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M.D. (ANATOMY)

Anatomy

1. General Anatomy :

TOPICS

1. **Introduction:**
   - Subdivisions of Anatomy
   - Nomenclature:
     - Terms used for describing the position of the body:
       Anatomical, supine, prone, lithotomy
     - Anatomical planes:
       Median or sagittal, coronal, transverse, oblique
     - Terms in Gross anatomy:
       Anterior, posterior, superior, inferior, medial, lateral
     - Terms in Embryology:
       Ventral, dorsal, cranial/ cephalic/ rostral, caudal
     - Terms related to the limbs:
       Proximal, distal, radial, ulnar, tibial, fibular, preaxial and postaxial borders, flexor, extensor, palmar and plantar surfaces.
     - Terms used for hollow organs:
       Interior, exterior, invagination, evagination
     - Terms used for solid organs: Superficial, deep
     - Terms used to indicate the side of the body: Ipsilateral, contralateral
     - Terms used describing the muscles: Attachment, origin, insertion,
     - belly, tendon, aponeurosis, raphe.
     - Terms used for describing the movements:
       Flexion, extension, adduction, abduction, medial rotation, lateral rotation,circumduction, pronation, supination, inversion, eversion. Plantar flexion, dorsiflexion, protraction, retraction, opposition.

2. Skin and subcutaneous tissue:

   Superficial fascia
   Deep fascia

3. Skeletal muscles:

   Features
   Nomenclature
   Blood supply
   Nerve supply
   Action
   Classification of muscle groups
   Applied anatomy
   Tendon
   Aponeurosis

4. Cartilage:

- Hyaline
- Elastic
- Fibro

5. Bone:

- General: Exoskeleton, examples- remains of it in humans
- Endoskeleton: Functions
- Classification:
  - Morphological: long, short, miniature, flat, irregular pneumatic, sesamoid
  - Structural: compact, cancellous
  - Developmental: membranous, cartilaginous
  - Microscopic: lamellar, Non-lamellar
  - Regional: axial, appendicular

- Long bone:
  - Parts: diaphysis, metaphysis, epiphysis
  - Types of epiphyses: pressure, traction, atavistic
  - Blood supply to a long bone
  - General concepts of ossification:
    Primary centre, secondary centre,
    medico-legal importance, age, sex and height.

6. Joints: Classification, features and examples:

- Based on movements
- Based on axes of movements- uniaxial, biaxial, polyaxial
- Based on the tissue intervening between the bones:
  - Fibrous: - sutures
    -syndesmosis
    -gomphosis
  - Cartilaginous -primary } synarthrosis (solid)
    -secondary }
  - Synovial -simple } diathrosis (cavitated)
    -compound }
    -complex }

- Based on morphology:
  - Simple: one pair of male and female surfaces
  - Compound: more than one pair of surfaces
  - Complex: with intracapsular menisci or articular disc

7. Blood vessels and lymphatics: 1 hr

- Artery, arteriole anfd capillaries
- Vein, venules and capillaries
- Anastomosis: arterio-arterial; veno-venous; arterio-venous
- Lymphatics: lymph channels and lymph nodes

8. Nervous system: Central and peripheral- an overview:

- Components
- Functions

2. <u>Gross Anatomy</u>

<u>Upper Limb</u>:

Pectoral region & Axilla

i. Front of arm & Cubital Fossa
ii. Superficial dissection of the back of the trunk, scapular region & Back of arm
iii. Joints of the shoulder girdle; Back of forearm & Hand
iv. Front of forearm And hand
v. Elbow, radioulnar, wrist and joints of the hand

<u>Lower Limb:</u>

i. Anterior and medial aspects of the thigh
ii. Gluteal region and posterior aspect of the thigh
iii. Hip joint , popliteal fossa , back of leg
iv. Anterior and lateral aspect of the leg, dorsum of the foot and the knee joint
v. Tibio fibular joints, ankle joint and joints of the foot.
vi. Sole of the foot

<u>Abdomen & Pelvis:</u>

i. Anterior abdominal wall and external genitalia
ii. Abdominal cavity, stomach & Intestines
iii. Liver, pancreas, duodenum & Spleen
iv. Kidney, Suprarenal and posterior abdominal wall
v. Pelvic viscera
vi. Blood vessels nerves and muscles of the pelvis
vii. Perineum

<u>Thorax :</u>

vii. Thoracic Wall ,Lungs and Pleura
viii. Superior And Middle Mediastinum including heart, blood vessels and pericardium
ix. Superior And Posterior Mediastinum And Joints Of Thorax.

<u>Head And Neck:</u>

i. Posterior Triangle Of The Neck.
ii. Anterior Triangle Of The Neck.
iii. Face And Scalp
iv. Cranial Cavity
v. Orbit And Lacrimal Apparatus
vi. Parotid And Infratemporal Fossa.
vii. Submandibular Region And Deep Dissection Of The Neck
viii. Deep Structures Of The Back Of The Neck And Trunk.

Neuroanatomy:

i. Introduction
ii. Peripheral nervous system
iii. Central nervous system
iv. Meninges and blood supply
v. Cerebrospinal fluid
vi. Cranial nerves
vii. Autonomic nervous system Sympathetic
viii. Autonomic nervous system Parasympathetic
ix. Ascending and descending pathways

3. Histology

GENERAL HISTOLOGY

TOPICS

1. Introduction: relevance of Histology in Medicine; Tissue processing; Principles of microscopy; cells and cell organelles; EM picture of protein synthesizing, Steroid synthesizing, absorptive and ion transporting cells

2. Epithelial tissue I: Surface/ lining epithelium:
Simple squamous, cuboidal, columnar, pseudostratiified.
Stratified: squamous- keratinized, non-keratinized; transitional

3. Epithelial tissue II: Glandular epithelium
Glands: mucous, serous and mixed

4. Connective tissue I: Loose areolar, elastic, cartilaginous, reticular; adipose
Dense connective tissue: Irregular and Regular

5. Connective tissue II: Cartilage- hyaline, elastic and fibro

6. Connective tissue III: Bone- compact and cancellous

7. Highly specialized connective tissue: Lymphoid tissue/ Immune system I:
Distribution: lymphatic follicles/ nodules- solitary, aggregates:
Lymph node and spleen.

8. Lymphatic tissue II: Tonsil and thymus
Myeloid tissue

9. Muscular tissue: Smooth muscle; Striated muscle- skeletal and cardiac

10. Nerve tissue/ Neural tissue:
Neurons and neuroglia
Spinal and sympathetic ganglia
Cerebral cortex and cerebellar cortex
Nerve- peripheral nerve; optic nerve; nerve endings

SYSTEMIC HISTOLOGY
TOPICS

1. Digestive system I:
General plan of GIT- Oesophagus

2. Digestive system II:
Oral cavity, lip, tongue, taste buds, salivary glands,
Parotid (serous), sublingual (mucous) and submandibular (mixed)

3. Digestive system III:
Stomach: body, fundus and pylorus

4. Digestive system IV:
Small and large intestines: Duodenum, jejunum and ileum; appendix, colon

5. Digestive system V:
Liver, gall bladder, pancreas – exocrine (acinar);
Pancreas- endocrine (Islets of Langerhans)

6. Urinary system:
Kidney- cortex, medulla; juxtamedullary apparatus (Demonstration)
Kidney- medulla; ureters and urinary bladder

7. Male reproductive system:
Testis; epididymis; vas deferens; prostate;
Seminal vesicle and penis

8. Female reproductive system I:
Ovary- Graffian follicle; corpus luteum; fallopian tube
Uterus- different stages of functional activity (Demonstration); vagina

9. Female reproductive system II:
Mammary gland- lactating; non-lactating; placenta; umbilical cord

10. Integumentary system:
Skin- hairy, glabrous; appendages; cutaneous receptors (Demonstration)

11. Respiratory system I:
Upper respiratory tract- nasal cavity; olfactory mucosa;
Respiratory mucosa; epiglottis and trachea

12. Respiratory system II:
Lower respiratory tract- extra and intra- pulmonary bronchi;
Lung parenchyma

13. Cardiovascular system:
Elastic artery, muscular artery, medium-sized vein,
Large veins, capillaries (Demonstration); conducting system of the heart (Demonstration)

14. Endocrine system I:
Pituitary, pineal; review of endocrine tissues in the pancreas, testis and ovcary

15. Endocrine system II:
Thyroid, parathyroid and adrenal

16. Special sense organs:
Eye; eye-lid; cornea; sclero-corneal junction; retina

4. Embryology

GENERAL EMBRYOLOGY

Introduction:

- Relevance of Embryology to medicine; Grief account of male and female reproductive system; testis and ovary; migration of primordial germ cells into the gonadal ridge; differentiation of gametes
- Ovum, oogenesis, growth of the ovarian follicle, uterine cycle; ovulation
- Sperm, spermatogenesis, spermiogenesis, normal sperm count, seminal fluid, abnormal conditions.
- Sex determination; Principles of family planning

First two weeks of development :

- Fertilization process ; site ; results : in-vitro fertilization; cleavage; blastocyst formation.
- Implantation : types ; formation of decidua; its subdivisions ; abnormal implantation.
- Formation of embryoblast and trophoblast ; development of embryoblast into bilaminar germ disc; development of trophoblast ; formation of cytotrophoblast and syncytiotrophoblast.
- Amniotic membrane ; yolk sac ; extraembryonic mesoderm ; extraembryonic coelome ; connecting stalk ; chorion ; formation of prochordal plate.

Third week of development

- Embryoblast ; primitive streak ; primitive node ; formation of intraembryonic mesoderm ; trilaminar germ disc ; notochord ; buccopharyngeal and cloacal membranes ; pericardial bar.
- Trophoblast : secondary yolk sac ; intraembryonic coelome and allantoic diverticulum ; intra embryonic mesoderm and its subdivisions; derivatives of ectoderm, endoderm and mesoderm.

Fourth week of development

- Formation of somites ; neural tube ; cephalo – caudal and lateral foldings of the embryo ; establishment of the body form ; formation of the gut and its subdivisions ; vitelline duct

Foetal membranes and the placenta :

- Placenta : formation, functions ; features, types ; circulation ; placental barrier ; abnormalities
  Umbilical cord ; amnion, amniotic fluid, its functions ; chorion laevae; decidua ; amniocentesis

Twins : formation, types, conjoint twins, multiple pregnancies

Causative factors for congenital malformations

SYSTEMIC EMBRYOLOGY

1. Development of musculoskeletal system

2. Development of GIT and respiratory systems:
   - Body cavities and serous membranes
   - Stomach
   - Midgut: rotation of the gut, liver, extrahepatic biliary system
   - Hindgut
   - Diaphragm, spleen and lesser sac
   - Trachea and lungs

3. Development of genitourinary system:
   - Kidney
   - Ureter, Urinary bladder
   - Testis, ovary
   - Descent of gonads
   - Genital ducts
   - External genitalia

4. Development of cardiovascular system:
   - Heart loop and formation of the chambers of the heart
   - Septa and valves of the heart
   - Intraembryonic vessels
   - Major veins
   - Foetal circulation and changes after birth

5. Development of face and pharyngeal apparatus:
   - Pharyngeal arches and their derivatives
   - Pharyngeal pouches, pharyngeal clefts, first arch syndrome and common birth defects
   - Face, oral cavity, soft palate and associated anomalies

6. Development of nervous system:
   - Neural tube: brain vesicles and their derivatives, neural crest and its derivatives

7. Development of organs of special senses
   - Eye and ear

8. Development of skin and its appendages
   - Skin and its appendages
   - Mammary gland and anomalies

9. Development of endocrines

5. Genetics

1. Introduction :

A. Definition:
   a. Medical genetics
   b. Cytogenetics
   c. Clinical genetics

B. History:
   a. Gregor Mendel
   b. Mendelian laws of inheritance
   c. Mitosis
   d. Meiosis

2. Chromosomes:

a. Structure
b. Classification of human chromosomes
c. Karyotyping- methodology
d. Sex chromatin
e. Lyon hypothesis

3. Chromosomal disorders:

- Importance of non-disjunction
- Numerical abnormalities
  - Polyploidy
  - Aneuploidy
  - Trisomy and monosomy
  - Down's syndrome
  - Patau's syndrome
  - Edwards's syndrome
  - Klienfelter's syndrome
  - Turner's syndrome
  - Mosaicism
  - Causes of numerical abnormalities
- Structural abnormalities
  - Deletion, inversion, translocation and ring chromosomes
  - Isochromosomes, chromosomal fragile sites, fragile X chromosome

4. Chromosome at molecular level:

- Structure of DNA- RNA
- Genetic code
- Genetic mutation
- Mutagens

5. Clinical genetics

- Pedigree chart
- Inheritance

6. Diagnosis of Genetic disease

- Prenatal diagnosis
- Indications

- Chorionic villi biopsy
- Maternal sera
- Amniocentesis

7. Genetic Counselling :

a. Definition
b. Indication
c. Basis of gene therapy

8. Recent advances in Genetics:

a. Polymerase chain reaction
b. Recombinant DNA
c. Cloning
d. Stem cell technology

6. Comparative Anatomy --- Including

- Cardiovascular System
- Urogenital System
- Respiratory System
- Larynx
- Sternum and Mandible
- Shoulder and Pelvic Girdles
- Nervous System
- Comparative embryology up to formation of Germ layers and Placenta

7. Evolution --- Including

- Organic Evolution
- Evolution of erect posture
- Evolution of Binocular Vision

8. Physical Anthropology And Forensic Anatomy

- Physical Anthropology
- Medico legal examination including identification Sexing and height estimation from bones etc

9. Applied Anatomy

Investigative Techniques
Recent Advances

- X-Ray
- Ultra sonography
- Magnetic Resonance and Imaging
- C.T Scan
- Electron Microscope
- Carbon dating
- Museum and Preservation techniques
- Embalming

10. History Of Anatomy And Embrylogy

- Including the knowledge of evolution of various anatomical investigative techniques

11. Embalming Techniques And Maceration