Posterior Abdominal wall – II

(Abdominal Aorta, Inferior Vena Cava, Lymph nodes)

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Learning Objectives

- At the end of this teaching session all the students should be able to:
  - Describe the location and vertebral extent of abdominal aorta
  - Enumerate the ventral, lateral, dorsal and terminal branches of abdominal aorta
  - Describe the relations of abdominal aorta
  - Describe the formation and termination of inferior vena cava (IVC)
  - Describe the relations of IVC
  - Enumerate the tributaries of IVC
  - Write a note on collateral pathways in IVC obstruction
  - Enumerate the chief lymph trunks and groups of lymph nodes in the abdomen
  - Write a note on territories drained by the lymph node groups present in the abdomen
Abdominal Aorta
Abdominal Aorta

- The abdominal aorta is the continuation of descending thoracic aorta at aortic orifice in the diaphragm (inferior border of T 12)
- Length- 10 – 11 cm
- Breadth: 2 cm
- Is retroperitoneal
- On posterior abdominal wall
Vertebral extent & Termination

- Extent – from L1 to L4

- Terminates at lower border of L4 vertebra to the left of midline by dividing into right and left common iliac arteries
Branches of abdominal aorta

<table>
<thead>
<tr>
<th>Anterior Group:</th>
<th>Lateral Group:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Celiac trunk</td>
<td>1. Right &amp; Left Inferior phrenic arteries</td>
</tr>
<tr>
<td>2. Superior mesenteric artery</td>
<td>2. Right &amp; Left Suprarenal arteries</td>
</tr>
<tr>
<td>3. Inferior mesenteric artery</td>
<td>3. Right &amp; Left Renal arteries</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dorsal Group:</th>
<th>Terminals Branches:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Right &amp; Left Lumbar arteries</td>
<td>1. Right &amp; Left Common iliac arteries</td>
</tr>
<tr>
<td>2. Median sacral artery</td>
<td></td>
</tr>
</tbody>
</table>

Detailed course and distribution of these arteries will be taught with the respective viscera or in the specific region.
<table>
<thead>
<tr>
<th>Name of Artery</th>
<th>Type</th>
<th>Number</th>
<th>Vertebral level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Celiac trunk</td>
<td>Visceral</td>
<td>Unpaired</td>
<td>T12</td>
</tr>
<tr>
<td>2 Superior mesenteric artery</td>
<td>Visceral</td>
<td>Unpaired</td>
<td>L1</td>
</tr>
<tr>
<td>3 Inferior mesenteric artery</td>
<td>Visceral</td>
<td>Unpaired</td>
<td>L3</td>
</tr>
<tr>
<td>4 Middle suprarenal arteries</td>
<td>Visceral</td>
<td>Paired</td>
<td>L1</td>
</tr>
<tr>
<td>5 Renal arteries</td>
<td>Visceral</td>
<td>Paired</td>
<td>L1/L2</td>
</tr>
<tr>
<td>6 Gonadal arteries</td>
<td>Visceral</td>
<td>Paired</td>
<td>L2</td>
</tr>
<tr>
<td>7 Inferior phrenic arteries</td>
<td>Parietal</td>
<td>Paired</td>
<td>T12</td>
</tr>
<tr>
<td>8 Lumbar arteries (L1, L2, L3, L4)</td>
<td>Parietal</td>
<td>Paired</td>
<td>L1-L4</td>
</tr>
<tr>
<td>9 Median sacral artery</td>
<td>Parietal</td>
<td>Unpaired</td>
<td>L4</td>
</tr>
<tr>
<td>10 Common iliac arteries</td>
<td>Terminal</td>
<td>Paired</td>
<td>L4</td>
</tr>
<tr>
<td>Name of Artery</td>
<td>Distribution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Celiac trunk</td>
<td>Derivatives of foregut</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Superior mesenteric artery</td>
<td>Derivatives of foregut</td>
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</tr>
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<td>3. Inferior mesenteric artery</td>
<td>Derivatives of foregut</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Middle suprarenal arteries</td>
<td>Suprarenal gland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Renal arteries</td>
<td>Kidneys, suprarenal gland, ureter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Gonadal arteries</td>
<td>Testes / Ovaries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Inferior phrenic arteries</td>
<td>Diaphragm, suprarenal gland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Lumbar arteries</td>
<td>Abdominal wall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Median sacral artery</td>
<td>Vestigial artery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Common iliac arteries</td>
<td>Its external &amp; internal branches supply lower limb, pelvic viscera, walls of pelvis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Relations

Anterior

- Between celiac trunk & SMA-splenic vein & body of pancreas
- Between SMA & IMA- left renal vein, uncinate process of pancreas and 3rd part of duodenum
- Below the 3rd part of duodenum – covered by parietal peritoneum of floor of infracolic compartment

Posterior

- L1- L4, 3rd & 4th lumbar veins

Right

- Inferior Vena Cava

Left

- Left sympathetic trunk

Diagrammatic representation of Aorta as seen from the right side
Aortic aneurysm

- Aneurysm - dilation of the artery to more than 1.5 times its original size.

- The abdominal part of aorta - common site for aneurysmal changes.

- Patients - may experience abdominal pulsations, abdominal pain and back pain, may also compress nerve roots causing pain/numbness in the lower limbs.
Inferior Vena cava
Inferior vena cava
(location & formation)

- Largest vein
- Drains blood from body below diaphragm
- Length – 20-23 cm
- Breadth – 2.5 cm
- Formation: opposite L5 by union of right & left common iliac veins
Inferior vena cava
(course)

- Longer course than aorta
- Ascends in front of vertebral column
- Lodges in a groove on right lobe of liver
- At T8 passes through diaphragm (central tendon)
- Pierces fibrous pericardium
- Opens into right atrium, opening guarded by valve (semilunar valve)
- Extent – right of L5 – T8
Relations of IVC

ANTERIOR RELATIONS:

In the Infracolic compartment

1. Root of mesentery
2. Above it by 3rd part of duodenum

In the Supracolic compartment

1. First behind portal vein, head of pancreas & bile duct
2. Above it behind the peritoneum forming posterior wall of epiplioic foramen
Relations of IVC contd.....

POSTERIOR RELATIONS:
- Lumbar vertebrae
- Right psoas major
- Right crus of diaphragm

On its RIGHT
- Right kidney & right ureter
- Hepatorenal pouch

On its LEFT
- Abdominal aorta
- Omental burse
- Caudate lobe of liver
Tributaries

1. **Common iliac veins** (formative tributaries)
2. **Lumbar veins** – 3rd & 4th
3. **Inferior phrenic veins** - Right & left
4. **Hepatic veins** (right, middle & left)
5. **Renal veins** - Right & left
6. **Gonadal vein** - Right
7. **Suprarenal vein** - Right
Lymph nodes of posterior abdominal wall
Lymph nodes of posterior abdominal wall

Lumbar nodes consisting of:

A. Pre aortic group/ Anterior group-
   around origin of 3 ventral branches

B. Para aortic group/ Lateral group-
   alongside aorta around origins of
   paired visceral and somatic branches

lymphatic drainage from any viscera
follows back its own artery
Overview of Nodes – afferent & efferent lymphatics

Celiac Nodes

- Receive afferent lymphatics from nodes draining organs supplied by three branches of celiac trunk (liver, stomach, spleen, pancreas etc.)
- **Efferents drain into – intestinal trunks**

Superior & Inferior mesenteric nodes

- Receive afferent lymphatics from nodes draining digestive tract from duodenojejunal flexure upto pectinate line of anal canal
- **Efferents drain into – celiac nodes**
Para Aortic Nodes:

- Present in relation to lateral / dorsal paired branches of aorta
- Receive afferents from visceras and other structures supplied by lateral / dorsal branches of aorta (kidneys, suprarenal, posterior abdominal wall, ureter, gonads, uterine tubes, upper part of uterus)
- Also receive afferents from internal & external iliac nodes – (drain pelvis & lower limb)
- Efferents drain into lumbar trunks

Detailed regional group of nodes and drainage pattern will be taught with the respective viscera or in the specific region
Lymph Nodes and lymph trunks

- Lymphatic drainage from viscera & other structures follows back alongside the arteries

- Lymphatics from all these nodes join to form abdominal lymph trunks - usually 4 major lymph trunks are formed
  - Efferents from celiac nodes form -------2 intestinal lymph trunks
  - Efferents from paraaortic nodes form--------2 lumbar lymph trunks

- These lymph trunks unite to form CISTerna CHYLI