

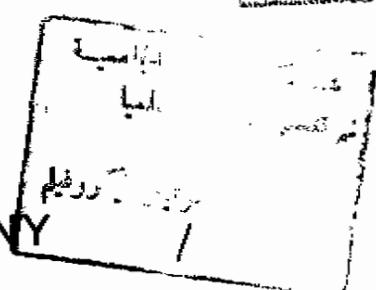
# "LAPAROTOMY IN ROAD TRAFFIC ACCIDENTS"

Essay submitted for partial  
fulfilment of master degree in  
general surgery.

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■ INTRODUCTION ■

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## **INTRODUCTION:**

Trauma is the "neglected disease" of modern society as it requires much more scientific attention.

Motor vehicle accidents remains one of the leading causes of death below the age of 40 years, and accounts for longer life lost than any other disease.

In U.S.A., over 100,000 lives are lost per year and nearly 500,000 injured persons suffer from permanent disability because of accidents. Thus, the associated morbidity and mortality and the socio-economic costs are huge, although much of the associated disability and death are potentially preventable. Well trained paramedical team plays an important role in the first aid management, but as a general rule the victim must be transferred to the nearest hospital.

In the emergency room, the surgeon must answer two questions. Firstly, does the patient need laparotomy and secondly, will the patient tolerate the time required for diagnostic manoeuvres before laparotomy is performed.

The aim of this study is to evaluate patients of road-traffic accidents with questionable intra-abdominal injuries and the role of diagnostic peritoneal lavage and laparotomy in their management.

**ANATOMY**

## Anatomy of Abdominal Organs

The superficial limits of the abdomen are formed by the lower margin of the thorax (above), inguinal ligaments (below) and iliac crests (below and on each side).

However, the real cavity of the abdomen extends upwards (beyond the costal margin) into the arch of the diaphragm, under cover of the lower ribs and the lower cartilages.

The usual intra-abdominal injuries in road-traffic accidents are primarily solid viscera as the liver, spleen and kidney with much greater frequency than hollow viscera. But with the use of belt restraints, there has been a striking increase in the incidence of bowel and mesenteric injuries (Asbun et al., 1990).

### Liver

The liver is the largest gland in the body. It weighs 1500 grams, and receives 1500 ml. blood/minute.

The normal or even the enlarged liver never falls down into the abdominal cavity. It is supported by the hepatic veins and I.V.C. The hepatic veins are entirely intra-hepatic and enter the inferior vena cava while it is clasped in the deep groove on the posterior surface. The thinner anterior edge of the liver is prevented from tilting downwards by the

attachment of the left triangular ligament and ligamentum teres and by resting on the underlying viscera (McMinn, 1990).

On the basis of blood supply and biliary drainage, four liver segments are recognized: left lateral and left medial, right anterior and right posterior. The left lateral segment corresponds to the left anatomical lobe, the left medial segment to the caudate lobe and most of quadrate lobe. The line of demarcation of functional right lobe from the rest of the liver is along the vena caval groove and gall bladder fossa at the back, but at the front there is no visible landmark. The right anterior and posterior segments again have no visible external marking, but the line of division runs obliquely and medially from the middle of the right lobe towards the vena caval groove (McMinn, 1990).

The liver receives blood from two sources; the hepatic artery and the portal vein, almost two-thirds is provided by portal flow and the remaining third by the hepatic artery. The hepatic artery divides into right & left branches in the porta hepatis. The right branch of the hepatic artery normally passes behind the common hepatic duct.

The portal vein divides in the porta hepatis into right & left branches. This portal blood is laden with the products of digestion which have been absorbed from the alimentary canal and which are metabolized by the liver cells.

There is no communication between right & left halves of the liver; indeed, even within each half the arteries are end arteries (hence infarction of the liver).

The venous return differs in that it shows a mixing of right & left halves of the liver. Three main hepatic veins drain into the I.V.C. A large central vein runs in the plane between right & left halves and receives from each. Further laterally lie right & left veins, all three open directly into the I.V.C. (they have no extrahepatic course) near the upper surface of the liver, just below the central tendon of the diaphragm. They suspend the liver to the I.V.C. and thus to the central tendon.

The lymphatics of the liver drain into three or four nodes that lie in the porta hepatis (hepatic nodes). These nodes also receive the lymphatics of the G.B. They drain downwards alongside the hepatic artery to retropyloric nodes and so to caeliac lymph nodes.

The nerve supply of the liver is derived from both the sympathetic & vagus. Vagal fibers from left vagal trunk reach porta hepatis along the lesser curve of the stomach via the lesser omentum. The sympathetics by way of the caeliac ganglia, whereas nerves run with the vessels in the free edge of lesser omentum and enter the porta hepatis (Decker and Duplessis, 1986).

### **The Spleen**

The spleen; the largest of the lymphoid organs, lies under the diaphragm on the left side of the abdomen, and although not part of the alimentary tract it drains to the portal venous system.

The odd numbers 1,3,5,7,9,11 summarize certain statistical features of the spleen. It measures 1\*3\*5 inches, weighs 7 oz and lies between ninth and eleventh ribs with its long axis lies along the line of tenth rib where they overlie the spleen. So in adult, fracture of one of these ribs alerts the surgeon to a possible splenic injury. Its lateral end does not extend beyond the mid-axillary line and its medial end about 1.5 inch from the tenth thoracic spine.

The spleen is completely covered with peritoneum and has Three ligaments.

- a) The gastro-splenic ligament is directed anteriorly, and it contains the short gastric arteries.
- b) The lieno-renal ligament is short and transmits the splenic vessels. The tail of pancreas lies in this ligament, but it does not always reach the hilum of the spleen. (So, the tail of pancreas can be damaged at the time of splenectomy).
- c) The phrenico-colic ligament attaches the splenic flexure of the colon to the peritoneum over the kidney. The lower pole of the spleen is in contact with this ligament which is thought to be one of the main supports of the spleen.

The arterial blood supply for the spleen is the splenic artery which is usually a branch of the coeliac trunk, but may arise from the aorta or superior mesenteric artery. It usually runs along the upper border of the pancreas. At the tail of the pancreas, it passes to the front of the pancreas and divides into its superior and inferior terminal branches. The intra-splenic branches of the splenic artery do not usually anastomosis; each supplies its own segment. There is a superior & inferior segments of the spleen separated by a relatively avascular plane perpendicular to the long axis of the organ, in less than 20% of patients three primary arterial branches supply a superior, middle and inferior segments. This segmental supply makes segment of resection possible; this could be impossible where preservation of splenic tissue is necessary (McMinn, 1990)

The splenic vein regularly runs on the posterior surface of the pancreas below the level of splenic artery. It receives the inferior mesenteric vein and joins the superior mesenteric vein at a right angle behind the neck of pancreas to form the portal vein.

The nerve supply of the spleen is derived from the coeliac plexus with sympathetic fibers only.

The lymph drains into several nodes lying at the hilum and thence, by way of retropancreatic nodes to the coeliac nodes.

### Kidneys

The kidneys lie high up on the posterior abdominal wall behind the peritoneum, largely undercover of the costal margin. At best, only their lower poles can be palpated in the normal individual. Each kidney lies obliquely, with its long axis parallel to the lateral border of psoas major muscle. On its vascular pedicle, it lies well back in the paravertebral gutter, so that the hilum faces somewhat forwards as well as medially. As a result of this slight rotation of kidney, an antero-posterior radiograph gives a somewhat foreshortened picture of the width of the kidney. The normal kidney measures about 12\*6\*3 cm (4\*2\*1 inch) and weighs about 130 g.

The hilum of the right kidney lies just below, and that of the left kidney just above the transpyloric plane. 5 cm from the midline, these are the surface marking of the hila. The bulk of the right lobe of the liver accounts for the lower position of the right kidney. The upper pole of the left kidney may overlies the eleventh rib. Each kidney moves in vertical range of 2 cm during full respiratory excursion of the diaphragm (Decker and Du Plessis, 1986).