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Original Article

The effect of delayed diagnosis on mortality in doudenal injuries

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Abstract. Duodenal injuries can occur after penetrant or blunt trauma. They are mostly seen after penetrant trauma. Delayed diagnoses of duodenal injuries are often accompanied by morbidity and mortality. In this study, follow-up and examination data from cases with duodenal injuries were evaluated retrospectively. Hospital records of 18 patients with duodenal injury who were followed-up were evaluated. Four patients with missing information related to follow-up and treatment processes were excluded from the study. Thus, 14 patients were included in the study. Of these, 6 patients were injured after penetrant and 8 patients after blunt trauma. One patient with mural hematoma on the first part of duodenum after a blunt trauma was medically followed-up. Sepsis-related late stage mortality was observed in 5 patients. Sepsis-related mortality was observed in 3 patients with delayed diagnosis and examination after getting stabbed. Mortality related to sepsis occurring after suture deficiency on the repair line was observed in one patient with duodenal injury after blunt trauma. Mortality related to sepsis after polytetraflouroethylene graft primary repairment was observed in one patient with iatrogenic duodenal injury. Following the stabilization and resuscitation of the patients after duodenal injuries, if the specialists are not skeptical in the first examination, there is usually a delay in the diagnosis. Early period vital sign and examination findings and radiological evaluations of the patients may not give exact results after trauma. In such a case, repeated examination and radiological evaluations may help. Early stage mortality is usually related to large vessel injuries, however late-stage mortality is related to delayed diagnosis and treatment, sepsis, duodenal fistula, pancreatic and choledochal injuries.

Keywords: Duodenum, injury, trauma, delayed diagnosis, mortality

Introduction

Duodenal injuries, most of which are caused by penetrant traumas, are generally seen around the age of 30 years old. These injuries may lead to serious complications and death if there is a delay in the diagnosis. In this study we have retrospectively evaluated the effect of diagnosis and treatment of duodenal injury on mortality in the examined cases.

Materials and Methods

In this study, 18 patients who were followed up because of duodenal injury during 1990-2015 were retrospectively examined. Four patients with missing information related to follow-up and treatment processes were excluded. Thus, 14 patients were included in the study. The records of the patients related to demographical characteristics, type of injury, duration until the surgical intervention, intra-operative data and the procedures were obtained.

Results

Of the patients, 9 were female and 5 were male. The average age was 35 (range: 12 - 58). 6 patients were injured after penetrant and 8 patients after blunt trauma (Table 1). In one case with injury after blunt trauma; the patient with mural hematoma in the first part of duodenum was medically followed up and discharged. Whipple procedure was applied to a patient who had grade 4 avulsion on duodenum and head of the pancreas. One patient had grade 5 duodenal injury and the patient was treated with Roux-en-Y diverticulization, cholecystectomy and bile duct drainage. Another patient had grade 4 spleen injury and grade 2 duodenum laceration and he was treated with primary suture repairment, splenectomy, cholecystectomy and bile duct drainage. Two of the patients had motor vehicle accident and as a result they had duodenum injury on the second part and they both received primary repairment. One patient had go-kart accident and as a result he had duodenal injury on the second part and he received laparoscopic primary repair. One patient had grade 4 duodenum injury and was treated with primary repairment, but the patient had suture failure and died because of sepsis on the 23rd post-operative day. Four patients had penetrant trauma injury and two had iatrogenic trauma after being stabbed. One patient had full-thickness injury on the liver, right kidney and the intersection of the duodenum parts 3-4 after being stabbed and the patient received primary repairment. Three patients

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TABLE 1
TREATMENT MODALITIES IN PATIENTS

Variable	No.
Male/Female	5/9
Blunt trauma	8
Follow-up	1
Whipple procedure	1
Roux-en-Y diverticulization, cholecystectomy and bile duct drainage	1
Primary suture repairment, splenectomy, cholecystectomy and bile duct drainage	1
Primary repairment	3
Laparoscopic primary repairment	1
Penetrant trauma	6
Primary repairment	1
Primary repairment, cholecystectomy, bile duct drainage, tube duodenostomy and feeding jejunostomy	1
Lateral duodenostomy, feeding jejunostomy and tube gastrostomy	1
Primary suture repairment and pyloric exclusion	1
Gastrotomy and sponge extraction	1
Primary repairment using polytetrafluoroethylene (PTFE) graft	1

were injured after being stabbed and they had exploratory surgery and no duodenal injury was observed. A new operation was planned since the abdominal examination findings of the patients were abnormal (on account of the fact that abdominal ultrasonography and abdominal CT scan were not commonly used in 1990s, re-laparotomy was exercised). The patient who received re-laparotomy on the fourth post-operative day had injury on the 3rd part of the posterolateral inferior of the duodenum and he was treated with primary suture repairment, cholecystectomy, bile duct drainage, tube duodenostomy and feeding jejunostomy. The patient who had suture failure on the primary repairment line did not accept reoperation and died. The patient who received re-laparotomy on the fifth post-operative day was treated with lateral duodenostomy, feeding jejunostomy and tube gastrostomy. The general condition of the patient kept deteriorating and the patient died on the 20th post-operative day because of sepsis. The patient who received re-laparotomy on the seventh post-operative day had injury on the lateral first part of the duodenum and he received primary suture repairment and pyloric exclusion but he died on the 17th post-operative day because of sepsis. In one of the patients who had iatrogenic duodenum injury, sponge was forgotten in foramen winslow after conventional cholecystectomy and then the patient was re-operated on the fifth post-operative month, he received gastrotomy and sponge extraction. The other patient developed injury on the second part of the duodenum dependent on cautery injury during laparoscopic cholecystectomy and he was treated with primary repairment using polytetrafluoroethylene graft. The patient died on the 12th post-operative day because of sepsis.

Discussion

Duodenal injuries are observed in %4.3 (% 3.7- % 5) of the patients who have abdominal injuries. Duodenal injuries are observed five times more in man and %70 of the cases are at ages 16-32 [1]. The frequency of the duodenum injury dependent on blunt trauma is %11-26 [2] and in our study this figure is %57 higher. Since duodenum is neighbor to vital organs, sole injury of the duodenum is rare. Liver is accompanied the most in injuries (%17). %15 vascular injuries, %13 colon, %12 pancreas, %11 small intestine, %9 stomach follows the liver in injuries respectively [1]. Since duodenum is neighbor to vital organs the diagnosis and treatment is also vital. In our cases; liver, pancreas, spleen and right kidney were the organs injured other than duodenum. In duodenum injuries 2nd part was the most frequently injured area with %36, 3rd part was %18, 4th part was %15 and 1st part was %13 in the frequency of injuries. Duodenum multiple area injury is observed %18 [1]. Though it has low sensitivity, measurement of serum amylase may be useful in duodenal injuries [3]. Some authors argue that %50 of the cases with gastrointestinal and duodenal injuries have an increase in the level of serum amylase [4]. Though it is not specific, amylase measurement in peritoneal lavage liquid may be useful in the cases with duodenal injuries [5]. However, some authors argue that measurement of serum amylase should not be used as an indicator for exploratory surgery [1]. Subdiaphragmatic free air in abdominal graph, retroperitoneal air, absence of the psoas shadow and lumbar spine scoliosis may give clue about injuries during pre-operative radiological evaluation [6]. Ultrasonography (focus assesment for the sonographic evaluation; FAST) provides little benefit since it is not efficient enough in the evaluation of retroperitoneal structures of the duodenum. Opaque CT scan imaging is the most useful way especially in the evaluation of retroperitoneal structures of the duodenum [5]. Occasionally negative results may be yielded in contrasted CT scan imaging in case it is performed in early stage and if there is an abnormal intestine image related to paraduodenal hematoma or inexplicable low level of liquid [7]. If the radiological evaluation does not help and the physician suspects of duodenal injury for a case, another means of diagnosis may be laparoscopy or laporotomy [6]. Since radiological evaluation was not sufficient enough, three of our patients received diagnostic laparotomy and one patient received diagnostic laparoscopy. Following the stabilization and resusitation of the patients after duodenal injuries, if the specialists are not skeptical in the first examination, there is usually a delay in the diagnosis. A thorough examination must be performed in cases of injury mechanism (acceleration and deceleration), upper abdominal rigidity and tachycardia, vomiting and fever. Vital and examination findings, radiological evaluations of the patient may not give exact results in the early post-traumatic stage. In such a case, repeated examination and radiological evaluation may help. The first evaluations and exploratory laparotomy findings of the three patients with duodenal injury caused by being stabbed were considered as normal. Since the abdominal examination findings of the patients were abnormal, and on account of the fact that abdominal ultrasonography and abdominal CT scan were not

commonly used in 1990s, re-laparotomy was exercised to these patients. If surgery is planned for the patients with suspicious duodenal injury and if these patients have conditions such as duodenal subcutaneous emphysema, bile in the duodenal wall, free bile, retroperitoneal hematoma around the duodenum or perirenal hematoma, the physician should mobilize the duodenum and evaluate each of the four parts. Even if perforation is detected on the anterior wall during the operation, posterior wall should also be evaluated with mobilization. Duodenal mobilization should be performed even for the cases without post-traumatic injury [8]. Full-thickness injury of one patient on the posterior wall of the intersection of the duodenum parts 3-4 after being stabbed could only be realized after the complete mobilization of the duodenum. Duodenal injuries can be treated with simple methods such as primary repairment (duodenoraphy) or it can be treated with complicated methods such as resection, anastomose, duodenal diverticulation, pyloric exclusion, pancreatic duodenectomy. No single method is successful in preventing duodenal fistula [9]. Most authors prefer using single or double layer primary repairment or resection and anastomose for duodenal injuries. It is important to keep the lumen width while performing primary repairment. If the patient has sepsis in the late stage, these options are limited [10]. Even if we performed some surgical methods such as primary suture repair plus cholecystectomy plus bile duct drainage plus tube duodenostomy plus feeding jejunostomy, lateral duodenostomy plus feeding jejunostomy plus tube gastrostomy, primary suture repair and pyloric exclusion, and primary repair with PTFE punch graft, the result did not change in our patients who developed mortality caused by sepsis. Mortality rates in duodenal injuries may change around 5-30%. Early stage mortality is usually related to large vessel injuries, however late stage mortality is related to delayed diagnosis and treatment, sepsis, duodenal fistula, pancreatic and choledochal injuries. Sepsis related late stage mortality was observed in 5 patients. Three patients, who got stabbed, died because of sepsis after delayed diagnosis and examination. One patient with iatrogenic duodenum injury died because of sepsis after polytetrafluoroethylene graft primary repair was performed. After blunt trauma, suture failure developed on the repair line in one patient with duodenal injury, and the patient died because of sepsis. Delay in diagnosis and treatment results in high levels of mortality and morbidity [1]. Mortality was observed in three patients because of delayed diagnosis and treatment; limited radiological evaluation also had an impact on their mortality. The relationship between an increase in radiological evaluation possibilities and lower levels of mortality is a remarkable detail. Most surgeons may not be suspicious of a duodenal injury because especially the ones following blunt traumas are rare. Repeated examinations and auxiliary imaging methods are important for diagnosis. Additionally, intra-operative skepticism is also important. In cases of duodenal injuries, it is important to mobilize the duodenum and evaluate each of the four parts. It should be kept in mind that a delay in diagnosis and treatment results in high levels of mortality and morbidity.

Conflict of Interest

The authors declare no conflicts of interest.

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