7.1.3. Orbital Anatomy (III)

Nose and Paranasal Sinuses

- Figure 1-11 (Courtesy of American Academy of Ophthalmology)
- diseases
  - sinonasal carcinomas
  - inverted papillomas
  - zygomycoses
  - granulomatosis with polyangiitis (Wegener granulomatosis)
  - mucoceles
  - sinusitis
- functions
  - decrease the weight of the skull
  - function as resonators for the voice
  - trap irritants
  - warm and humidify the air
- nasal cavity
  - nasal septum
  - lateral wall
    - has 3 bony projections
      - superior, middle, and inferior conchae (turbinates)
    - superior
      - posterior ethmoid air cells
    - meatuses
      - middle
        - openings for
          - frontal sinus
          - maxillary sinus
          - anterior and middle ethmoid air cells
      - inferior
        - nasolacrimal duct opening
    - sphenoethmoidal recess
      - orphaned to the superior concha
      - spheroid sinus opening
  - lined by a pseudostratified, ciliated columnar epithelium
    - copious goblet cells
    - mucous membrane overlying the lateral alar cartilage is hair bearing
      - can use the mucoperichondrium over the nasal septum
      - was suitable for use as a composite graft in eyelid reconstruction
- frontal sinuses
  - complete by early adulthood
  - pneumatization continues through childhood
  - sinuses can develop asymmetrically
  - not seen radiographically until the sixth year of life
  - anterior portion of the middle meatus
  - each frontal sinus drains through a separate frontonasal duct
- ethmoid air cells
  - between the medial orbital wall and the lateral wall of the nose
    - thin-walled cavities
    - present at birth
      - expand as the child grows
      - can extend into frontal, lacrimal, and maxillary bones
        - may extend into the orbital roof
          - supraorbital ethmoids
  - drainage
    - divided into anterior, middle, and posterior air cells
    - anterior and middle air cells into middle meatus
    - posterior air cells into superior meatus
  - sinusitis in the ethmoids is a common cause of
    - orbital cellulitis
    - medial orbital subperiosteal effusions or abscesses
    - inflammation or infection spreads through the thin bone or the vascular foramina of the medial orbital wall
- maxillary sinuses
  - largest of the paranasal sinuses
    - extend posteriorly to the inferior orbital fissure
  - infraorbital nerve and artery travel along the roof of the sinus
  - roof of each maxillary sinus forms the floor of each orbit.
    - orbital blowout fractures
      - disrupt the floor of the orbit medial to the infraorbital canal
        - infraorbital nerve is often compromised
          - hypoaesthesia of the cheek, upper lip, and maxillary teeth
  - maxillary ostium
    - drains into the middle meatus
  - bony nasolacrimal canal lies within the medial wall

Nerves

- Figure 1-10 (Courtesy of American Academy of Ophthalmology)
- Sensory innervation
  - ophthalmic and maxillary divisions of CN V
- trigeminal ganglion
  - ophthalmic division of CN V (V1)
    - pass through in the lateral wall of the cavernous sinus
      - divides into 3 main branches
        - frontal
          - enter through the superior orbital fissure above the annulus of Zinn
            - medial canthus
              - supratrochlear branch
            - upper eyelid
              - lacrimal and supratrochlear branches
            - forehead
              - supraorbital branch
        - lacrimal
        - nasociliary
          - enters through the superior orbital fissure within the annulus of Zinn
            - innervates the eye via the ciliary branches
              - short ciliary nerves
                - pass through the ciliary ganglion without synapse
                - penetrate the sclera
              - long ciliary nerves
                - pass by the ciliary ganglion
                - enter the sclera
                - extend anteriorly to supply the iris, cornea, and ciliary muscle
  - maxillary division of CN V (V2)
- parasympathetic innervation
  - functions
    1. accommodation
    2. pupillary constriction
    3. lacrimal gland stimulation
  - parasympathetic fibers synapse within the ciliary ganglion
    - enter the eye as the short posterior ciliary nerves
    - parasympathetic innervation to the lacrimal gland
      - originates in the lacrimal nucleus of the pons
      - joins the lacrimal nerve to enter the lacrimal gland
    - only the parasympathetic fibers synapse in the ciliary ganglion
- sympathetic innervation
  - sympathetic fibers originate in the hypothalamus
    - descend through the brainstem to the spinal cord
      - synapse in the ciliospinal center of Budge-Waller
        - travel with branches of the carotid artery to the orbit
          - pass through ciliary ganglion without synapse
            - short ciliary nerves
          - nasociliary nerve
            - long ciliary nerves
          - follow arterial supply to pupil, eyelids, and orbit
  - carry innervation for
    1. pupillary dilation
    2. vasoconstriction
    4. hidrosis
    3. smooth muscle function of the eyelids and orbit
- motor supply to muscles of facial expression
  - CN VII (Facial nerve)
    - branches enter on the undersurface of each muscle

Lacrimal Gland

- 2 lobes
  - orbital lobe
    - located within a fossa of frontal bone (lacrimal fossa)
    - may protrude inferiorly out of the fossa and present as a mass in lateral upper eyelid
  - smaller palpebral lobe
    - ducts from both lobes pass through the palpebral lobe
      - empty into the upper conjunctival fornix
      - biopsy is generally not performed on the palpebral lobe or temporal conjunctival fornix because it can interfere with lacrimal drainage

Ophthalmology Mind Maps/Arman Mashayekhi, MD