

PAEDIATRIC OTOLARYNGOLOGY NOTES

V AND VI Year MEDICAL STUDENTS

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INTRODUCTION

Paediatric Otolaryngologists provide medical and surgical care to infants and children who have complicated and often rare diseases and disorders that are most effectively and safely managed in institutions that specialise in children's health care. Infants are not just "little adults". At every age they are different, requiring an understanding of the anatomic, physiologic and psychological changes that occur with their growth and development. We take care, as Charles Bluestone says, of "special" problems or "special" children, or both, in a "special" institution.

These notes are not meant to be a comprehensive review of the scope of paediatric otolaryngology. They cover those subjects with which I feel the student with an interest in family practice or paediatrics should be conversant.

OTITIS EXTERNA

Infection of the skin of the ear canal. It may be bacterial, fungal or viral. It is usually caused by pH change in the ear canal by water (normal ear canal pH 5.1) and overgrowth of organisms with a breach of canal skin causing invasion.

Organism

- Candida, Aspergillus niger
- Pseudomonas
- Herpes virus

Presentation

- Severe discomfort in the external ear
- Swelling ear canal with discharge
- Tenderness on movement of the tragus and/or pinna
- "Wet cardboard" appearance, fungal OE

Management

- Meticulous cleaning of the ear canal
 - Otowick optimal treatment with:
Ciproxin HC ear drops 3 drops three times a day for 5 days
OR Locacorten-Vioform
 - Change wick daily prn
 - Systemic antibiotics if cellulitis or lymphadenopathy
- .If doubt about TM perforation, don't use potentially ototoxic drops.

Prevention

- Alcohol ear drops/acetic acid 3% (Aqua ear)---not with perforation!
- Ear putty, ear plugs
- Remove wax at the beginning of the swimming season

THE "RED EAR"

60% of red ears are **NOT** acute OM

- often crying child, febrile, otitis externa, OME
- if diagnosis of OM uncertain, rationale of giving prescription for antibiotics to be taken if paracetamol etc not effective after 24 – 48 hours

ACUTE SUPPURATIVE OTITIS MEDIA

Incidence

- 80% of children will have one attack by the age of four years
- Peaks at 6 – 18 months and 4 – 5 years

Aetiological Factors

- Major Factors
Daycare Centre attendance (“Biologic Zoos”/orphanages)
Cigarette smoke exposure
Prop feeding/reflux
URTI, Acute sinusitis

Bacteriology

- 90% caused by a single organism
- | | |
|--------------------------|--|
| Streptococcus pneumoniae | 20 – 30% (becoming less with
Pneumococcal immunisation) |
| Haemophilus influenzae | 30 – 40% |
| Moraxella catarrhalis | 8 – 10% |
| Streptococcus pyogenes | 4 – 8% |
- Recurrent Otitis Media – H. influenzae organism increases to 50 – 60%

Management

- Amoxicillin up to 90 mg/kg/day for 10 days
- If allergic to Penicillin – Rulide D/Septrin/Azithromycin
- Analgesia, local anaesthetic ear drops (only if ear not about to perforate)
- If not improving after 48 hours, i.e. fever/pain persist-- suspect resistant organism
Augmentin/Cefaclor

Prevention

- Amoxicillin/Cefaclor 20 mg/kg/day for 4 weeks

Indications for Surgical Intervention (Myringotomy and Ventilation Tubes)

1. Persistent otitis media/impending mastoiditis
2. 6 separate attacks of otitis media in 12 months, OR
4 separate attacks of otitis media in 6 months

Complications

1. Acute mastoiditis
2. Chronic otitis media/perforation
3. Otitis media with effusion
4. Facial nerve palsy
5. Meningitis
6. Cholesteatoma

CHRONIC SUPPURATIVE OTITIS MEDIA

Implies chronic middle ear infection with a tympanic membrane perforation with either active discharge or dry middle ear.—for longer than 6 weeks.

Aetiology

- Sequelae of acute otitis media
- Related to poor hygiene/nutrition

Bacteriology

Multiple organisms

- | | |
|-----------------------------------|----------|
| • Pseudomonas sp | 60 – 80% |
| • Staphylococcus aureus | 20 – 30% |
| • Streptococcus pneumoniae | 10 – 20% |
| • Bacteriodes and other anaerobes | 25% |

Management

- Regular ear toilets (0.05% Betadine)
- Topical ear drops/powder
- Ciproxin HC or Ciloxan ear drops for recalcitrant ears
- Little place for systemic antibiotics except for bony/soft tissue invasion
- When dry, between age 5 –7 years, consider myringoplasty

OM/CSOM IN ABORIGINAL CHILDREN

- Early colonisation of nasopharynx by Pneumococcus—90% by age 3 months
- Less specific otologic symptoms – “silent” otorrhoea in acute OM
- Higher incidence of chronic otorrhoea (up to 70% of children in some communities)---Ciloxan ear drops now available on authority prescription.
- Relates to overcrowding, poor hygiene and nutrition, passive smoking etc
- As general health improves, so does incidence of OME, retraction pockets and cholesteatoma

OTITIS MEDIA WITH EFFUSION (OME)

Synonyms

- glue ear
- Serous otitis media
- Middle ear effusion

Serous or mucoid middle ear effusion secondary to Eustachian tube dysfunction. In 50% of cases, low levels of bacterial pathogens are present – usually those seen in acute otitis media.

Aetiologic Factors

- Daycare centre attendance
- Prematurity/low birthweight
- Cleft palate – 80% by age 1 year
- Down syndrome
- Reflux
- Allergic rhinitis/sinusitis
- ?Adenoiditis/adenoid hypertrophy
- Inadequate treatment of otitis media
- Relationship to bacterial biofilm.

Symptoms

Infants – 3 years

Delayed speech development
Balance disorder – delay in walking
Hearing loss – fail clinical test
Recurrent otitis media
Head banging, nocturnal otalgia
Behavioural problems, FB

3 – 7 years

Partial hearing loss – fluctuating hearing loss
Eustachian symptoms, dull ache
Difficulty at school – “tuning out”
Behavioural problems
Lack of self-esteem
Reading problems (Dunedin study)

Signs of otitis media

- Retracted TM with decreased mobility
- May be opaque, yellow, brown, vascularized or black
- Retraction pockets/adhesive OME

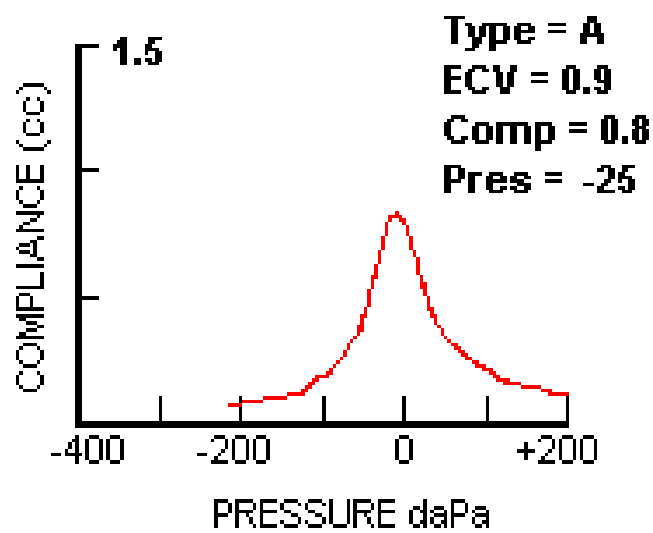
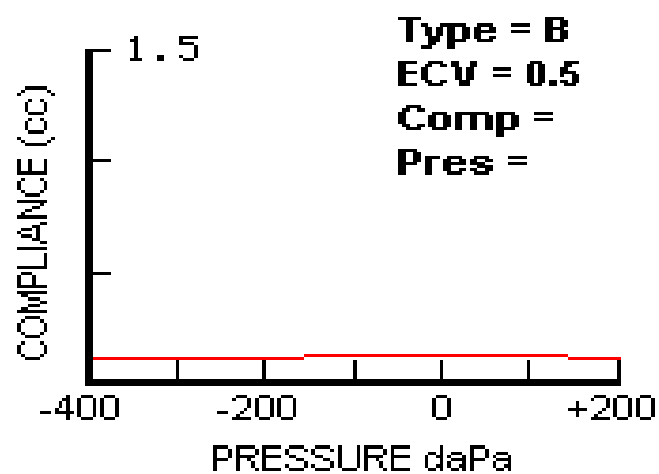
Investigations

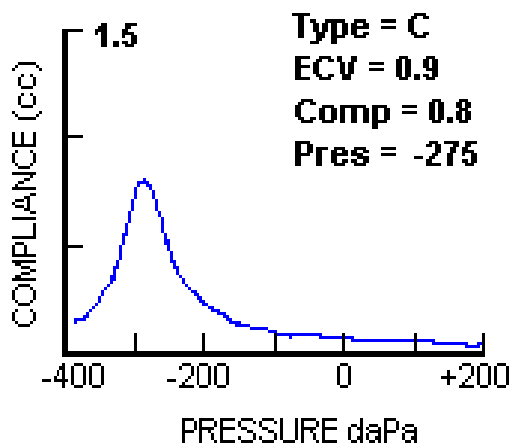
- Audiometry
- Tympanometry
 - 'A' normal peaked tracing
 - 'B' flat tracing
 - 'C' negative pressure peak

Management

1. Amoxicillin/Ceclor 20 mg/kg/day 1 dose for 2 – 4 weeks (becoming more contentious)
2. Steroid nasal spray if atopic—Mometasone 2 months.
3. Modified Valsalva – Otovent
4. Hearing aid (uncommon)
5. Antihistamines/decongestant – not proven
6. Steroids orally – not proven
7. Bisolvon – not proven
8. Surgical
 - Myringotomy alone – little help
 - Myringotomy and insertion of ventilation tubes (grommets)
 - Adenoidectomy with myringotomy and tubes—decreases 2nd op by 50%
9. Look for associated medical conditions
 - Oesophageal reflux
 - Sinusitis – in infants as young as 12 months
 - Allergic rhinitis – association with OME, particularly in >6 year old with persistent OME
 - Immunologic deficiency, especially subclass IgG2 and IgG3 deficiency
 - Craniofacial abnormality

Tympanogram**Type A**

**Type B****Type C**



MYRINGOTOMY AND TUBES

Indications

Absolute

1. Handicapping hearing loss for 3 months
2. 6 separate attacks of otitis media in 12 months OR 4 separate attacks in 6 months
3. Atelectatic otitis media with effusion

Relative

1. Mild hearing loss for 12 months or greater
2. Marginal child with speech delay
3. Balance problems
4. Recurrent otitis media with facial nerve palsy
5. Mild otitis media with effusion/hearing loss and recurrent otitis media 3 – 4 times
6. Attic retraction pocket

Complications of Ventilation Tubes

1. Otorrhoea with URTI/H₂O
2. Polyps/bleeding
3. Early/late extrusion

4. Retraction pockets/cholesteatoma at myringotomy site
5. Persistent perforations 1.6 – 10%

Management of Grommet Infections

1. Local ear toilets with 0.05% Betadine followed by Ciprofloxacin ear drops 3 drops three times a day for 5 days. Tissue spearing an adjunct—not a cure!
2. Consider otowick/drops/Ciproxin HC
3. Rarely IV antibiotics/removal of tube
4. If organism is cultured and pseudomonas etc – drops only
5. If H. influenzae or Strep. Pneumoniae – consider oral antibiotics also

Reintubation

- 20% of patients
- Particularly cleft palate/Down syndrome/allergic rhinitis

Protection of ear with tubes in place

1. Sea water none or ear plugs
2. Pools silicone ear putty, Bluetac
Earplugs, moulded ear plugs
Avoid prophylactic eardrops

Complications of otitis media with effusion

1. Cholesteatoma
2. Ossicular complications
3. Language problems/ reading difficulties
4. Central auditory processing disorder
5. Hearing loss in background noise as adults?

CHOLESTEATOMA

- More aggressive in children
- Cystic structure associated with invagination of tympanic membrane, with accumulation of skin, debris, bacteria eroding middle ear structure
- Aboriginal children with CSOM over age 10 years—10% chance of cholesteatoma.

Complications

Intratemporal bone

- Hearing loss
- Ossicular damage
- Perforation TM/otorrhoea
- VII nerve palsy
- Mastoiditis
- Labyrinthitis
- Perilymph fistula

Extratemporal bone

- Meningitis
- Sigmoid sinus thrombosis
- Intracranial abscess

Surgery for cholesteatoma

Individualised

Varies with:

- Location/extent of cholesteatoma
- Status of hearing and infections
- Socioeconomic issues regarding followup
- Likelihood of compliance with plan

SENSORINEURAL HEARING LOSS

Incidence

- Severe sensorineural hearing loss in 1 in 1000 infants

Aetiology

- 50% congenital sensorineural hearing loss is genetic
- Non-genetic TORCH syndrome (perinatal infection)
 - Toxoplasmosis
 - Rubella
 - Cytomegalovirus
 - Herpes simplex
 - Syphilis
- Maternal ototoxic medications
 - Thalidomide
 - Quinine
 - Aminoglycosides
 - Ethyl alcohol?
- Metabolic Diseases
- Asphyxia/birth trauma
- Hyperbilirubinaemia
- ICU admission
- Neonatal meningitis
- Ototoxic medications
- Prematurity/low birthweight
- Noise trauma

In essence, all children who are graduates of the neonatal intensive care unit should be identified as “at risk” for sensorineural hearing impairment. The prevalence of moderate to profound sensorineural hearing loss in the “at risk” group is higher than the rate in the well baby population.

Over 100,000 West Australian babies have had neonatal hearing screening using various technologies. ANY BABY CAN HAVE A HEARING SCREENING FROM DAY 1- Using objective screening methods.—Otoacoustic emission testing/aABR testing.

Babies with normal hearing at birth can develop progressive or acquired SNHL (eg meningitis/ head injury) –doubling the incidence by 5 years and tripling it by 10 years.

COMMONLY OCCURRING TYPES OF GENETIC HEARING IMPAIRMENT

Syndromic

Autosomal Dominant

- Treacher Collins syndrome
- Goldenhar syndrome
- Waardenburg syndrome
- Branchio-oto-renal syndrome

Autosomal Recessive

- Usher syndrome
- Pendred syndrome
- Jervell and Lange-Nielson syndrome
- Alport syndrome

Non-syndromic

- Autosomal dominant delayed onset progressive sensorineural hearing loss
- X linked recessive mixed-stapes fixation with mixed hearing loss and perilymph gusher

Meningitis

- Sensorineural hearing loss is most common permanent sequelae of bacterial meningitis (10% of infants). 31% with *S. pneumoniae*
- If sensorineural hearing loss persists for 2 –3 weeks – permanent
- Progressive sensorineural hearing loss may occur and will require serial audiograms till age 3 years or 2 years after the meningitis.
- Consideration of cochlear implantation within 12 months for meningitis patients

Perilymph Fistula

- Accounts for 8% of congenital sensorineural hearing loss
- Fluctuating or progressive hearing loss. Balance problems less common in children.
- Oval window leak more often than round window
- High index of suspicion; explore middle ear

HEARING SCREENING IN CHILDREN

1. Otoacoustic emission screener
 - Initial screening test for infants
 - If infant fails OAE screening, then automated Auditory Brainstem Screening (ABR) is performed
 - Diagnostic ABR is gold standard diagnostic tool
2. 6 months – 2 1/2 years – visual reinforcement audiometry
3. 2 1/2 years to 4 years – play audiometry
4. 4 years and older – adult type audiometry with earphones

HEARING ASSESSMENT RESOURCES IN WA

1. Princess Margaret Hospital for Children Audiology Department/ENT Department
2. State Child Development Centre, Rheola Street, West Perth
3. Australian Hearing, City,
4. Lions Hearing Centre, QEII Medical Centre at SCGH, Joondalup
5. Telethon Speech and Hearing Centre, Wembley
6. Private Otolaryngologists and Audiologists

SPEECH DELAY

Normal speech development

- Generally 20 words or short phrases at 18 months
- Generally 50 words/short sentences at 2 years

Causes of speech delay in a 2 year old

- Variation of normal development
- Hearing loss
- Intellectual disability
- Environmental deprivation
- Neurological abnormalities
- Autism

Also Bilingual households
Twins
Premature infants

NASAL PROBLEMS

Neonatal Nasal Obstruction

Respiratory distress can occur anywhere from nasal vestibule to the lungs.

The neonate may be an obligate nasal breather (until 8 – 16 weeks) because of the proximity of the soft palate to the base of the tongue, the epiglottis and the larynx.

Causes

Anterior obstruction

- Deformed lower lateral cartilages
- Septal deformity
- Pyriform aperture stenosis
- Lacrimal duct cysts
- Turbinate hypertrophy

Posterior obstruction

- Encephalocoele
- Dermoid
- Haematoma
- Chordoma, teratoma
- Rhabdomyosarcoma
- Unilateral/bilateral choanal atresia
- Adenoid hypertrophy

Investigations

- Mirror misting test
- Passage of nasal catheter
- Septal strut testing
- Telescope/fibrescope
- CT scan/contrast (atresia)

CHOANAL ATRESIA

- Most common anatomic obstruction in nasal cavity
- Unilateral more frequent – girls more common
- Complete/incomplete persistent bucco-pharyngeal membrane
- Bony/membranous or bony (90%)

Associated Congenital Lesions

C	Coloboma
H	Heart defects
A	Atresia choanae
R	Retarded growth
G	Genital hypoplasia
E	Ear defects/deafness

Also Branchial arch defects, microcephaly, micrognathia, palatal defects, mandibulofacial dystostosis

Management

- Bilateral – life threatening – oral airway
- Surgery
 - Transnasal
 - Transpalatal approach
 - Stenting for 4 – 6 weeks

OLDER CHILDREN – Nasal Obstruction**History**

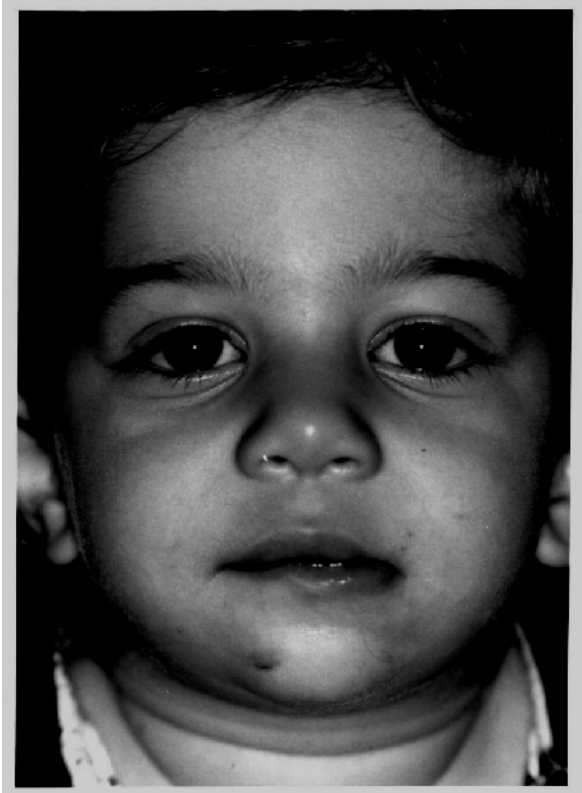
- Duration
- Association with obstructive sleep apnoea
- Family history of atopy, epistaxis history
- Nasality of speech

Examination

- Adenoid facies
- Open Mouth
- Short upper lip, flat middle 1/3 face
- Dull facial appearance, dental malocclusions

Allergic facies

- As above, plus:
 - 'Allergic shiners', Denny's line
 - Broad nasal tip, transverse crease



Examine

- Ears (secondary to NPX obstruction)
- Septum, nasal cavity (otoscope)
- OPX – tonsil size
- Palate shape and length
- Nasopharynx if possible
- Voice – hyper/hyponasality

Investigations

- **Sinus X-rays**
Lateral – to assess adenoids
Waters – to assess antra
- **CT Scan**
Coronal mini-series CT Scan
For sinus disease, ostial disease
- **Polysomnography**
If OSA noted
- **Allergy Tests**
Skin tests, RAST testing

Management

Remember to consider nose, adenoid region and tonsil area as a whole – the airway obstruction occurs in series, not in parallel. Many obstructed children will need adenoidectomy and tonsillectomy to affect a cure. In fact the upper and lower respiratory tract are 'ONE AIRWAY'.

ADENOIDECTOMY

- Snore loudly, obstructive sleep disorder
- Avoid with short or cleft palate
- Rule out submucous cleft palate, i.e.
 - Bifid uvula
 - Thin median raphe
 - Bony notch in hard palate
- Can be done and home in 6 hours (same day care unit)
- Rhinolalia (hypernasality)

ALLERGIC RHINITIS

- 40-80% have parental atopy
- Seasonal (hayfever) or perennial (PAR)
- PAR – dry, stuffy, blocked nose – sniffer
- Inhalant or food allergy as cause
- RAST testing – for inhalant antigen
- Avoidance – provocation tests for foods

Management and Prevention

- Avoidance of allergen e.g. HDM
- Desensitization – ID/Sublingual
- Nasal steroid sprays eg Mometasone

Medical Treatment

- Antihistamines – sedating/non-sedating
 - Nasal steroid sprays
- NOTE: Cortisone absorption effect on growth in children
- | | |
|----------------|---------------|
| Beclomethasone | 40% absorbed |
| Rhinocort | 8% absorbed |
| Nasonex | 0.1% absorbed |

Surgical Treatment – NOT A CURE!

- Cautery of turbinates/cryosurgery
- Trimming of turbinates

Note: Cautery of turbinates may be combined with tonsillectomy and adenoidectomy. Remember allergy may manifest as eczema, asthma and hayfever and also tonsillar and adenoid hypertrophy, otitis media with effusion and sinusitis.

OBSTRUCTIVE SLEEP DISORDER

A spectrum of symptoms ranging from mild snoring through to apnoea with cardiac failure. In general, if a child has apnoea lasting more than 10 seconds or seven apnoeic episodes per hour then they have significant obstructive sleep disorder (Especially if they desaturate to less than 90%)

Features

Snoring	100%
Chronic mouth breathing	50%
OSA – apnoea	25%
Hypersomnolence	20%
Nocturnal sweating	20%
Restless sleep	20%+
Nightmares, waking	10%
Sleepwalking	10%
Enuresis	5%
Growth problems	5%
Meat dysphagia	5%+
Neuro-cognitive, behavioural symptoms.	

Diagnosis

1. History
2. Examinations – nose/adenoids/tonsils
3. Investigations
 - Sinus views
 - Modified sleep study
 - Polysomnography

Management

1. Medical
 - Nasal steroid sprays
 - CPAP (Down syndrome/Craniofacial abnormality)
2. Surgical
 - Ts + As + CIT
 - Tracheostomy

It is essential for post-operative tonsillectomy and adenoidectomy patients with obstructive sleep disorder to have overnight pulse oximetry to avoid apnoea/hypoxic drive stimulus. Great care to avoid oversedation with narcotics.

In Australia 0.7% of children have Ts/Ads (0.5% for OSD) yet 10% of children snore and 3% have OSD/OSA---indicating significant under-diagnosis.

PAEDIATRIC SINUSITIS

Factors

- Air pollution, allergic rhinitis, URTI, day care attendance, reflux (new concept)

Definitions

- **Acute Sinusitis**
Persistent no longer than 6 – 8 weeks
Resolves with medical therapy with no significant mucosal damage
- **Chronic Sinusitis**
Persistent disease not alleviated by medical therapy alone. 12 weeks of persistent symptoms or six episodes per year of acute sinusitis

Pathogens

Streptococcus pneumoniae	40%
Haemophilus influenzae	35%
Anaerobes	7%
Streptococcus species	7%

Diagnosis

1. Acute viral URTI – commonly the precipitating event (“the cold that lasts a month, Doctor”)
2. The most common cause is bacterial infection secondary to obstruction
3. Plain sinus x-rays may be misleading
4. With persistent symptoms – CT scan (especially modified coronal CT) and endoscopy. The key to sinusitis is blocked ostiomeatal complex.
5. In WA, allergic rhinitis is often implicated

Symptoms

- Nasal obstruction and congestion
- Pressure with pain
- Thick nasal discharge
- Toothache
- Fever
- Cough or irritability

<u>Maxillary</u>	Cheek pain, frontal headache, tooth ache
<u>Ethmoid</u>	Inner canthal pain/pressure, periorbital headache
<u>Frontal</u>	Frontal headache, tenderness over frontal sinus
<u>Sphenoid</u>	Deep seated headache, PUO

Treatment of Acute Sinusitis

1. Most patients respond to appropriate decongestant and antibiotics in adequate dosage for sufficient duration
2. Antibiotic resistance – suggest Cefaclor, 'Augmentin' or Septrin for 10 – 14 days
3. Antihistamines not helpful, inhalations often helpful
4. Rule out reflux as cause
5. Topical decongestants/saline nasal spray

Systemic or Predisposing Factors for Sinusitis

- Cystic fibrosis
- Ciliary dyskinesia
- Young's syndrome
- Serious immune deficiency
- AIDS (30% have sinusitis)
- Anatomic abnormalities
- Environmental and genetic factors
- Hyper-reactive respiratory lining, especially in patients with asthma

Management Goals for Sinusitis

- Control infection
- Reduce tissue oedema
- Facilitate drainage
- Maintain patency of sinus ostia
- Break pathological cycle leading to chronic sinusitis

Surgical Management

- Aim to establish ventilation for sinuses especially at keystone area of ostiomeatal complex
- Antral washout, intranasal antrostomy, functional endoscopic sinus surgery

Epistaxis in Children

- Uncommon under the age of 2 years
 - Related to hot dry summers, heating in winter
 - Little's area on septum commonest site of bleeding
 - 80% can be prevented by Vaseline or Nozoil b.d. in nares
 - Nose picking, rubbing (allergy), trauma as causes
 - Foreign bodies may present as epistaxis
 - Neoplasms – juvenile Angiofibroma (NPX) – rare tumour in adolescent males
-
- **Cauterisation**
Use Cophenylcaine either on cotton wool or directly by spray. Then use AgNO₃ cautery stick. If 3 cauteries performed – elective surgery with electro-surgery. Packing uncommon.

Foreign bodies in nose

- Suspect if foul smelling unilateral discharge
- Adequate light decongestion/anaesthesia and instrumentation for success
- Cophenylcaine on cotton wool pledget – into nose and then remove both cotton wool and foreign body
- Look for secondary sinusitis if long standing

Fractured nose in children

- Uncommon to fracture nasal bones in infants – usually septal cartilage/soft tissue injuries
 - Rule out septal haematoma (like prow of boat)
 - Often wait 7 days for swelling to subside, then review
 - Radiography not always necessary except for medico-legal reasons
 - Reduction of nasal fracture at 7 – 14 days optimally
- .Ensure an ENT surgeon sees the child by 10-14 days after injury before the fracture sets

TONSILLITIS AND TONSILLECTOMY INDICATIONS

Tonsillitis

- Acute, viral or bacterial
- Streptococcus (Group A beta haemolytic)
- Penicillin treatment of choice 7 – 10 days
- If Lactamase producing bacteria (non-responsive to Penicillin) consider Augmentin/Cefaclor
- If 6 attacks of bacterial tonsillitis in 12 months in child over 4 years with 2 weeks off preschool/school – consider tonsillectomy
- “Chronic tonsillitis” – other older children with cryptic debris coughed up, frequent sore throat and halitosis

Peritonsillar Abscess (Quinsy)

- Abscess may point or be ‘subacute’
- Trismus drooling, pain, fever
- Two management options
 1. IV antibiotics, subsequent tonsillectomy
 2. Quinsy or immediate tonsillectomy
- The latter is favoured as one hospitalisation and decreased pain and morbidity
- Recurrence rate if not operated – 20%

Indications for Tonsillectomy in the 2010’s

- Obstructive Sleep Disorder
 - Upper airway obstruction secondary to tonsillar or tonsillar and adenoid hypertrophy
 - Commonest indication for tonsillectomy in paediatric hospitals worldwide
- Severe recurrent bacterial tonsillitis
- Quinsy – 1 – 2 episodes
- Biopsy purposes – to rule out e.g. lymphoma

Tonsillectomy Procedure

- General intubation anaesthesia and protection of airway
- Often combined with adenoidectomy
- Sharp/blunt dissection to remove tonsils. Coblation/electro-surgery may cause higher incidence of 2ndary haemorrhage/
- Meticulous attention to haemostasis
- Post-operative overnight pulse oximetry mandatory for children with OSD
- Post-operative antibiotics for 7 days reduce pain, incidence of secondary haemorrhage
- Avoid ASA, NSAIDS

Tonsillectomy Complications

- Bleeding
primary or reactive
secondary – to 14 days post-operative
- Seen in 1 in 50 procedures
- Secondary bleeding if tonsil bed infection or early separation of slough
- Secondary healing often controlled by admission, IV drip, antibiotics, removal of clot/AgNO₃
- Late complication of scarring or velopharyngeal incompetence (VPI) causing rhinolalia or hypernasality (cleft palate type speech)

Tonsillar Hypertrophy Revisited (See OSD)

- All large tonsils are not always associated with OSD
- Relatively small tonsils (Grade II) may be floppy or in patients with lax tissues e.g. Down syndrome may be obstructive

Tonsil Size

Grade 1

Grade 2

Grade 3

Grade 4

Increasing Severity of Obstruction Symptoms

- Chronic mouth breathing and snoring
- Increased URTI, oral-dental ill health
- Orthodontic abnormalities, altered taste, smell
- Restless sleepers, 2 – 3 pillow, head arched
- Waking for drinks, sleep walking, enuresis
- Thin, poor eaters, meat dysphagia
- Chronic nocturnal cough (micro aspiration)
- Decreased stamina for day time activities
- Nocturnal sweating, morning headaches (CO₂ retention)
- Hypoxia, apnoea, pulmonary hypertension
- Right heart failure, cardio-respiratory arrest

PAEDIATRIC LARYNGOLOGY

Stridor

Symptom not a diagnosis

- | | |
|---------------------------|---|
| <u>Inspiratory</u> | superior part of upper airway obstruction |
| <u>Expiratory</u> | obstruction distal to vocal cords |
| <u>Biphasic</u> | subglottic (or glottic) obstruction |

Age relationship

- At birth – choanal atresia/congenital subglottic stenosis
- Several weeks after birth – laryngomalacia
 - Subglottic haemangioma
 (Inflammatory disorders rare in neonates)
- 1 – 6 years – inflammatory
 - croup, epiglottitis
- 8 – 12 years – bacterial tracheitis

Acute stridor

- Inflammation, trauma, FB

Chronic Stridor

- Fixed lesion, e.g. VC palsy/subglottic stenosis

Increasing Severity

- Papilloma, subglottic haemangioma

Examination

- Auscultation of neck
- Position e.g. leaning forward in epiglottitis
- Colour
- Respiratory rate, cardiac rate
- Retractions

Care with examination of mouth, pharynx (especially epiglottitis)
Flexible fibre-optic scope is useful

Radiology

- AP/Lateral neck and chest
- (inspiratory and expiratory if suspect a foreign body)
- Fluoroscopy, barium swallow
- CT, MRI

Endoscopy

Team approach – with anaesthetists

Differentiating Features of Three Paediatric Inflammatory Diseases

FEATURE	DISEASE		
	CROUP	BACTERIAL TRACHEITIS	EPIGLOTTITIS
AGE	<2 years	Any age	3-4 years
ORGANISM	RSV Parainfluenza	Staph. aureus	H. influenzae
SITE OF INVOLVEMENT	Subglottis	Trachea	Supraglottis
STRIDOR	Biphasic	Expiratory	Inspiratory
VOICE	Barking cough	Hoarseness	Unaffected (Hot potato)
POSITION	Not characteristic	Not characteristic	Erect, chin jutting forward
SWALLOWING	Unaffected	Unaffected	Drooling
TREATMENT	Humidity Adrenalin ?Steroids	Bronchoscopy Suctioning IV antibiotics ICU	Intubation IV antibiotics Humidity ICU

Note: With the increasing use of Hib vaccination, epiglottitis is becoming less common

CONGENITAL ABNORMALITIES OF THE LARYNX

Laryngomalacia

- Common laryngeal anomaly
- Intermittent low-pitched crowing inspiratory stridor
- Abnormal flaccidity or tightness of supraglottic structures
- Often worse when supine
- May cause respiratory distress, feeding difficulties and FTT, associated with neurological condition
- Tubular epiglottis, prominent arytenoids, short ary-epiglottic fold
- Subside usually after 1 – 2 years
- Occasionally laser surgery to AE fold in severe cases

Vocal Cord Paralysis

Symptoms

- | | |
|------------------------------------|-----|
| • Stridor | 65% |
| • Dyspnoea, dysphonia | |
| • Inhalation, respiratory distress | 17% |
| • Cyanosis | 12% |

Bilateral

- CNS disease, birth trauma, Arnold-Chiari malformation
- Most present by 6 weeks of life
- Respiratory distress, normal cry
- 50% will need intubation or tracheostomy

Unilateral

- Idiopathic 35%, obstetric 24%
- Cardiac surgery, neurologic, vascular
- Left 72%, Right 28%
- Weak cry, stridor on exertion

Diagnosis

- Endoscopy of larynx
- CT if CNS problem suspected

Management

- Observation
 - Unilateral, treat cause (e.g. hydrocephalus)
 - Bilateral – ETT/tracheostomy (50%)
- Late
 - Arytenoidectomy for bilateral VC palsy

Subglottic Stenosis

- Congenital or acquired
- Stridor, respiratory distress, recurrent LTB
- Circumferential narrowing at cricoid level
- Post extubation (cause) and failure extubate
- Bronchoscopy, radiology
- Occasionally need cricoid split operation, OR Laryngotracheal reconstruction

Subglottic Haemangioma

- Smooth compressible mass in subglottis
- 50% associated cutaneous lesions
- Present as increasing stridor, or a persistent laryngotracheobronchitis
- Diagnosis X-ray, Bronchoscopy (no biopsy)
- Usually involute in 1 – 4 years
- Observe/tracheostomy, CO₂ Laser and Interferon

OTHER LARYNGEAL CONDITIONS**Recurrent Respiratory Papillomatosis (RRP)**

- Low incidence, on the increase HPV 6, HPV 11
- Condyloma-like papilloma on vocal cords, larynx
- Increasing hoarseness, stridor (avoid tracheostomy)
- Frequent endoscopies, CO₂ laser, interferon
- Rarely seed to tracheo-bronchial tree

Vocal Cord Nodes

- Vocal abuse, cough
- Often resolve in teenage years
- Occasionally surgical removal if over the age of 10 – 12 years and failed speech therapy for 6 months

CHRONIC COUGH IN CHILDREN

Holinger	“Symptom not a diagnosis”
Jackson	“Cough is the watchdog of the airway”
	“Don’t drug the watchdog!”

Diagnostic Protocol

1. Histology

- Immunization, allergies, asthma, sinusitis, URTI
- Passive smoking history
 - a) Dry Barking (Brassy) Cough – Infections
 - Subglottic stenosis
 - Aberrant innominate
 - Tracheomalacia
 - b) Wet Productive Cough
 - Specific infection LRT or chronic bronchitis
 - c) Cough with associated throat clearing
 - PND, reflux

2. Physical Examination

3. Radiology

- Chest x-ray, sinus views (?mini CT)
- Barium swallow

4. Blood Tests

- CBC, Diff, Pertussis Ab titres
- IgGs, $\alpha 1$ – Antitrypsin

5. Skin Testing

- Allergy, PPD, Sweat Chloride

Endoscopy

- If cough greater than 6 – 8 weeks
- History of foreign body/obstructive lesion
- Most valuable diagnostic tool (followed by sinus x-rays)

Results**Birth to 18 months**

- Cough variant asthma
- Aberrant innominate artery
- Reflux
(most effective studies – endoscopy/Ba Ex/Rx asthma)

1 1/2 years to 6 years

- Sinusitis
- Asthma
- Subglottic stenosis
(most effective studies – sinus x-rays, endoscopy, Rx asthma)

6 to 16 years

- Cough variant asthma
- Psychogenic
(most effective studies – PFT, endoscopy, Rx asthma)

Overall

- | | |
|-------------------------------|-----|
| 1. Cough variant asthma | 32% |
| 2. Sinusitis | 23% |
| 3. Reflux | 15% |
| 4. Aberrant innominate artery | 12% |

FOREIGN BODIES

Sixth most common cause of accidental death

Chest

- Peanuts 50%, carrot and apple
- 20% of children with a foreign body not seen by GP for 1 month

High index of suspicion

- Choking episode, wheeze
- Recurrent or migrating pneumonia
- Unexplained persistent respiratory symptoms

Investigations

- Insp/Exp chest films
- Fluoroscopy
 - Air trapping
 - Mediastinal shift
 - Obstructive emphysema

Oesophagus

- May cause fatal airway obstruction by impinging on airway
- Commonly – coins, plastic toys
- C6 level, stricture, aortic arch
- Careful removal

CORROSIVE INJURY OF THE OESOPHAGUS

Scenarios

1. Accidental ingestion by toddlers
2. Older children – mislabelled containers
3. Adolescents – suicide
4. Child abuse

Agents

Corrosive, e.g. caustic soda, dishwashing liquid (pH 11)

Acids, e.g. HCl, H₂SO₄

Non-phosphate detergent powders – airway problems > oesophageal problems

Management

1. Emergency

- H₂O/milk
- **No** acid to neutralise
- **No** vomiting

2. Oesophagoscopy – first 48 hours

- Oesophageal burns in absence of oral burns
- To level first circumferential burns
- Nasogastric tube
- Antibiotics, steroids
- Re-oesophagoscope at 10 – 14 days

3. Sequelae

- May need dilatations
- Occasionally oesophageal replacement
- Increased risk of oesophageal malignancy 40 years later