

**SINUSITIS - ACUTE BACTERIAL**



*Parasaurolophus cyrtocristatus; Mid Cretaceous Period, (70-90 million years ago)  
Field Museum, Chicago.*

*On Friday December 5, 1997 at the New Mexico Museum of Natural History and Science an eerie sound in the pitch of a deep base trombone suddenly boomed out to an expectant group of computer scientists and palaeontologists. This sound was like no other heard before by any of those who had gathered to witness it. It was eerie, something deeply primal. A rush of adrenaline surged through the collective veins of the gathered group for they had just witnessed something extraordinary. These mournful haunting sounds had not been heard by any human ear before, in fact they had not been heard on the Earth at all for over 70 million years. What they had heard was the first reconstructed sounds of a living dinosaur, calling out to them from some steaming Cretaceous rainforest across untold eons of geological time to reach the ears of humans via a 21<sup>st</sup> century laboratory computer.*

*The origin of this extraordinary event had its roots in the wilderness regions of the San Juan Basin of north western New Mexico, two years previously in August of 1995. Dr Robert Sullivan was part of a fossil hunting team that was searching the region when he stumbled across a very rare find, the massive 4.5 foot head crest of a Hadrosaur (or “duck billed”) dinosaur by the name of Parasaurolophus. Hadrosaurs consisted of two main groups, the Hadrosaurines and the Lambeosaurines. The latter being much rarer and distinguished by their striking supracranial crests, the Parasaurolophus being the most spectacular member of this group.*

*Ever since the first discovery of a Parasaurolophus in 1922 palaeontologists have wondered what purpose, if any, these crests served. Many theories were put forward, including a snorkel type structure to enable under water breathing, a display structure, and a brain cooling structure. Current best theories however suggest that its purpose was to act as a resonating chamber due to the fact that it consisted of numerous chambers that are continuous with the nasal cavity. The theory suggests that the animal would have been able to produce a very impressive call and this could really only be for one thing. It most probably acted as a means of communication to other Parasaurolophuses. The crest that Dr Sullivan discovered was taken to the St Joseph Medical centre in Albuquerque and put under a high resolution CT scanner. About 350 thin sliced images were taken. Then using the most advanced computer technology available a 3D reconstruction was made of the crest. Fossilized bone was then able to be “digitally subtracted” from surrounding and infiltrating sandstone to give a pristine 3D representation of the crest as it was in life. Further computer modelling was then able to reproduce the sound that would have been produced by the animal as air was blown through these nasal passages from its massive lungs.*

*The Parasaurolophus was evolution’s most extreme experiment in paranasal sinus biology. Nature has a propensity to utilize any anatomical structure to enhance that organism’s chances of survival. The purpose of the sinuses in this creature was clearly one of communication with its fellow beings, which may have included such uses as an early warning distress call to its fellow herd members on the appearance of a predator. This is an understandable adaptation when one considers that the predators of the Cretaceous period were the most fearsome ever devised by evolution, predators that included the Allosaurus and the Tyrannosaurus Rex.*

*The vestiges of this primal legacy still remain today in many animals, including humans. These sinuses have greatly regressed in the human species, as they are no longer required as a defence against the monstrous predators of bygone times. In cases of human sinusitis however we may hear the faint echo of these primal calls emanating from the waiting room of the Emergency Department as patients communicate their distress through the impressive array of nasal cacophony that is associated with this condition.*

## SINUSITIS - ACUTE BACTERIAL

### Introduction

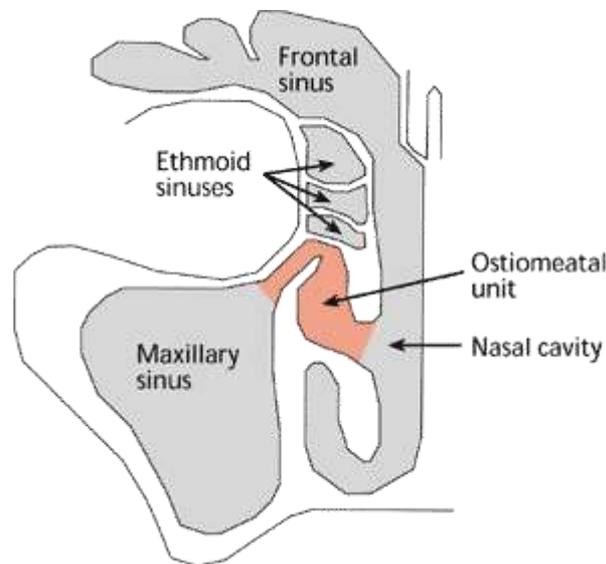
Infections in the nose involve the sinuses because the lining of the nose and the paranasal sinuses is continuous.

Sinusitis is a common condition, it can be allergic, viral or bacterial, (occasionally other causes, such as fungal).

Most cases run a benign course, but rarely potential serious complications may occur and **fungal infection in the immunocompromised can be lethal.**

See also **spate document on Mucormycosis (in Infectious Diseases folder).**

### Anatomy



*The paranasal sinuses consist of four pairs of sinuses. These are the maxillary, frontal, ethmoid and sphenoid sinuses. The maxillary, frontal and anterior ethmoid sinuses open into the ostiomeatal unit under the middle turbinate while the posterior ethmoid and sphenoid sinuses open into the superior meatus above the middle turbinate. Blockage of the ostia results in sinus disease.*

### Pathology

#### Organisms:

Acute bacterial sinusitis follows upper (usually viral) respiratory tract infection in 0.5% to 5% of cases. <sup>1</sup>

It is usually caused by:

1. *Streptococcus pneumoniae*
2. *Haemophilus influenzae*

- Less frequently by *Moraxella catarrhalis*.

### Complications:

Complications are rare in acute bacterial sinusitis but can be potentially serious, including:

- Osteomyelitis
- Retro-orbital/orbital spread with periorbital/orbital cellulitis.
- Deep spread with intracranial sepsis including, cavernous sinus thrombosis, meningitis and cerebral abscess.

### Clinical Features

#### Important points of history:

- Persistent mucopurulent nasal discharge (>7 to 10 days)
- Facial pain.
- Poor response to decongestants.

#### Important features of examination:

- Tenderness over the sinuses, especially unilateral maxillary or frontal tenderness.
- Tenderness on percussion of maxillary molar and premolar teeth that cannot be attributed to a single tooth.

<b>Similarities and differences between the common cold and acute sinusitis</b>		
<i>Symptoms &amp; signs</i>	<i>Common cold</i>	<i>Acute sinusitis</i>
Nasal obstruction	+++	+++
Rhinorrhoea (clear or pale yellow)	++++	±
Facial pressure	++	++++ (especially when bending forward)
Poor response to topical decongestants	-	++
Purulent rhinorrhoea (yellow/green)	-	+++
Facial pain	-	+++
Dental pain	-	+

Sinus tenderness	-	++
Fever	-	+

Consider more serious disease/ complications if the following “**red flags**” are present:

1. Patients fail appropriate medical therapy
2. Prolonged duration (more than 5 to 7 days)
3. High fever (38.4 °C or more)
4. There are *atypical* features:
  - Unilateral symptoms
  - Blood-stained discharge
  - Associated eye symptoms or signs
  - Significant facial swelling
5. Very severe pain/ headache unrelieved by analgesics or seemingly out of proportion to the clinical signs
6. Immunosuppression:
  - **In these patients the far more serious, life-threatening fungal infections, in particular mucormycosis, need to be considered.**

**Frankly *necrotic lesions* may be seen peri-orbitally and/or on the hard palate**

### Investigations

The diagnosis of uncomplicated acute sinusitis can usually be made on clinical grounds without the need for investigation.

#### Blood tests:

These are not routinely required, unless alternative diagnoses need to be ruled out, or serious secondary complications are suspected.

Consider:

1. FBE
2. CRP
3. U&Es/ glucose
4. Blood cultures

### Plain radiology:

Plain radiology is *not* recommended for the routine investigation of suspected uncomplicated sinusitis, where the diagnosis is usually a clinical one.

Plain x-rays may be helpful when the diagnosis is less clear, and CT is not available or radiation needs to be minimised.

- A *Waters* (straight anteroposterior) view of the skull will allow the maxillary sinuses to be evaluated.
- A *Caldwell* (*occipitomental*) view will allow evaluation of the frontal sinuses.
- *Lateral* x-rays can help evaluate the sphenoid sinuses.

The patient should be upright in all radiographs so that air-fluid levels can be seen.

As the maxillary sinuses are involved in nearly 90% of patients with acute sinusitis, a single Waters view may be all that is required to help confirm the diagnosis of acute sinusitis

### CT Scan:

This should not be a routine investigation due to radiation risk, however it should be considered if:

- The patient appears very unwell
- A serious complication is suspected
- The patient is immunocompromised
- The diagnosis of headache/ facial pain is unclear.

### MRI:

This will **best** delineate suspected serious secondary intracranial complications such as cerebral abscess or venous thrombosis.

### Nasal endoscopy:

The diagnosis of acute bacterial sinusitis is primarily clinical.

**Definitive** diagnosis is by endoscopy showing one or more of: <sup>2</sup>

- Mucopurulent discharge from the middle meatus
- Oedema or obstruction at the middle meatus.
- Polyps (or other obstruction lesions in chronic cases).

## Management

### 1. Analgesia:

Simple oral analgesics are usually adequate:

- Use aspirin or NSAIDs
- If pain is very severe, requiring parenteral opioids, consider the possibility of a more serious complication, such as osteomyelitis.

### 2. Decongestants:

- Common practice includes simple decongestants which shrink the nasal mucosal oedema and help open the natural ostia of the sinuses and allow re-aeration and muco-ciliary drainage.

For example oxymetazoline 0.5% in the form of a nasal spray gives good nasal mucosal decongestion with symptomatic relief.

Topical decongestants reduce oedema but should not be used for more than 5 consecutive days to avoid *rebound* nasal congestion. <sup>2</sup>

### 3. Topical steroids:

- Topical nasal corticosteroids may improve symptoms within 3 days

**See latest Antibiotic Therapeutic Guidelines for regime options.**

### 4. Antibiotics can shorten the duration of the illness. <sup>1</sup>

Options include:

- Amoxicillin/ Augmentin
- Cefuroxime or doxycycline, if allergic to penicillin.
  - ♥ Cefuroxime is now preferred to cephalexin or cefaclor due to superior anti-pneumococcal activity. <sup>1</sup>

Duration of treatment should be for 7 to 14 days depending on the patient's response.

**See latest Antibiotic Guidelines for full prescribing details.**

### 5. In cases of chronic sinusitis:

- Chronic sinusitis does not usually cause pain unless it is complicated by acute infection.

Acute infective exacerbations of chronic sinusitis are managed in the same way as acute bacterial sinusitis but with more prolonged courses of antibiotic therapy

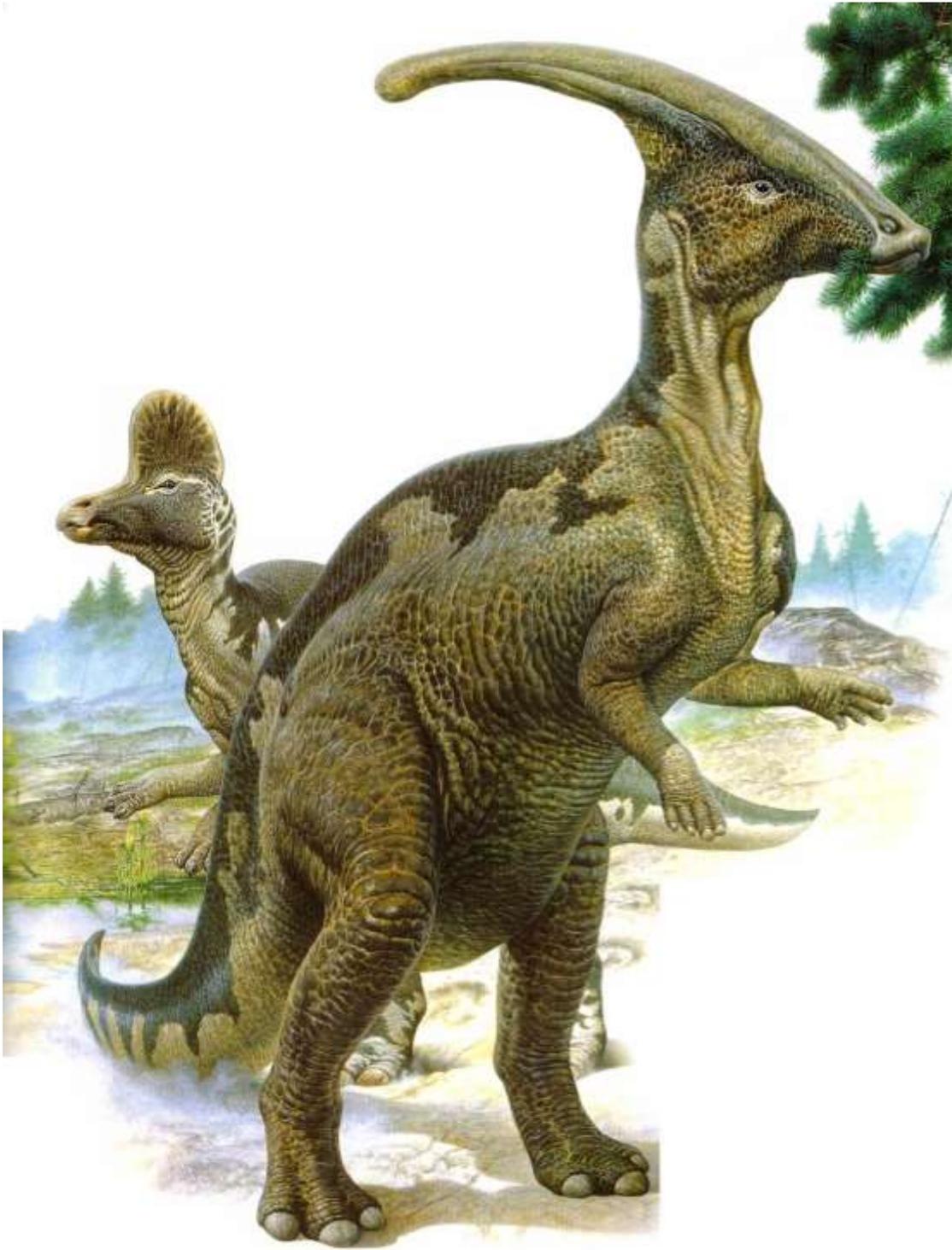
- Chronic sinusitis may arise from chronic infection or allergy, but is more likely to be due to *structural abnormalities*.

Disposition:

Most cases can be managed as an outpatient.

Referral to an otolaryngologist should be considered for chronic cases.

Rare complications including orbital involvement and osteomyelitis will need urgent investigation and specialist consultation as will **suspected fungal infections** in the **immunocompromised**.



*Artist's impression, "Parasaurolophus", (foreground): Mid Cretaceous Period, (70-90 million years ago)*

References

1. eTG - July 2017.
2. Wormald P.J “Treating Acute Sinusitis”, Aust Prescr. 2000; 23; 39 - 42

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