

DUODENAL ONARIMLAR SONRASI KAÇAĞI ÖNLEMELİK İÇİN YENİ BİR CERRAHİ TEKNİK A NEW SURGICAL TECHNIQUE FOR PREVENTION OF LEAKAGE AFTER DUODENAL REPAIRS

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ÖZET

Giriş: Retroperitoneal yerleşimlerinden dolayı duodenal yaralanmalar cerrahlar için tanısal zorluk oluştururlar. Bu yaralanmaların gecikmiş tanı ve tedavisi, morbidite ve mortalite oranlarının artmasına neden olur. Duodenal yaralanmanın derecesine bağlı olarak uygulanan birçok farklı cerrahi prosedür vardır. Cerrahi teknikteki gelişmelere rağmen duodenal lezyonlar hala yüksek morbidite ve mortalite oranları ile seyretmektedir.

Amaç: Bu sunumun amacı duodenal yaralanmaların tedavisinde yeni bir cerrahi tekniği tanımlamaktır.

Cerrahi Teknik: Bu teknik, Crohn hastalığı ile birlikte intestinal tüberkülozu olan bir hastada, postoperatif takipte duodenokolik fistül ve apseye sekonder olarak meydana gelen duodenal hasarın tedavisinde uygulanmıştır. Hasta; invajinasyon, intraabdominal apse ve genel durumunun kötüleşmesi nedeniyle ameliyat edilmiş, ikinci ameliyat ise duodenumdan kontrast ekstrevasyonu olması nedeniyle yapılmıştır. Tekniğin üçüncü bölümü olan tüp enterostomi ve negatif basınç uygulaması, duodenumda sekresyon birikimini ve basınç artışını önleyerek duodenum içi basıncı minimuma indirirken anastomoz açılma ve fistül oluşumu riskini azaltmıştır. Bu amaçla ilk 14 gün enterostomi tüpünden uzatılan aspirasyon kanülü ile sürekli negatif aspirasyon yapılmıştır. Hasta herhangi bir komplikasyon olmaksızın, sorunsuz bir şekilde iyileşmiştir.

Sonuç: “Pilorik eksklüzyon, duodenumdaki yaranın mukozal tabakasının stapler ile, serozanın ise vicryl ile onarımı, enterostomi tüpü ile negatif basınç uygulayarak intra-duodenal basıncı en aza indirme” tekniğinin, özellikle de duodenostomi tüpünden yapılan negatif basınçlı aspirasyonun duodenum içi basıncı azaltarak kaçakları önlemede alternatif bir çözüm olabileceği düşünülmektedir.

Anahtar Kelimeler: Duodenal hasar, cerrahi, pilorik dışlama, duodenostomi, negatif basınçlı aspirasyon

ABSTRACT

Background: Duodenal injuries, due to their retroperitoneal location, are a diagnostic challenge to the surgeon; for this reason, they are identified in a late stage, and thus associated with increased morbidity and mortality. The diagnosis of duodenal injury requires a high level of suspicion. Delayed diagnosis and management of these injuries results in increased morbidity and mortality rates. It must be remembered that the retroperitoneal location of the duodenum usually precludes early detection of injury by physical examination, which is characterised by minimal findings. Signs of defence, abdominal rigidity and absence of bowel sounds indicate intra-abdominal injury and lead to a surgical procedure. There are many different surgical procedures based on injury complexity, one of which is the tube duodenostomy technique. Despite the advances in surgical technique, duodenal lesions are still associated with high morbidity and mortality rates.

Purpose: The purpose of this presentation is to describe a new surgical technique in the management of duodenal injuries.

Surgical Technique: The technique was performed on a patient, presented with Crohn's disease together with intestinal tuberculosis, in the management of duodenal injury secondary to duodenocolic fistula and abscess during the postoperative follow-up. The patient was operated on due to invagination, intra-abdominal abscess and general condition deterioration. The second operation was performed because of contrast extravasation from the duodenum. Especially the third part of the technique,

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application of negative pressure through a tube enterostomy in order to prevent the accumulation of secretions and pressure increase in the duodenum, minimized the intra-duodenal pressure and decreased the risk of anastomotic dehiscence and fistula formation (Figure 1). For this purpose, continuous negative aspiration was performed with an aspiration cannula extended through the enterostomy tube during the first 14 days. The patient was recovered without any complications.

Conclusion: The authors concluded that this new technique of “pyloric exclusion, the repair of the mucosal layer of the primary wound in the duodenum with a stapler and of serosa with vicryl, minimizing intra-duodenal pressure by applying negative pressure with the enterostomy tube” can be considered to be an alternative solution for duodenal injuries.

Key Words: Duodenal injury, surgery, pyloric exclusion, duodenostomy, negative-pressure aspiration

Introduction

Crohn's disease (CD) and intestinal tuberculosis (ITB) often have similar clinical and endoscopic features and it is difficult to make a differential diagnosis between these two diseases, especially in regions with high prevalence of tuberculosis, such as Asia and Africa [1]. It is important to differentiate between CD and ITB because treatment and prognosis are quite different [2-4]. In most cases, ITB can be treated with appropriate anti-Tbc drugs with a positive outcome, whereas CD is a chronic disease that requires lifelong treatment. In addition, misdiagnosis of ITB as CD may lead to worse outcomes, because immunosuppressive drugs given in CD treatment may exacerbate ITB [5]. Conversely, the misdiagnosis of CD as ITB may expose CD patients to the potential toxicity of anti-TB drugs and delay the proper treatment of CD [6].

Duodenal injuries are an important surgical problem among gastrointestinal injuries due to both high morbidity and mortality rates and the need for complex surgical procedures. Duodenal injuries have high mortality rates ranging from 4% to 47% [7]. Although various surgical procedures are used in the treatment of duodenal injuries, there is still uncertainty about the optimal surgical treatment.

In this case report, a patient presented with complaints of non-specific gastrointestinal system disorder, which had been ongoing for approximately 3 years, during which time the differential diagnosis of ITB and CD was difficult. After the application of CD treatment protocols, ITB developed on a CD background and the patient was operated on due to invagination of the surviving colon + intra-abdominal multiple abscesses and lymph node + acute abdomen + general condition disorder. Duodenocolic abscess was detected during the operation. Due to the possibility of fistula

after drainage of this abscess, a test was performed with methylene blue administered from a nasogastric tube and duodenocolic fistula could not be detected. In this report, a new surgical method is presented together with the results in the management of duodenal injury secondary to duodenocolic fistula and abscess during the postoperative follow up.

CASE

A 28-year old male patient first presented three years ago with abdominal distention, epigastric burning and dyspeptic complaints. Intra-abdominal multiple LAP and non-specific ileitis were detected. The patient was given non-specific treatments for dyspepsia and pancreatitis for dyspeptic complaints. When the patient presented with complaints of retching, indigestion and weight loss (10 kg in total), ongoing for 2 years, with complaints of gastritis regressed, new examinations, assays and investigations were performed and as a result of these examinations, CD was diagnosed and anti-TNF treatment with immunosuppressive effect was started as treatment. The patient was hospitalized on the 20th day because of fever and abdominal pain. On CT examination, there was seen to be wall thickening in the distal ileocolic area, findings consistent with invagination in the ascending colon, multiple abscess areas adjacent to the distal ileal loops and multiple lymph nodes in the mesentery. The patient was operated on due to invagination, intra-abdominal abscess and general condition deterioration. In the exploration, fibrosis, thickening and shortening in the ascending colon, multiple conglomerated caseified lymph nodes in the retroperitoneal region and multiple abscesses between the bowel loops were observed in the ileocolic region.



Figure-I: Specimen from the first surgery performed on the patient. Conglomerated lymph nodes in the mesentery, intense inflammation of the terminal ileum, fibrosis of the ascending arm and shortening due to invagination.

Right hemicolectomy + ileotransversostomy + multiple lymph node excision + drainage of multiple abscesses between the bowel loops and sampling were performed. While the fibrotic adhesions between the right transverse colon and the third segment of the duodenum were separated, the abscess drained (Figure I). Methylene blue was administered via a nasogastric catheter in order to identify possible fistula. In this test, methylene blue extravasation between the duodenum and transverse colon that would suggest fistula was not detected and the operation was terminated.

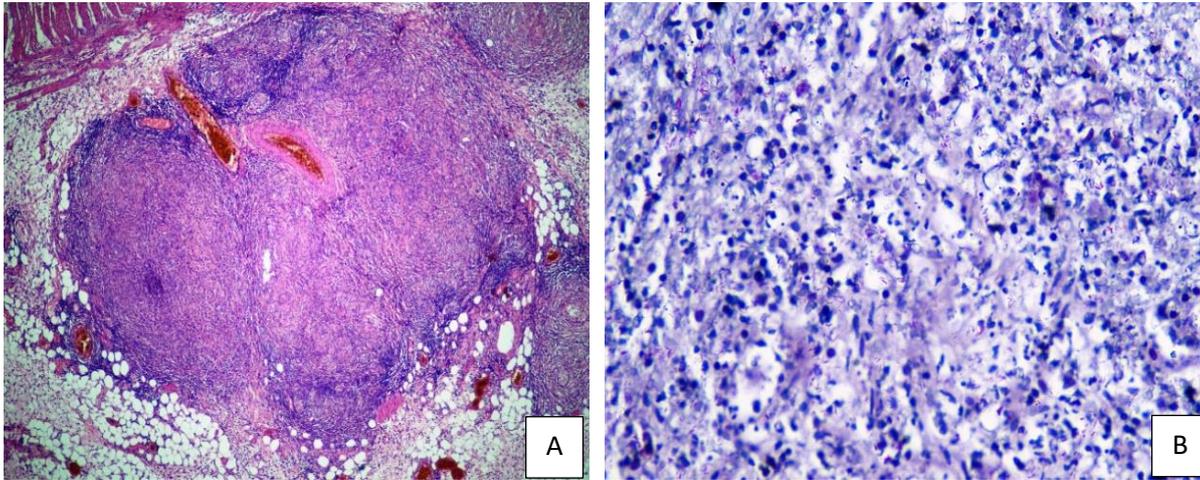


Figure II: A. Granuloma structures containing necrosis and giant cells in the middle surrounded by lymphocytes in the colon serosa (Hematoxylin & Eosin, x40) **B.** Presence of a large number of acid-resistant bacilli within the granuloma area (EZN, x400)

Direct microscopic examination of the sample of received abdominal abscess (Figure IIA) content showed intense TB bacilli (Figure IIB) and ATT was immediately started. In the biochemical examination of the abdominal drain from day 1 postoperatively, amylase was 800 U / L and total bilirubin was found to be 17 mg / dL. The patient underwent reoperation under emergency conditions because of the appearance suggestive of contrast agent extravasation from the third continent of the duodenum on the control CT performed on the second postoperative day. A perforation area of approximately 2 cm was detected in the anterior face

of the third section of the duodenum. First, the pylorus was released and pylorus exclusion was performed with stapler. The pylorus and duodenum junction were not separated with excision. Then the mucosa was repaired using an Endogia stapler in the perforation area in the duodenum, and the serosa was repaired by suturing one by one with 3/0 vicryl. The drainage catheter was inserted through the enterotomy at a distance of 15-20 cm from the treitz and was advanced to the ampulla of Vater. Gastrojejunostomy was performed 20 cm distal to the enterotomy. An aspiration tube was inserted into the drainage catheter extending from the

enterotomy to out of the abdomen and active drainage was started with negative pressure (Figure III).

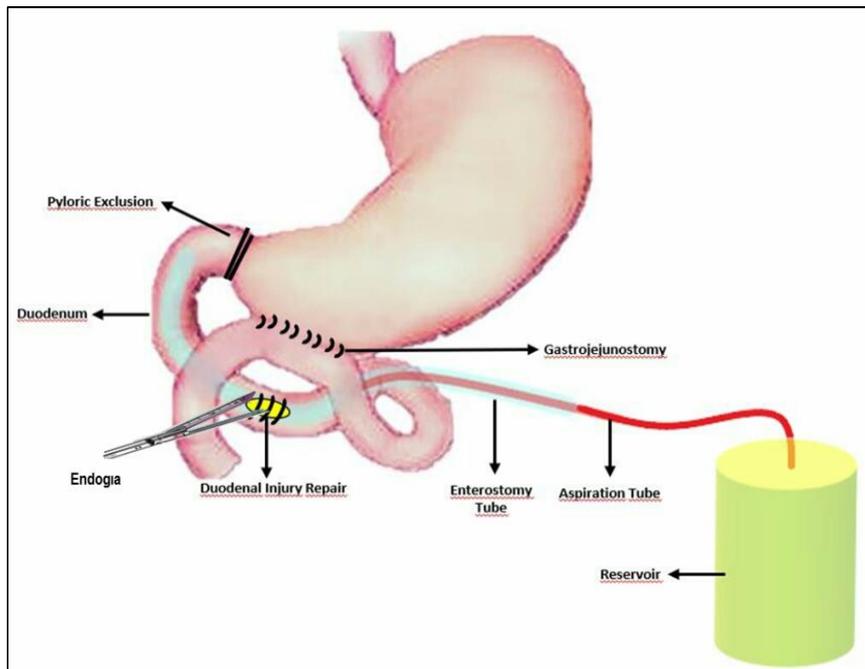


Figure III: Second operation due to fistula in the duodenum. The repair of the mucosa with Endogia[□] stapler and the serosa with 3/0 vicryl separate sutures in the area of injury to the duodenum, enterostomy tube and extended cannula for aspiration with negative pressure from the enterostomy tube.

The presence of any leakage from the repaired place in the duodenum was monitored by analysing amylase and bilirubin values in the drainage fluid every other day with biochemical tests. As the patient had 40 cc / 24 hours drainage from drains and 1100 cc / 24 hours from enterotomy on the 14th day, negative aspiration was terminated and the aspiration cannula was withdrawn. The enterostomy catheter was allowed to drain free. Approximately 1000 cc / 24 hours from enterostomy tube and 20cc/24 hours from drains were seen on days 14-20. The enterostomy catheter was removed on the 20th day, after which, no gastrointestinal contents appeared and no fistula developed. The patient was discharged with no surgical problems to complete the medical treatment of CD and ITB.

Discussion:

In the distinction of CD and ITB, diarrhea, the presence of perianal disease, and extraintestinal symptoms support the diagnosis of CD, while fever, night sweats, acid and lung involvement support the diagnosis of ITB. Abdominal pain, early saturation, weight loss, nausea, vomiting, and progressive gastric outlet obstruction are the most common symptoms and signs of DCD (duodenal CD). In a study by Seo H. et al., 38.9% of CD patients had active and / or past perianal fistula on first admission, which was a lower rate than in ITB patients [8]. The preferred diagnostic procedure in ITB is colonoscopy and biopsy. Rectal and sigmoid colon

involvement is more frequent in CD patients than ITB patients while IC valve and cecum involvement is more common in ITB patients than CD patients. The presence of granulomas supports the diagnosis of ITB more strongly than CD [9]. In a study by Seo et al., it was stated that ITB cases (48.2%) previously misdiagnosed as CD could be diagnosed correctly as ITB after TB treatment, and the other half (49.4%) of ITB patients could be diagnosed correctly based on the positive culture of *M. Tb* [8]. Kedia S. et al. reported that in cases where this differential diagnosis could not be made completely, it would be more appropriate to give anti-tbc treatment to patients before starting immunosuppressive therapies such as anti-TNF and to start CD treatment according to the clinical table after this treatment [10]. MDR-TB cases are seen at a frequency of 5% and tend to behave like CD [11]. TNF α inhibitors used in CD treatment have been shown to be effective in alleviating CD symptoms in some patients [12]. Inhibition of TNF α has been reported to increase the risk of infection, especially opportunistic infections [13]. Recent studies have also shown that CD is closely related to *Mycobacterium Avium Paratuberculosis* (MAP), a TB-like bacterium [14]. Blocking TNF α not only disrupts the body's ability to hold and respond to TB, but it can also increase patient sensitivity to MAP or worsen disease states [15]. In addition to trauma, in upper gastroenterology system surgery, interventional procedures such as ERCP, duodenal integrity may be impaired by fistulas caused by inflammatory diseases such as CD. Duodenal injuries cause morbidity up to 65% and the overall



mortality rate is between 5.3% and 30%, but injury to the duodenum itself is responsible for a mortality rate of approximately 10% [16]. There is no single duodenal repair method that completely eliminates the possibility of detachment of the duodenal suture line, and although aggressive surgical procedures are still advocated for some complex injuries, the actual benefits have not been proven [17]. Innovative procedures such as “diverticulization”, “pyloric exclusion”, and “triple tube ostomy” have been used to repair duodenal wounds and to remove duodenal fistulas, the most serious complication associated with surgical repair of duodenal injuries [18]. Fraga GP et al. reported a tendency towards a higher complication rate in the pyloric exclusion group (71% vs. 33%) and concluded that simple repair without pyloric exclusion was both adequate and safe for penetrating duodenal injury [19]. The physiological status of the patient is the most important factor in predicting mortality in patients with traumatic duodenal injury [20]. Optimal management and better outcome of duodenal injuries appears to be associated with a shorter operation time, and simple and rapid damage control surgery, as opposed to definitive surgical procedures [21]. The majority of duodenal internal fistulas are due to ileocolic anastomoses located anatomically adjacent to the duodenum or in the colon adjacent to the duodenum. In most patients, primary closure of the duodenal defect is recommended after fistula resection and associated bowel resection. Although the results of studies conducted in recent decades have shown a general tendency towards less invasive procedures for high-grade duodenal injuries, the destruction of the duodenopancreatic complex and/or cases of duodenal devascularization, described as Grade 5 injury in the duodenal injury classification, is still indicated to require complex procedures [22].

In the current case, a different method was applied for the primary repair of the duodenum and subsequent follow-up. A simpler repair technique was implemented, not the complex processes described in recent publications in the literature. The technique applied is pyloric exclusion + primary repair of mucosa with Endogia[□] stapler and serosa with 3/0 vicryl one-by-one suturation of the injured area of the duodenum+ gastroenterostomy + tube enterostomy + continuous aspiration of bile and pancreas secretions with negative pressure.

Exploration of this case revealed intense inflammation in the abdomen, dense gato-forming lymphadenitis and soft tissue in the superior and inferior mesenteric artery region and at the head of pancreas. Therefore, the Whipple procedure was not performed. Triple ostomy was not considered due to the poor preoperative general physiology of the patient. It was decided that the fluid electrolyte imbalance caused by triple ostomy would increase the overall mortality with underlying physiological status and CD and ITB. Therefore, it was decided to perform a minimally invasive procedure as described in the recent literature. First, pyloric exclusion + gastroenterostomy was performed to deviate gastric secretion in order to reduce the accumulation of bile, pancreas and stomach secretions in the duodenum due to ileus which developed in peritonitis. In the

pyloric exclusion, the flow was prevented by closing the duodenum-pylor transition with the stapler, but no cutting was performed. The aim was to protect the patient from the complications of duodenal stump and gastric stump. In cases of ileus due to this type of intra-abdominal active chemical and infectious peritonitis, the accumulation of pancreas and bile secretion in the duodenum together with increased pressure results in the opening of the duodenum stump and associated complications. The risks that could be caused by opening the duodenum stump were minimized by not cutting. The second stage was the individual one-by-one repair of the serosa with vicryl after the closure of the mucosa with an Endogia[□] stapler. A double-deck repair consisting of Endogia[□] + primary serosal repair was performed. Endogia[□] can be considered safer than primary repair due to its success in sleeve gastrectomy and other laparoscopic surgical procedures.

The third procedure was to perform tube enterostomy in order to prevent the accumulation of secretions and pressure increase expected in the duodenum due to ileus, which will continue until the end of intra-abdominal inflammation. During the first 14 days, which was accepted as the upper limit of wound opening time in duodenal surgery in such repairs, continued negative aspiration was performed with an aspiration cannula extended through the enterostomy tube. Thus, intra-duodenal pressure was minimized. The aspiration rate was adjusted to aspirate a total of 2100 cc / 24 hours of secretion daily. The basis for this determination was that the total amount of pancreas and bile secretion in a healthy person is approximately 2100 cc / 24 hours. If a negative aspiration pressure of more than this amount was applied, the duodenal mucosa could be damaged. If lower negative pressure was applied, the secretions would accumulate in the duodenum and cause damage to the repair site due to intraluminal pressure. Approximately 2100 cc / 24 hours of secretion was aspirated in the first week, but this amount decreased to 1100 cc / 24 hours in the following days. Gradually negative negative pressure was decreased in parallel with the decrease of aspirated secretion amount. Adherence of the mucosa to the enterostomy tube was prevented by aspiration at the secretion rate. Biochemical testing was applied to bilirubin and amylase from the fluid in the drain to determine whether there was any leakage from the repaired duodenum. During the 20-day follow-up, amylase and bilirubin levels were within normal limits. Negative pressure aspiration was terminated on the 14th postoperative day. Secretion from the enterostomy tube was allowed to drain free. No increase in the bilirubin-amylase amount and contents of drainage fluid were observed in the follow-up of the abdominal drains. No intra-abdominal abscesses or fluid collections were detected on control ultrasonography. The enterostomy tube was removed on the postoperative 20th day. No fistula formation was observed after withdrawal of the enterostomy tube. Since the bilirubin and amylase levels were studied in the drainage fluids and observed to be 20 cc / 24 hours after the enterostomy tube was removed, the abdominal drains were also removed on the postoperative 22nd day.



From now on, this technique of “separation of the duodenum and stomach with pyloric exclusion with the help of a straight stapler, but not cutting, the repair of the mucosal layer of the primary wound in the duodenum with an Endogia[□] stapler and of serosa with vicryl, minimizing intraduodenal pressure by applying negative pressure with the enterostomy tube and the aspiration cannula extended through it” can be considered to be an alternative solution for duodenal injuries. Nevertheless, larger case series are required to test its safety.

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