TOP KNIFE
FIGHTER SURGEON COURSE

173 Fighter Wing
Kingsley Field Oregon

RSV-1B3

BAROTRAUMA

Criterion Referenced Objectives

- Define barotrauma and how it impacts Air Force flying operations
- Identify the characteristics of barotitis and barosinusitis, how they are diagnosed in the flyer, and how they are treated

Overview

- Dysbarism definition
- Barotrauma impact on USAF flying operations
- Barotitis
  - Definition, description, treatment
- Barosinusitis
  - Definition, description, treatment
- Take home points

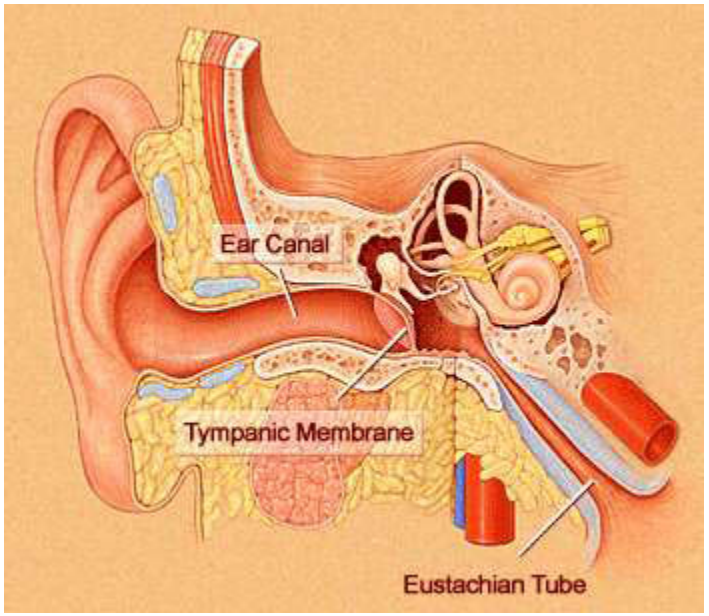
Dysbarism Definition

Disturbances within the body resulting from a change in barometric pressure, including both increases and decreases

- Flight Surgeon's Guide

Barotrauma – The Problem

- Class E physiologic incidents, 1 Jan 2010 – 9 Oct 2012
  - 20 ear blocks
  - 19 sinus blocks



Barotitis Definition

Barotitis media: An acute or chronic traumatic inflammation of the middle ear produced by a pressure differential (either positive or negative) between the air in the tympanic cavity and contiguous air spaces and that of the surrounding atmosphere.

- Flight Surgeon's Guide

Also known as "ear block"

Barotitis

- Anterior 2/3 of Eustachian tube acts as flutter valve to accommodate atmospheric pressure change
  - Air easily escapes when ear pressure > atmospheric, i.e. on ascent
  - When atmospheric pressure > ear, i.e. on descent, valsalva maneuver sometimes necessary

Barotitis Ascent Problems

- If pressure does not equilibrate on ascent → alternobaric or pressure vertigo
  - Likely from differential stimulation of vestibular system (one ear not equilibrated or less equilibrated than other)
  - Sudden onset, often after forceful Valsalva
  - Usually 10-60 seconds in duration
  - Avoid by frequent clearing and not flying with sx's of URI

Barotitis Descent Problems

- External pressure greater than internal
  - Relative vacuum in middle ear
  - TM retracts, vasculature engorges, transudate may form
  - Worst case is TM rupture
  - If differential over 80-90 mm Hg, Valsalva cannot open Eustachian tube
  - URI and allergic rhinitis predispose

Contribution of Aircraft O_2

- Aircraft O_2 not humidified, dries mucosa, predisposes to poor flutter valve function
- O_2 absorbed by mucosa, decreases pressure, contributing to relative vacuum
- Flying on 100% O_2 especially at night can cause delayed ear block because of failure to swallow/clear ears while asleep

Barotitis Symptoms

- Mild – Sensation of fullness, mild pain, tinnitus, conductive hearing loss
- Moderate – All increased *and*
  - Transudate can form leading to fluid sensation
- Severe – All increased *and*
  - Pain may be incapacitating
  - Vertigo may occur
  - TM rupture can quickly resolve symptoms

Barotitis Treatment - Aircraft

- Avoidance key!
- Failing that, in order:
  - Valsalva
  - Topical decongestant spray (Afrin) in two stages if available
    - First spray will shrink anterior mucosa
    - Second spray minutes later will shrink Eustachian tubal orifice
  - Ascend and then gradually descend

Barotitis Treatment - Office

- Politzer bag if no exudate
- Topical and oral decongestants if exudate present
  - Bubble represents opening tube
- Care is conservative – mucus membranes are delicate!
  - Don’t be overly aggressive with bag
  - Myringotomy not usually indicated

Barosinusitis Definition

Barosinusitis is an acute or chronic inflammation of one or more of the nasal accessory sinuses produced by a pressure difference (usually negative) between the air in the sinus cavity and the surrounding atmosphere.

- Flight Surgeon's Guide

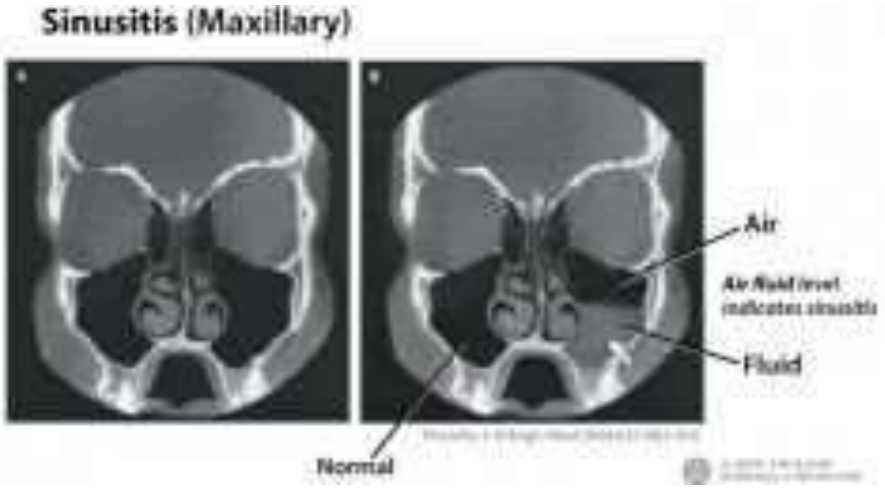
Also known as "sinus block"

Barosinusitis – Clinical

- Like barotitis, more likely on descent
- Symptoms range from mild fullness to incapacitating pain
- Milder form may have gradual onset
  - May occur after landing
  - Epistaxis very suggestive of diagnosis
- Severe form sudden onset

Barosinusitis - Diagnostic

- If in doubt X-rays or CT scan can help diagnose
  - Transudate identified



Barosinusitis Treatment – Aircraft

- Similar to barotitis without Valsalva
- Avoid flying with URI or allergic rhinitis!
- Ascend if able to altitude where block occurred
- Topical decongestant (Afrin) if available
- Slow descent

Barosinusitis Treatment – Clinic

- Promote drainage
  - If severe, use altitude chamber if available
  - Decongestants, topical and systemic
- Treat pain
  - Transudate forms, fills space, relieves pressure
  - Oral analgesics as needed
  - Local heat
- Address infection

Take Home

- Barotrauma results from barometric pressure change, in our environment because of altitude
- Aviators must avoid flying when symptoms of URI or allergic rhinitis indicate possible ear or sinus block
- Topical decongestants can help the aviator “get down”
- Next slide for quiz instructions

- Go to quiz
- Enter your answers on the answer sheet
- Print only one answer sheet for entire course
- Press ESC to go back to main menu