

## Gallbladder injuries due to blunt abdominal trauma: report on five cases and review of the literature

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Gallbladder lesions by blunt abdominal trauma are rare, due to the organ's anatomical particularities. Diagnosis is difficult, and it generally occurs during surgery. The trauma is usually associated with other lesions and is related to very serious traumas or to deceleration.

Due to the scarcity of publications on this topic and to its reduced incidence, we present here a report of five patients who had suffered blunt abdominal trauma with gallbladder lesion and who were attended at the General Hospital (of the University of São Paulo Medical School) Emergency Service between 1986 and 1991.

Furthermore, we analyze the incidence of this trauma, presence of associated lesion, treatment, morbidity and mortality of the patients, as well as a review of the literature.

**UNITERMS:** Gallbladder, trauma

**G**allbladder injuries due to blunt abdominal trauma is not a common occurrence and, as an isolated condition, it can be a very serious problem if not diagnosed precociously.

Partially encompassed by the liver and surrounded by the omentum and the intestine, the gallbladder is well protected and thus rarely subject to traumas. This protection is, nevertheless, limited, as injuries can take place in certain exceptional situations, such as traumas with deceleration. The predisposing factors for this type of lesion are distension of the gallbladder by fasting or by alcoholic intake, and cystic duct obstruction by cholelithiasis.

Due to the reduced number of publications on this topic we present a report on five patients who suffered blunt ab-

dominal trauma with gallbladder lesions and were treated at the Emergency Service of the General Hospital (the University of São Paulo Medical School) between 1986 and 1991.

### MATERIAL AND METHODS

The medical records of patients admitted to the Emergency Service of the General Hospital of the University of São Paulo Medical School between 1986 and 1991 were analyzed and diagnosed as having suffered blunt abdominal trauma, and who had lesions of the gallbladder. Five patients were selected to be the object of the present study. The incidence of traumas (RTS, ISS and TRISSCAN) and the presence of associated lesions, treatment, morbidity and mortality of these patients were analyzed and compared. In all of the patients, diagnosis of gallbladder lesion was made during surgery. The case reports are summarized hereafter.

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FUNGA S T  
BIBLIOTECA

### Case 1

C.A.L., age 35, male, entered the Emergency Service of the General Hospital (FMUSP) victim of an automobile accident. He arrived hypotensive (80x50 mm Hg, mentally confused (Glasgow = 14), dyspneic (FR = 32) and with a pulse of 90 (RTS = 6.8174; ISS = 27 and TRISSCAN = 0.97). Physical examination revealed reduced lung auscultation in the left hemithorax. The abdomen was smooth, painful, tense, no sounds, and positive brisk decompression. A bladder probe showed signs of hematuria. The left hemithorax was drained by removal of 100 ml of blood.

Laparotomy revealed a large complex stellate lesion in the right lobe of the liver, injured gallbladder serosa and stable retroperitoneal hematoma. The hepatic lesions and the cholecystectomy were sutured.

The patient improved rapidly and was released on day 25 after surgery.

### Case 2

E.B. age 31, female, referred from another hospital, victim of an automobile accident. She arrived hypotensive (80x65 mm Hg), conscious, (Glasgow = 15), dyspneic (FR = 36) and with a pulse of 128 (RTS = 6.8174; ISS = 34; IAT = 24 and TRISSCAN = 0.94).

Physical examination showed reduced lung noises in the right hemithorax. Abdomen was painful, pelvis stable but painful upon movement. She also showed fracture of both femurs, of the right humerus and of the right clavicle. Peritoneal washing was performed resulting positive. Surgery was indicated.

Laparotomy revealed hemoperitoneum (approximately 700 ml), multiple hepatic injuries, minor lesion at the right of the diaphragm (2 cm), discrete retroperitoneal hematoma and contuse gallbladder injury with avulsion of the cystic artery. Suturing of the hepatic injuries was followed by cholecystectomy.

The patient evolved with progressive respiratory and renal insufficiency. She developed a biliary fistula on the 5th day post surgery. On the 7th day she went into shock, had acute infarction in the posterior region of the miocardia, leading to total atrial-ventricular block and death.

### Case 3

L.W., age 32, male, victim of automobile accident. Arrived in a state of shock (30x0 mm Hg), showed agony breathing (FR = 4), mental confusion and pulse of 40 (RTS = 3.8338; ISS = 34 and TRISSCAN = 0.46). There was also cranial injury with bone exposure, fracture of upper left arm and perineal hematoma. Physical examination showed reduced auscultation in left hemithorax and abdomen pain-

ful to the touch. Urgent surgery was indicated.

Laparotomy revealed hemoperitoneum, lesion of upper pole of the spleen, and the gallbladder was displaced. During laparotomy the patient suffered cardiac arrest, resuscitation was unsuccessful, and he died in the operating room.

### Case 4

S.V.W., age 5, female, hit by automobile. She arrived conscious, with arterial pressure of 90x50 mmHg, breathing frequency of 40 and pulse of 100 (RTS = 7.55; ISS = 26 and TRISSCAN = 0.98).

Abdomen was discretely tense, pelvis stable. She presented fractures of the right femur. Surgery was indicated.

Laparotomy showed hemoperitoneum (approximately 800 ml), a splenic lesion, right renal fracture and extensive hepatic lesions in segments III and IV, in front of the gallbladder, which was lacerated. Splenectomy, right nephrectomy and hepatectomy of the injured segments were performed; gallbladder was sutured and conserved. The patient evolved to acute renal insufficiency, and was released on day 27 after surgery, with progressive improvement of renal functions. She showed no gallbladder complications.

### Case 5

J.M.A.B., age 21, male, victim of automobile accident. Arrived in a state of mental confusion, hypotensive (70x40 mmHg); normal breathing (FR = 20) and with pulse of 100 (RTS = 6.3756; ISS = 14 and TRISSCAN = 0.98). Physical examination revealed contuse injuries to cranium and face, excoriations in thorax and right flank and tense abdomen with reduced noise. Diagnostic peritoneal washing was frankly positive. Surgery was indicated.

Laparotomy revealed hemoperitoneum (2000 ml), rupture of the right lobe of the liver with partial avulsion of the gallbladder, lesion in a tributary of the portal vein and minor retroperitoneal hematoma. Cholecystectomy, suture of the hepatic injuries, suture of the venous lesion and draining of the cavity were performed. Patient was released on day 6 following surgery, with no further complications.

## RESULTS

Incidence was 2.64%. The age of these patients varied from 5 to 35 years; 3 patients were male and two female. Four were victim of automobile accidents and one had been hit by an automobile. Laparotomy showed hemoperitoneum in all five patients. Hepatic lesions were also present in four of the five cases (80%). The data on age, incidence of trauma (RTS, ISS and TRISSCAN), treatment carried out and evolution are summarized in Table I.

Table 1

Pat.	Age/Sex	RTS	ISS	Trissc.	Assoc. L	Type	Surgery	Evol.
1.	35/ m	6.8174	27	0.97	liver & retroperitoneum	contusion	cholecystectomy	release
2.	31/ f	6.8174	34	0.94	liver and diaphragm	laceration	cholecystectomy	death
3.	32/ m	3.8338	34	0.46	spleen	avulsion	SO death	death
4.	05/ f	7.5550	26	0.98	liver, kidney and spleen	laceration	suture	release
5.	21/ m	6.3756	14	0.98	liver portal vein & retroperitoneum	avulsion	cholecystectomy	release

Data on patients with gallbladder injuries due to blunt abdominal trauma

## DISCUSSION

Gallbladder lesions are a rare occurrence and difficult to diagnose, due to the size of the organ and its anatomic peculiarities. Incidence varies between 0.5 and 8.5% of all intra-abdominal lesions (17,16,4). Penn (9), in a study of 5070 cases of blunt abdominal trauma, came up with an incidence of approximately 2%. In our study, we found an incidence of 0.264%; lower, therefore, than that found in the literature.

Many different types of gallbladder traumatism can occur. Smith and Hastings (12), classified them into three types: contusion, avulsion and laceration (or perforation). The most frequent type is contusion, followed by avulsion and finally by laceration. In our series, the types encountered most were avulsion and laceration (two cases each). Contusions are probably more common than statistics would show, as this type of lesion can easily be overlooked. The natural course of this type of lesion is unknown, but Hicks (8) believes that an intramural hematoma can interfere with irrigation of the gallbladder, leading to necrosis and posterior perforation. Penn (9) adds a fourth type of trauma: traumatic cholecystitis, a condition resulting from gallbladder trauma.

In relation to mechanism of this trauma automobile accidents, falls from high altitudes, and direct trauma on the abdomen can be included. All patients in the present study were victim of traumas from motor vehicle accidents. Smith & Soderberg (11) described three predisposing factors to gallbladder lesions in blunt abdominal trauma: 1) the normal gallbladder wall, being thinner, is more susceptible to rupture than that of the diseased one, which is generally fibrotic and thick (except when there is an obstruction by stones); 2) a full, distended gallbladder is more likely to rupture 3) alcoholic intake causes an increase in sphincter tonus in the choledochoduodenal junction, and reduces gallbladder emptying (10).

Diagnosis of gallbladder injury is rarely made in pre-surgical examinations. In most published studies on the subject, diagnosis was made during laparotomy or even later, when the patient showed acute abdomen. In some cases, diagnosis occurs only in autopsy. Immediately after the trauma, symptoms include pain in the right hypochondrium and hypotension, neither of which can be entirely explained by the trauma (17). Hypovolemia, which is present in patients without significant loss of blood, probably reflects sequestrum of intraperitoneal liquid caused by the presence

of bile (16, 9). Initially, fever and leucocytosis are generally absent, since the bile is generally sterile. There may be pain in the shoulder due to the diaphragm irritation (17).

In this study, the incidence of the trauma seems to indicate a correlation between the intensity of the trauma and the occurrence of gallbladder lesion. That is, a high ISS was seen in most of the patients. There was low correlation with predictive indicators, however, (TRISSCAN) as death occurred in patients with 94% survival possibility.

There are few pathognomonic signs, symptoms or auxiliary diagnostic tests which could contribute to the diagnosis of the lesions. Some authors (9,6) refer to jaundice as a useful sign of gallbladder rupture. X-ray studies have little utility. Rarely can the presence of free air be noted, although, in later stages, X-rays sometimes suggest the presence of free liquid or paralytic ileum. Soderstrom, et al., (13) presented two cases with gallbladder avulsion and contusion having normal oral cholecystogram. Spigos, et al. (15) recommend ultrasonography and cholangiography (endoscopic and percutaneous) as auxiliary methods. Baumgartner (2) describes a case where computerized tomography and magnetic resonance results indicated suspicion of gallbladder injury.

The return of bilious liquid in peritoneal washing or abdominal puncture may be indicators of gallbladder lesion. Other authors (11, 1) reported patients with absence of bile in gallbladder rupture. Some authors, however, showed that laparoscopy can be very useful in cases of choleperitoneum, even in those cases not indicated by peritoneal washing, because the diagnosis, unlike other methods, is performed under direct vision (18).

Options for treatment include observation, draining, suture of the gallbladder or cholecystectomy. In our study, of the four cases treated surgically (one died in the operating room), three were submitted to cholecystectomy with draining and the five-year old child had her gallbladder sutured. In none of the four cases were any postoperative biliary complications observed which could be related to therapeutic conduct in treating the gallbladder. The biliary fistula seen in case 2 was related to the hepatic wound.

Smiths & Hastings (12) recommend suturing simple lacerations of the gallbladder to preserve it for future use. Hall et al. (7) recommend removing only extremely damaged gallbladders. Most of the articles published, however, call for cholecystectomy as the preferred treatment in this type of lesion. In ruptures of the gallbladder in children, many authors (14, 5, 3) believe that preservation of the organ should be attempted, by simple suturing or cholecystotomy. In a study by Zollinger et al. (19), one third of the patients with gallbladder injury were children, a fact which contributed to

the idea that the normal gallbladder is more easily injured, since cholecystitis is not a common pathology for this age group. It should be noted that sutures, at least those which come into contact with mucous membranes, should be of absorbable thread, to avoid the formation of stones.

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