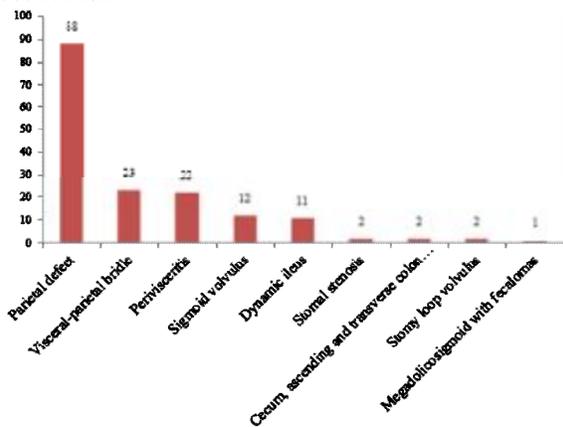
Figure no. 2. Distribution of tumoral/non-tumoral etiology of the bowel obstruction by age groups



Of the 53 tumoral cases, 47 had a tumor belonging to the digestive tract. The most common stenotic tumors of the digestive tract involved the sigmoid colon (20 cases), followed by the rectum (10 cases) and the ileocecal segment with the ascending colon (6 cases).

Among the non-tumoral causes of obstruction, the most frequent were complicated abdominal parietal defects (88 cases), followed by adhesions – bridles (23 cases) and periviscerites (22 cases) (figure no. 3). The postoperative incisional hernia was the most common parietal defect (32 cases), followed by inguinal hernia (23 cases) and umbilical hernia (15 cases).

Figure no. 3. Non-tumoral etiology of the bowel obstruction



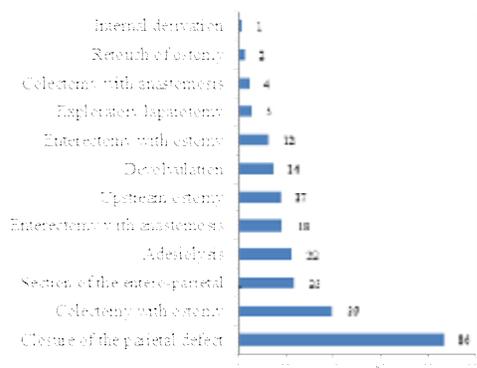
In most cases, 61 in number, the hernia sac contained viable small bowel loops, followed by 14 cases with necrotic small bowel loops, respectively 7 cases where the sac contained viable transverse colon.

Surgical procedures have varied, from the closure of the parietal defect, to segmental enterectomy or colectomy, with or without anastomosis. Most cases (86) involved the closure of the parietal defect responsible for the occurrence of the bowel obstruction, followed by the cases in which the resection of the large bowel segment involved was required, performing an external derivation in the upstream segment afterwards (figure no. 4).

It should be mentioned that besides these procedures aimed at resolving the obstructive pathology, secondary procedures such as liver metastases, ureter and urinary bladder resections, atypically gastric resection or total hysterectomy with bilateral anexectomy were performed, in case of tumor invasion in these organs, tumor biopsies for diagnostic

purposes, omphalectomies or partial omentectomies.

Figure no. 4. Distribution of the surgical procedures performed in the study group

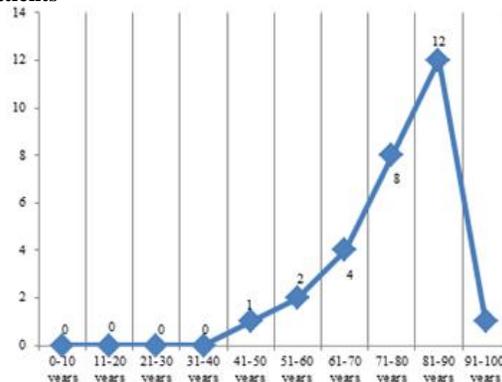


Laboratory parameters collected in the first postoperative days revealed leukocytosis in 62 patients (29.66%) and leukopenia in 6 patients (2.87%). In 77 patients (36.84%) we experienced anemia, at 59 patients (28.22%) we found altered renal parameters, and 74 patients had changes in the ionogram.

The postoperative complications encountered were local abdominal (dysfunction of the ostomy, intestinal fistulas, wound infection and necrosis, evisceration), but numerous systemic complications were also found, among which the most numerous cardiovascular or respiratory decompensations (30 cases each). A number of 14 patients (6.69%) required early reintervention, during the same hospitalization period.

The mortality rate was 13.4% (28 patients), with most deaths occurring in the 9th decade of life (12 cases) (figure no. 5).

Figure no. 5. Distribution by age groups of the deceased patients



The mean age among deceased patients was 76.64 years, the minimum age was 44 years and the maximum was 93 years. Of the 28 deceased patients, a number of 17 patients (60.71%) were female, while 11 patients (39.28%) were male.

Out of the 28 deceased patients, 7 patients (25% of deaths) were diagnosed with bowel obstruction due to a tumor process. Of the 21 deceased patients in whom the obstruction etiology had no tumor substrate, the most numerous cases were dynamic ileus (5 patients), complicated postoperative incisional hernias (4 patients), femoral hernias and sigmoid colon volvulus (3 patients each).

By performing the ANOVA test (the value of the

calculated F index = 8.424, higher than tabular F = 3.039), we notice a statistically significant correlation between the age of the patients and their subsequent evolution.

DISCUSSIONS

Bowel obstruction remains one of the most common intraabdominal diseases encountered by the general surgeons.(2) Epidemiological data are difficult to analyze, with significant variations in the frequency and etiology of bowel obstructions, involving many factors such as race, age group, eating habits or geographical location.(3)

Bowel obstruction may account for between 20-30% of cases of acute abdomen.(4) Certain studies have reported a proportion of 1% of all hospitalized patients, 3% of surgical emergency admissions as well as 4% of all laparotomies, of patients diagnosed with bowel obstruction or requiring a surgical procedure involving adzeolysis.(5) The data in the literature correspond to those obtained in our study, where the proportion of the patients diagnosed and operated for bowel obstruction was 2.19% compared to the number of admissions in General Surgery Department of the "Bagdasar-Arseni" Hospital within 3 years, respectively of 2.98% of all surgical procedures in the department over the same period of time.

Recent studies performed on groups of patients diagnosed and operated for mechanical bowel obstruction revealed an average age of 62.9 years, increasing with over 20 years over the age of patients diagnosed with the same disease 100 years ago (6), which can be explained by the increase in life expectancy, as well as the increase in the incidence of digestive tract neoplasms in the last decades. Leaving aside the 11 patients diagnosed with dynamic ileus that did not significantly influence the data, the average age of the patients in our study group was 66.07 years, with a median of 67 years, meaning that 50% of the patients had a higher age than this value.

According to the literature data, bowel obstruction has a slightly higher frequency among female patients in terms of obstetric-gynecological procedures that may subsequently predispose to adhesion syndromes.(2) Similarly, in our group, the proportion of women was 53.58%.

The average number of days of hospitalization among the patients in our group was 9.68 days, most of the patients around this value having a favorable evolution, the number of days of hospitalization being explained by the postoperative recovery, and the patients being discharged when a satisfactory recovery of intestinal transit for gas and faeces was found. The distribution of patients' ages was tilted to the left, and extreme values, either very low (with a minimum of one day) or very high (with a maximum of 34 days) were explained by unfavourable postoperative evolution, with an early death, respectively a trendy development that associated local and systemic complications, most of the time requiring a prolonged supervision in the Intensive Care Unit.

Clinical manifestations among patients diagnosed with bowel obstruction are represented by pain (of major intensity, that may be intermittent or continuous, in the case of high obstructions being improved by vomiting), nausea and vomiting (occurring in particular in high obstruction, fecaloid over time, or may be reflex), rebound tenderness, abdominal distension as well as absence of intestinal transit (the last two - especially in low obstructions).(7,8) In our study, the most frequent clinical manifestation was pain, in 89.47% of the patients. Thus, pain is met in most cases of bowel obstruction, regardless of the obstructive mechanism and the topography of the obstruction.

Simple abdominal radiography in orthostatic position

or in lateral decubitus is the most simple imagistic investigation in case of bowel obstructions, highlighting the presence of air-fluid levels, all the patients from our study group benefitting from it. Although some studies suggest a specificity of air-fluid levels for the diagnosis of bowel obstruction on the simple abdominal radiography of 67-80% (9,10), the sensitivity of this procedure have values between 46-85%, because of the absence of air-fluid levels in case of distended, filled with liquid small bowel loops.(11) The advantages of performing an abdominal and pelvic CT scan in case of bowel obstructions include the establishment of complete/incomplete property of the obstacle when oral contrast substance is used, determining the malignancy of the obstructive lesion, finding adjacent lesions (metastases, ascitis), as well as supplying information about the topography of the obstruction, which may facilitate the surgical procedure.(12-15) In our study group, the preoperative CT scan was performed in 10.04% of the patients, not being a routine investigation, with high costs and sometimes difficult to access. We resorted to this procedure when there were doubts of diagnosis or we wanted to find additional information regarding the obstructive pathology, but only when the lesion did not require an emergency surgical procedure.

We paid a very special attention to the preoperative management of the patients diagnosed with bowel obstruction. Besides the compulsory urinary catheter for monitoring the diuresis and the nasogastric tube for decompression of the digestive tract and for establishing the diagnosis, multiple peripheric venous lines were established, as well as a central venous one, whenever it was possible. Also, the patient was hydrated by infusion with crystalloid fluids.

Although a rapid, non-invasive test that would indicate an imminent intestinal ischemia in case of a bowel obstruction has not yet been imagined (16), growth of a number of biological parameters such metabolic acidosis, inorganic phosphate, hexozaminidase, serum amylase, intestinal fatty acids binding protein (I-FABP) or serum D-lactate, was associated with an already established intestinal ischemia.(17,18) Despite we did not have all these parameters, we benefited from usual laboratory tests, that were useful for the pre- and postoperative rebalance of the patients, either regarding the electrolytes (imbalances appeared after multiple vomiting episodes or disorders of the intestinal processes of electrolytes absorbtion/secretion), acid-base balance, coagulation disorders (possible in case of a previous anticoagulant treatment), renal parameters or in the case of an anemic syndrome following bleeding tumors, major intraoperative blood loss or for preventing the occurrence of postoperative anastomotic fistulas.

The most frequent associated medical pathology was represented by heart disease (54.06% of the cases), the management of these patients being therefore a multidisciplinary one, in close collaboration with the intensive care physician and the cardiologist, for assessment and prevention of postoperative cardiovascular events.

We also took in consideration the surgical history of the patients, being known that approximately 5% of the patients who undergo a laparotomy will develop, in time, a bowel obstruction by adhesion syndrome and from the latter subgroup a proportion of 10-30% will have a risk of occurrence of similar episodes afterwards.(19,20) The most common surgical history in the patients from our group were represented by procedures performed for abdominal wall defects (16.74% of the cases), followed by procedures in the gynaecologic area.

CLINICAL ASPECTS

The obstruction mechanisms are very varied, multiple attempts being made to classify bowel obstructions from the etiopathogenic point of view. In developed countries, the main cause for the obstructive process is represented by postoperative adhesions (approximately 60% of the cases), followed by neoplastic diseases and complicated abdominal wall defects.⁽¹⁾ In our study group, identifying the obstructive mechanism was in many cases easy, in the emergency department, by observing at the clinical exam a complicated abdominal wall defect, with local inflammatory elements, the patient being able to correlate the moment of the onset of symptoms with the occurrence of irreducible hernia. Another case in which the etiology of the bowel obstruction can be established involves identifying a stenotic rectal tumor at the rectal touch. Despite all of this, in many cases, the mechanism is identified only intraoperatively. Sometimes, a mixed mechanism is found, by superposition of multiple disorders with obstructive potential. The explanation that we found for the large number of complicated abdominal wall defects compared to the adhesion syndromes, contrary to the data in the literature, suggest a low addressability of the patients from our country to the doctor, ignoring an abdominal wall defect until the moment it complicates.

The performed surgical procedure had as primary objective the solution of the obstructive problem, but also there were secondary objectives, such as respecting the oncological principles and avoiding the relapses. Numerous factors were taken into account, like the mechanism that caused the bowel obstruction, the biological status of the patient, the age or the associated diseases. Many times, to shorten the duration of a general anesthesia and to avoid major imbalances by performing major surgical procedures, we opted for a minimal gesture that would restore the patient's intestinal transit. The intention was to preserve the affected digestive tract segment, when its viability was present (for example, in case of abdominal wall defects). When the resection of a digestive tract segment was necessary (either by necrosis or by presence of a tumor), we opted for an anastomosis (when it was possible) or for an upstream external derivation. There were also situations when the minimal surgical gesture consisted in an external derivation for decompression (keeping the obstructive lesion in its place) with the possibility of a subsequent surgical procedure, or in an internal derivation, bypassing the obstructive lesion. Also, we avoided the protetic materials for reinforcement of the abdominal wall, due to the risk of septic impregnation.

Postoperatively, the patients remained in the Intensive Care Unit or they went to the General Surgery Department, were they followed volume replacement and electrolyte rebalance treatment, antibiotics, anticoagulants, painkillers or proton pump inhibitors. In case of digestive tract sutures, complete fasting was recommended, along parenteral nutrition solutions.

Systemic postoperative complications were managed in a multidisciplinary team (intensive care physician, cardiologist, neurologist, infectious diseases physician). Regarding the local postoperative complications, conservatory treatment was tempted, but when the situation imposed it, a reintervention was performed (14 patients – 6.69%).

It was observed from the age group distribution a larger number of deaths in older patients – most deaths (12) were found in the 9th decade of life, followed by 8 deaths among the patients from 8th decade of life. These results can be explained by a more fragile background in case of older patients, with numerous comorbidities, a faster worsening of the obstructive syndrome and the occurrence of organ failures,

all of there overlaying a possible late hospital presentation due to medical, social and economical factors (old patients with a certain degree of isolation, hardly to move, with major cognitively imbalances).

CONCLUSIONS

1. Gender distribution of patients with bowel obstruction shows a slightly higher percentage among women, due to gynaecological history.
2. Management of bowel obstruction is performed in a multidisciplinary team, given the presence of associated diseases, the organ failures determined by the obstructive process and the complications that may occur postoperatively.
3. Although the diagnosis of bowel obstruction is easy to establish, often only intraoperatively, we can specify the obstruction mechanism.
4. Cases with a tumoral etiology of bowel obstruction were distributed in older patients than the ones with a non-tumoral cause.
5. Patients that presented tumors as the mechanism for the bowel obstruction had a larger number of days of hospitalization, their management thus implying higher costs.
6. The surgical procedure performed should take into account the patient's biological status, age, associated diseases, the main purpose being to restore the intestinal transit.
7. Deaths among patients diagnosed and operated for intestinal obstruction occur especially in older patients, due to the fragile background, associated diseases and late hospital presentation.
8. The bowel obstruction still represents a challenge for the general surgeon, in terms of emergency of this disorder, obstruction mechanism, type of surgical procedure required and postoperative complications that may occur, leading to a high mortality rate

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