BLOOD SUPPLY VENOUS AND LYMPHATIC DRAINAGE OF THE GIT

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Blood is supplied to the oral vestibule and oral cavity via branches of the external carotid artery (facial, maxillary, and lingual).
Superior thyroid artery - Supplies the thyroid gland and some of the adjacent skin.

Lingual artery - Chief blood supply to tongue and floor of the mouth.

Facial artery - Supplies structures of the superficial structures of face.

- **Cheeks**: Vascular supply - arterial supply - buccal branch of maxillary artery

- **Lips**: Vascular supply – mainly supplied by superior and inferior labial branches of facial artery.

- **Oral vestibule**
  Vascular supply - mainly supplied by branches of facial and lingual artery.
The branches of lingual artery are:

1. Dorsal lingual artery
2. Sublingual artery
3. Deep lingual artery

**Lingual A** - It arises from the external carotid artery at the level of greater horn of the hyoid bone.
Tongue Blood Supply

- **Arteries:**
  - LINGUAL ARTERY
  - Tonsillar branch of facial artery
  - Ascending pharyngeal artery

Deep Lingual Artery

- Sublingual artery
- Dorsal lingual artery
- Hyoid branch
- Lingual Artery

Veins:
- Lingual vein, ultimately drains into the internal jugular vein
The branches of the facial artery

- **Facial**
  - Inferior labial artery
  - Superior labial artery
  - Lateral nasal branch to nasalis muscle
  - Angular artery - the terminal branch

- **Cervical**
  - Ascending palatine artery
  - **Tonsillar branch**
  - Submental artery
  - Glandular branches

Scheme to show branches of the facial artery.
• **Ascending pharyngeal artery**
• **Pharyngeal trunk** usually consists of several branches which supply the middle and inferior pharyngeal constrictor muscles and the stylopharyngeus.
• Are in hemodynamic equilibrium with contributors from the internal maxillary artery.
Branches of maxillary artery

FIGURE 6-9 Pathway of the maxillary artery (except those branches to nasal cavity and palate).
Venous drainage

• The venous drainage of the palate and the floor of the oral cavity occurs via the
  - Greater and lesser palatine veins
  - Sphenopalatine vein,
  - Lingual vein,
  - Submental vein and
  - Pharyngeal plexus.

• The venous drainage of the maxillary and mandibular teeth occurs via the
  - Anterior superior alveolar vein,
  - Middle superior alveolar vein,
  - Posterior superior alveolar vein and inferior alveolar vein.
Pterygoid Venous Plexus

- It is a network of veins between the medial and lateral pterygoid muscles, and between the lateral pterygoid and temporalsis muscles.
- It drains nasal cavity, paranasal sinuses, nasopharynx, roof and lateral wall of the oral cavity, all teeth and muscles of infratemporal fossa.
- In addition, it drain the inferior ophthalmic vein from the orbital cavity through inferior orbital fissure.
- It has very important venous connections:
  1. **Superiorly with the Cavernous sinus** by small emissary veins that pass through Foramen ovale or through the cartilage that fills foramen Lacerum.
  2. **Posteriorly with Retromandibular vein** by a short maxillary vein.
  3. **Anteriorly with Facial vein** by deep facial vein.
Lymphatics of oral cavity

General schema for lymphatic drainage of Oral Cavity and pharynx

- Middle of tongue crosses to both sides
- Submandibular Lymph nodes
- SDC nodes
- Inferior Deep Cervical nodes
- Submental
- Lateral lip cross over
- Tip of tongue cross over
- Retropharyngeal nodes
- Submandibular nodes
- Jugulo-Diagastric node
- Superior Deep Cervical nodes
- IDC nodes
Tongue Lymphatic Drainage

- **Tip:**
  - **Submental nodes** bilaterally & then deep cervical nodes
- **Anterior two third:**
  - **Submandibular unilaterally** & then deep cervical nodes
- **Posterior third:**
  - **Deep cervical nodes** (jugulodigastric mainly)
Blood supply of lower Gastrointestinal Tract
Esophagus
Blood supply

- Cervical Esophagus
  - Branches from inferior thyroid artery
- Thoracic Esophagus
  - Branches from bronchial arteries and aorta
- Abd. Esophagus
  - Branches from Lt. gastric & inferior phrenic A
Lymphatic return from esophagus
Abdominal Aorta

- It begins at the aortic hiatus of the diaphragm, anterior to the lower border of vertebra T7.
- It descends to the level of vertebra L4 it is slightly to the left of midline.
- The terminal branches of the abdominal aorta are the two common iliac arteries.
## Branches of Abdominal Aorta

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Basic Concept

- Fore Gut
  - Celiac Trunk

- Mid Gut
  - Superior Mesenteric Artery

- Hind Gut
  - Inferior Mesenteric Artery
• Celiac Artery.
• Superior Mesenteric Artery.
• Inferior Mesenteric Artery.

The three anterior branches supply the gastrointestinal viscera.

Anterior Branches of The Abdominal Aorta
Celiac Trunk

- It arises from the abdominal aorta immediately below the aortic hiatus of the diaphragm anterior to the upper part of vertebra L1.
- It divides into the:
  - *left gastric artery*,
  - *splenic artery*,
  - *common hepatic artery*. 
• LEFT GASTRIC ARTERY
• SPLENIC ARTERY
  – Short gastric vessels
  – Lt. gastroepiploic artery
• COMMON HEPATIC ARTERY
  – Hepatic artery proper
    • Left hepatic artery
    • Right hepatic artery
  – Gastroduodenal artery
  – Rt. Gastroepiploic (gastro-oment al) artery
  – Sup pancreatoduodenal artery
  – Supraduodenal artery
• It arises from the abdominal aorta immediately 1cm below the celiac artery anterior to the lower part of vertebra LI.

• It is crossed anterior by the splenic vein and the neck of pancreas.

• Posterior to the artery are the left renal vein, the UNCINATE process of the pancreas, and the 3rd part of the duodenum.
- Inferior pancreaticoduodenal artery
- Jejunal and ileal arteries
- Middle colic artery
- Right colic artery
- Ileocolic artery
ASCENDING COLON
CECUM
ILEUM
LIVER
DUODENUM
JEJUNUM
HEPATIC FLEXURE
SUPERIOR MESENTERIC ARTERY
TRANSVERSE COLON
SUPERIOR MESENTERIC VEIN

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• It is the smallest of the three anterior branches of the abdominal aorta and arises anterior to the body of vertebra L3.
• Initially, the inferior mesenteric artery descends anteriorly to the aorta and then passes to the left as it continues inferiorly.
Inferior mesenteric artery

Branches:
1. Left colic artery
2. Several sigmoid arteries
3. Superior rectal artery
Arterial supply of the rectum and anal canal

median sacral artery

superior rectal artery (inferior mesenteric)
middle rectal artery (internal iliac)
inferior rectal artery (internal pudendal)
Posterior view of anterior pelvis and perineum
Venous Drainage of Gastrointestinal Tract
1. Veins of portal venous system

2. Systemic veins

- Blood from GIT enter the liver via portal vein and leave the liver via hepatic veins to enter the inferior vena cava
- Venous drainage of the abdominal part of the gastrointestinal tract, spleen, pancreas and gallbladder except for the inferior part of the rectum, is through the **portal system of veins**.
Portal Vein

- It is formed by the union of the **spleenic vein** and the **superior mesenteric vein** posterior to the neck of the pancreas at the level of vertebra L2.
Course:
Extrahepatic part

- Passes upwards & Rt, behind neck of pancreas & 1st part of duodenum
- Enters rt free margin of lesser omentum in front of epiploic foramen with BD & HA
- Reaches porta hepatis & divides into rt & Lt branches.
Tributaries to The Portal Vein

- **Right and left gastric veins** draining the lesser curvature of the stomach and abdominal esophagus
- **Cystic veins** from the gallbladder
- **Superior pancreaticoduodenal veins**
- The **para-umbilical veins** are associated with the obliterated umbilical vein and connect to veins on the anterior abdominal wall.
Superior Mesenteric Vein

- It drains blood from the small intestine, cecum, ascending colon, and transverse colon.
- It begins in the RIF as veins draining the terminal ileum, cecum, and appendix.
- It ascends in the mesentery to the right of the superior mesenteric artery.
Tributaries to The Superior Mesenteric Vein

- **Right gastro-omental vein**, draining the right part of the greater curvature of the stomach;
- **Anterior and posterior inferior pancreaticoduodenal veins**
- **Anterior superior pancreaticoduodenal vein** usually empties into the right gastro-omental vein, and the posterior superior pancreaticoduodenal vein usually empties directly into the portal vein.
Inferior Mesenteric Vein

- It drains blood from the rectum, sigmoid colon, descending colon, and splenic flexure.
- It begins as the **superior rectal vein** and ascends, receiving tributaries from the **sigmoid veins** and the **left colic vein**.
- It joins the splenic vein posterior to the body of the pancreas.
**Splenic Vein**

- It is formed from numerous smaller vessels leaving the hilum of the spleen.
- It passes to the right, passing through the splenorenal ligament with the splenic artery and the tail of pancreas.
- It crosses the posterior abdominal wall and unite with IMV.
Tributaries to The Splenic Vein

- **Short gastric veins** from the fundus and left part of the greater curvature of the stomach
- **Left gastro-omental vein** from the greater curvature of the stomach
- **Pancreatic veins** draining the body and tail of pancreas
- **Inferior mesenteric vein (IMV).**
Portal Vein

- It divides into **right** and **left branches**, which enter the liver parenchyma.
RECTUM - VESSELS/LYMPHATICS

Blood supply: Superior rectal artery from inferior mesenteric
Middle rectal artery from internal iliac.
Smaller inferior rectal artery from internal pudendal
Median sacral may contribute
All arteries supply all layers

Venous drainage: Superior rectal vein to inferior mesenteric which
is portal. Middle rectal to internal iliac (systemic)
Inferior rectal to internal pudendal to internal
iliac (systemic). Portosystemic anastomosis in upper
anal canal where internal & external venous plexuses
meet.

Lymphatics: Follow deep veins and arteries (black arrows below)

To para-aortic nodes
Superior rectal vein (to inferior mesenteric)
Superior rectal artery
To internal iliac nodes
Middle rectal artery
Middle rectal v (to internal iliac)
Inferior rectal vein (to internal pudendal then
to internal iliac)
To inguinal nodes

Portosystemic anastomosis in upper anal canal where internal
& external venous plexuses meet

RULE: Lymphatics from viscera follow deep arteries back to nodes
around the origin of the artery
Relations of IVC
Anterior: Bile duct, liver, opening of lesser sac, 1st/3rd parts of duodenum, head of pancreas, small bowel, right common iliac artery, root of mesentery, right gonadal artery, portal vein
Posterior: Right renal artery, lumbar arteries, right crus of diaphragm, right suprarenal & its artery, bodies of L3,4,5 vertebrae, right psoas, right sympathetic chain, right coeliac ganglion
Note: NO tributaries from gut
Porto-systemic Anastomosis

• The gastroesophageal junction around the cardia of the stomach-where the left gastric vein and its tributaries form a portosystemic anastomosis with tributaries to the azygos system of veins of the caval system.

• The anus-the superior rectal vein of the portal system anastomoses with the middle and inferior rectal veins of the systemic venous system.

• The anterior abdominal wall around the umbilicus-the para-umbilical veins anastomose with veins on the anterior abdominal wall.
PORTOSYSTEMIC ANASTOMOSES

1 Lower oesophagus
   Portal: Oesophageal branches of left gastric veins
   Systemic: Azygos veins

2 Upper anal canal
   Portal: Superior rectal vein
   Systemic: Middle/inferior rectal veins

3 Umbilical
   Portal: Veins of ligamentum teres
   Systemic: Superior/inferior epigastric veins

4 Bare area of liver
   Portal: Hepatic/portal veins
   Systemic: Inferior phrenic veins

5 Patent ductus venosus (rare)
   Portal: Left branch of portal vein
   Systemic: Inferior vena cava

6 Retroperitoneal
   Portal: Colonic veins
   Systemic: Body wall veins
The lymphatic drainage of abdomen

Lymphatic drainage of abdominal wall

- To **axillary lymph node** from region above umbilicus
- To **superficial inguinal lymph node** from region below umbilicus
- To **lumbar lymph node** from post wall of abdomen
Plan of the lymphatic drainage in the abdomen

- Thoracic duct
- Cisterna chyli
- Suprarenal
- Kidney
- Gonads
- Common iliac
- External iliac
- Internal iliac
- Lower limb
- Pelvis
- Aorta
- Para-aortic
- Intestinal lymph trunk
- Stomach
- Liver
- Spleen
- Pancreas
- Superior and inferior mesenteric