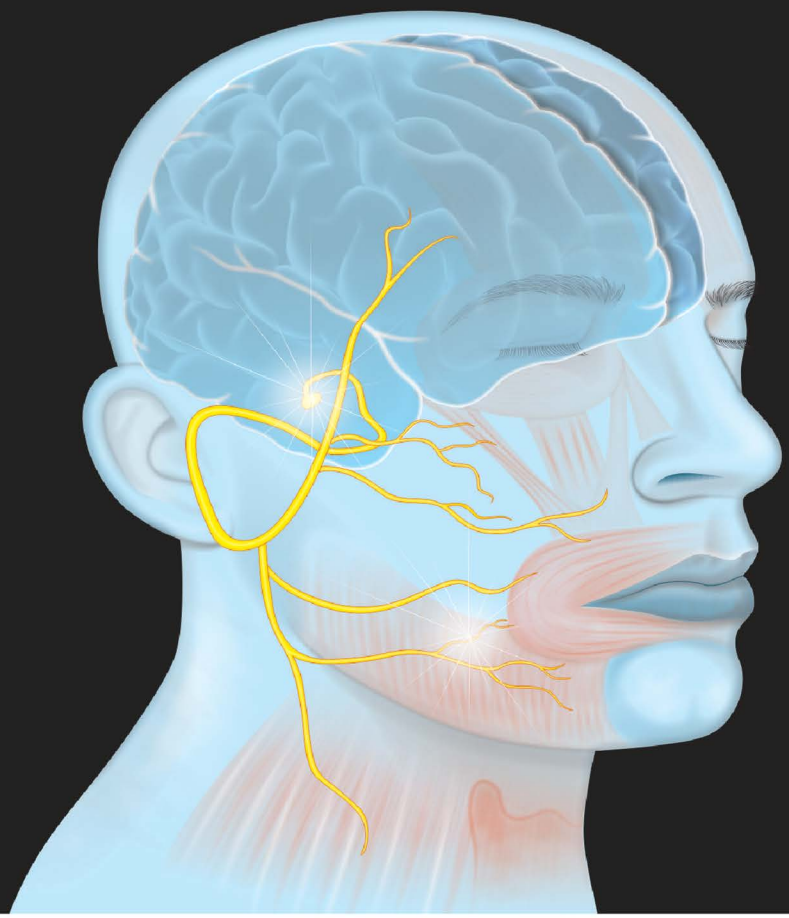
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Symptom Oriented Otolaryngology Head & Neck Surgery

Rhinology and Facial Plastics

Volume 2



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Zahoor Ahmad
Randall P Morton
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Foreword
Eugene N Myers

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Acute General Nasal Symptoms

2

Ravinder Natt, Claire Hopkins

Chapter Overview

Diagnostic Summary of Symptoms
Acute Nasal Discharge
2.1 Nasal Foreign Body
2.2 Odontogenic
2.3 Acute Rhinosinusitis
2.4 CSF Rhinorrhea
2.5 Rhinitis
2.6 Adenoiditis
2.7 Septal Abscess
2.8 Facial Cellulitis
2.9 Allergic Reaction

Pearls and Pitfalls

Pearls

- Acute rhinosinusitis most common cause of acute nose related symptoms.
- Most cases are self-limiting and antibiotics are not required.
- Urgent ENT specialist referral in presence of warning signs of actual or impending complications, altered vision, severe headache or other neurological symptoms.

Pitfalls

- Missing acute complications of rhinosinusitis may lead to permanent morbidity.

DIAGNOSTIC SUMMARY OF SYMPTOMS

- Nasal discharge
- Facial pain
- Nasal obstruction
- Facial swelling
- Eye swelling

ACUTE NASAL DISCHARGE

2.1 NASAL FOREIGN BODY

Epidemiology and Pathogenesis

- Common in pediatric population.
- Can be in seen in adult patients with psychiatric problems.
- Organic materials include food and rubber.
- Inorganic materials include metal and plastic.

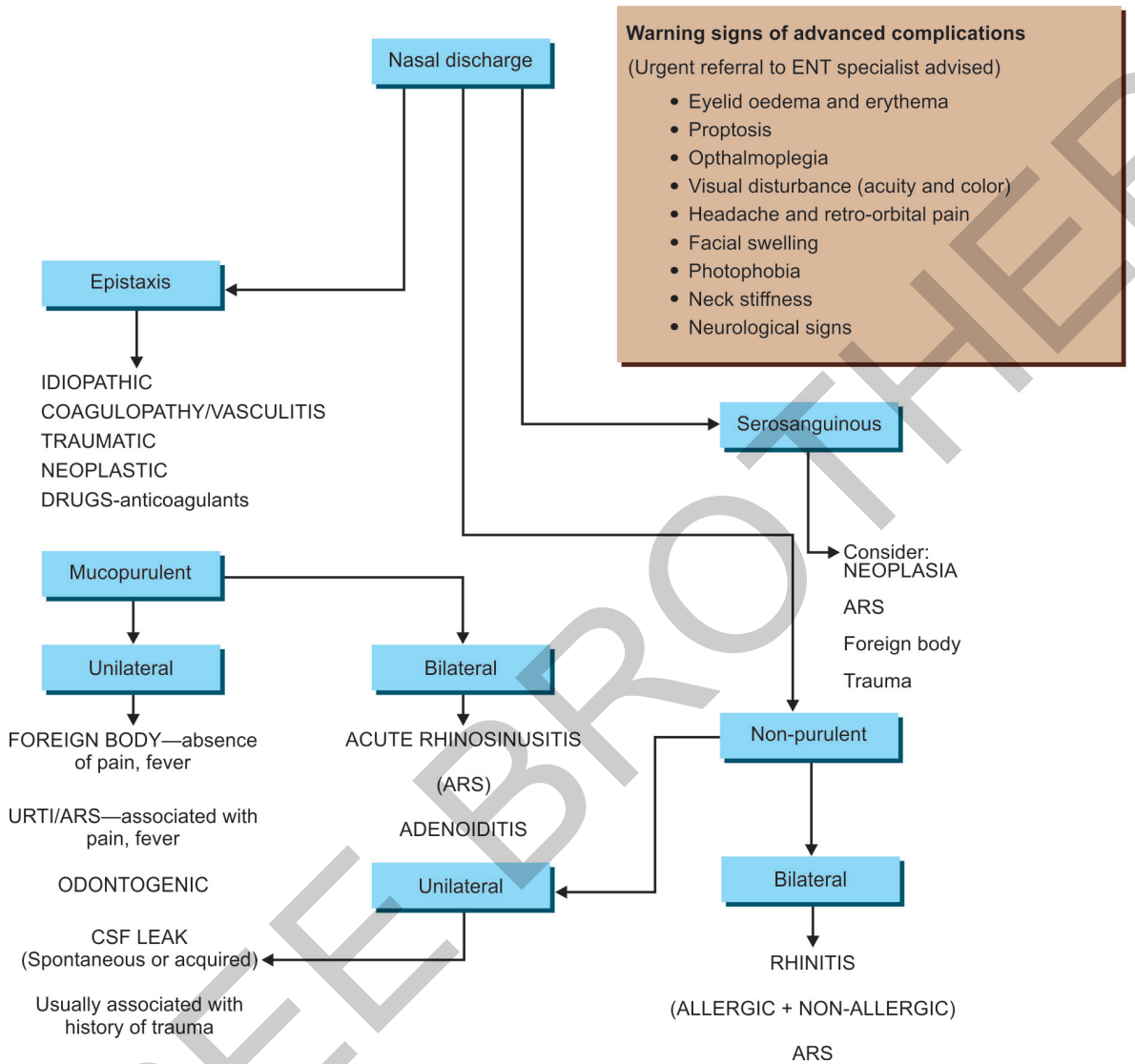
Clinical Features

Features in Clinical History

- Progressive nasal obstruction.
- Unilateral mucopurulent discharge.
- Painful FBs are highly suspicion of a corrosive agent such as battery.

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Flowchart 2.1: Diagnostic tree for acute nasal discharge.



Diagnostic Summary: Nasal Discharge (Flowchart 2.1)

- Serosanguinous:
  - Consider neoplasia—Chapter 4
  - Acute rhinosinusitis (ARS)
  - Foreign body (FB)
- Mucopurulent:
  - Acute rhinosinusitis
  - FB
  - Odontogenic
- Non-mucopurulent:
  - Acute rhinosinusitis
  - Allergic rhinitis (AR)
  - Non-AR (NAR)
  - Cerebrospinal fluid (CSF) rhinorrhea
- Epistaxis—Chapter 9

Typical Findings on Examination

- FBs usually anterior to middle turbinate or below inferior turbinate.
- Must examine both nostrils to exclude occult foreign bodies.

Investigations

Radiograph: To exclude corrosive FB (battery) if history inconclusive and child not cooperating with examination.

Preferred Treatment

- Direct instrumentation and removal under general anesthesia if child is not cooperating.

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- Corrosive FB to be removed urgently to avoid complications.
- Positive pressure technique including the Parent's Kiss by the parent delivering air into child's mouth and occluding the unaffected nostril (Alleemudder, Sonsale and Ali, 2007).

Complications of Treatment

- Bleeding if FB very tightly impacted against mucosal surfaces.
- Nasal stenosis and adhesions as a result of mucosal trauma.

Complications of Disease

- Mucosal irritation causing epistaxis.
- Nasal septal perforation/adhesions and stenosis if corrosive FB.
- Posterior dislodgement and tracheal aspiration (rare).
- Rhinolith formation.

2.2 ODONTOGENIC

Epidemiology and Pathogenesis

- Most commonly, the maxillary sinuses are affected because of the anatomical proximity.
- Dental periapical or periodontal abscess secondary to caries.
- Iatrogenic causes of bony sinus wall perforation following dental treatment.
- Benign and malignant odontogenic neoplasia invading into the paranasal sinuses.

Clinical Features

Features in Clinical History

- Facial swelling and pain
- Pyrexia
- Trismus
- Can progress to ARS and cause mucopurulent discharge and nasal obstruction.

Typical Findings on Examination

- Usually, unilateral mucopurulent discharge in the nasal cavity.
- Intraoral examination confirming dental abscess with localized edema of affected teeth.

Investigations

- Orthopantomogram radiograph: to determine site of abscess.
- Computed tomography (CT) scan of paranasal sinuses: if surgical treatment to sinuses considered or diagnostic uncertainty.

Preferred Treatment

- Antibiotic treatment to cover anaerobe organisms, which are the commonest causes of dental abscesses.
- Removal of infected tooth if infection persisting or recurrent.
- Persistent sinus disease may need treatment after dental cause has been treated, or prior to extractions to reduce risk of oroantral fistula.

Complications of Disease

- Development of ARS.
- Formation of dental cyst at site of infected tooth causing recurrent sinus infections.
- Oroantral fistula after dental extraction.
- Osteomyelitis (Longhini, Branstetter and Ferguson, 2012).

2.3 ACUTE RHINOSINUSITIS

Epidemiology and Pathogenesis

- Acute rhinosinusitis can be defined as the sudden onset of two or more symptoms, one of which should be either nasal obstruction of rhinorrhea (anterior or post nasal drip) with the presence or absence of facial pain and hyposmia.
- The symptoms persist by definition for <12 weeks.
- Acute rhinosinusitis is highly prevalent affecting 6–15% of the population (Fokkens, et al., 2012).
- Recurrent ARS is rare.
- Acute viral rhinosinusitis (common cold—rhinovirus) is defined as duration of symptoms of <10 days.
- Acute bacterial rhinosinusitis is usually preceded by an acute viral rhinosinusitis with a phase of further deterioration of symptoms after an initial episode of recovery during the same period of illness (double sickening).
- Bacterial infection thought to occur in 2% cases.
- Usually self-limiting; however, antibiotics often are expected by the patient and subsequently prescribed—92% consultation in primary care result in antibiotic prescription.
- Systematic reviews demonstrate very small clinical benefit from antibiotic use, but number needed to treat is 15, whereas number needed to harm is 7.

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Therefore, antibiotics should only be considered in severe cases, or in the presence of complications.
- Analgesia and decongestants may provide symptomatic relief.
- Intranasal corticosteroids are beneficial and associated with low incidence of adverse events.

Clinical Features

Features in Clinical History

- Facial pain may be throbbing, dull, or severe and extends to the frontal, vertex, retro-orbital, and malar regions.
- Facial swelling—suggestive of advanced disease over eyes and frontal region.
- Pyrexia (>39°C), elevated erythrocyte sedimentation rate, purulence on anterior rhinoscopy, purulence in postnasal space, suggested of a bacterial etiology.
- Hyposmia
- Nasal discharge—anterior and/or posterior nasal drip. Purulence alone has positive predictive value of 50% for bacterial infection.
- Children often present with cough—can be difficult to differentiate from acute adenoiditis.
- Exclude warning signs suggestive of complications of ARS—*see* below.

Typical Findings on Examination

- Mucopurulent discharge in the nasal cavity.
- Facial swelling and tenderness.
- Nasal mucosal edema.

Investigations

- *Bacteriology*: Gold standard for diagnosis of bacterial infection is sinus puncture; however, endoscopically guided middle meatal swabs are an alternative.
- *Streptococcus pneumoniae*, *Moraxella catarrhalis*, and *Haemophilus influenzae* are the most common organisms.
- *CT scan of paranasal sinuses*: Indicated only in suspected complications of ARS, as does not differentiate between common cold and ARS, or if surgical intervention considered.
- Contrast CT recommended if suspected orbital or intracranial abscess.
- *Magnetic resonance imaging (MRI) scan*: To determine any intracranial complication.

Preferred Treatment (Flowchart 2.2)

- Complete resolution of symptoms suggests cure. Persistence should lead to re-evaluation of diagnosis and treatment for chronic rhinosinusitis if appropriate.

Complications of Treatment

- Complications of antibiotics usage include severe allergic reactions leading to anaphylactic shock. Gastrointestinal, renal, and neurological disturbance may develop leading to pseudomembranous colitis, convulsions, and renal impairment.
- Antibiotic resistance is a major global health-care problem and the emergence of multidrug resistant pathogens (including methicillin-resistant *Staphylococcus aureus*). The genetic mutations resulting in resistant genes is a consequence of excessive and inappropriate use of antibiotics including indication and duration.
- Antibiotics may also mask sign and symptoms indicating complications of ARS.
- Complications of surgery if required for complicated ARS (endoscopic or external drainage of sinus) are rare but may include epiphora, development of postoperative nasal adhesions, diplopia, visual disturbance, CSF leak, arterial hemorrhage including retrobulbar and cerebral injury with meningitis.

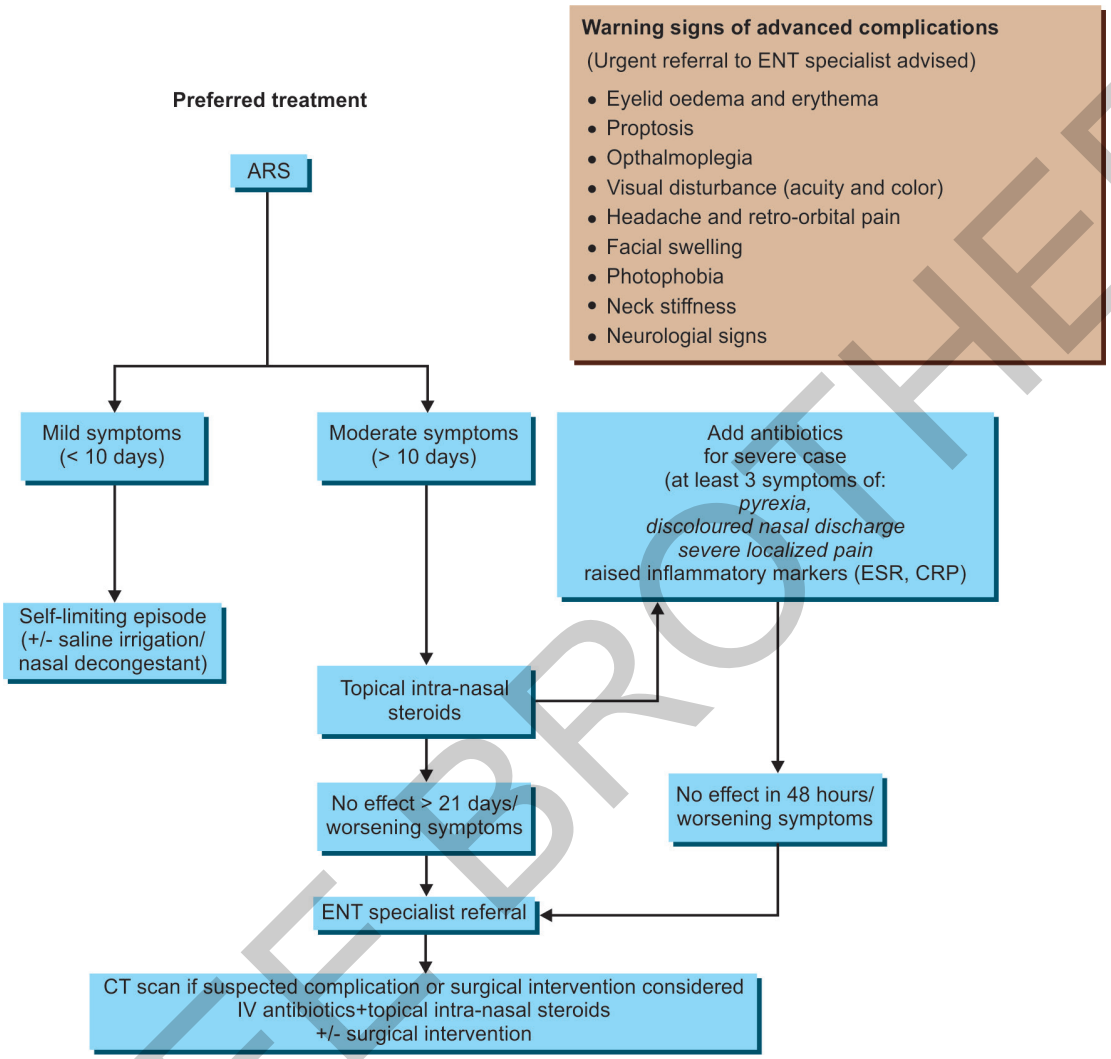
Complications of Disease

- The incidence of complications has been reported as 3 per million populations per year (Hansen, et al., 2012).
- Complications can be categorized with decreasing frequency into orbital (60–75%), intracranial (15–20%), and osseous (5–10%) (Pearlman and Conley, 2008).

Orbital: The close anatomically proximity of the orbit to the paranasal sinuses in particular the ethmoid sinuses makes the orbital region the most commonly involved site of complication. Orbital complications of acute sinusitis have been classified into five categories by Chandler, Langenbrunner and Stevens (1970) as follows:
- *Preseptal cellulitis*:
  - Inflammation of the eyelid and tissue anterior to the orbital septum.
  - Eyelid edema, orbital pain, eyelid erythema.
  - Without reduced or painful eye movements, proptosis, or visual disturbance.
  - Medical therapy for treatment.

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Flowchart 2.2: Management of acute rhinosinusitis.



- *Orbital cellulitis*:
  - Inflammation of tissue posterior to the orbital septum.
  - Periorbital cellulitis symptoms with reduced or painful eye movements, proptosis, and chemosis in the presence of NORMAL vision.
  - Medical therapy for treatment.
  - Consider CT if failure to resolve within 24–48 hours, or progressive signs.
- *Subperiosteal abscess*:
  - An extraconal abscess between the periorbita area and lamina papyracea.
  - Orbital cellulitis symptoms with fever and reduced visual acuity with diplopia.
  - Loss of red color vision occurs as early sign—Ishihara charts very useful for assessment (available on smart phones).
  - CT scan reveals edema of the medial rectus muscle with lateralization of the periosteum of the bony orbital margin and displacement of the globe.
  - Surgically drainage of affected paranasal sinus and of abscess through an endoscopic approach involving an ethmoidectomy and opening of lamina papyracea or direct drainage via an external approach.
- *Orbital abscess*:
  - An intraconal abscess within the orbital tissue with significant threat to the optic nerve and irreversible visual loss.

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  - Additional symptoms of profound proptosis and opthalmoplegia and significantly deteriorating visual acuity.
  - Proceed as with subperiosteal abscess management and in addition drain intraconal collection in conjunction with ophthalmologist.
- *Cavernous sinus thrombosis*:
  - Rare complication, cavernous sinus thrombophlebitis develops as a consequence of disease propagation from the affected veins of the paranasal sinuses resulting in generalized sepsis and cranial nerve disorders.
  - Symptoms in contralateral eye.
  - There is significant mortality rate of 30% and a morbidity rate of 60%.
  - Additional signs of papilledema, with spiking temperatures and signs of meningeal irritation.
  - Cerebral magnetic resonance venogram demonstrates absence of venous flow in the affected cavernous sinus and filling defects of the ophthalmic veins.
  - Intravenous antibiotics with steroids.
  - Surgical drainage of affected sinus (commonly sphenoid sinus).
  - The use of anticoagulation to prevent thrombus migration remains controversial as there is a potential increased risk of intracranial and intraorbital bleeding (Desa and Green, 2012).

Intracranial: Infections can proceed from the paranasal cavities to the endocranial structures through hematological spread along the diploic veins to reach the brain or via direct bony erosion of the sinus walls and along traumatic fracture lines.

- Most commonly associated with disease involving the frontal, ethmoid, or sphenoid sinuses.
- Specific symptoms and signs include nausea and vomiting, neck stiffness, lethargy and altered conscious levels, focal neurological signs, including cranial nerve palsies and signs of increase intracranial pressure including papilledema.
- Nonspecific symptoms include high pyrexia and severe progressive headache.
- Complications in reducing order of frequency include meningitis, epidural abscess, subdural abscess, intracerebral abscess, and venous sinus thrombosis including sagittal sinus.
- Treatment includes high-dose intravenous antibiotic therapy and steroids with drainage of appropriate sinuses at the same time as neurosurgical drainage of intracranial collection.

Osseus: Sinus infections can involve bony margins causing osteomyelitis and result in thrombophlebitis of the diploic veins leading to intracranial complications.

The frontal sinus bone is most commonly involved.

- Specific symptoms and signs include periorbital and frontal swelling, nasal congestion, rhinorrhea, focal neurological signs, diplopia, photophobia, and meningeal irritation.
- Nonspecific symptoms include high pyrexia and severe progressive headache.
- A Pott's puffy Tumor may develop with features of fluctuant edema over the anterior wall of the frontal bone with subperiosteal pus collection as a consequence of underlying osteomyelitis.
- High-dose long-term intravenous antibiotic therapy and steroids with surgical drainage of subperiosteal abscess and surgical debridement of bone affected by osteomyelitis (Akiyama, Karaki and Mori, 2012).
- Combined drainage of the affected paranasal sinuses.

2.4 CSF RHINORRHEA

Epidemiology and Pathogenesis

Causes include:

- Iatrogenic after surgery
- Head trauma
- Spontaneous

Clinical Features

Features in Clinical History

- Unilateral clear watery nasal discharge
- Increased on tilting head forward or straining
- Salty taste of secretions

Typical Findings on Examination

- May identify on nasal endoscopic examination skull-base defect with active CSF rhinorrhea.

Investigations

- *Immunoelectrophoresis*: β2 transferrin protein detected in nasal secretions, which is highly specific for CSF.
- *CT scan*: May demonstrate skull base defect.
- *MRI scan*: Can demonstrate meningoencephalocele in particular involving sphenoid sinus.

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- *Intrathecal fluorescein*: Injection of fluorescein into subarachnoid space prior to surgical repair can reveal fluorescein passing from skull-base fistula into nasal cavity, indicating the site of an occult CSF leak.

Preferred Treatment

- Conservative approach with bed rest and head elevation and stool softeners post-trauma.
- Prophylactic antibiotics remain controversial as they may mask signs of cerebral infections and encourage drug resistance organisms.
- Endoscopic approach for repair now preferred in majority of cases, using abdominal fat, fascia lata, or temporalis fascia graft to repair the defect and secured by nasal mucosal flaps or grafts with fibrin glue (Daele, Goffart and Machiels, 2011).

Complications of Disease

- Risk of meningitis.

Complications of Treatment

- External approaches for repair (including bicoronal and eyebrow incisions) may cause forehead paresthesia following disruption to the supraorbital and supratrochlear nerves.

2.5 RHINITIS

Epidemiology and Pathogenesis

Allergic rhinitis: Inflammation of nasal mucosa primarily but may involve other structures including eyes, middle ear, and pharynx involving inflammatory mediators mediated by immunoglobulin E (IgE).

- Intermittent form of disease is characterized by symptoms < 4 days per week or < 4 weeks per episode.
- Persistent disease of form disease is by symptoms > 4 days per week or > 4 weeks per episode (Bousquet, et al., 2012).

Non-allergic rhinitis: Inflammation of nasal mucosa in the absence of any allergy-based component and can be characterized further into subgroups:

- Infectious rhinitis—commonly viral, of which common cold caused by rhinovirus is the most prevalent with duration of symptoms < 10 days.
- Atrophic rhinitis—impaired mucociliary clearance causing nasal crusting.
- Rhinitis medicamentosa—excess self-use of topical nasal decongestants causing rebound congestion.
- Vasomotor rhinitis—increased vascular tone and permeability triggered by the environment.
- Non-allergic rhinitis with eosinophilia syndrome—presence of nasal eosinophilia without an allergy component.
- Hormonal rhinitis—hormonal imbalance triggers rhinitis (pregnancy, hypothyroidism, and puberty).
- Drug-induced rhinitis—use of certain medications can precipitate rhinitis symptoms including aspirin, oral contraceptives, and beta-blockers.

Clinical Features

Features in Clinical History

- Nasal congestion—bilateral
- Nasal discharge (discoloration suggest and infective cause)
- Ocular symptoms—itchy and watery eyes in AR
- Frequent sneezing—in AR
- Hyposmia

Typical Findings on Examination

- Inflamed nasal mucosa and congested turbinates, clear rhinorrhea
- Conjunctivitis—AR

Investigations

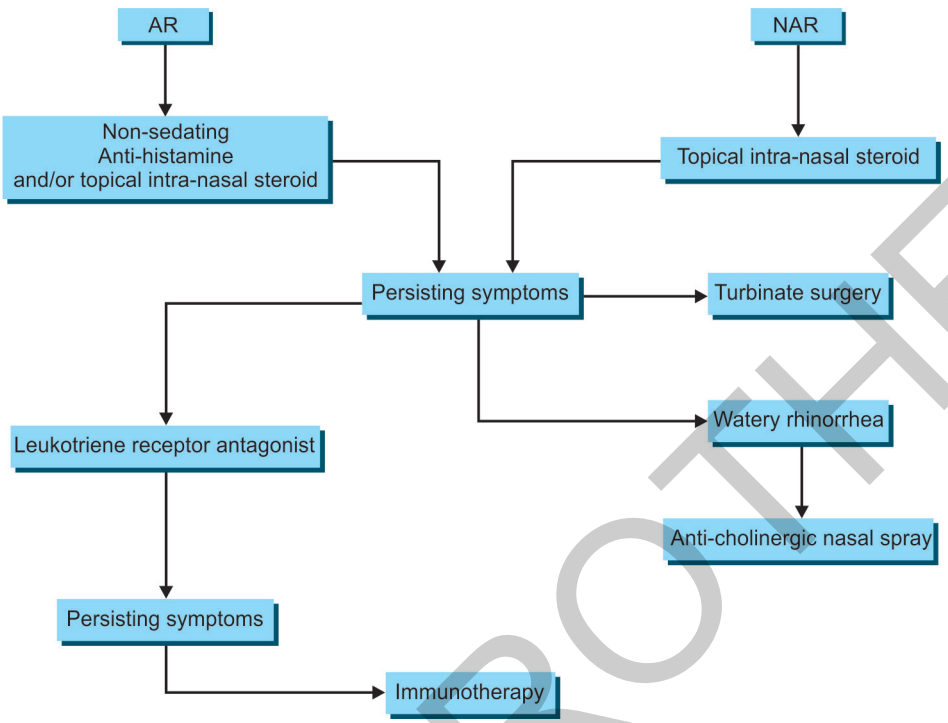
- *Skin-prick test*: Intradermal inoculation of allergens. A positive response results in a wheal and flare appearance when compared to a control solution.
- *Radioallergosorbent test*: In vitro serological analysis of IgE responses to allergens avoiding complication of anaphylaxis with skin-prick testing.
- *CT scan*: Not usually indicated. Consider if no response to medical treatment with suspicion of chronic rhinosinusitis requiring surgical management.

Preferred Treatment (Flowchart 2.3)

- Symptomatic treatment of symptoms with simple analgesics and antipyretics for viral rhinitis.
- Avoidance of allergen, medication, occupational triggers, and correct hormonal imbalances.
- For mainly obstructive symptoms, consider surgical reduction of inferior turbinates.

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Flowchart 2.3: Management of rhinitis.



Immunotherapy: Desensitization through controlled application of allergen (Redulovic, et al., 2010).

Complications of Disease

- AR associated with ARS
- Impact on quality of life, reduced performance in school examinations, work.

Complications of Treatment

- Topical nasal sprays can cause localized irritation and epistaxis.
- Allergen immunotherapy carries the risk of anaphylaxis and appropriate management schemes, and clinical environment must be implemented to combat this.
- Hemorrhage and crusting secondary to turbinate reduction.

2.6 ADENOIDITIS

Epidemiology and Pathogenesis

Causes include:

- Inflammation of adenoidal lymphoid tissue.
- Infective cause either viral or bacterial.
- Incidence decreases with age–peak between 3 and 8 years, rare in adolescence, and beyond.

Clinical Features

Features in Clinical History

- Nasal obstruction.
- Mucopurulent discharge.
- Snoring and features suggestive of obstructive sleep apnea (Chapter 10).
- Associated with tonsillitis.
- Associated with otitis media and otitis media with effusion.

Typical Findings on Examination

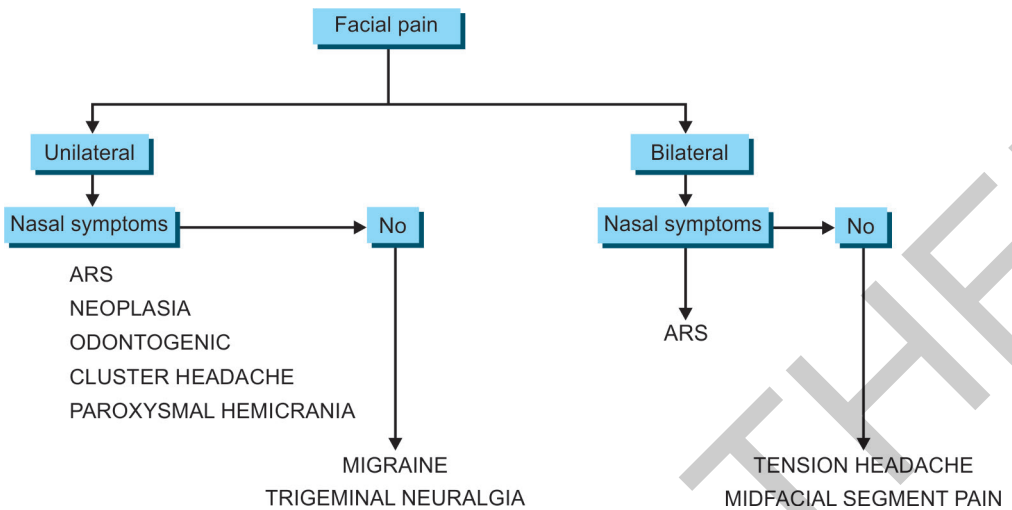
- Endoscopic nasal examination in cooperative child may demonstrate adenoidal hypertrophy and mucopurulent discharge.

Preferred Treatment

- Usually self-limiting, may require antibiotics in severe infection.
- Prophylactic antibiotics may be considered if recurrent otitis media or adenoiditis.
- Adenoidectomy

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Flowchart 2.4: Diagnostic tree for facial pain.



Complications of Treatment

- Infection and hemorrhage.

Complications of Disease

- Extension of infection to surrounding structures causing potential airway obstruction.

Diagnostic Summary: Facial Pain (Flowchart 2.4)

- Unilateral:
  - Neoplasia (*see* section Nasal Discharge)
- Acute rhinosinusitis (*see* section Nasal Discharge):
  - Odontogenic (*see* section Nasal Discharge)
  - Cluster headache
  - Paroxysmal hemicrania
  - Trigeminal neuralgia
- Bilateral:
  - Acute rhinosinusitis (*see* section Nasal Discharge)
  - Migraine
  - Tension headache
  - Midfacial segment pain

Diagnostic Summary: Nasal Obstruction (Flowchart 2.5)

- Unilateral:
  - Neoplasia (*see* section Nasal Discharge)
  - Foreign body (*see* section Nasal Discharge)
  - Odontogenic (*see* section Nasal Discharge)
  - Trauma—(*see* Chapter 12 on Nasal Trauma)
  - Septal abscess
- Bilateral
  - Acute rhinosinusitis (*see* section Nasal Discharge)
  - Allergic rhinitis (*see* section Nasal Discharge)
  - Non-allergic rhinitis (*see* section Nasal Discharge)
  - Adenoiditis (*see* section Nasal Discharge)
  - Trauma (*see* Chapter 12 on Nasal Trauma)

2.7 SEPTAL ABSCESS

Epidemiology and Pathogenesis

- Presence of pus between the cartilaginous septum and overlying layer of mucoperichondrium.
- Associated with nasal trauma or surgery resulting in septal hematoma, which progresses into an abscess and disrupts the blood supply to the septal cartilage.

Clinical Features

Features in Clinical History

- Nasal obstruction
- Pyrexia
- Nasal discharge

Typical Findings on Examination

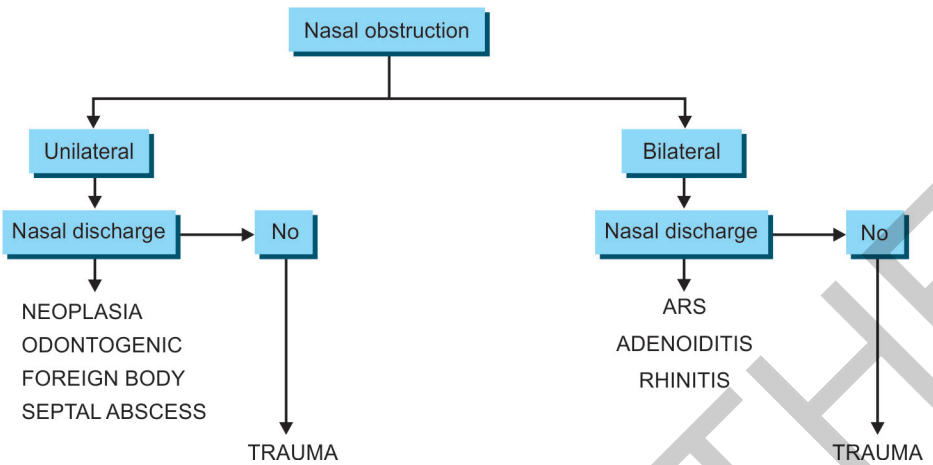
- Erythema and pain on palpation of nasal tip and dorsum.
- Edema of septum obstructing nasal passage.

Preferred Treatment

- Surgical incision and drainage of abscess with antibiotics.

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Flowchart 2.5: Diagnostic tree for nasal obstruction.



Complications of Disease

- Cosmetic deformity of nose as a consequence of avascular necrosis of septal cartilage.

Diagnostic Summary: Facial Swelling (Flowchart 2.6)

- With fever
  - Acute rhinosinusitis (*see* section Nasal Discharge)
  - Odontogenic (*see* section Nasal Discharge)
  - Cellulitus
- Without fever
  - Trauma (*see* section Facial Trauma)
  - Neoplasia (*see* section Nasal Discharge)

2.8 FACIAL CELLULITIS

Epidemiology and Pathogenesis

- Non-necrotizing inflammation of the skin and subcutaneous tissues secondary to bacterial infection (*Streptococcus* and *Staphylococcal* species) involving the face.
- Danger triangle of face involves the nasal bridge (roof of triangle) and extend to the corners of the mouth (base of triangle) occupying the nose and maxilla.

Clinical Features

Features in Clinical History

- Edema including face, eyes, and lips
- Erythema
- Pain over affected site
- Warmth sensation over inflamed skin
- Pyrexia

Typical Findings on Examination

- Warmth sensation over inflamed skin
- Exclude odontogenic cause of underlying infection

Preferred Treatment

- Use marker pen to demarcate affected area on face to determine further spreading infection.
- Intravenous antibiotics.

Complications of Disease

- Spread of infection along facial veins, which communicate with the cavernous sinus via ophthalmic veins resulting in cavernous sinus thrombosis and associated complications (*see* section Intracranial Complications of ARS).

Diagnostic Summary: Eye Swelling (Flowchart 2.7)

- Unilateral
  - Acute rhinosinusitis (*see* section Nasal Discharge)
  - Trauma
- Bilateral
  - Allergic reaction including AR.

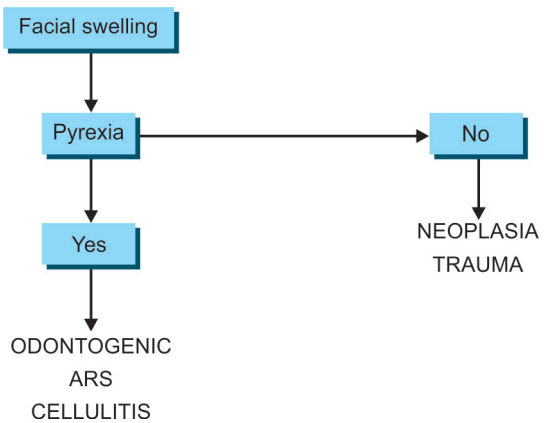
2.9 ALLERGIC REACTION

Epidemiology and Pathogenesis

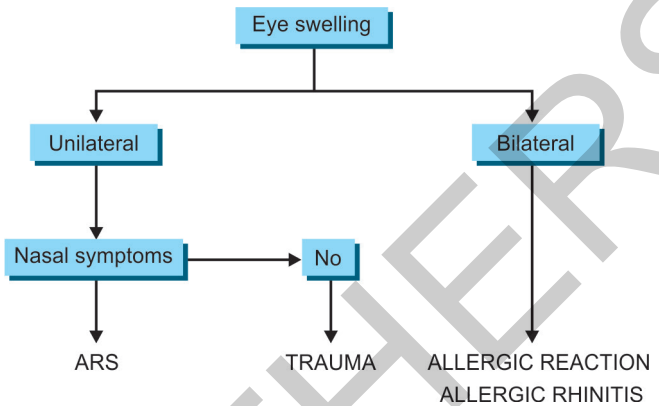
- Inflammatory reaction following exposure to an allergen.

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Flowchart 2.6: Diagnostic tree for facial swelling.



Flowchart 2.7: Diagnostic tree for eye swelling.



Clinical Features

Features in Clinical History

- Edema including face, eyes, and lips
- Urticaria
- Cough and wheeze
- Sneezing
- Watery eye
- Increased nasal secretions

Typical Findings on Examination

- Look for signs of severe and progress allergic reaction including respiratory and cardiovascular compromise.

Investigations

- Serology: measure baseline mast cell tryptase (Rutkowski, Dua and Nasser, 2012).

Preferred Treatment

- Avoid allergen exposure.
- Combination of antihistamines, bronchodilators, topical nasal steroid sprays, and eye drops depending on severity of reaction.
- Immunotherapy for repeated attacks.
- Progression to anaphylaxis reaction, which is potentially life threatening.

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Zahoor Ahmad MBBS MS FRACS is Consultant Otolaryngologist—Head and Neck Surgeon, Counties-Manukau Health, Auckland University Hospitals, Auckland, New Zealand. He is the Vice-Chairman, Department of Otolaryngology—Head and Neck Surgery, Counties-Manukau Health, Auckland, New Zealand.

He is a member of the New Zealand Society of Otolaryngology—Head and Neck Surgery, American Academy of Otolaryngology—Head and Neck Surgery, and a life member of the Association of Otolaryngologists of India.

He previously served as President of the Northern Regional Society of Otolaryngology—Head and Neck Surgery, Wellington, New Zealand.

Dr Ahmad has clinical interests in head and neck, salivary, thyroid, nasal, and sinus diseases. His thesis for MS (Masters in Surgery) was on adenoids and middle ear disease in children.

He has lectured in a number of scientific meetings, and has been a keynote Lecturer in several International meetings. He has about 75 publications in peer-reviewed International journals and has also written chapters in books.

Dr Ahmad was born in Kashmir, India, and after graduation and post-graduation, he has traveled widely before falling in love with New Zealand and made it his home.



Randall P Morton MBBS MSc FRACS is Consultant Otolaryngologist—Head and Neck Surgeon, Counties-Manukau Health, Auckland University Hospitals, Auckland, New Zealand. He is Professor of Otolaryngology at University of Auckland, and Deputy Clinical Director of Surgery in Counties-Manukau Health, Auckland, New Zealand.

He is currently the Chairman of the Royal Australasian College of Surgeons (RACS), New Zealand National Board, Wellington, New Zealand.

He previously served as President of The New Zealand Society of Otolaryngology—Head and Neck Surgery (NZSOHNS), the Australia & New Zealand Head and Neck Cancer Society, and the Asia-Oceania Association of Otolaryngology Societies.

He was awarded the RACS Colin McRae Medal in 2004. His MSc thesis was based on the epidemiology of sinonasal cancer, and Triologic Society (USA) thesis was based on research into quality-of-life outcomes in head and neck cancer patients.

He has received Presidential Citations from the American Head and Neck Society and NZSOHNS. He has delivered keynote Lectures in several International meetings, including Eponymous Lectures in the UK, USA, and New Zealand.



Malcolm Giles MBChB FRACS is a specialist Otolaryngologist at Waikato Hospital, Hamilton, New Zealand. He qualified from Auckland University School of Medicine, Auckland, New Zealand in 1979, and became a fellow of Royal Australasian College of Surgeons, Melbourne, Australia in 1986. He became a fellow at the Royal Infirmary in Glasgow, UK from 1988 to 1989, studying the relationship between hearing loss and disability as well as the management of severe hearing loss.

On completing this Fellowship in late 1989, Dr Giles became a full-time consultant otolaryngologist at Waikato Hospital, Hamilton, New Zealand where he has worked since then. His main areas of practice are otology, congenital deafness, and otoneurology. He attends special clinics in otoneurology, congenital hearing loss, and cleft lip and palate.

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