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RESEARCH ARTICLE

Surgical Approach to Small Intestine Obstructions; Etiology and Its Management

İnce Barsak Tıkanmalarında Cerrahi Yaklaşım; Etiyoloji ve Yönetimi

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ABSTRACT

Aim: In this study, it was aimed to investigate the ethiology, surgical treatment approaches and complications in the patients who underwent the surgical treatment due to small intestine obstruction.

Method: The data of patients who had surgical intervention in the general surgery department of our hospital due to small intestine obstruction between 2009 and 2015 was evaluated retrospectively. Demographics such as the age, additional morbidity, history of abdomen operation of the patients were recorded. During the operation, etiology was investigated and treatments were recorded. The patients' postoperative follow-up data and complications were recorded.

Results: In this study 121 patients were included. Hypertension was determined to be the most common additional comorbidity in the patients (28.9%). The most common complaint was abdomen ache and it was seen in 94.2% of the patients. The reasons of obstructions were adhesions in 57% of the patients, hernia in 27.3% of the patients, gallstones in 4.1% of the patients, cancers in 4.1% of the patients and phytobezoars in 3.3% of the patients. The patient group were applied these operations; separation of adhesions in 49.6% of patients, repair of the hernia in 19.8% of patients, repair of the hernia+resection in 7.4% of patients and separation of adhesions+resection in 5.8% of patients. Total complications rate was 26.5% and the most common complication was iatrogenic intestine injury in 9.1% of patients.

Conclusion: The most common etiology of the patients who underwent small intestine obstruction operation were found as adhesions and hernias. These factors should be primarily considered as etiology during preoperative assessment. It was found that one out of the four patients had at least one complication after operation.

Keywords: Obstruction of small intestine, etiology, complication

ÖZ

Amaç: Bu çalışmada kliniğimizde mekanik ince barsak tıkanması nedeniyle cerrahi tedavi uygulanan hastaların tıkanmaya neden olan etiyolojiyi, cerrahi tedavi yaklaşımlarını ve komplikasyonları incelemek amaçlanmıştır.

Yöntem: 2009 ve 2015 tarihleri arasında hastanemiz genel cerrahi kliniğinde ince barsak tıkanması nedeniyle cerrahi girişim yapılan hasta verileri geriye dönük olarak incelendi. Hastaların yaşı, ek morbiditeleri, geçirilmiş karın ameliyatı öyküsü gibi demografik veriler kaydedildi. Ameliyat süresince etiyolojisi saptanarak yapılan tedaviler kaydedilmiştir. Ameliyat sonrası hasta izlem verileri ve komplikasyonlar kaydedildi.

Bulgular: Bu çalışmaya toplam 121 hasta dahil edildi. Hastalarda en sık bulunan ek morbiditenin hipertansiyon (%28,9) olduğu saptandı. En sık görülen yakınmanın %94,2 olguda karın ağrısı olduğu bulundu. Tıkanmanın nedeni %57 olguda yapışıklıklar, %27,3 olguda fıtıklar, %4,1 olguda safra kesesi taşları, %4,1 olguda kanserler ve %3,3 olguda fitobezoar olduğu saptanmıştır. Bu hasta grubuna uygulanan ameliyatlar; %49,6 olguda yapışıklıkların ayrılması, %19,8 olguda fıtık tamiri, %7,4 olguda fıtık tamiri+rezeksiyon ve %5,8 olguda yapışıklık ayrılması+rezeksiyon yapılmıştır. Toplam komplikasyon oranı %26,5 ve en sık görülen komplikasyon %9,1 olguda iyatrojenik barsak yaralanması idi.

Sonuç: İnce barsak tıkanma ameliyatı yapılanlarda en sık etiyoloji yapışıklıklar ve fıtıklar olduğu bulunmuştur. Bu etkenler ince barsak tıkanmalarında preoperatif değerlendirmede öncelikle etiyoloji olarak düşünülmelidir. Dört hastadan birinde ameliyat sonrası en az bir komplikasyon geliştiği saptanmıştır.

Anahtar Kelimeler: İnce barsak tıkanmaları, etiyoloji, komplikasyon

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Introduction

Small intestinal obstructions (SIO) are encountered after abdominal surgery when upper gastrointestinal secretions and air cannot pass distally through the gastrointestinal tract.[1] It is reported to constitute 7-14% of all abdominal pain in adults and 17% of acute abdomen clinical status.[2] As a clinical status SIO is an emergent surgical entity which requiries emergent effective treatment with fast and accurate diagnosis. Hypovolemia due to fluid and electrolyte loss and fluid loss into the third intertistial is generally accompanied. Besides sepsis and acute abdominal findings, the main aim for the evaluation of the patients are are to analyze the vascular supply of the small bowel (strangulation, ischemia etc.) and maintain adequate resuscitation. Different treatment modality planning might be necessary according to different etiologies of obstruction. The type of treatment varies depending upon the reason of obstruction as abdominal adhesions, Crohn's disease, bowel obstruction due to cholelithiasis.[3] Therefore, the identification of the etiology giving rise to bowel obstruction is important. Despite physical examination, laboratory values and radiological evaluation for preoperative etiological diagnosis of obstruction, there are still difficulties in definitive diagnosis.[4] Recently, there is an active role of abdominal computed tomography (CT).[5] It has been documented that, CT reported both the etiology of obstruction and the nutrition of bowel with more than 90% of spesificity and sensitivity.[6]

The criteria for surgical treatment are decided according to general status of the patient, physical examination, laboratory values, the experience of the surgical team, the nutritional status of the bowel and the underlying etiology.[2,7] The surgical operation must intended for the etiology of bowel obstruction and supply for the bowel.[3,8] The postoperative complication rate and mortality are high due to the emergency of surgical operations, presence of comorbidities, hypovolemia and sepsis.[2,3,9] A total evaluation of clinical status of the patient undergoing an operation for SIO and being informed for the etiology for obstruction are important clues for the type of operation and prevention of complications. This study aimed to analyze the etiologies leading to obstruction, the type of surgical treatment and complications.

Material and Methods

The ethical committe approval was obtained from the local hospital committee. Between January 2009 and July 2015, the medical reports of patients who were operated for SIO at Tepecik Education and Research Hospital General Surgery Clinic were retrospectively analyzed. The medical reports were provided from electronical report system of medula medical report system (Probel Co.). Informed consent for the type of treatment and for the study were obtained from all the patients. The patients who were operated for mechanical obstruction of small bowel and whose medical reports can be attained were included in the study. Patients who had mesenteric artery thrombosis, who presented with impeded functional bowel passage as paralytic ileus, who were under 18 years old and with incomplete medical reports were excluded from the study.

The etiolgy for small bowel obstruction were identified according to physical examination, radiological evaluation and operative findings. The decision for emergent surgical operation was taken after the deteriotion of vital signs, peritonitis findings on physical examination, laboratory values and experience of the surgeon. Patients with impaired postoperative recovery and systemic insatbility were followed in intensive care unit (ICU) for surgical operations. The prophylactic antibotics were Cephazolin 1 gr twice per day in patients who had no ischemia and perforation (clinically and on laboratory values) and Metronidazol 500 mg three times per day with Ceftriaxon 1 gr twice per day for gram negative and anaerob bacteria in patients with perforation and peritionitis signs.

The demographic data of patients as age, gender, comorbidity, previous abdominal operation were recorded. Leucocytosis were defined as leucocyte count more than 10.000/mL and uremia as higher blood urea levels from 40 mg/dL. The preoperative complaints of patients, physical findings, laboratory values and radiological findings were analyzed. The accurate diagnosis of etiolgical reason, ischemia, perforation, necrosis records were obtained from the operation notes. The type of operation, duration of the surgical intervention, intraoperative findings were also recorded. Postoperative follow up data, hospitalization period, postoperative and 30 day complications were collected. Mortalities in the postoperative period and 30 day mortalities were also recorded.

SIOs after abdominal adhesions were hospitalized, preoperatively decompressed with nasogastric tube and had IV fluid resuscitation. These patients were clinically (physically and radiologically) observed. Patients with clinical deterioration (development of strangulation and peritonitis signs), ongoing vomiting (or massive drainage from nasogastric tube) or without recovery sings were operated. Enema but not contrast material was used clinically in this preoperative period.

Statistical Analysis

The data were recorded and descriptive analysis were made with SPSS 15.0 (SPSS Inc, Chicago, Illinois, USA). The datas are defined in percent ratios.

Results

One hundred twenty one patients were enrolled in the study. Median age was 64 (range 34-82). Females were 55.7%. The most common comorbidity was hypertension. Chronic renal failure was recorded in 7 patients and one patient had presented with acute renal failure. The demosgraphic datas are presented in Table 1. Abdominal pain was the most common complaint (94.2%). Abdominal CT scans were taken in 79.3% of patients and 28 (23.1%) of these scans were taken with contrast material. Preoperative physical examination, laboratory values and radiological scanning methods were detailed in Table 2. Peroperatively laparoscopic surgery was applied to 4 patients (3.3%). The median operative time was 55 minutes (30-150 minute range).

The most common indication for operation due to SIO was small intestinal adhesions performed to 67 patients (57%). Previous abdominal surgery was the reason of adhesions in 57 patients (85%). The peroperative surgical interventions were as lysis of adhesions, lysis of adhesions in disrupted vascular supply (strangulation and severe inflammations) and small bowel resections, lysis of adhesions due to severe edema and inflammation over small intestine and enterostomy. The second most common reason for obstructions were abdominal hernias. In our series 11 inguinal hernias, 8 umbilical hernias, 6 insicional hernias, 4 femoral hernias, 2 obturator hernia and 2 internal hernias. The patients were treated with hernia repair whereas 9 patients had additional intestinal resection. Obstruction due to cholelithiasis after fistulization between gall bladder and small intestine, an enterotomy was done and gall stones were extracted. Obstructions after malignancies were classifed as gynecological cancer in 2 patients, colon cancer, gastric cancer, small intestinal cancer sequentially in one patient. Required oncological resections were done in these patients. Obstrucitons due to phytobesuars were recorded after orange ingestions in 2 patients and grape and quince ingestion in one patient.

Enterotomy was performed in one patient whereas manual degradation of intestinal content and milking to cecum was done in 3 patients. Two patients had abcess drainage and intestinal resection respectively. The patients with the suspicion of Cronhs' disease had mesothelial biopsies from intestine. Table 3 demonstrates etiologic factors causing obstruction and Table 4 depicts surgical interventions.

The predominant complication was iatrogenic small intestinal lacerations and they were treated with primary repair. Table 5 displays the details of complications. Three patients ve re-hospitalized for early period obstruciton and were medically managed. One patient was re-operated on postoperative 9th day due to early period obstruction and adhesions were separated. Two patients with abdominal abcess were treated with one patient undergoing open drainage peroperatively and the other replacement of a drainage tube. One patient with evissecation were re-operted for abdominal closure. Two patients had anastomosis leakage where the patient with lower flow of leakage was treated medically and the other

Table 1. The demographic data

	n	%
Female	67	55.4
Previous abdominal surgery	71	58.7
Diabetes	27	22.3
Hypertension	35	28.9
Heart disease	30	24.8
Lung disease	17	14.1
Renal failure	8	6.6
Malignancy history	9	7.4

Table 2. Preoperative clinical, laboratory and radiological data

	n	%
Abdominal pain	114	94.2
Without gaita decharge	95	78.5
Nausea	94	77.7
Vomiting	86	71.1
Abdominal distension	78	64.5
Leucocytosis	112	92.6
Uremia	45	37.2
Abdominal X-ray	118	97.5
USG	110	90.9
CT	96	79.3

USG: Abdominal ultrasonography, CT: abdominal computed tomography

Table 3. Causes of intestinal obstructions

Etiology	n	%
Adhesion	69	57.0
Hernia	33	27.3
Cholelithiasis	5	4.1
Malignancy	5	4.1
Phytobesuar	4	3.3
Abcess	2	1.7
Crohns' disease	2	1.7
Intestinal torsion	1	0.8

Table 4. Surgical interventions

	n	%
Lysis of adhesions	60	49.6
Lysis of adhesions and resection	7	5.8
Lysis of adhesions and enterostomy	2	1.7
Hernia repair	24	19.8
Hernia repair and resection	9	7.4
Resection	6	4.9
Enterotomy	6	4.9
Enterostomy	3	2.5
Biopsy	1	0.8
Abcess drainage	1	0.8
Detortion	1	0.8

Table 5. Complications

	n	%
Iatrogenic intestinal lacerations	11	9.1
Surgical site infections	10	8.2
Early period ileus	5	4.1
Leakage from anastamosis	3	2.8
Intraabdominal abcess	2	1.7
Reoperation	2	1.7
Subcutanoeus seroma	2	1.7
Evisseration	1	0.8
Total	32	26.5

patient was operated and enterostomy was opened. Mortality was observed in 5 patients (n=5, 4.1%). One diabetic patients with chronic renal failure who had an emergent operation due to umbical hernia and accompanying sepsis was death on the postoperative first day in ICU. Another patient with diabetes, obezity and chronic lung disease was operated emergently for the huge insicional hernia and septic schock and 100 cm small intestine was resected with hernia repair. He was lost in the postoperative 9th hour. A 80 years old patient who had coronary artery by-pass 4 years ago had strangulated inguinal hernia and was operated but he was dead due to cardiac problems in ICU on postoperative 3rd day. A patient who was on renal dialysis was operated for three times due to bowel obstruction was lost on postoperative 4th day due to sepsis and respitatory problems.

Discussion

The study designates that the most common etiological reason for SIOs is intestinal adhesions. Intraabdominal trauma or infection generates fibrous tissue bands or memnranous adhesions thereby resulting intestinal adhesions. These regenarated tissues make abdominal organs cohere either to each other or to peritoneum. It is reported that the etiology for SIOs are 60-70% intraandominal adhesions.[10,11] Williams et al.[12] reported the incidence or surgical intervention as 57% in SIOs after adhesions. In a population based large study of Foster et al.,[11] intraabdominal adheisons were 56% the etiologic reason for the operation of 7935 patients with SIO. Another study had notified that abdominal adhesions are the etiologic causein 66% of patients with SIO.[3] Our study introducing 57% rate for SIO presents similar results with the literature. Previous abdominal surgery is stated in 85% of patients. Although the diagnosis is based on the clinical evaluation of the patient in obstruction due to adhesions, the type and timing of surgical intervention or medical follow up is still controversial. It must be clearly identified whether the patient had previous abdominal surgery when SIO is the suspicion after physical examination and radiological evaluation on clinical approach. SIOs are generallly an emergency situation and despite radiological advances it might be difficult to identify the etiological reason. Probable intraabdominal adhesions must be considered in surgical intervention of these patients.

Our study stated that hernias are the second in etiology of the SIOs. In a study from England 100 years ago, starngulated hernias were identified as the 50% of etiological reason for patients who were operated.[13] As the time passed, however the number of abdominal operations had increased and intraabdominal adhesions has become the most common etiological cause.[3]

Nevertheless, population based large studies provided 38% rate of hernia in patients who were operated for obstructions.[11] Markogiannakis et al.[14] published their results as 31%, with the rate as 25% in the study of Mohamed et al.[15] whereas Miller et al.[3] reported a lower rate as 4% in their study. The hernia rate for etiology of obstruciton is 27.3% in our study. It is recalimed that in developing countries the rate of obstruction due to hernias are higher when compared with the other economical regions. Obstructions due to hernias generally have strangulation accompanying the clinical scenario and thus it is advised that emergent surgical intervention must be considered.[3,11,16] Hernias in the abdominal wall and that could not be reduced, rapid surgical decision must be taken for prevention of morbidities. As soon as the patient arrives the emergency room ischemia and strangulation must be considered.

Intraandominal malignancies can also lead to SIOs. Tumors arising from small intestine, other tumors of gastrointestinal system or gynecologic cancers either on first diagnosis or

metastasis to small intestine or its mesothelial tissue after oncological exploration might cause obstructions. Miller et al.[3] reported the incidence of malignancy as 3% whereas the rate is 4% in geriatric population.[17] Our study documented the etiological rate of malignancy as 4.7%. The clinical evaluation represents either isolated SIOs or involvement of the neigbouring organs. CT evaluation might be useful on preoperative oncological screening or in patients with history of intraabdominal malignancy and provides information about the reason, location, severity of the obstruction.

Cholelitiasis migbt lead to SIO. Obstrucitons due to cholelitiasis is a rare condition. Over a time period bilio-enteric fistula occurs and stones pass through the small intestine.

Stones with a diameter of >2.5 cm can lead to obstrucitons especially in terminal ileum and ileocecal valve where the luminal diameter is small. This situation is reported to have an incidence of 2-4% in the literature and our study revealed the our incidence as 4.1%.[18,19] Misdiagnosis or a delay in diagnosis can lead an insrease in morbidity and mortality. Abdominal CT scans can give information about etiology, location and reason of the obstruction.[5] It must be remembered that in patients with a history of cholelitiasis and small bowel obstruction, this might be due to stones causing ileus.

The rate of obctruction in Crohns' disease is 2-8% in literature. The rate is considered higher in developed countries.[3,14,15] The incidence of Crohns' disease in our study is 1.7% which lower than malignancy and cholelitiasis. The decision of surgical intervention in Crohns' disease must be clearly defined due to complications.

According to our study open surgical interventions are the most common type of modality when surgery for SIOs is performed. Open surgery had become a gold standard for the exploration of SIOs. Recently laparoscopic manupulations come into prominence with considerable complication rates, fast healing and return to work.[20,21,22] But still probable technical problems, need of skill and experience and patient selection are handicaps.[20] Our rate for open surgery is 96.7%. The reason for this high rate is that our surgical team is more experienced on open surgery and the clinical presentation was an emergency situation. The type of surgical intervention differed according to the etiology of the obstruction. In the literature it is reported that 38% patients had only lysis of adhesions, 38% had hernia repair and 18% had lysis of adhesions and intestinal resections after strangulation.[11] The results were as 49.6% lysis of adhesions, 5.8% resection and lysis of adhesions, 19.8% hernia repair, 7.4% resections and hernia repair, 4.9% enterotomy for cholelithiasis and phytobesuar extraction in our series. The most important factor affecting the type of surgery is the reason of obstruction and vascular supply asssessing the ischemia and strangulation of small intestine.[23] For the desicion of surgical treatment evaluation of these parameters are of paramount importance.

Considering all the preoperative evaluation the morbidity and mortality rates of surgical treatment of SIO is high in our series. Emergency operations especially in the gastrointestinal tract complication rates might be expected higher as the study of Byrne et al.[21] reported as 43.6% complicaiton rate with a 7% mortality rate. Interestingly another study in the literature revealed the rates as 3.5% and 1%, respectively.[14] In our series complicaiton rate is 26.5% with the mortality rate as 4.1% with the most frequent complication as iatrogenic intestinal laceration and surgical site infection. Our results are in the median interval when compared with the literature.

The lysis of adhesions are generally difficult in diffuse and severe inflammation. Iatrogenic intestinal lacerations diagnosed peroperatively are repaired but despite this, the sensitive intestinal vascular supply might give rise to leakage and morbidity. Mortality rates differ according to stage of obstruction (strangulation, sepsis etc.) additional morbidity and general status of the patient. In the planning of surgical treatment morbility and complicaitons must be taken inot consideration.

Study Limitations

The study has limitations of retrospective study. Multivariate analysis between treatment, etiology and complications could not be accomplished due to the small number of sample size. The median and long term follow up of patients could not be documented.

Conclusion

Our study presented that the most common etiological reason for SIO s are adhesions and hernias respectively. Preoperative evaluation must be primarily based on these prospects. Currently, open surgery is the preference for the surgical intervention of the patients with lysis of the adhesions as the most common procedure practiced. On the other hand complications were noted in every four patient. For the determination of outlining diagnosis and treatment of SIOs, randomized prospective studies must be implemented.

Ethics

Ethics Committee Approval: Tepecik Training and Research Hospital Ethics Committee received approval from the local ethics committee for our study, Informed Consent: It was taken.

Peer-review: External and Internal peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: Mustafa Emiroğlu, Tayfun Kaya, Levent Uğurlu, Cengiz Aydın, Concept: Mustafa Emiroğlu, Tayfun Kaya, Design: Mustafa Emiroğlu, Data Collection or Processing: Mustafa Emiroğlu, Tayfun Kaya, Levent Uğurlu, Mehmet Üstün, Bengi Balcı, Analysis or Interpretation: Mustafa Emiroğlu, Tayfun Kaya, Cengiz Aydın, Literature Search: Mustafa Emiroğlu, Tayfun Kaya, Levent Uğurlu, Writing: Mustafa Emiroğlu, Bengi Balcı, Cengiz Aydın.

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