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LAPAROSCOPIC OPERATIONS IN PATIENTS WITH POLYTRAUMA AND ABDOMINAL BLUNT TRAUMA

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ЛАПАРОСКОПИЧЕСКИЕ ОПЕРАЦИИ У БОЛЬНЫХ С ТЯЖЕЛОЙ СОЧЕТАННОЙ ТРАВМОЙ И ТУПОЙ ТРАВМОЙ ЖИВОТА

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Проанализирован опыт лечения 822 пациентов с политравмой и тупой травмой живота. Целью данной работы было оценить возможные преимущества стандартной диагностической лапароскопии и лапароскопических операций, выполненных у пациентов с травмой живота. После общего обследования, лабораторных тестов, рентгенографии, УЗИ и КТ-диагностики травмы у 622 пациентов выполняли диагностическую лапароскопию. В 152 (24,6 %) случаях обнаружили травму печени, осложненную кровотечением. Во всех этих случаях (53,4 % от общего числа — 282 пациентов, которым проводили лапароскопию) выполняли лапароскопические операции. В 51 случае травмы грудной клетки, осложненной гемотораксом, выполнили видеоторакоскопии с коагуляцией межреберных сосудов. Также проанализированы показания к лапароскопии в случаях травмы. Сделан вывод, что при травме живота лапароскопия позволяет избежать ненужных лапаротомий у гемодинамически стабильных пациентов. Кровотечения из небольших повреждений печени и (или) селезенки могут быть проконтролированы лапароскопически. У пациентов с политравмой и тупой травмой живота лапароскопические операции значительно снижают летальность и количество постоперационных осложнений.

Ключевые слова: политравма, тупая травма живота, лапароскопическая операция.

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In this article we analyzed our experience of treatment of 822 patients with polytrauma and abdominal blunt trauma. The aim of this study was to evaluate the possible benefits of the routine diagnostic laparoscopy and laparoscopic operations performed in case of abdominal trauma. After general examination, labtests, X-ray, USS and CT and diagnosis of trauma, 622 patients were performed videolaparoscopic examinations. In 152 (24.6%) cases we found trauma of the liver complicated with bleeding. We performed the laparoscopic operation in 152 (53.9%) patients of 282 liver trauma cases. In 51 cases of thoracic trauma with haemothorax we performed videothoracoscopies with coagulation of intercostal vessels. We also analyzed indications to laparoscopy in case of trauma and came to conclusion that laparoscopy is a useful tool to avoid an unnecessary laparotomy in stable patients with abdominal trauma. Bleeding from minor injuries of the liver or the spleen can be controlled through the laparoscopy. Laparoscopic operations in patients with mixed trauma and abdominal blunt trauma decrease mortality and number of postoperative complications. Future developments in minimally invasive surgery will allow a wider usage of laparoscopy for diagnosis and treatment of abdominal trauma.

Key words: polytrauma, abdominal blunt trauma, laparoscopy.

Actuality

The acute abdomen and abdominal trauma are the most controversial diagnostic issues in general surgical practice [1; 2]. In the past decade, an exponential rise in the prevalence of trauma injuries has been observed in most industrial countries. This is mostly of road accidents and increasing frequency and severity of violent crimes. Mortality in severe polytrauma ranges from 12 to 50%.

Laparotomy for abdominal trauma used to be negative or non-therapeutic in approximately one-third of patients. [3; 4] Two randomized studies have been published on laparoscopy in trauma [5; 6] .

The results of these studies were: laparoscopy has higher diagnostic specifity compared with peritoneal lavage, laparoscopy saved more than half of patients from laparotomy, laparoscopy reduced hospital stay compared to laparotomy, but prolonged hospital stay compared to conservative management.

The aim of this study was to evaluate the possible benefits of the routine diagnostic laparoscopy and laparoscopic operations

performed in case of abdominal trauma.

Methods and Matherials

Over the past three years in the Odessa City Center of Polytrauma there we treated 822 patients with trauma of abdomen. All patients were examined according to generally accepted standards. Ultrasound examination was performed in 380 patients. 120 of them fulfilled the dynamic ultrasound monitoring of the internal organs for 3–5 days (Table 1).

Ultrasound is the method of choice in the presence of subcapsular hematomas and ruptures of the liver, which are difficult to diagnose by other methods.

Computed tomography was performed in 170 patients. This research method has a high diagnostic value, but not always applicable because of the high cost of the survey.

80 patients fulfilled laparocentesis. However, this method of examination has a high rate of false results risk of complications in the presence of adhesions in the abdominal cavity. The most informative method of examination was laparoscopy using additional 3–2 ports, allowing a detailed view all abdominal cavity to establish and assess the origin of the damage, as well as to perform in some cases laparoscopic surgery.

Indication for the laparoscopy and thoracoscopy were: trauma of abdomen (in haemodynamically stable patients), haemoperitoneum, trauma of abdomen, thoracic trauma with pneumohaemothorax, trauma of abdomen with fractures of pelvis and extremities. Contraindications to laparoscopy were terminal condition of patient, blood loss more than 1.5 L and hypovolemic shock, trauma of diaphragm, trauma of the liver V, VI (the Liver Injury Scale (LIS) Classification), severe heart failure, massive adhesions in the abdominal cavity. We evaluate liver injury with the LIS rate (Table 2).

In 200 cases after diagnostic procedures (X-ray, ultrasound, CT, MRI) when we determined multiply damage to different organs of abdominal cavity we performed urgent laparotomies. We performed 622 videolaparoscopies examinations in patients with abdominal blunt trauma and mixed trauma, videothoracoscopy was conducted in 51 cases. In 27 cases we found bleeding from intercostals vessels which we coagulated and clipped.

Examination of abdominal organs began with the diaphragm, liver and spleen, with a gradual change in the angle of the patient on the operating table. After puncture of the gastro-colonic ligament there was performed oral examination of small glands and pancreas. Then a soft intestinal clamp seal moved up and exam-

Table 1

Mechanism and Type of Trauma

Type of trauma	Mechanism of trauma	Number	Frequency, %
Blunt trauma of abdomen	Motor-vehicle crush (car driver, pedestrian, motocycles) bicycles, falls	325	39.6
Penetrating trauma of abdomen	Knives, guns, bombs and others	83	10
Mixed trauma	Motor-vehicle crush, falls	414	50.4
Total	—	822	100

Table 2

Liver Injury Scale

Grade	Description of injury
I	
Haematoma	Subcapsular, non-expanding, less than 10 per cent of surface area
Laceration	Capsular tear, non-bleeding, parenchymal depth less than 1 cm
II	
Haematoma	Subcapsular, non-expanding, 10–50 per cent of surface area; or intraparenchymal, non-expanding, less than 2 cm in diameter
Laceration	Capsular tear, active bleeding, parenchymal depth 1–3 cm, less than 10 cm in length
III	
Haematoma	Subcapsular, more than 50 per cent of surface area or expanding; ruptured subcapsular haematoma with active bleeding; intraparenchymal haematoma larger than 2 cm
Laceration	Parenchymal depth more than 3 cm
IV	
Haematoma	Ruptured intraparenchymal haematoma with active bleeding
Laceration	Parenchymal disruption of more than 25–50 per cent of hepatic lobe
V	
Laceration	Parenchymal disruption of more than 50 per cent of hepatic lobe
Vascular	Juxtahepatic venous injuries
VI	
Vascular	Hepatic avulsion

Table 3

The Type of Abdominal and Blunt Trauma

Type of trauma	Number	Frequency, %
Trauma of abdomen with trauma of thorax	189	45,6
Trauma of abdomen with fractures of extremities, pelvis and trauma of urinal bladder and kidneys	47	11,4
Trauma of abdomen with fractures of extremities	99	24
Trauma of abdomen with fractures of extremities, pelvis and trauma of urinal bladder and kidneys, brain damage and thoracic trauma	79	19
Total	414	100

ined the bowel loops in terms of their integrity and availability of bleeding. We made 622 videolaparoscopies, of them 252 cases of traumatic injuries of the liver were diagnosed (Table 3).

Results

Among 622 cases of trauma we didn't find any damage of organs of abdominal cavity in 268 (43%) patients. In 202 (32.4%) cases we observed patients with massive liver rupture (IV, V grade of LIS) accompanied with rupture of the spleen, mesentery vessels and damage of the colon, stomach and pancreas. In these 204 cases we performed urgent laparotomies with suturing of ruptures and ligation of bleeding vessels, splenectomies, suturing of the holes in the colon and stomach, duodenum and jejunum and drainage of the abdominal cavity. In 152 (24.6%)cases we found trauma of the liver complicated with bleeding. In 152 (53.9%) patients of 282 cases with trauma of the liver we performed the laparoscopic operation. In all these cases we used auto-bloodtransfusion from abdominal cavity with "Haemonetics" © 'Cell-Saver' device. Due to this we could prolong time of operation without danger of shock in patient.

In cases of liver damage we used such methods of laparoscopic operations as you can see in table 4.

In 30 cases we performed laparoscopic operation on the liver with laparoscopic suturing: of

Table 4

Methods of Laparoscopic Operations in Patients with Trauma of the Liver

Type operation	Number	Frequency, %
Suturing	57	37.5
Electro-coagulation/ Argon-plasma coagulation	45/34	29.6/ 22.3
Packing	41	26.9
Cholecyst-ectomy	2	1.31
Total	152	100

the stomach — 2 cases, of the intestine — 9 cases, of the mesenterium — 12 cases, of the spleen (I–II Spleen Injury Scale) — in 4 cases, of the rupture of urinal bladder — 3 cases

Operating time in the cases of diagnostic laparoscopy was about 15 min and in cases of laparoscopic operations on organs of abdominal cavity — about 45–80 min. Time of thoracoscopic operations was about 20–35 min.

There were 25 postoperative complications after 152 operations: bile leakage — 8, infrahepatic abscess — 1, pancreatitis — 2, wound infection — 4, pneumonia — 6, hernias (of abdominal wall and diaphragmatic posttraumatic hernias) — 2.

In a **conclusion** we should say that:

1. Laparoscopy is a useful tool to avoid an unnecessary laparotomy in stable patients with abdominal trauma.

2. Bleeding from minor injuries of the liver or the spleen can be controlled through the laparoscopy.

3. Laparoscopic operations in patients with mixed trauma and abdominal blunt trauma decrease mortality and number of postoperative complications.

4. Future developments in minimally invasive surgery will allow a wider usage of laparoscopy for diagnosis and treatment of abdominal trauma.

REFERENCES

1. *Chung R. S.* Efficacy of routine laparoscopy for the acute abdomen / R. S. Chung, J. J. Diaz, V. Chari // Surg. endosc. – 1998. – Vol. 12. – P. 219–222.

2. *Leppaniemi A. K.* The role of laparoscopy in blunt abdominal trauma / A. K. Leppaniemi, D. S. Eliot // Ann. Med. – 1996. – Vol. 28. – P. 483–489.

3. *Leppaniemi A.* Complications of negative laparotomy for truncal stab wounds / A. Leppaniemi, I. Salo, R. Haapiainen // J. Trauma. – 1995. – Vol. 38. – P. 54–58.

4. *Renz B. M.* Unnecessary laparotomies for trauma: a prospective study of morbidity / B. M. Renz, D. V. Feliciano // J. Trauma. – 1995. – Vol. 38. – P. 350–356.

REFERENCES

1. Chunf R.S., Diaz J.J. et al. Efficacy of routine laparoscopy for the acute abdomen. *Surg. endosc.* 1998; 12: 219-222.

2. Leppaniemi A.K., Eliot D.S. The role of laparoscopy in blunt abdominal trauma. *Ann. Med.* 1996; 28: 483-489.

3. Leppaniemi A., Salo I., Haapiainen R. Complications of negative laparotomy for truncal stab wounds. *J. Trauma* 1995; 38: 54-58.

4. Renz B.M., Feliciano D.V. Unnecessary laparotomies for trauma: a prospective study of morbidity. *J. Trauma* 1995; 38: 350-356.

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