ANIL AGGRAWAL'S
Internet Journal of
Forensic Medicine and Toxicology
The world's first online journal devoted entirely to forensic medicine and toxicology · Published 1 January and 1 July

VOL. 1, NO. 2
Downloaded from www.anilaggrawal.com · ISSN 0972-8074 (Online) · https://www.anilaggrawal.com/ij/vol_001_no_002/theses/1/2.html

2. GENERAL CONSIDERATIONS

ANATOMICAL ASPECTS

The abdomen is the region of the trunk below the diaphragm. It comprises two parts; upper part, the abdomen proper and lower part, the lesser pelvis. The dividing line between the two is the pelvic inlet which is bounded by the sacral promontory, the arcuate lines of the innominate bone, the pubic crest in the upper border of symphysis pubis. These two divisions are set nearly at right angle to one another.

The chief contents of the abdomen proper are: (a) Solid and fixed organs, viz., liver, spleen, pancreas and kidneys; (b) Hollow Viscus, viz., stomach, bowels, gallbladder. Liver, spleen, stomach, bowels are intra-peritoneal structures, while kidneys, pancreas and duodenum are retro peritoneal structures. The lesser pelvis contents are genitourinary structures, sigmoid colon, few coils of small bowel and iliac vessels.

Abdominal wall and pelvis have the unique resilience property by virtue of which they absorb, without visible injury, impacts of such force which if delivered else where might cause laceration and skeletal damage. The nine regions of abdomen are: (a) right costal and subcostal area; (b) the epigastric area; (c) the left costal and subcostal area; (d) the right lumbar area; (e) the umbilical area; (f) the left lumbar area; (g) the right iliac area; (h) the supra-pubic area, and (i) the left iliac area.

RIGHT COSTAL AND SUBCOSTAL AREA

Penetrating wounds or trauma directed toward this area of the body may involve the following structures : (a) the right lobe of the liver; (b) the gallbladder; (c) the common bile duct; (d) the hepatic artery, the portal vein, the inferior vena cava, and the cystic artery; (e) the right leaf of diaphragm; (f) the hepatic veins (g) The right lung; (h) the hepatic flexure of colon; (i) the duodenum (j) the head of the pancreas; and (k) the right adrenal gland or upper pole of the right kidney.

EPIGASTRIC AREA

The following structures are likely to be injured by trauma to the epigastic area: (a) superior epigastric arteries; (b) the liver; (c) the stomach; (d) the pancreas; (e) the duodenum; (f) the aorta; (g) the inferior vena cava; (h) the diaphragm; (i) the hepatic, splenic, left gastric or superior mesenteric arteries; (j) the adrenal glands; (k) the celiac ganglia; (l) the transverse colon, and (m) the thoracic duct.

LEFT COSTAL AND SUBCOSTAL AREA

In this area, the following structures are the most commonly injured: (a) the left lobe of the liver; (b) the stomach; (c) the pancreas; (d) the spleen; (e) the splenic vein or artery; (f) the celiac axis; (g) the diaphragm; (h) the left adrenal gland and kidney; (c) the left lung; (j) the splenic flexure of the colon; (k) the small bowel, and (l) the aorta.

RIGHT LUMBAR AREA

Injuries to this area are likely to involve the following structures: (a) the right lobe of the liver; (b) the gall bladder; (c) the ascending colon; (d) the small bowel; and (e) the right kidney and right adrenal gland.

UMBILICAL AREA

Injuries to this area around the umbilicus may involve the following structures: (a) small bowel; (b) a ptotic transverse colon; (c) an enlarged liver; (d) kidney if horse shoe or displaced; (e) small bowel mesentery; (f) the mesocolon; (g) the superior mesenteric artery; (h) the inferior vena cava; (i) the aorta, and (j) the sympathetic trunk.

LEFT LUMBAR AREA

The following are the most commonly involved structures within the abdomen that may be injured as a result of trauma: (a) the small bowel; (b) the descending colon; (c) a ptotic spleen, and (d) the left kidney or adrenal gland.

RIGHT ILIAC AREA

Injuries to this area may result in tears to the deep epigastric artery or injury to the right spermatic cord. The following are intra-abdominal structures that may be injured as a result of trauma to this area: (a) the small bowel; (b) the caucus or ascending colon; (c) the right common iliac artery or vein; (d) the right ureter; (e) the mesenteriolum of the appendix or the appendix; (f) the bladder; (g) the right tube and ovary, and (h) the uterus (if pregnant and enlarged).

SUPRA PUBIC AREA

Trauma to this area should immediately arose a suspicion of injury to the following structures: (a) the bladder; (b) small bowel loops; (c) the sigmoid colon; (d) the ureter; (e) hypogastric arteries, and (f) the uterus if enlarged by tumor or pregnancy.

LEFT ILIAC AREA

Trauma to this area may result in injury to the deep epigastric artery on the left side or the spermatic cord on the left side. The following intra-abdominal structures may be injured: (a) the descending colon or the sigmoid colon; (b) small bowel loops; (c) the left ureter; (d) the uterus if enlarged by tumor or pregnancy, and (e) the left tube or ovary.

GENERAL ASPECTS

Blunt trauma to the abdomen end pelvis commonly involves solid viscus, viz., liver, spleen because of their large size, relatively fixed and superficially placed position in the abdominal cavity. Liver being friable is crushed between objects such as buffers etc and right lobe of the liver is frequently injured than the left lobe. Spleen is torn as a result of compression and traction forces, commonly seen in vehicular accidents. At times, trauma to one area may result in contre-coup effect with

injury on the opposite side of solid organ, e.g., liver. Kidneys are rarely injured because of their well protected anatomical position in the posterior abdominal wall. Most of the renal injuries occur as a consequence of blunt trauma, viz., traffic accidents, falls, blows, fights, etc. Pancreas and duodenum because of their fixed position against the lumbar spine are trapped by compressing abdominal trauma, e.g., steering wheel injury. The reported incidence of pancreatic injuries in 1-2% of all abdominal injuries and are commonly seen following blunt trauma to the abdomen.

Injuries of hollow viscus, e.g., stomach, small intestines are uncommon because of protection afforded to them by their being mobile. Stomach wounds are more common in penetrating than in blunt injuries of the abdomen. In blunt trauma abdomen, bowel is usually injured at the junction of mobile and fixed portions, e.g., first portion of jejunum, distal portion of ileum, beginning of sigmoid and ascending colon. A large percentage of injuries to the small gut have associated lacerations or bruising of the mesentery. Transverse tear in the mesentery (which is parallel to the axis of the gut) usually includes few blood vessels and may endanger blood supply to a segment of gut. Injuries to the large gut in form of contusions or lacerations are commonly seen following penetrating trauma to the abdomen (stab and firearm wounds). Injuries to extra-hepatic biliary system, which includes contusion avulsion, tear or rupture of gall bladder, traumatic cholecystitis, rupture or complete transection of the common bile duct, are quite uncommon. Distended viscus such as urinary bladder, stomach, pregnant uterus may rupture as a result of sudden increase in pressure within these organs due to blunt abdominal trauma. Ureteric injuries following both penetrating and non-penetrating trauma to the abdomen are quite rare. Patients may collapse or even die without any visible injury following blunt trauma abdomen due to vaso-vagal inhibition through the solar plexus present in the posterior wall of the upper abdomen.

The diaphragm can undergo tear or rupture following both blunt and penetrating abdominal injuries. Injuries to blood vessels in the abdomen and pelvis can be seen after both penetrating and non-pentrating trauma. The blood vessels commonly involved includes abdominal aorta, inferior vena cava, mesenteric vessels, omental vessels, and smaller vessels in the retro-peritoneal tissues. Retro-peritoneal haematoma is a common feature of blunt traumatic injuries and is often associated with bony injuries such as fracture of the pelvis or lumbar spinal column. This haematoma may also be present along with a renal or vesical injury.

Pelvic injuries occur either due to direct impact in vehicular accident or due to forces transmitted through the femora when the forward movement of knee is arrested by fascia board. In vehicular run over victims, pelvis may be compressed from side to side or in antero-posterior diameter producing urological or vascular injuries. The fracture of pelvis may cause associated traumatic injuries to the rectum lying in its close vicinity.

The incidence of abdomino-pelvic trauma is variable from time to time, depending on the circumstances, mode of injury, and the general background of the area of occurrence. Thus, in war time, the incidence of this trauma is much higher than that in peace time. The extent of mechanization and the overall attitude towards violence in a particular population also has a significant role to play. The three main causes are : (a) Road traffic accidents; (b) Industrial and domestic accidents, and (c) Military violence. In big cities of India, especially in Delhi, the problem is much more complex because of increase in vehicle population from just 3 lakhs in 1951 to about 3 crores (One crore in Hindi is equivalent to ten million) at present, with two wheelers constituting 66.7% of total vehicle population. About 60,000 persons are killed annually in India in road

accidents and 30% of the deaths in road accidents are due to untimely medical assistance (Indian Express - January 3, 1997).

A Forensic Expert has to take into consideration all possible information while deducing his opinion. Many a times, he has to visit the spot in cases of traffic accidents to ascertain the nature and direction of impact on the body in vehicular accident cases. While analyzing penetrating injury of the abdomen and pelvis; course and direction of penetrating instruments or missiles and its ricocheting effect are of paramount importance. The high velocity bullet penetrating the distended viscus has an explosive effect and may cause extensive laceration of the viscus.

AIMS AND OBJECTIVES

1. To study the pattern of abdominal and pelvic injuries.
2. To study the prevalence of abdominal and pelvic injuries in relation to various factors viz., epidemiological factors, socio-economic status, penetrating/ non-penetrating injuries, time of occurrence etc.
3. To identify the risk organs in abdomen and pelvis so as to facilitate the early diagnosis of trauma by the clinicians.
4. To study the relationship between severity of the injuries and survival period.

