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Conservative management of abdominal injuries

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Objective: Non-operative management of abdominal injuries has recently become more common. Especially non-operative treatment of blunt abdominal trauma is gaining wide acceptance. In this study, the efficacy of non-operative treatment in abdominal trauma (blunt penetrating) is discussed.

Material and Methods: All patients who received treatment due to abdominal trauma from November 2008 to January 2013 were retrospectively analyzed. The demographic characteristics, type of injury, injured organ, type of treatment (operative vs. nonoperative) and mortality data were evaluated.

Results: The study includes 115 patients treated for abdominal trauma in our department. The mechanism of trauma was stab wounds in 60%, blunt abdominal trauma in 23.5% and gunshot wounds in 16.5%. Forty-two patients (36.5%) were operated for hemodynamic instability and/or peritonitis on admission. The remaining 63.5% of patients (n=73) were treated nonoperatively, 10 of whom required laparotomy during follow-up. The remaining 63 patients were treated with non-operative management. The success rate for non-operative treatment was 86.3% and there was no difference in terms of the types of injuries. The mortality rate was 4.3% (n= 5) in the whole series, but there were no deaths among the patients who had received non-operative treatment. In the whole patient group 54.2% (n=63) were treated nonoperatively.

Conclusion: Nonoperative treatment in abdominal trauma is safe and effective. Patients with clinical stability and normal physical examination findings can be treated nonoperatively with close monitoring.

Key Words: Abdominal injury, abdominal trauma, nonoperative treatment

INTRODUCTION

Injuries within the abdominal cavity and abdominal organs continue to be a problem for general surgeons. Abdomen is the most common region to be injured following the head and extremities (1, 2). Injuries may be in the form of blunt abdominal trauma, stab wounds or gunshot wounds. The majority of blunt abdominal trauma is seen after motor vehicle accidents. There have been major changes in the approach to abdominal trauma in the last 20 years.

Non-operative treatment strategies are becoming more common. Conservative treatment experience is based more on experience in blunt abdominal trauma. However, recent publications suggest that nonoperative (conservative) treatment can be performed in gunshot and stab wounds in selected patients. Most of the abdominal trauma patients are younger than 40 years, and it remains to be an important cause of morbidity-mortality in this population (1, 2).

This study aimed to investigate the efficacy of conservative management of abdominal trauma in selected patients.

MATERIAL AND METHODS

The records of patients who were treated in our general surgery department from November 2008 to January 2013 for abdominal injuries were retrospectively analyzed. Type of injury, injured organ and method of treatment (operative-selective nonoperative) were recorded. Along with demographic data of patients, nonoperative treatment failure and mortality were also recorded.

In our clinics, hemodynamically stable patients without any signs of peritonitis underwent conservative treatment for their abdominal injuries. These patients were followed up closely with physical examination by the same physician and by imaging methods. Informed consent was obtained from all patients.

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Blunt abdominal trauma patients who were hemodynamically stable and without any signs of peritonitis were followed nonoperatively. Patients were operated if deterioration of hemodynamic stability and/or lesion (hematoma, etc.) progression on imaging was detected. In addition to this, additional methods such as diagnostic laparotomy or diagnostic laparoscopy were used for diagnosis and monitoring, especially in noncooperative patients due to various reasons, including cranial trauma or alcohol. Patients with suspicion of hollow organ injuries were also operated.

Patients with stab wounds were hospitalized for clinical follow-up and treatment due to possible penetrating abdominal injury. Patients were accepted as penetrating abdominal injuries if the exploration of the injury site revealed abdominal penetration/or the last point of injury could not be reached or if imaging methods revealed penetrating abdominal injury. These patients were followed both hemodynamically and clinically for signs of peritonitis. Hemodynamically stable patients with no signs of peritonitis after 24 hours were started on oral diet. Patients who tolerated oral feeding and with gas and stool passage were discharged. Patients with deterioration in hemodynamic stability or signs of peritonitis were operated.

Patients with gunshot wounds having signs of peritonitis and/or hemodynamic instability on admission were directly operated. Low-energy gunshot wounds and tangential wounds underwent nonoperative management similar to other abdominal injuries in hemodynamic stability and the absence of signs of peritonitis.

Statistical analysis

Statistical Packages for the Social Sciences (SPSS) 15.0 for Windows program was used for the analysis of data. Descriptive statistics were presented as mean and standard deviation. Categorical data were analyzed by chi-square test. Significance level was accepted as $p<0.05$.

RESULTS

At our clinic, 115 patients with abdominal trauma were treated. Ninety-eight of the patients were male and 17 female, the mean age was 38.6±15.7. According to mechanism of injury, 69 of these patients (60%) had stab wounds, 27 (23.5%) had blunt abdominal trauma and the remaining 19 (16.5%) had gunshot wounds.

Twenty-seven of 69 patients with stab wounds underwent laparotomy due to hemodynamic instability and/or presence of signs of peritonitis. The remaining 42 patients were followed up nonoperatively. Four patients who developed signs of peritonitis, and one patient with suspicious physical examination and diagnosed with diaphragmatic injury on diagnostic laparoscopy underwent delayed laparotomy. The remaining 37 patients were discharged with nonoperative follow-up. There were no outpatient complications in any patients after discharge. A negative laparotomy was present in 9 out of 32 patients who received surgical treatment (early and delayed laparotomy). The nonoperative treatment success rate was 88% (37/42), and the negative laparotomy rate was 28% (9/32). The most commonly injured organs were the small bowel (n=7). One patient with injuries to the diaphragm, spleen, pancreas, and aorta died.

Six of 27 patients with blunt abdominal trauma were operated emergently due to hemodynamic instability and/or signs of peritonitis. The decision to perform surgery in one patient (an unconscious patient with head trauma) was made following diagnostic laparotomy. The remaining 21 patients were managed conservatively. A patient with splenic hematoma was operated in the late stage (10 days) due to rupture. Likewise, another patient was operated in the late period (5 days) for intestinal injury. One patient received a negative laparotomy. The remaining 18 patients were treated nonoperatively. The most commonly injured organ was the liver with a success rate of 85.7% (18/21) for conservative treatment.

Nine of the 19 patients with firearm injuries were treated by laparotomy due to hemodynamic instability on arrival and / or signs of peritonitis. The remaining 10 patients were followed nonoperatively. Two of these patients required delayed laparotomy. The remaining 8 patients were followed up and treated nonoperatively.

Out of all patients (n=115) 54.2% were treated nonoperatively. Nonoperative treatment success of patients was similar regardless of the type of injury (p=0.796) (Table 1).

DISCUSSION

Causes of abdominal injuries vary according to region. In Europe, the majority of these injuries are blunt abdominal trauma due to traffic accidents (1, 3). In Africa gunshot wounds to the abdomen is the most common cause (4). Although motor vehicle accidents are an important social problem in our country, in our clinics stab injuries constitute the majority of abdominal injuries. The majority of the thoracic abdominal injuries are associated with other parts of the body like the thorax and the limb (5). In most of these cases, abdominal injuries do not require treatment. The presence of abdominal trauma must be questioned in patients with hemodynamic instability, low Glasgow score, and with thoracic and extremity injuries (6). Missing abdominal trauma in these patients might lead to increased morbidity and mortality.

The management of abdominal injuries has changed significantly when compared with the management prior to 1990. The rate of unnecessary laparotomy has also reduced significantly due to nonoperative management, particularly of blunt abdominal injuries (7). Patients can be followed up nonoperatively given they are hemodynamically stable, regardless of the severity of injury. These patients are followed with close clinical observation and imaging methods (CT, ultrasound). The appropriate conditions to instantly operate on the patient, when hemodynamic instability and / or signs of peritonitis are detected, must be set (7, 8). The liver, followed by the spleen are the most commonly injured abdominal organs in blunt abdominal injuries. In these injuries, shock, acidosis, transfusion requirement, presence of multiple organ injury, delay in treatment, presence of co-morbid diseases and high trauma sco-

Table 1. Method of treatment, treatment success and mortality rate

Abdominal Trauma Mechanism of Injury	Number (x)	Surgery on arrival (a)	Delayed surgery (b)	Non-operative treatment (c)	Nonoperative treatment success N (%) (c-b)	Nonoperative treatment applicability % (c-b/x)	Mortality
Stab wounds	69	27	5	42	37 (88,1)	%53,6	1
Blunt Abdominal Trauma	27	6	3	21	18 (85,7)	%66,6	3
Gunshot wounds	19	9	2	10	8 (80)	%42,1	1
Total	115	42	10	73	63 (86,3)	%54,7	5 (%4,3)

res are factors increasing mortality (3-5). Although there are studies reporting mortality rate as high as 25.8% (64 deaths in 248 trauma patients) for abdominal injuries, in general the mortality is 10% (3-5, 9). The mortality rate in our study (4.3%) was found to be lower than the literature.

Liver is the most commonly injured organ in blunt and penetrating abdominal trauma. Conservative treatment for liver injury in blunt trauma patients is safe and effective, with the necessity of delayed laparotomy being approximately 10% (10-13). In a study conducted by Howes et al. (12) out of 926 blunt abdominal trauma patients only 8% (n=65) required surgical treatment.

Hemodynamically stable patients, independent of the degree of injury, can be treated nonoperatively (7). Van der Wilden et al. (8) treated 262 hemodynamically stable blunt abdominal trauma patients with grade 4-5 liver injuries nonoperatively, and in 239 patients (91.3%), the treatment has been successful. Liver-specific complication rate is 10%. In many studies, nonoperative management failure rate is under 10% (13). Similarly, in our series hemodynamically stable patients with grade 4 injuries were treated non-operatively with success (Figure 1, 2).

Computed tomography (CT) is widely used during follow-up of blunt abdominal trauma. The sensitivity and specificity of CT in demonstrating solid-organ damage is high. However, it is insufficient in detecting hollow organ injuries (12). In a study where CT findings in blunt abdominal trauma were compared with surgery results (n=78) the sensitivity of CT in detecting hollow organ injuries was 55.3% and the specificity was 92% (14). That is why imaging should be used to support clinical findings, during follow up of hollow organ injuries in abdominal trauma and surgical decision-making (13).

Intestinal injury after blunt abdominal trauma should be handled seriously. The delay in diagnosis and treatment is associated with increased morbidity and mortality (15). Intestinal injury may be diagnosed in the late period following trauma. Ertuğrul et al. (16) presented a case that developed colon perforation 10 days after the trauma. In our series, two patients were operated on for intestinal injury in the late period (3 and 5 days after trauma).

Figure 1. Ruptured hematoma, right liver lobe (active hemorrhage within the hematoma)

Figure 2. Subcapsular splenic hematoma and laceration extending to splenic hilum

The spleen is the most commonly injured intra-abdominal solid organ after liver and can be treated conservatively as the liver. In a study conducted by Bruce et al. (17) out of 236 patients with isolated splenic injuries 190 patients were treated nonoperatively . Thirty-one patients required angioembolization and 15 patients underwent surgery. In similar studies, it has been shown that hemodynamically stable patients with splenic injuries due to blunt abdominal trauma can be treated nonoperatively with a success rate of over 90% (18). However, studies reporting splenectomy rates up to 60% are also available (19). In addition, a combination of multiple organ injuries should be kept in mind. In unstable patients with head trauma abdominal injuries should be suspected and it should not be forgotten that concomitant splenic injury (grade 4-5) and liver injury may cause increased mortality (20).

In series where patients with penetrating injuries undergo routine explorative laparotomy, it has been shown that approxi-

mately 30-50% of these patients do not actually require treatment (negative laparotomy) (21-23). In our study, the negative laparotomy rate was 28% and we believe this rate will decrease with more rigorous clinical and laboratory evaluation and perhaps with more effective use of diagnostic laparoscopy. Therefore, penetrating abdominal injuries in hemodynamically stable patients and in the absence of signs of peritonitis can be treated nonoperatively, similar to blunt abdominal trauma (11, 24, 25). In a study of a large series (n=25,737) the nonoperative treatment failure rate in penetrating abdominal injuries (stab wounds and gunshot wounds) is reported as 15.2% in stab wounds and 20.8% in firearm injuries, and these rates are higher than the rates in blunt abdominal trauma (24). Although nonoperative management is successful in penetrating injuries, delay in diagnosis and treatment increases mortality and morbidity therefore patients should be carefully selected (24, 25). In a study conducted by Velmahos et al. (26) 792 patients with penetrating injuries to the abdomen has been followed-up by nonoperative management. In this study, only 80 patients (10%) required laparotomy and the remaining 712 patients were discharged without surgery. Also in this study, as in our series, the delay in laparotomy did not result in an increase in morbidity and mortality.

In the studies that have been included in this metaanalysis, the diagnostic accuracy of laporoscopy lies in a wide spectrum between 50 and 100%. This is related mostly to the experience of the performing surgeon. Laparoscopy has a low reliability in the detection of hollow organ injury. In our clinic we prefer to perform laparoscopy only in cases where we remain clinical uncertain.

Laparoscopy can be applied for diagnostic and therapeutic purposes in blunt and penetrating trauma (4). Diagnostic and therapeutic laparoscopy is recommended in blunt abdominal trauma for diaphragmatic injury, mesenteric injury, hollow organ injury, and when the patient's clinic is indecisive (27). In a meta-analysis by O'Malley et al. (28), diagnostic laparoscopy was performed in 1129 patients with penetrating abdominal trauma. Of these patients, laparoscopic treatment was possible in 13.8% and in 33.8% of the patients, a laparotomy was carried out. In 11.5% of these patients, diagnostic laparoscopy was negative. In the studies included in this meta-analysis, the diagnostic accuracy rate of laparoscopy was in a wide range between 50% and 100%. This rate is associated with the experience of the surgeon. The reliability of laparoscopy in determining hollow organ injuries is low. We prefer to use laparoscopy in our department only if we remain indecisive clinically.

CONCLUSION

Nonoperative management is widely accepted in hemodynamically stable blunt abdominal trauma patients. Similarly, patients with penetrating trauma can be treated nonoperatively in the absence of signs of peritonitis and in hemodynamically stable patients. Nonoperative management of abdominal injuries is effective and safe. The basic principle of nonoperative management is close clinical follow-up of the patient by the same physician. The nonoperative treatment efficacy in this study was similar regardless of the type of injury.

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