## **Applied anatomy**

Cambridge Academy of Implant Dentistry

YEAR COURSE

26<sup>th</sup> June 2015

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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



- 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 many different trunk nerve branches 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 <sup>3</sup>⁄<sub>4</sub> of the hard palate (the remaining <sup>1</sup>⁄<sub>4</sub> from the paired palatine bones)





## other features

- foramina
  - infraorbital
  - incisive fossa
  - greater palatine—
  - lesser palatine
  - posterior superior alveolar

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PRIMAL

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







## **Maxillary innervation**

- maxillary division of the trigeminal (5<sup>th</sup> cranial) nerve
- arises as the sensory root from the Pons (midbrain)
- enters the trigeminal ganglion and divides into three branches – opthalmic, 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 posterior alveolar foramen)
  - 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**

Infraorbital block video

#### **Posterior superior alveolar nerve block**







#### Nasopalatine nerve block

- **Direct technique** slow, drop by drop 0.5ml+
- 3 injection technique
  - 1<sup>st</sup> 0.3ml into buccal sulcus
  - 2<sup>nd -</sup> into papilla until pal tissues blanch
  - 3<sup>rd -</sup> into NP canal

### Nasopalatine nerve block



## **Infraorbital 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 often with a very thin buccal plate

# Lekholm and Zarb classification of bone density









































- look back at your text books/atlases
- read innervation pathways
  - have a go at IO/PSA/GP blocks
- think about the tissues you are working in could there be an unexpected ridge form?
- if you have a CT scan look at it in detail to view common ridge shapes/problems/root positions