

Extrahepatic Biliary Tract Injuries

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Abstract:

Background: Extra hepatic biliary tract (EBT) injuries are injuries that involve the gall bladder (GB), the common hepatic (CHD) and the common bile ducts (CBD). They are rarely encountered during external abdominal traumas. They are serious and associated with high morbidity and mortality when the ductal system is involved and because of the associated visceral and vascular injuries and thus they need special care to be diagnosed early, and managed properly.

Objectives: To study the incidence, clinical presentation, management, and complications of extrahepatic biliary tract injuries.

Methods: Retrospective review was done for all the patients who had laparotomy for their abdominal traumas during a year at Al Yarmouk Teaching Hospital with special emphasis on extrahepatic biliary tract injuries.

Results: Nearly 700 people had severe abdominal injuries necessitating an explorative laparotomy for their management. Out of this number only 8 definite extrahepatic biliary tract injuries were discovered. 6 of them had cholecystectomy and 2 had biliary ductal injuries for which drainage was the major step in their management. 4 cases were labeled to have missed EBT injuries.

Conclusion: Extrahepatic biliary injuries are rare coincidences on exploring traumatized abdomen. They are serious injuries associated with high morbidity and mortality when the ductal system is involved and are usually accompanied by severe other visceral injuries. Their management should be done by the most senior surgeon and if possible in a well equipped center.

Key Words: extra-hepatic, biliary, injuries, Iraq

Introduction:

Trauma is the principle public health problem world wide regardless of the level of socioeconomic development. In the United States, trauma is the leading cause of death in children and adults up to the age 44 years preceding all other diseases combined 1. The 150 000 annual deaths caused by trauma are more than 3 times the number of combat casualties that occurred during the entire Vietnam conflict, and trauma accounts for approximately one in six hospital admissions 1.

The abdomen is frequently injured after both blunt and penetrating trauma. The incidence continues to increase 2 and 25% of all trauma victims require an abdominal exploration 1.

In Iraq there are no accurate data regarding numbers of trauma victims, but definitely the ever lasting military actions since the early 80s are the main cause of casualties resulting in the loss of hundreds of thousands of innocent people of both sexes and of different age groups.

This paper is concerned with Extrahepatic Biliary Tract (EBT) injuries. External trauma is an uncommon cause for such injuries and the biliary ductal system is more frequently injured during surgeries i.e. via iatrogenic traumas. Still the EBT can be involved by external penetrating and blunt injuries. Very rarely they are the sole injuries and usually coincide with injuries to nearby

abdominal viscera such as the liver, the duodenum, the pancreas, the right kidney or the hepatic flexure of the colon.

Injuries inflicted by penetrating bullets and shells will form the major part of this study since we are no more receiving road traffic accidents as we can no more drive our cars in Baghdad in a speed more than 20-40 KPH.

Patients and Methods:

All the patients injured during the year starting in June 2006 and ending in June 2007, received at Al Yarmouk teaching hospital and needed an explorative laparotomy as part of their management, were reviewed retrospectively regarding total number, age, sex, the causative injury, and the type of viscera injured.

The discharging notes were reviewed to assess the type of viscera injured and the causative agent, paying special emphasis looking for EBT injuries i.e. injuries of the GB, CHD, or the CBD. The operative notes were reviewed looking for details of such injuries and for the procedures used for their management.

Patients labeled to have "missed EBT injuries" are those who had any amount of bile noted during laparotomy, without a convincing hepatic, duodenal, or pancreatic lacerations as a source of it, or patients who present post-operatively with jaundice or with bile leaking through their abdominal drains.

The morbidity and mortality rates of these EBT injuries (and of course the associated visceral injuries), were followed only for the immediate post operative period (i.e. till the patient was stable and discharged, was transferred to another sector or hospital, or till death).

Results:

Six hundreds ninety five laparotomies were performed during the year starting in June 2006 and ending in June 2007 for patients with abdominal trauma. These injured people were 606 males and 89 females.

Tab.1 sex distribution

sex	Number	%
Males	606	87.2
Females	89	12.8
Total	695	100

Nearly three quarters of the injured patients were between 15-45 years old.

Tab.2 age groups distribution among

patients	0-15	15-30	30-45	45-60	>60	total
males	52	197	25	88	18	606
Females	9	27	38	11	4	89
Total	61	224	289	99	22	695
%	8.8%	32.2%	41.6%	14.2%	3.2%	100%

The majority were injured by penetrating injuries. 456 of them were injured by bullets while 228 were injured by shells or sequel or explosions. 4 patients were stabbed, and only 7 patients had blunt trauma (out of these only 4 were due to road traffic accidents!!).

The types of associated visceral injuries were estimated in a random sample taken as every sixth patient of the whole number of injured patients. The sample size was 116 patients. The small

bowel was injured in 45 cases, the spleen in 16, the liver in 14, the colon in 13, the diaphragm in 13, the stomach in 12, mesenteric tears in 12, the kidneys in 11 (mostly the left one), the urinary bladder in 8, the duodenum in 6, negative laparotomy in 5, the ureter in 2, and single case of abdominal aorta, abdominal oesophagus, and external iliac vessel injury.

Table.3 percentages of visceral injuries

<i>Visceral injury</i>	<i>%</i>	<i>Visceral injury</i>	<i>%</i>
<i>Small bowel</i>	38.3%	<i>Urinary bladder</i>	6.9%
<i>Spleen</i>	13.8%	<i>Duodenum</i>	5.2%
<i>Liver</i>	12%	<i>Negative laparotomy</i>	4.3%
<i>Colon</i>	11.2%	<i>Ureter</i>	1.7%
<i>Diaphragm</i>	11.2%	<i>abd. Aorta</i>	0.9%
<i>Stomach</i>	10.3%	<i>abd. Esophagus</i>	0.9%
<i>Mesentery</i>	10.3%	<i>ext. iliac vessel</i>	0.9%
<i>Kidneys</i>	9.5%		

Regarding EBT injuries caused by such penetrating abdominal traumas, there were 12 cases, 9 males and 3 females. 8 of them were labeled as definite injuries since they were discovered per-operatively during explorative laparotomies. The remaining 4 cases were labeled as missed EBT injuries. 6 (out of the 8 definite cases), were discovered to have GB injuries; they were 4 males and 2 females, with a mean age of 28 years (ranging 10-45years). All of them had associated visceral injuries mainly involving the liver (but fortunately they were of grade I and II). They were all managed by cholecystectomy, and apart from a transient hyperpyrexia for a day or two, they were all discharged in a good stable condition at day 5 up to day 8. The other 2 definite EBT injuries were involving the biliary ductal system. The first was an unfortunate male patient who sustained multiple shell injuries to his abdomen causing severe visceral and vascular injuries involving the liver, the duodenum, the hepatoduodenal ligament structures, the IVC, and the pancreas, in addition to multiple bowel injuries, and in spite of the efforts paid by the surgical team, the patient could not be saved and died on the table. The second case of ductal injury was a 32 years old male who on laparotomy was found to have a tangential injury to the common bile duct near the junction with the cystic duct. After performing cholecystectomy, a trial to drain the extra hepatic biliary system was attempted and ended with the patient leaking bile through his upper abdominal drain. The patient was then referred to The Gastroenterology Center in Baghdad and ERCP and papillotomy was arranged for him ending in closure of his fistula one week after the last procedure.

Those cases which were labeled as missed EBT injuries were 4 cases, 3 males and one female in whom no definite EBT injuries discovered per-operatively but post-operative complications suggested such injuries. A child of 9 with massive haemoperitonium and severe duodenal injury was managed by double layer suturing. Post-operatively the patient developed jaundice of the cholestatic type and fever. On referring him to the GIT Center and performing ERCP for him, there was evidence of lower CBD stricture and minor amount of leakage. The procedure done for him was the insertion of a stent and the patient did improve within days. The other 3 cases presented post-operatively with leakage of bile (or greenish fluid) through their upper abdominal drains. A contrast study was not available in their files to confirm on solid base that this clear yellowish green fluid is bile rather succus entericus. One of these patients had developed wound dehiscence and the other developed a fistula, and the third had a collection drained under ultrasound guidance. All the 3 cases did improve on conservative measures although the one with the fistula remain in the hospital for a total period 40 days in 2 admissions.

If we consider the definite cases only, the incidence of EBT injuries will be 8 cases out of 695 laparotomies performed during a year and this will give us the incidence of 1.15% and if the whole 12 cases were considered to calculate the incidence of EBT injuries to be 1.73%.

Table.4 numbers and incidence of EBT injuries.

Type	Males	Females	Total	%
Definite	6	2	8	1.15%
Missed	3	1	4	0.58%
Total	9	3	12	1.73%

Discussion:

- The continuous military actions in Iraq are the cause of such huge numbers of casualties injured by bullets and shells, in contrast with road traffic accidents which are the main cause of traumatic injuries in other parts of the world. Yet it is still surprising this very low number of RTAs.
 - The age groups involved by these injuries are the active working groups who had to leave their relatively safe residency regularly heading for their daily jobs and activities to be exposed to the hazards of these blind bullets and bombs.
 - The methods used to get retrospective information about these injured people were as follows; the discharging notes of all those who had laparotomies for their abdominal traumas were reviewed. The files of all those with EBT injuries, those with prolonged hospitalization (10 days or more), or those with postoperative morbidity or immediate mortality, were reviewed in details including the operative notes and the follow up papers.
- The incidence of visceral injuries was estimated in a random sample chosen as every sixth file according to the list including file numbers of all these injured people.
- As a rule little pre-operative evaluation is required for firearm injuries that penetrate the peritoneal cavity, because the chance of internal injury is over 90% and laparotomy is mandatory 3-p.141. This may explain the large number of laparotomies done during the year of the study.
 - The extra hepatic biliary tract can be injured in penetrating trauma and bile duct injury management in such cases is often complicated by coexisting injury to other structures in the portal triad, liver, duodenum, and the pancreas 2. Furthermore bleeding from injury to the hepatoduodenal ligament vessels may disturb good assessment and surgical management of the biliary tract in a severely injured patient.
 - Injuries to the gall bladder are treated by lateral suture or cholecystectomy, whichever is easier 3. And if lateral suture is performed, absorbable suture should be used to prevent the formation of calculi. All the 6 cases of gall bladder injury reviewed by this paper were treated by cholecystectomy and fortunately they were discharged in a stable good condition and this means that morbidity and mortality of gall bladder injuries without biliary ductal injuries were good.
 - In spite of their rarity injuries to the extra hepatic bile ducts are a challenge. Because of the proximity of the portal vein, hepatic artery and the vena cava, associated vascular injuries are common and the patient physiologic status is often poor. Furthermore, the ducts are of normal size and texture (small diameter and thin wall).These factors usually preclude primary repairs except for the smallest lacerations with no loss of tissue 3.
 - These injuries in general can be treated by the insertion of a T-tube through the wound, or by lateral suture using 4-0 to 6-0 monofilament absorbable suture. All transactions and any injury associated with significant tissue loss will require a Roux-en-Y choledochojejunostomy using single layer interrupted 4-0 or 5-0 monofilament absorbable suture. Injuries of the hepatic ducts are almost impossible to satisfactory repair under emergency circumstances and one approach is to intubate the duct for external drainage and attempt a repair when the patient recovers 3.
 - Because of our local circumstance in Iraq with the lack of many of the surgical supplies including the T-tube itself, the single EBT ductal injury, that was discovered and saved, was managed by external drainage. Also the lack of supportive biochemistry or radiology backups made it impossible for further follow-up or management in the same center, and the necessity to refer them to another center where we can no more follow his/her progress.

- Regarding missed injuries, definitely the number is more than what I have mentioned but the lack of ERCP or MRCP or the necessary biochemical tests that could definitely prove that the leaking fluid is bile and not small bowel content, made me hesitant even to mention these cases in the results above. Also the way by which the operative notes are recorded (so abbreviated and devoid of enough details), added to the difficulties in reviewing and discovering more missed cases.
- The lack of experience to do sophisticated biliary drainage surgeries such as choledochojejunostomy by the junior surgeons and the lack of security that made it impossible for the most senior surgeon to reach the hospital at night add to the problem of management of EBT injuries in our country.

Conclusion

In spite of the large number of traumatic injuries encountered during the time of the study due to the ever continuing violent actions in Iraq, still extrahepatic biliary injuries are rare coincidences on exploring a traumatized abdomen. Different visceral injuries were noticed but what make extrahepatic biliary injuries more serious is that; they are associated with high mortality and morbidity especially when the ductal system is involved and they are usually accompanied by even more serious visceral and vascular injuries. Cholecystectomy, biliary ductal drainage; whether external or internal, draining any collection and managing associated visceral injuries are the main procedures used to manage these injuries. Their management should be done in a well equipped center, and managed by the most senior experts in dealing with biliary, pancreatic, and of course GIT surgery.

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