

CLINICAL STUDY

Injuries of the intraabdominal organs at patients with polytrauma

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Abstract

The authors analyse group of 77 patients with several injuries of the intraabdominal organs by polytrauma and intraabdominal continuing bleeding. The injuries were classified in compliance with the classification of the American Association for the Surgery of Trauma (AAST), 1994. At hemodynamically stable patients, the authors accept selective non-operative forms of treatment, however are aware of the risk of delaying the therapy of severe polytrauma. (Tab. 4, Fig. 2, Ref. 3.)

Key words: intraabdominal injuries at patients with polytrauma, forms of treatment.

Abbreviations:

Resection B1 — resection of stomach by First Billroth's method, GDA — gastroduodenal anastomosis, GEA — gastroenteric anastomosis, EEA — enteroenteric anastomosis, RHC — right hemicolectomy, TS — transversostomy, SE — splenectomy, CPF — cardiopulmonary failure, USG — sonography, HT — hepatic artery, EL — explorative laparotomy, MOSF — multi-organs failure.

The growing number of traffic and criminal accidents resulting in an increasing incidence of injuries of intraabdominal organs represent a source of significant morbidity and mortality due to blunt or penetrating injuries. The majority of severe blunt injuries occur as part of polytrauma. The diagnostic procedure is therefore more complex using several imaging methods (USG, CT, angiography). On the basis of the evaluation of the current state of the injured, the optimal therapeutic procedure is selected, including the operational revision of the intraabdominal injury.

The significance of blunt injuries of the abdominal cavity as a part of polytrauma resides in its possible omission or late recognition due to the dominating symptoms of other injuries (cranio-cerebral injuries, pelvis fractures, open fractures). The form of further treatment of blunt or penetrating injuries depends on the current hemodynamic state of the patient. Urgent operations at unstable patients with a presumable or proved source of bleeding within the chest or abdominal cavity, represent part of the resuscitation care (1, 3).

Patients, methods and results

At the Surgical Department of the Faculty Hospital in Ruzinov, Bratislava, 2,152 injured patients were treated during the five-year period from 1st January 1997 to 31st December 2001. Out of these patients, 77 (3.6 %) were treated surgically due to injuries of intraabdominal organs as part of polytrauma. Urgent laparotomies were performed at 71 patients (92 %), and 6 patients (8 %) were subdued to secondary laparotomy, out of whom 4 patients up to 24 hours and 2 patients up to 48 hours after their admission to hospital. 52 patients (68 %) were males and 25 patients (32 %) were females. The average age was 29 (19–70) years. The analysis was focused on epidemiologic indices, mechanism of injuries, clinical data, complications and results. Associated injuries (polytrauma) were defined as an accidental damage of two or several organ systems that potentially endangered the life of the injured. The lethality was evaluated as hospital lethality. Blunt mechanism of injury occurred at 46 patients (60 %), and penetrating mechanisms at 31 patients (40 %) (24 stab wounds and 7 bullet wounds). Traffic accidents resulted in injuries at 41 patients (52 %), criminal accidents at 21 patients (27 %), falls from height at 5 patients (7 %), suicide at 5 patients (7 %), and other mechanisms at 5 patients (7 %). The average stay at KAIM lasted 2 (1–14) days and that at the Surgi-

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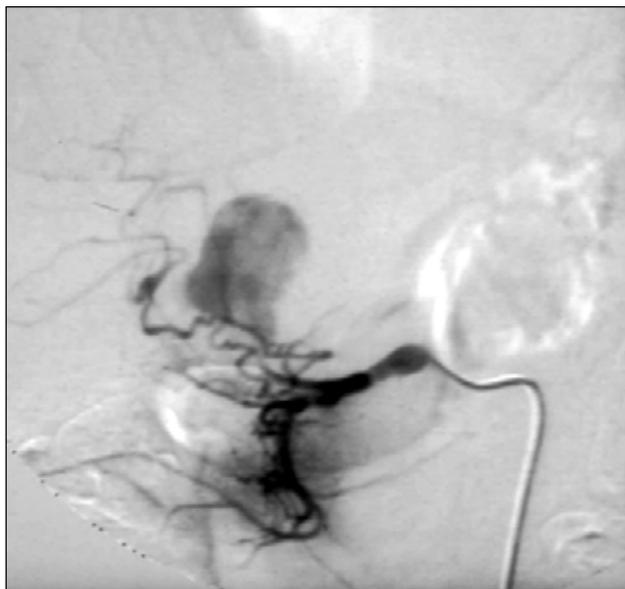


Fig. 1. Post-injurious aneurysm of the left hepatic artery in the area of the hilum.

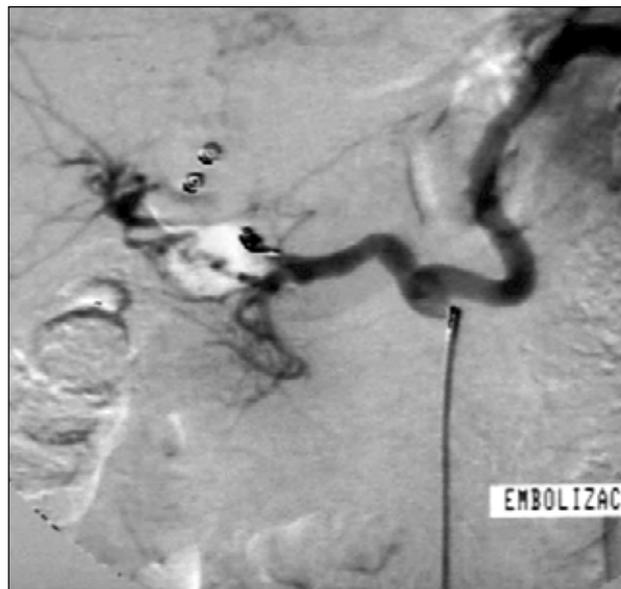


Fig. 2. State after embolization by interventional radiology technique.

cal Department lasted 12 (1–76) days. After the admission to hospital, the injured were evaluated by the physiologic scoring system of Revised Trauma Score (RTS). Its average value was 8 (5–13), while the value of 11 was given to severe injuries. 47 (61 %) patients suffered further injuries of other organ systems and 30 patients (39 %) suffered skeleton fractures, out of which 13 % were vertebral fractures. The most severe injury of intra-abdominal organ was analysed. The average number of blood transfusion units per patient was 9 (4–20). The extent of intraabdominal injury was classified in compliance with the classification of American Association for Surgery Trauma (AAST). The indications of primary urgent laparotomies in blunt injuries were assessed on the basis of clinical examination, x-ray native picture of the abdomen, the presence of free fluid within the abdominal cavity or the presence of organ damage detected by use of USG or CT scan. Most frequent indications for secondary laparotomies in coincidence with blunt injuries were hemodynamic instability, increasing volume of intraabdominal fluid detected by USG examination or the proof of organ injury by CT scan. The usual pathologic anatomic findings in coincidence with blunt injuries were represented by traumatic lacerations of injured organs. Primary laparotomies in coincidence with penetrating stab injuries were indicated on the basis of clinical examinations. In coincidence with bullet injuries, they were indicated also on the bases of x-ray native pictures or CT examinations of the abdominal cavity with the possibility of judging the extent of accidental damage of intraabdominal organs or the localisation of the projectile.

Accidental injuries of the stomach were treated at 7 patients (9 %). 4 patients with accidental perforations of the stomach of degree II and 2 patients with accidental perforations of the stomach of degree III were treated by suture and external drainage of the abdominal cavity. The accidental injury of the stomach of

degree IV with loss of tissue and devascularisation of the stomach at one patient was treated by 2/3-resection of the stomach according to Billroth I and GDA with drainage of the abdominal cavity. There was one case of complicated healing of the operational incision performed due to stomach injury.

Three patients (4 %) were treated due to the duodenal injury. Two patients suffering from traumatic perforations of degree II were treated by suturing the injured wall and by external drainage. One patient with traumatic perforation of degree III was treated by D2 suture of the duodenal wall, GEA and EEA with external drainage of the abdominal cavity. At this patient the post-operation course was complicated by duodeno-cutaneous fistula that was electively resected 2 months after the injury.

12 patients (16 %) were treated due to accidental perforations of small bowels. The injuries of four patients were of degree II, and four of them had injuries of degree III. All of them were treated with suturing the intestinal wall. Intestines were also resected by end-to-end anastomosis in four of the patients due to injuries of degree IV. At one patient, the injury of degree II was overlooked during primary laparotomy. On the second day after the operation, due to the symptoms of peritoneal irritation, the state of the injured was revised and solved by two ileostomoses that were enclosed 6 months after the injury. At one of the injured, the operation wound healed per secundam intentionem.

6 patients (8 %) were treated due to accidental perforations of large bowels. At two patients with injuries of degree II, sutures of the intestinal wall were performed 6 hours after the accidents. At two patients with accidental perforations of the caecum and ascending colon, right hemicolectomies were performed. At one of them, an abscess between circular folds was detected and solved by operational revision and drainage of the abdominal cavity. 2 patients overcame injuries of degree IV. One of them

Tab. 1. Injuries of intraabdominal organs at polytraumatised patients of the Ruzinov Faculty Hospital in Bratislava from 1st January 1997 to 31st December 2001, the total number of patients is 2,152, operated n=77 (3.6 %).

Males	52	68%
Females	25	32%
Average age	29	19-70
Average RTS value	8	5-13
Urgent laparotomy	71	92%
Delayed laparotomy	6	8%
Average stay at KAIM (in days)	2	1-14
Average stay at the Surgical Department (in days)	12	1-76

Tab. 2. Mechanism of injury.

Blunt injury	46	60%
Penetrating injury	31	40%
- injury	24	
- bullet injury	7	
Traffic accident	41	52%
Criminal accident	21	27%
Fall from height	5	7%
Suicide	5	7%
Other mechanism of injury	5	7%

with trans-section of colon transversum was treated with transversostomy, and the other with several-fold trans-sections of the sigmoid colon after a bullet injury was treated by Hartmann operation. In this case, six months after the injury, end-to-end sigmoido-rectoanastomosis was electively performed and the passage was renewed per vias naturales. In this patient, the healing of the wound was complicated.

Spleen injuries were treated at 17 patients (22 %). Injuries of degree III were present at 7 patients. 6 patients suffered injuries of degree IV, and 4 patients had injuries of degree V. Owing to such serious extent of injuries, all patients were treated by splenectomy with left subphrenic drainage. At one patient with injury of degree IV, subphrenic abscess was detected and subsequently solved by re-operation and repeated drainage of the left subphrenic space.

The liver was treated at 25 patients (32 %). Injury of degree II was treated in 6 patients by means of Braun Parenchymaset suture and external drainage of the abdominal cavity. At two patients, dehiscence of operation incisions were recorded and treated by re-suture by means of Ventrofil suspensory suture. Injuries of degree III were treated in 6 patients also by means of parenchymal suture and external drainage. During the post-operational period, one patient displayed biliary-cutaneous fistula treated by endoscopic intervention by means of self-expanding stent. At the second patient, the post-injurious aneurysm of the left hepatic artery in the area of the hilum after one year from the accident was embolised by means of interventional radiology technique (Fig. 1). The degree IV of injury was treated at four patients. At two of them, we performed resection debridements of liver segments V and VI, and the biliary tract was drained. At two other patients being after the suture of the liver due to its

continuous bleeding and disorder in coagulation, we used the 72-hour perihepatic packing. In this group, one patient developed a post-operational bilioma that was drained under sonographic control. The other patient developed a subhepatic abscess that was solved by re-operation and repeated drainage of the abdominal cavity. 5 patients with injuries of degree VI died due to protracted hemorrhagic shock. At two patients, intracaval shunt was introduced during the resuscitation period.

Injuries of pancreas were treated at 5 patients (6.5 %). At one of these patients, with tangential bullet injury of the pancreatic body of degree II, suture of the pancreas was performed and the left sub-phrenic space, sub-hepatic space and omental bursa were drained. On the fourth post-operational day, post-operational pancreatitis was detected by means of CT examination and revised with the operational finding of a necrotic omentum and abscess. The abscess was evacuated, necrectomy of the pancreas was performed by means of digitoclasia, the necrotic omentum was resected, irrigated and drained. The operation was terminated by laparostomy, and the toilet of abdominal cavity and retroperitoneum was regularly performed. Gradually, the necrosis was infected by *Clostridium perfringens* and the patient died on the fifteenth post-operational day due to failure of several organs. The resection of pancreatic cauda was performed at two patients with injuries of degree II. One of them developed an intraabdominal abscess that was punctured under USG control. One of the patients with proximal destruction of the pancreatic head with injury of degree IV died during the operational resuscitation phase and the operation was terminated by explorative laparotomy.

Bullet injuries of the kidneys (vascular structures in the area of hilum) of degree IV were treated at two patients (2.5 %) by means of nephrectomy.

On the whole, postoperational complications were recorded at 14 patients (18 %) and solved by the presented procedures. 12 patients (16 %) died after operation. Ten patients died due to protracted haemorrhagic shock. One patient died in result of failure of several organs due to clostridium sepsis and one injured died after splenectomy due to cardiorespiratory failure and pneumonia (Tabs 1–4).

Discussion

Examinations of patients with polytrauma are limited by the state of their hemodynamic stability and the availability of imaging methods. In hemodynamically instable injured with protracted hypovolemic shock not responding to volume resuscitation, immediate laparotomy is always indicated in cases where intracavitary injury is presumed. In cases with blunt injury of the abdomen, spiral CT enables to judge the extent of intracavitary injury in short time as well as the indication of operational revision. In cases with blunt injuries, laparoscopy is presented as an auxiliary method that supplements CT examination in conservative treatment of injuries. The benefit of laparoscopy is presented especially in penetrating injuries.

The operation technique is in compliance with the recommended procedures. In cases with injured spleen, splenectomy

Tab. 3. Injuries of intraabdominal organs.

Stage	n	Treatment	Complications and their solution	Cause of death
Stomach n=7 (9%)				
II	4	exploration, suture, drainage		
III	2	exploration, suture, drainage		
IV	1	resection BI, GDA, drainage	wound infection	
Duodenum n=3 (4%)				
II	2	suture, drainage		
III	1	suture, GEA, EEA, drainage	fistula - reoperation, resection	
Small intestine n=12 (16%)				
II	4	suture	peritonitis n=1 (omission) 2 ileostomy, recurrence in 6months	
III	4	suture		
IV	4	resection, EEA	wound complication n=1	
Large intestine n=6 (8%)				
II	2	suture in 6 hours, drainage		
III	2	RHC, drainage	abscess between the circular folds, peritonitis n=1 reoperation	
IV	2	TS n=1 Hartman n=1	wound complication	
Spleen, n=17 (22%)				
III	7	SE, drainage		
IV	6	SE, drainage	abscess, peritonitis n=1 reoperation	
V	4	SE, drainage	bronchopneumonia, sepsis n=1	CPF n=1 (6%)
Liver, n=25 (32%)				
II	6	suture, drainage	wound dehiscence n=2 ventrofil	
III	6	suture drainage	biliocutaneous fistula n=1 self-expanding stent pseudoaneurysm HT n=1 radiological embolisation	
IV	4	debridement, drainage n=2 packing n=2	bilioma n=1 - drainage USG abscess n=1 - reoperation, drainage	
V	5	EL		in tabula n=5
VI	4	EL		in tabula n=4 (9/36%)
Pancreas, n=5 (6.5%)				
II	1	suture, external drainage	pancreatitis, Clostridium sepsis n=1	MOSF n=1
III	2	resection of the cauda	abscess, peritonitis n=1 punction under USG	
IV	1	EL		in tabula n=1 (2/40%)
Kidney, n=2 (2.5%)				
IV	2	nephrectomy		

was always performed since the injury of the spleen parenchyma was extensive, namely of degree III–IV of the classification of parenchymal organ injuries, or severe associated injuries were present. In extensive hepatic lacerations, either resection de-

bridement and straight suture or a ligature of the injured vessels and bile ducts were used. Perihepatic packing was indicated in hemodynamic instability and disturbed blood coagulation.

Tab. 4. Treatment results.

General complications	14	18%
Exitus	12	16%
Analysis:		
protracted hypovolemic shock	10	
MOSF	1	
Cardiopulmonary failure	1	

Mayer and co-operators (2) recommend a therapeutic algorithm of pancreatic injuries according to the injury of the main pancreatic outlet. For the degrees I and II, only external drainage is recommended, in some cases debridement, necrectomy or suture of the gland. In injury cases of the degree III, left-side resection of the pancreas or distal pancreateojejunostomy is recommended. In cases with proximal or complex destruction of the pancreas and duodenum of the degrees IV and V, should the overall state of the patient and associated injuries enable it, it is recommended to perform partial subtotal pancreatectomy or duodenopancreatectomy.

Urgent operations in cases with intraabdominal injuries are primarily indicated when serious intraabdominal bleeding is di-

agnosed on the basis of clinical examination. In haemodynamically stable injured, immediate operations are indicated on the basis of results of imaging methods (CT, USG, angiography) that in addition to significant bleeding prove also other serious injuries of abdominal organs. The protracted hypovolemic shock and the development of failure of several organs, or concomitant occurrence of associated injuries are the most frequent causes of mortality at polytraumatised patients that were operated due to intraabdominal injuries.

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LETTER TO EDITOR

At Jessenius School of Medicine in Martin Professor Piřha, Czech specialist and outstanding expert in electrophysiology and pathogenesis of neurological diseases participated in the development of the Department of Neurology. He was superseded by the leading person of the Department Prof. Drobny, who is a prestigious expert in electrophysiological methods and the present leading person of Neurologic Department Jessenius School of Medicine is Assoc. Prof. Egon Kurča.

Within the Institute of Postgraduate Education, the Department under the administration of Assoc. Prof. Trávník was founded, later moved to Trenčín and then to Bratislava. After his death Assoc. Prof. Orolín, a distinguished expert in liquorology, was appointed by this post The Department is headed now by Prof. Lisý, a considerable member of the neurological community, the chairman of the Slovak Neurological Society and a member of the committee of the European Federation of the Neurological Associations. The Department is focused particularly on the treatment of neuromuscular disease and genetic problems in neurology.

In 1968, the 2nd Department of Neurology at the SMCU was founded to extent the educational activities. It was headed by Prof. Bohm. After his leaving of Czechoslovakia the year he superseded by Prof. Cigánek, who is the outstanding specialist in the field of epileptology and electroencephalography. His works are constantly quoted all over the world. His successor and the present head of the department is Prof. Kukumberg. The Department under his administration is specialized on paroxysmal diseases and the manifestations of neuropsychiatric diseases, but also in the other spheres.

P. Traubner