Applied anatomy of the maxilla

IMPLANTOLOGY YEAR COURSE
‘Surgical Skills Study Day’

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Aims and objectives
• basic embryology
• bony anatomy
• innervation
• anaesthesia and regional blocks
• ridge shape and bone density
• CT scans to aid 3D thinking

Maxilla
• in embryological terms, maxilla is of mesodermal origin
• derived from the maxillary process swellings of the first pharyngeal arch
• coalescence of various embryonic swellings to form the premaxilla, main body and palatal shelves
• innervated by different nerves as result

• 2 maxillae, each consisting of a body and four processes
  • body
    – the body is the largest part and is pyramidal in shape
    – interior part of the body is hollowed out by the maxillary paranasal air sinuses, volume c15ml
    – upper surface forms the floor of the orbit
    – anterior surface forms the curved external surface of the upper jaw
    – posterior surface provides the anterior wall of the infratemporal fossa
    – medial surface forms structural component of the nose

• four processes
  – zygomatic
  – frontal
  – palatine
  – alveolar
• bony palatine process
  – provides the floor of the nasal cavity
  – provides the anterior ¾ of the hard palate (the remaining ¼ from the paired palatine bones)

Other features
• foramina
  – infraorbital
  – incisive fossa
  – greater palatine
  – lesser palatine
  – posterior alveolar
other features

• pterygopalatine fossa
  – between infratemporal surface of maxilla and the pterygoid process
  • houses maxillary nerve
  • terminal part of the maxillary artery
  • pterygopalatine ganglion (parasympathetic relay station)
  – infratemporal fossa

Maxillary innervation

• maxillary division of the trigeminal (5th cranial) nerve
• arises as the sensory root from the Pons (midbrain)
• enters the trigeminal ganglion and divides into three branches – ophthalmic, maxillary and mandibular
• leaves cranial cavity via foramen rotundum, passing into the pterygopalatine fossa
• enters the orbit via the inferior orbital fissure becoming the infraorbital nerve

• infraorbital nerve passes through the i/o foramen to innervate the skin of the face
• before leaving the foramen gives off a number of branches known collectively as:
  – anterior superior alveolar nerve
  – middle superior alveolar nerve

• within the pterygopalatine fossa the maxillary nerve is associated with the pterygopalatine ganglion (secretomotor) from which several other branches are given off before the nerve enters the orbit
  – posterior superior alveolar nerves (enter maxilla via post alveolar foramina)
  – greater palatine nerve
  – lesser palatine nerve
  – nasal nerves – lateral and medial posterior superior nasal
  – nasopalatine
Innervation of the sinuses
- mucous membrane innervated by various sources
- infraorbital nerve
- superior alveolar nerves (a,m,p)

Anaesthesia
- infiltrations, buccal and palatal
- regional blocks
  - infraorbital
  - posterior superior alveolar
  - greater palatine
  - nasopalatine
- infraorbital nerve block
- posterior superior alveolar nerve block
- greater palatine nerve block
• nasopalatine nerve block

Ridge shape / bone density

• anteriorly, maxilla proclines buccally and has a buccal concavity
• posteriorly, ridge is wider but consider the effect of the maxillary sinus
• limited cortical bone in posterior maxilla, mostly cancellous bone, so bone is less dense and softer
• tends to be denser in anterior maxilla but very thin buccal plate

Lekholm and Zarb classification of bone density

D1  D2  D3  D4
Simplant demo maxilla