Axial Skeleton 2
Vertebral Column and Thorax

Objectives
1. Identify the subdivisions of the skeleton as axial or appendicular
2. Explain how the spine supports the body.
3. Explain the changes on vertebrae from fetus-birth.
4. Explain the function of the vertebral column
5. List the divisions of the vertebral column

AXIAL SKELETON
• FORM THE VERTICAL AXIS OF THE BODY
• CONSISTS OF 80 BONES
• INCLUDES BONES OF HEAD, VERTEBRAL COLUMN, RIBS, STERNUM

APPENDICULAR SKELETON
• BONES OF THE FREE APPENDAGES & THEIR POINTS OF ATTACHMENTS
• CONSISTS OF 126 BONES
• INCLUDES BONES OF LEG, ARM, PECTORAL & PELVIC GIRDLES

Spine Supports Body
• Extends from the spine (supports head) to pelvis where weight of the body supports the lower limbs.
• Formed by 26 irregular bones that reconnected in such a way that a curved structure results
• Allows man to be bipedal

Functions
• LINKED BY CARTILAGE & LIGAMENTS TO AID IN FUNCTIONS:
  – PROVIDE FLEXIBILITY
  – SUPPORT TO TRUNK
  – PROTECTION OF SPINAL CORD
  – SUPPORTS HEAD
Changes from fetus to birth

- EMBRYO HAS 33 VERTEBRAE
  - Nine eventually fuse to form the sacrum and coccyx
  - These form the inferior portion of the vertebral column

DIVISIONS OF VERTEBRAL COLUMN

- 1. CERVICAL – NECK REGIONS; 7 VERTEBRAE
- 2. THORACIC – CHEST REGION; 12 VERTEBRAE
- 3. LUMBAR – LOWER BACK REGION; 5 VERTEBRAE
- 4. SACRAL – BETWEEN HIPS; 5 FUSED BONES INTO 1 BONE CALLED THE SACRUM
- 5. COCCYGEAL – TAILBONE; 4 BONES FUSED INTO 1 BONE CALLED THE COCCYX

Objectives

6. Discuss the importance of spinal curvatures
7. Name and identify the parts of a typical vertebrae

VERTEBRAL CURVES

- Increase strength, maintain balance, absorb shock & protect from fractures
- 1. cervical – neck area; forms around 3rd month after birth allowing infant to hold up head
- 2. lumbar – lower back; develops when child begins walking
- 3. thoracic – middle
- 4. sacral – most inferior

VERTEBRAE STRUCTURE (p. 128 Figure 5.16)

1. BODY – thick, disc shaped anterior portion that is weight bearing
2. VERTEBRAL ARCH – extends from body
   - Formed by 2 short, thick processes
     a. Pedicles – base of arch; one on each side of arch
     b. Laminae – posterior portion of arch
3. VERTEBRAL FORAMEN – opening in vertebrae for passage of spinal cord

4. INTERVERTEBRAL FORAMEN – openings between vertebrae for passage of spinal nerves; look at vertebrae from side when vertebrae are stacked together

5. TRANSVERSE PROCESS – junction of lamina & pedicle; extends laterally on each side; serves for muscle attachment
   — Facet – depression at ends of transverse processes; articulate with ribs

6. SPINOUS PROCESS – projects posteriorly where 2 laminae meet; muscle attachment

7. SUPERIOR ARTICULAR PROCESS – meets with vertebrae above it

8. INFERIOR ARTICULAR PROCESS – meets with vertebrae beneath it.
   — Where joints form with adjacent vertebrae; lateral to foramen
   — The superior articulate of one vertebrae meets with the inferior articulate of another
Objectives

8. Explain how cervical, thoracic and lumbar vertebrae differ and be able to identify all parts

ATLAS

• C1
  • Ring of bone
  • No body & faint spinous process
  • Depressions on superior surface that articulate with occipital condyles; allows nodding of head

AXIS

• C2
  • Peg like process called odontoid process (dens) projects up through ring
  • Dens pivots on atlas allowing head to turn from side to side
CERVICAL VERTEBRAE
- Smallest body
- Spinous process of C3 – C6 are bifid – split
- 3 foramen: vertebral foramen & 2 transverse foramen

VERTEBRAL PROMINENS
- C7
- Lacks the bifid spinous process
- Bulge that is felt at the base of the neck

THORACIC VERTEBRAE
- Medium size body
- Spinous process longer and directed inferior
- Longer transverse process
- Facets – depressions on transverse process that allow ribs to articulate; no facets on T11 or T12
- Demifacets – half formed on body of vertebrae

LUMBAR VERTEBRAE
- Largest body
- All process are short & thick
- Spinous process is quadrilateral shaped & directed posteriorly
- Adaptations to accommodate large back muscles
Objectives
9. Explain the function of the sacrum and coccyx
10. Name and identify all parts of the sacrum and coccyx

SACRUM
- Serves as a foundation for the pelvis
- Anterior surface is concave; posterior is convex
- Sacral promontory – projecting border on superior end (body)
- Transverse lines (4) – show fusion of vertebral bodies
- Anterior sacral foramen – at ends of transverse lines
- Median sacral crest – shows fusion of spinous process
- Lateral sacral crest – shows fusion of transverse processes
- Posterior sacral foramen – openings that run parallel to lateral crest

- Sacral canal – passage of spinal cord
- Sacral Ala – wing like structures on superior end
- Sacral horns – superior articular processes of first sacral vertebrae
- Sacral hiatus – present at inferior end only if S4 & S5 do not fuse

COCCYX

- Tailbone
- 4 vertebrae fused together
- Vestigial tail

Objectives

11. Discuss the importance of intervertebral discs
12. Explain how abnormal spinal curvatures differ from one another

INTERVERTEBRAL DISCS

- Located between each vertebrae
- Composed of fibrocartilage ring called annulus ring
- Inner soft tissue called nucleus pulposus
- Functions:
  - Form stronger joints
  - Flexibility of spinal column
  - Absorb shock
WHIPLASH
- Hyperextension of cervical vertebrae
- Can cause a fracture to spinous process, ruptured discs, strained or torn muscle
- Fatal if dens is driven into medulla oblongata

HERNIATED DISK
- Annulus ring weakens causing the nucleus pulposus to protrude
- Pressure on spinal nerves or spinal column
- Most common in lumbar region

RUPTURED DISK
- Annulus ring breaks

SCOLIOSIS
- Lateral bending of vertebral
- Possible cause:
  - Born w/ half of a vertebrae
  - Sciatica
  - Polio
  - Poor posture

KYPHOSIS
- Exaggeration of thoracic curve
  - "hunchback"
- Common in elderly due to degenerating discs
- Also associated with rickets & poor posture

LORDOSIS
- Exaggeration of lumbar curve
  - "swayback"
- Due to excessive weight in abdomen – obesity or pregnancy
SPINAL BIFIDA

- “split spine”
- Congenital defect in which laminae of vertebral arch do not meet
- In severe cases the spinal cord is exposed leading to paralysis, incontinence & fluid build up on brain