Vbodne rane trebuha – analiza 10-letne serije

Abdominal stab wounds: a 10-year survey in Slovenia

Avtor / Author

Ustanova / Institute

Arpad Ivanecz[1,2], Tomaž Jagrič[1], Borut Gajzer[1], Stojan Potrč[1,2]

[1]Univerzitetni klinični center Maribor, Oddelek za abdominalno in splošno kirurgijo, Maribor, Slovenija, [2]Univerza v Mariboru, Medicinska fakulteta, Maribor, Slovenija,

[1]University Medical Centre Maribor, Department of Abdominal and General Surgery, Maribor, Slovenia, [2]University of Maribor, Faculty of Medicine, Maribor, Slovenia

Ključne besede:
vbodne rane trebuha, laparotomija

Key words:
abdominal stab wounds, laparotomy

Članek prispel / Received
01.04.2011

Članek sprejet / Accepted
21.04.2011

Naslov za dopisovanje / Correspondence

As. mag. Arpad Ivanecz, dr.med.
Univerzitetni klinični center Maribor, Oddelek za abdominalno in splošno kirurgijo, Ljubljanska 5, SI–2000 Maribor, Slovenija
Telefon +386 41962402
E-pošta: arpad.ivanecz@ukc-mb.si

Izvleček

Namen: *Incidenca vbodnih ran trebuha (VRT) je na nekaterih območjih Sveta visoka. Dilema glede principov oskrbe takšnih poškodovancev je še vedno odprta. Namen naše študije je analiza epidemioloških in demografskih značilnosti takšnih poškodb, prikaz strategije zdravljenja ter primerjava rezultatov z rezultati iz literature.*

Metode: *Opravili smo retrospektivno analizo vseh poškodovancev z VRT, ki so bili zdravljeni v naši ustanovi v obdobju od leta 1997 do 2007. Indikacija za laparotomijo je bilo stanje kardiocirkulatorne nestabilnosti ali znaki draženja peritoneja. Dokaz penetrantne poškodbe trebuha (PPT) je prav tako pomenila indikacijo za laparotomijo tudi pri bolnikih, ki so bili sicer brez simptomov.*

Rezultati: *Skupaj je bilo v naši ustanovi obravnavanih 56 poškodovancev z VRT. 51 poškodovancev je bilo s*

Abstract

Purpose: *The incidence of abdominal stab wounds (ASWs) is high in some regions of the world. In general, the dilemma of the workup of these patients remains unsolved. We analyzed the epidemiological and demographical characteristics, and presented the strategy of the workup of patients with ASWs. Our results were compared with those from the literature.*

Methods: *In this retrospective study we reviewed the records of all patients with ASWs treated between 1997 and 2007 at University Medical Center – Maribor (Maribor, Slovenia). In patients with circulatory instability and in those with signs of peritoneal irritation, explorative laparotomy was done immediately. The indication for laparotomy was also given in all asymptomatic patients with penetration across the peritoneum as evidenced by exploration of ASWs.*

samo eno vbodno rano, ki so bili ob sprejemu brez simptomov. Skupaj je bilo 23 laparotomij zaradi VRT, v povprečju dve na leto (letno število laparotomij je znašalo od 0 do 4). Od organov v trebušni votlini so bila največkrat poškodovana jetra in tanko črevo. Zapletov po operaciji je bilo 13% pri 23 bolnikih s PPT. Kasnih zapletov po odpustu iz bolnišnice je bilo 26%. Nihče od bolnikov z VRT ni umrl, bodisi zaradi vboda samega ali pa zaradi zapletov po operaciji.

Zaključek: *Število VRT v naši regiji je bistveno manjše kot v nekaterih drugih urbanih področjih po svetu. Prednost selektivno konzervativnega pristopa pri VRT je nesporna in se odraža v manjšem deležu nepotrebnih laparotomij. Takšen pristop pa zahteva izkušeno ekipo kirurgov, natančno oceno kliničnega stanja, neprekinjeno dostopnost do slikovnih preiskav in invazivno diagnostičnih postopkov ter možnost takojšnjega kirurškega ukrepanja. Kadar takšni pogoji niso dani, je bolj varen tradicionalen pristop – laparotomija ob dokazu PPT.*

Results: *Fifty-six patients with ASWs were treated in our institution; 51 had a single stab wound and were asymptomatic on hospital admission. There were 23 explorative laparotomies for ASWs, the mean number being 2 per year (range, 0–4 per year). The liver and small intestine were the most often injured. Perioperative complications occurred in 13% of 23 stabbed patients. Late morbidity (after hospital discharge) was 26%. No patient from the present study died as a result of ASWs or perioperative complications.*

Conclusion: *The incidence of ASWs in our part of the country is much lower than in many other urban regions in the world. The selective conservative approach to ASWs is advantageous and this is reflected in a lower number of unnecessary laparotomies. An experienced surgical team, continuous access to imaging systems and invasive procedures, and the possibility of immediate surgical intervention are necessary for this approach. If these conditions are not fulfilled, then the traditional approach – laparotomy – may be safer if there is evidence of a penetrating abdominal stab wound.*

INTRODUCTION

Some European countries have a high incidence of abdominal stab wounds (ASWs). In a typical hospital at Istanbul, Turkey, ~100 ASW are treated per year, whereas the figure in Helsinki, Finland, is ~50 ASW (1–3). Data for Slovenia are not available.

In asymptomatic injured persons, the treatment strategy may differ. A therapeutic approach in which laparotomy is undertaken in every penetrating abdominal wound regardless of symptoms is considered traditional (Figure 1). According to the literature, 30–40% of ASWs do not penetrate into the abdominal cavity, whereas 30–40% of penetrating abdominal stab wounds (PASW) does not involve injury to abdominal organs such that surgical management is required (1–3). It was over 40 years ago that some authors suggested a selective conservative approach to decrease the percentage of laparotomies without therapeutic procedures (4). If a selective conservative approach proves penetration into the abdominal cavity, selection of further procedures is done on the basis of clinical status (haemodynamic instability, signs of peritoneal irritation) and findings of imaging techniques such as abdominal ultrasonography (US) and computed tomography (CT) of the abdomen, whereby evidence of fluid in the abdomen or signs of penetration of hollow organs are evaluated (Figures 2). Numerous larger treatment centres in the USA and Europe report success using the selective conservative approach; the optimum method of treatment for asymptomatic patients with PASW, however, is open for discussion (1–15). Our aim was to analyse the epidemiologic and

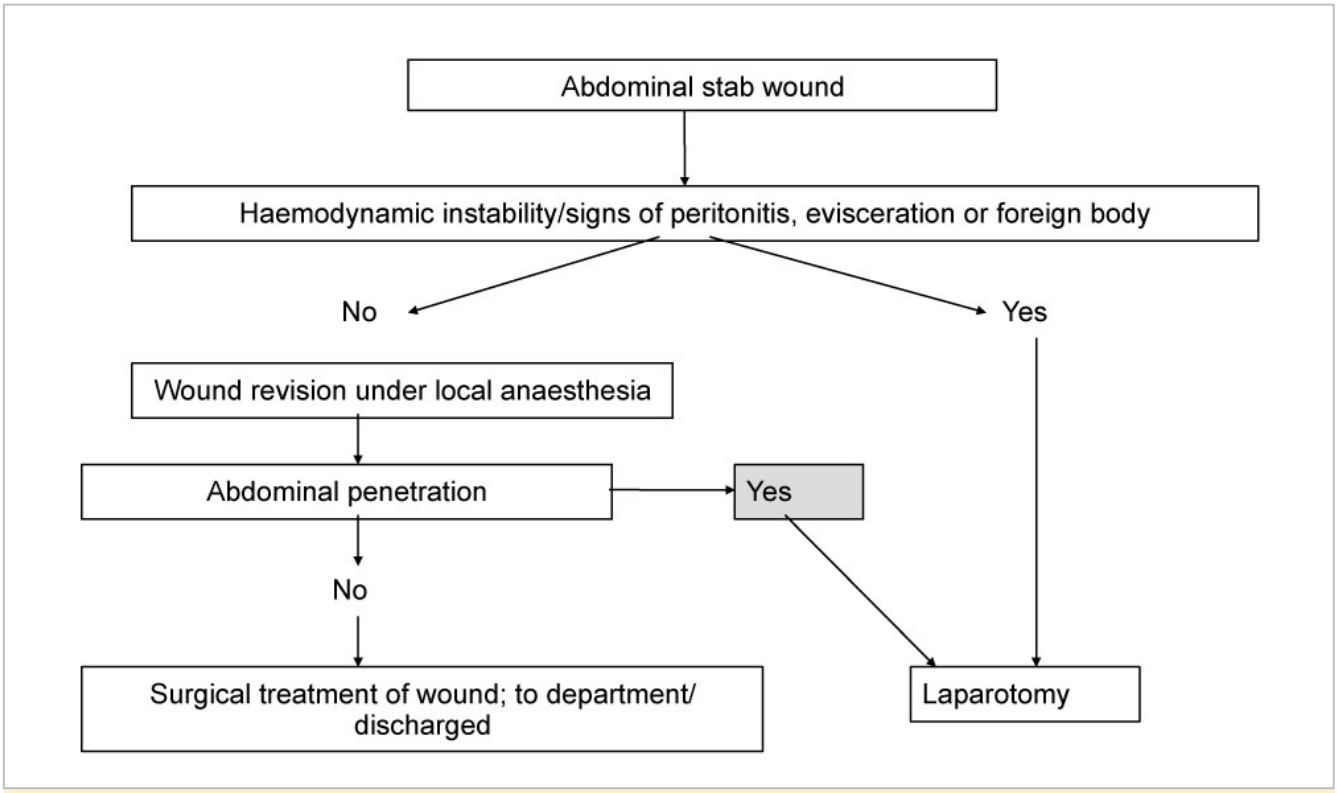

Figure 1. *Traditional approach to the patient with an abdominal stab wound.*

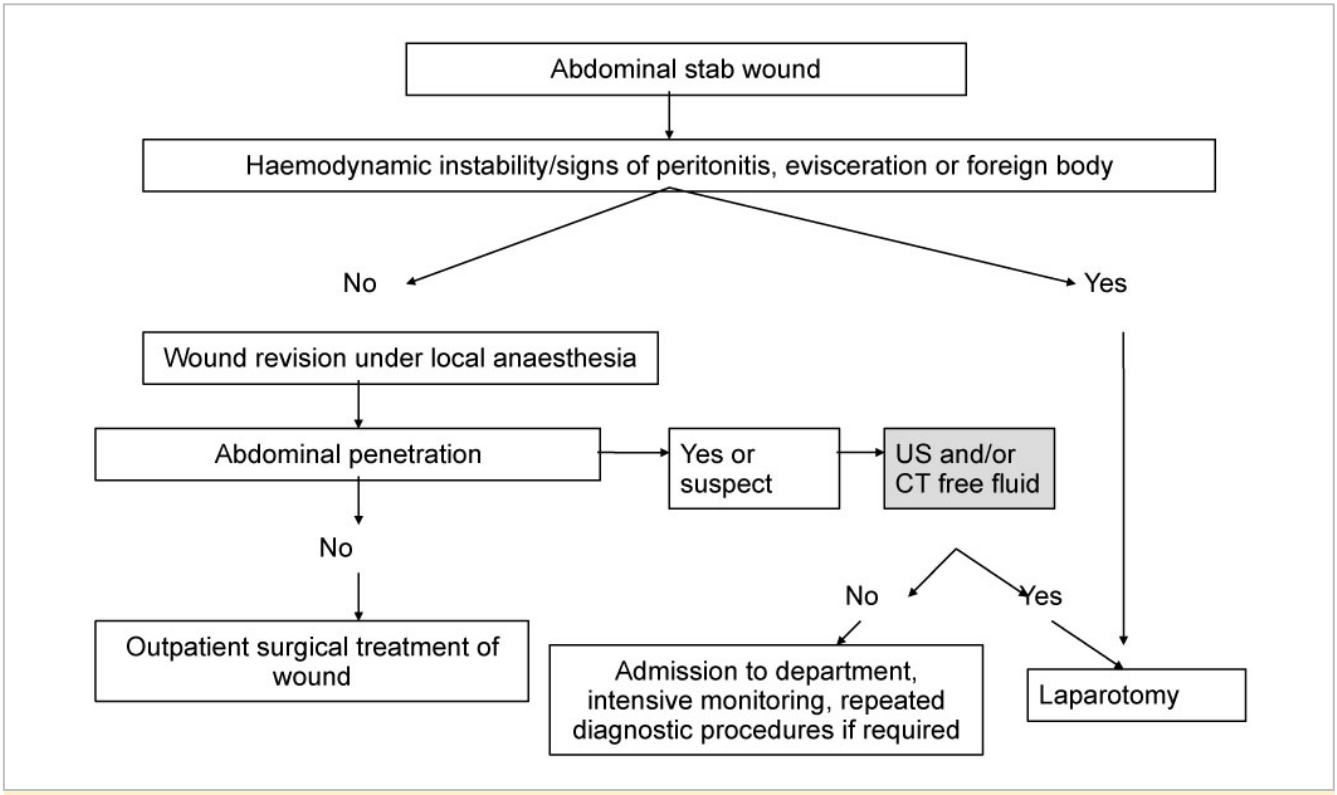

Figure 2. *Selective conservative approach according to Nagel (8); evidence of fluid on ultrasonography (US) or computed tomography (CT) examination of the abdomen is an indication for laparotomy.*

demographic characteristics of such injuries, to present the treatment strategy, and compare our results with those of other centres around the world.

MATERIAL AND METHODS

In our retrospective study we analysed the results of surgical management of 56 injured persons (47 males, 9 females; mean age, 35 years; age range: 17–80 years) treated for ASWs at University Medical Center – Maribor (Maribor, Slovenia) between January 1997 and August 2007. For each patient we collected the following data regarding the injury: location; time; circumstances; type of instrument involved; site of injury on the abdomen; surgical procedure; postoperative complications; and duration of hospitalisation. Besides taking the history and undertaking clinical examination, basic laboratory tests (complete blood count, electrolytes, urea, creatinine and blood alcohol) were also done. The indications for additional laboratory tests and imaging procedures (radiography of the abdomen, lungs and heart; US; CT) were set with regard to the clinical picture and at the discretion of the surgeon on duty. If the patient's condition did not require immediate laparotomy, primary surgical management of the stab wound with revision of peritoneal integrity was done under local anaesthesia in all patients. In the course of the diagnostic therapeutic procedure, the patient's cardiocirculatory stability (unstable): blood pressure <100 and pulse >100/min, haemoglobin (Hb) decrease >15 g/L in 3 h) and signs of peritoneal irritation (enteroparesis, pain, abdominal rigidity) were evaluated periodically. Evidence of penetration, haemodynamic instability, signs of peritoneal irritation, a foreign body in the abdomen and evisceration were indications for laparotomy. The laparotomy was defined as 'diagnostic and therapeutic' if an actively bleeding injury to a parenchymal organ or perforation of a hollow organ was treated surgically. If injuries to organs in the abdominal cavity did not require surgical treatment, the laparotomy was defined as 'diagnostic and non-therapeutic'. If the laparotomy did not reveal injury to an abdominal organ, it was defined as 'non-diagnostic and non-therapeutic'. Long-term follow-up was achieved in 19 laparotomised patients (mean duration of follow-up: 3 years). We checked the data on possible readmission to our institution for sequelae of ASW management for all patients. Statistical analysis was done using SPSS software (version 12.0; SPSS Chicago, IL, USA).

Table 1. *Total number of patients with abdominal stab wounds (ASWs), number of penetrating abdominal stab wounds (PASWs), and number of laparatomies per year in the analysed period. (* = 1 patient with PASW treated according to the selective conservative approach)*

Year	Total number of patients with an ASW	PASW	Laparotomy
1997	4	1	1
1998	8	4	4
1999	10	3	3
2000	7	2	2
2001	9	4	4
2002	4	1	1
2003	3	2	2
2004	5	4*	3*
2005	2	1	1
2006	2	0	0
2007	2	2	2
Total	**56**	**24**	**23**

RESULTS

Our analysis comprised data for 56 patients with ASWs. There were 23 laparotomies for PASW, the yearly number of laparotomies was 0–4 (mean, 2 laparotomies per year) (Table 1). The stab wounds were most often inflicted at home or in a bar by another person in the course of criminal activity (Tables 2 and 3). Five patients had >1 stab wound (4 subjects had 2 each and 1 patient had 10). In 1 case, the ASW was above and below the umbilicus. There were 42 cases of ASWs in the region above the umbilicus and 28 below the umbilicus, as well as 1 case of several stabs below and above the umbilicus (Table 4). The mean number of stabs was 1.25 (1 to 10). On hospital admission, 87% of patients were in a satisfactory physical state, none had signs of peritonitis, but 4 cases were already exhibiting signs of circulatory instability (Table 5). Seventy-six percent of subjects did not have a concomitant injury and 8 patients had insignificant concomitant injuries. One of the

Table 4. *Region of the abdomen and the number of abdominal stabs wounds (ASWs).*
(= narrowed region of epigastric, umbilical and hypogastric area)*

Region of abdomen	Number of ASWs
Above the umbilicus	42 (60%)
Upper midline region*	12
Right upper quadrant	13
Left upper quadrant	17
Below the umbilicus	28 (40%)
Lower midline region*	3
Right lower quadrant	10
Left lower quadrant	15

Table 2. *The location of the stab injury. Total and penetration stab wounds (PASW).*

	Number (%) total	Number (%) of PASW
At home	23 (41.1%)	7 (29.5%)
Pub/disco/street	11 (19.6%)	9 (37.5%)
Workplace	8 (14.3%)	1 (4%)
Penitentiary	4 (7.1%)	1 (4%)
Hunting	1 (1.8%)	0
Unknown	9 (16.1%)	6 (25%)

Table 3. *Circumstances of the injury. Total and penetration stab wounds (PASW).*

	Number (%) total	Number (%) of PASW
By another person with intent	23 (41.1%)	14 (58%)
Accidental stab by another person	4 (7%)	1 (4%)
Self-induced accidental stab	16 (28.6%)	4 (15%)
Suicidal intent	10 (17.9%)	4 (15%)
Unknown	3 (4.4%)	2 (8%)

Table 5. *Clinical condition upon hospital admission*

Condition upon hospital admission	Number (%)
Without symptoms	49 (87.5%)
Haemodynamic instability	4 (7.3%)
Evisceration	2 (3.5%)
Foreign body in the abdomen	1 (1.7%)
Peritoneal irritation	0

patients, a victim of an industrial accident (a fall on an iron fence from a height), was polytraumatized.

In 41 patients, heart–lung and abdominal radiographs were taken; in 19 cases, abdominal US and in 1 patient CT of the abdomen was done. Abdominal radiographs were taken in all patients with PASWs (19 patients) except those who underwent surgery immediately. No case of free air in the abdominal cavity was established by abdominal radiography. In 3 cases, US showed fluid in the abdomen while CT revealed no pathologic occurrence.

Primary care of the stab wound under local anaesthesia was provided for 48 of 56 patients. These patients were haemodynamically stable and had no clinical signs of peritoneal irritation, injury to parenchymal organs or injury to the cardiovascular system (Table 5). In 8 patients, primary care under local anaesthesia was not carried out because immediate laparotomy was indicated (Table 6). In 16 of 48 patients, laparotomy revealed penetration across the peritoneum. Laparotomy was indicated in 23 patients (Tables 1 and 6). In 2 subjects, laparotomy was indicated by evidence of penetration across the peritoneum and by pathologic findings on US examination (fluid in the abdominal cavity). In 13 patients, evidence of penetration across the peritoneum was the only indication for laparotomy. In 11 of 23 patients, laparotomy revealed an abdominal injury that required surgical treatment, in 4 cases the injury did not require surgical treatment, and in 8 patients no abdominal injury was found (Tables 6 and 7). The mean time from hospital admission to laparotomy was 75 min (range, 15–180 min). In 4 patients who underwent surgery immediately due to haemodynamic instability, the mean time from hospital admission to laparotomy was 22 min (range, 15–30 min). The mean duration of hospitalisation for the 23 laparotomised patients was 8.5 days (range, 3–29 days). Of 32 patients without PASWs, 8 received am-

Table 6. *Indications for laparotomy; (free fluid on US examination of the abdomen; * = diagnostic therapeutic, ** = diagnostic non-therapeutic, *** = non-diagnostic non-therapeutic; # = haemodynamically unstable).*

	Indication	No	dg+th lap*	dg+nth lap**	ndg+nth lap***
Immediate laparotomy	Unstable #	4	4	0	0
	Evisceration	2	2	0	0
	>500 ml on US	1	0	0	1
	Foreign body in abdomen	1	1	0	0
Laparotomy after evidence of penetration	Revision only	13	2	4	7
	Revision + Fluid on US	2	2	0	0
Laparotomy	Total	23	11 (47.8%)	4 (17.4%)	8 (34.8%)

Table 7. *Injury to abdominal organs found on laparotomy for penetrating abdominal stab wounds. (*; **; #: labels for affected organs in 3 patients with injury to more than one organ)*

Organ injured	Number of injuries	Total number of injuries
Liver	7 + 1* + 1**	10
Small intestine	2 + 1#	3
Stomach	1+1**	2
Splenic vein and splenic artery	1*	1
Inferior vena cava	1	1
Mesentery	1+1#	2
Diaphragm	1**	1
Pancreas	1*	1
Gallbladder	1#	1
Kidney	1*	1

bulatory treatment, and 24 were admitted for 24–48-h observation. In 1 case, despite penetration across the peritoneum, the patient was observed and no laparotomy done. After a few days of observation (additional diagnostic imaging procedures: US and CT), the patient was discharged. Short-term complications (30 days post-laparotomy) arose in 3 patients (13%): there were 2 cases of laparotomy dehiscence, and one febrile state of unknown origin. In the group of 12 patients who had non-therapeutic laparotomy, a complication occurred in 1 patient (laparotomy dehiscence). None of the patients died. Late complications arose in 6 (26%) patients; 4 cases of scar herniation were treated surgically whereas both cases of developing ileus resolved without surgery. Among 12 patients with non-therapeutic laparotomy, there were 2 (16%) cases of postoperative hernia.

DISCUSSION

The incidence of ASWs in Maribor is low. We treat an average of 4–5 patients with ASWs each year, but some authors from institutions serving a similar-sized population report 8–12 patients per month (1–7). Regarding the number of ASWs, the results of our analysis come closest to those of Wong et al. from Australia (11). The demographic characteristics of the patients from our series are similar to those from other analyses, confirming that ASWs are most frequent in young men, and that the victims are generally in good physical condition (1–12). The percentage of PASWs in our analysis was lower (41%) than that reported by other authors (60–70%) (1–3).

Some authors object to the principle of ASW exploration and establishment of peritoneal integrity under local anaesthesia because they believe that such exploration of ASWs is not sufficiently accurate to prove peritoneal injury and abdominal penetration. This particularly true in individuals with well developed abdominal muscles and/or a thick abdominal wall, in which case such revision gives reliable information only for establishing the injury or integrity of anterior musclo-fascial sheaths (2, 3).

Survey abdominal radiographs are rarely elucidative. A possible explanation for the negative radiographic findings in the present study was the relatively short time interval between injury and examination by the surgeon (median time, 45 min), and the relatively

small perforating defects of the intestine (the abdominal wall may cover a small defect). There was no free air even in the patient with a foreign body in his abdomen (a piece of iron fence) and intraoperative proof of stomach perforation. Lepaniemi et al. state that evidence of free air in the abdominal cavity is not a sufficient indicator of injury to hollow organs because it could be due to entrance of air through the penetrating wound. Their study included 7 such patients whereas perforation of a hollow organ was seen in only 2 cases (3). Only one-third of our patients had an abdominal US examination. This can be explained by the fact that proof of PASWs by revision of ASWs under local anaesthesia was followed by laparotomy. There are conflicting opinions as to the weight of US in making the decision on laparotomy. For some authors, US evidence of fluid in the abdomen is an indication for laparotomy whereas others object to this principle, suggesting additional diagnostic procedures are needed (3, 9, 10). In the present study, US revealed free fluid in 3 cases. In 2 cases, the subsequent laparotomy was therapeutic (haemorrhage from the inferior vena cava in 1 case and haemorrhage from the liver in the other case) and in 1 case it was not therapeutic because it disclosed a collection of blood that had transported from the abdominal wall into the abdominal cavity. Many authors advise abdominal CT for diagnostic evaluation of the trauma victim with suspected PASWs (5, 12). Some authors use only the administration of a single contrast medium into the vein (7), other authors use a double (venous and oral) (4), whereas other researchers use a triple (venous, oral and rectal) (12). Demetriades recommends only intravenous administration of contrast in CT. As diagnostic criteria on CT, he mentions the presence of even small quantities of air; free fluid in the abdomen in the absence of injury to parenchymal organs; local thickening of the intestinal wall; and leakage and collection of contrast medium. The evaluation of these parameters on CT is not always easy, and should be considered within the context of the clinical picture. We applied CT angiography only once, in our 1 patient with PASWs who was treated according to the principles of a selective conservative approach.

In some centres diagnostic laparoscopy is applied to patients with PASWs (5, 7, 12, 14). This is contradicted by Lepaniemi who proved that in PASWs diagnostic laparoscopy has no advantage over a traditional or selective conservative approach (14). Laparoscopy was not used in any of our cases.

In 23 laparotomised patients with PASWs, the mean time from hospital admission to laparotomy was 75 min (range, 15–180 min). In 4 haemodynamically stable patients, this time amounted to 15–30 min, which is comparable with data from the USA (7). We had no cases of deterioration in patient condition on account of late laparotomy.

In the present study, the percentage of laparotomies without therapeutic action amounted to 52%, which is in accordance with the results of other authors using the traditional approach (30–60%) (1–3, 5, 15). The percentage of complications in this group of patients was 8.3% (laparotomy dehiscence), which corresponds to the reports of other authors (1–3, 6, 15). What could be the fate of the 52% of patients with non-therapeutic and non-diagnostic laparotomy under a selective conservative approach? It is most likely that most could be spared laparotomy because reports state that the percentage of unnecessary laparotomies according to the selective principle is 5–15% (1–3, 6, 15). All except 4 patients were haemodynamically stable and had no signs of peritonitis. Hence, in most patients with PASWs, there would be enough time for additional diagnostic procedures. Besides, laparotomy was indicated in 10 of 23 laparotomised patients with PASWs even if we had considered one of the algorithms for the selective conservative procedure (Figures 1–3, Table 6). In 1 of 10 patients, the laparotomy proved to be unnecessary. Of the remaining 13 patients with PASWs (proven by stab exploration), laparotomy was not necessary in 11 cases (85%). Abdominal US was done in 9 of 13 patients, but the results neither indicated an injury of visceral organs nor did they exclude it. Such was also the case in both patients with therapeutic laparotomy (1 case with vena cava injury with increasing retroperitoneal haematoma and 1

case with intestinal injury with escape of intestinal contents). What would have resulted if CT examination had also been done instead of laparotomy in these 13 patients? Considering the laparotomy findings in 11 patients, it is highly likely that the CT images would not have disclosed any pathologic occurrence. In 1 of the 2 patients who underwent a therapeutic laparotomy for rupture of the vena cava, we could probably see the leakage of contrast medium or a haematoma along the vena cava; in the other case, however, it was perhaps too soon after injury to see any sign of escaping intestinal contents. Consequently, in the selective approach, only 1 patient would undergo surgery in the early phase whereas 12 would be under observation and undergoing repeated US and/or CT examination, depending on the clinical picture. In the other patient with a therapeutic laparotomy, control CT examination would perhaps have revealed fluid and gas in the abdominal cavity, or signs of peritoneal irritation would have developed while waiting for definitive data. Regardless of the scenario, this patient would probably also have undergone surgery, but the question of whether the delayed laparotomy would have been fatal remains unanswered. According to the experience of centres in which the selective conservative approach is firmly established, this occurs in 5–17% of cases (laparotomy delay, 19–41 hours) (3, 7). In the reports mentioned, such delay did not lead to a higher prevalence of mortality (0– 3.6%) (1, 5, 6).

CONCLUSION

In our region, the number of ASWs was significantly smaller than that seen in other urban centres around the world. Two procedures are available for asymptomatic patients with PASWs: the traditional with immediate laparotomy or the selective conservative procedure. The advantage of the latter is undisputed and is reflected in the smaller percentage of unnecessary laparotomies, and consequently in the absence of possible complications associated with the procedure (6). Such an approach, however, demands an experienced team of surgeons, accurate evaluation of the clinical condition, continuous access to imaging and invasive diagnostic procedures, as well as the possibility of immediate surgical intervention. If these conditions are not fulfilled, then the traditional approach may be safer – laparotomy on evidence of a PASW. As a rule, the complications that may arise on unnecessary laparotomy are not of such a nature that they would put the patient at risk and compensate for the possible serious complications associated with missed or incorrect actions in the selective conservative procedure.

REFERENCES

1. Taviloglu K, Günay K, Ertekin C, Calis A, Türel Ö. Abdominal stab wounds: the role of selective management. Eur J Surg 1998; 164: 17-21.
2. Leppäniemi AK, Haapiainen RK. Selective nonoperative management of abdominal stab wounds: prospective, randomized study. World J Surg 1996; 20:1101-6.
3. Leppäniemi AK, Voutilainen PE, Haapiainen RK. Indications for early mandatory laparotomy in abdominal stab wounds. Br J Surg 1999; 86:76-80.
4. Shaftan GW. Indication for operation in abdominal trauma. Am J Surg. 1960; 99:657-64.
5. Nicholas GM, Rix PE, et al. Changing patterns in the management of penetrating abdominal trauma: the more things change, the more they stay the same. J Trauma 2003; 55:1095-100.
6. Demetriades D, Rabinowitz B. Indications for operation in abdominal stab wounds: a prospective study of 651 patients. Ann Surg 1987; 205: 129-32.
7. Demetriades D, Hadjizacharia P, Constantinou C, Brown C, Inaba K, Rhee P et al. Selective nonoperative management of penetrating abdominal solid organ injuries. Ann Surg 2006; 244: 620-28.
8. Arikan S, Kocakusak A, Yucel AF, Adas G. A prospective comparison of the selective observation and routine exploration methods for penetrating abdominal stab wounds with organ or omentum evisceration. J Trauma 2005; 58: 526-32.
9. Nagel M, Kopp H, Hagmuller E, Saeger HD. Schuss- und Stichverletzungen des Abdomens. Zentralbl Chir 1992; 117: 453-9.
10. Brussel MV, Hee RV. Abdominal stab wounds: a five-year patient review. Eur J Emer Medic 2001; 8:83-8.
11. Wong K, Petchell J. Severe trauma caused by stabbing and firearms in metropolitan Sydney, NSW, Australia. ANZ J. Surg. 2005; 75:225-30.
12. Chiu WC, Shanmuganathan K, Mirvis SE, Scalea TM. Determining the need for laparotomy in penetrating torso trauma: a prospective study using triple-contrast enhanced abdominopelvic computed tomography. J Trauma 2001; 51: 860-9.
13. Soto JA, Morales C, Munera F, Sanabria A, Guevara JM, Suarez T. Penetrating stab wounds to the abdomen: use of serial US and contrast-enhanced CT in stable patients. Radiology 2001; 220:365-71.
14. Ahmed N, Whelan J, Brownlee J, Chari V, Chung R. The contribution of laparoscopy in evaluation of penetrating abdominal wounds. J Am Coll Surg 2005; 201:213-16.
15. Leppäniemi A, Haapiainen R. Diagnostic laparoscopy in abdominal stab wounds: a prospective, randomized study. J Trauma 2003; 55:636-45.