

How I Deal With Rhinosinusitis in Children: Practical, Objective and Informal Considerations

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We are going through a true “cough epidemic” today in São Paulo. As the theme to be presented is childhood rhinosinusopathy, cough is important. Childhood rhinosinusitis manifests itself clinically with, in addition to cough, fever (usually not too high), obstruction, and nasal discharge.

Cough is one of the main manifestations of sinusitis in pediatric patients. Do not forget that cough can be part of the clinical manifestation of a wide range of diseases. In pediatric ORL, adenoiditis also causes coughing. Some colleagues call it rhinopharyngitis or adenoiditis when the adenoid is present. Someone who has a rhinopharyngitis or adenoiditis coughs more at night.

Those who have sinusitis cough night and day, with a worsening at night. The presence of persistent day and night coughing leads one to consider or rule out sinusitis. It is also different from allergic cough, irritative laryngo/tracheitis, which we now see very often here in São Paulo due to excess environmental “dryness”—it has not rained for a long time, and the relative humidity is below 20%, in a long dry season combined with environmental pollution. But in principle, cough is an important diagnostic sign in sinusitis.

Fever

It all starts with a little fever. Usually, the fever is not very high: the fever of pharyngotonsillitis or tonsillitis is almost 104° F (40° C), while fever in sinusitis usually does not go beyond 100° F (38° C). Headaches or pain in the face are rarely mentioned, and children will hardly ever say, “I have a headache.” They may put their hands on the head, lower the head, and you will notice they are restless. Nasal discharge is also a possible sign of rhinosinusitis and nasal obstruction. Therefore nasal obstruction, *nasal* discharge, fever, and cough are usually the symptoms and signs of rhinosinusitis.

Usually, the vast majority of cases of acute rhinosinusitis start with a common flu or cold or upper respiratory tract infection (URTI). Not just **sinusitis but also acute otitis media usually starts as a common cold**. Acute viral rhinosinusitis progresses with up to ten days of symptoms, and in acute non-viral rhinosinusitis symptoms worsen after five days, or symptoms last longer than ten days and less than 12 weeks. Incidentally, today rhinosinusitis is exclusively defined as acute or chronic; acute, less than 12 weeks and chronic longer than 12 weeks. Other terms are no longer used: sub-acute, recurring chronic or persistent, intermittent.

Let us first focus on acute rhinosinusitis. Sometimes it starts as a cold that affects the sinuses. In children, the most often affected sinuses are the maxillary and anterior ethmoidal. Sinusitis affecting sinuses other than maxillary-ethmoidal is hardly ever seen in young pediatric patients. In older children (pre-adolescent or adolescents) frontal sinusitis, and then sphenoidal, may be considered. Now, let us forget for a while sphenoiditis or even frontal sinusitis.

Nasal discharge

Let us now focus more on the most frequent cases, maxillary-ethmoidal sinusitis. A child who has or has recently had a common cold may have discharge trapped inside these sinuses. It forms a real empyema at first. Sinuses or even the cavity of the middle ear may be filled with discharge.

This discharge may have a high viral load. Adenovirus, rhinovirus, all of the countless respiratory microorganisms may be present in this discharge that fills the paranasal sinuses. If the discharge that is there has a high viral load, why would you order an x-ray of the sinuses? Just to confirm that they are filled with fluid, in the early phase of a cold. This is the main reason why they have URTI, low fever, nasal discharge, and obstruction, with a little cough.

You do not need a simple x-ray of the paranasal sinuses because it is a viral rhinosinusopathy, resulting from a common cold of viral origin. Therefore, there is no need of too many tests for an **early URTI**, because the x-ray will show opacification, but so what? Opacification in the sinus in this phase refers to **discharge with important viral load** with a negligible bacterial load, so much so you would not consider the possibility of prescribing antibiotics, for example. Incidentally, this is today the beginning of many cases of otitis media that also start with a URTI; you could better observe them, without worrying about antibiotics at first.

The American Academies of Pediatrics and Otolaryngology say that we can wait up to eight or ten days after the onset of a URTI to start a more aggressive pharmacological treatment (antibiotics). Until then, it is a viral disease (or it may also have started with a crisis of allergy that gets contaminated with the viral load of the cold). In this early phase, we should only give children medications for symptoms of fever, increase liquid intake, liquefy discharges, clean the nose well, and so on. Therefore, if you have the clinical picture of a cold, in the beginning, you should simply observe this child. If you give in to the pressures of parents who insist on having an x-ray of the face, and the result is a diffuse opacification of the paranasal sinuses, you should only observe, because the quantity of microorganisms in this cavity is more viral, and you cannot treat viruses with antibiotics. We are back to zero. Why order an x-ray, with its financial costs, just to come to the conclusion that it is viral sinusitis? Therefore, you should only observe and monitor this child closely, with medications for the symptoms.

However, if the situation persists, and lasts eight or ten days, then yes, you will think: “up to then, there was a viral load. This viral load got secondarily contaminated by bacteria.” And then you may start an antimicrobial or antibiotic agent. This would be the *a posteriori* situation, when you can monitor the child without an x-ray. We, ENT doctors, have available fiber optic tests (nasofibroscopy), which can be done in any phase of this process.

Medications

What could you offer to this child? Analgesics and anti-pyretics, and nose-cleaning, have to be promoted much more intensely, cleaning with ordinary saline solutions or occasionally, when the discharge is more viscous, thicker, you may even use hypertonic solutions with a higher saline concentration, 3%, which will help solve this greater viscosity of the nasal discharge. Therefore, “do your best”, strongly recommend nose-cleaning, because the cleaner the nose, the easier it will be to eliminate the discharge “trapped” inside these maxillary-ethmoid cavities. You should also offer this child an alternative to clear the nose so they can breathe, and in this early stage a topical nasal vasoconstrictor can be indicated upon medical discretion, considering the child’s baseline conditions, age and weight and so forth. Normally I would use pediatric oxymetazoline, diluted in an equal volume of saline solution.

I use this topical medication to clear the nose so the child can breathe, before eating and before sleeping. In fact, no child can breathe, eat, or sleep well without a clear nose. Even we adults, when we have a common cold, cannot sleep if our nose is blocked. Therefore, it is important to remember to clean and clear. Naturally, as a specialist (ENT), I always recommend not using a topical vasoconstrictor for more than five days so you do not cause medication-rhinitis, with “rebound.”

Nebulization

Is nebulization used? In the VIth IAPO Manual (www.iapo.org.br), we wrote a chapter on nebulization. There is a popular belief according to which one could use a pan with boiling water and eucalyptus or another similar substance—in theory mucolytic—and you could “liquefy” these discharges more easily. This is a mistake. First, because these homemade solutions using hot pans may lead to major accidents involving severe burns. Secondly, if there is already vasodilation in the nose caused by the inflammation (viral/allergic) and you use nebulization with a hot fluid, you will increase vasodilation. Therefore, it is in fact a mistake, even from the pathophysiological standpoint, to use a hot substance in home nebulizations. The chapter on nebulization mentioned above is interesting, providing other possibilities for other respiratory problems involving the larynx, trachea, bronchi. It was written by Dr. Nelson Augusto Rosário Filho, from Curitiba, Brazil, a leading immunologic pediatrician.

Management

Therefore, we use nebulization, nose-cleaning, and disobstruction of the nasal cavity to provide relief from the discharges to be drained. Do not forget that children will hardly ever blow their own noses; they usually end up swallowing or “sucking” it back through the nasopharynx. When you examine, as you lower the tongue you will see that “purulent veil” on the pharynx, coming from above, from the rhinopharynx. These are situations that really come along with acute viral rhinosinusitis, which accompanies URTI from the acute clinical pharmacological standpoint. For now, in this phase, you will be just observing and not prescribing antibiotics.

Do not forget the analgesics/anti-pyretics, such as paracetamol, acetaminophen, or even dipyronone for those who like it, and you continue observing. I really

like to observe for a few days, but after eight or ten days observing a child, if the condition does not improve, nasal obstruction, nasal discharge, important obstruction, and low fever persist, then I tend to think that this viral load turned into a bacterial situation, and therefore the microorganisms—we do not say germ(s) any longer—have changed. They are no longer viruses. There may be viruses with bacterial co-pathogens in greater quantity such as *Streptococcus pneumoniae* (pneumococcus), *Haemophilus influenzae*, *Moraxella catarrhalis*, with a little *Staphylococcus aureus* and *Streptococcus pyogenes* too. Anyway, we should focus on these three main pathogens, pneumococci, *Haemophilus*, and *Moraxella*, the same microorganisms most common in acute otitis media.

These three, therefore, require antibiotics. The antibiotic you may prescribe (after observing these children who did not get better after a few days) will be amoxicillin. I suggest that you always start “going up the steps of the stairs slowly” (in terms of expanding the range of action). Amoxicillin, in the normal dose, 40 to 50 mg/kg and then, if the child does not get better, you can go up another step to amoxicillin with clavulanic acid, or then even cephalosporin, part of the betalactamic family, cefdinir, cefuroxime, cefpodoxime, and so on. We usually prefer the betalactamic family (penicillins and cephalosporins), always favoring amoxicillin, at the normal dose.

I consider changing antibiotics 72 hours after their introduction if there is a negative course (without significant improvement). Then, I will try another one, always going up in steps. If the child, for example, has recently taken antibiotics, or is in contact with other children who are taking antibiotics at school or daycare, and has had infections very close together, then you may consider the possibility of a more resistant pneumococcus or even *Haemophilus*. Here in Sao Paulo, highly resistant pneumococci are not as common as they are in the United States; however, moderate resistance is increasing. For this reason, be careful; many times, guidelines come from other countries, where patterns of resistance are different from ours. For example, in the United States, there are places where up to 40%-50% of pneumococci are highly resistant. Recently, a paper was published describing that pneumococcal serotype 19F is not only resistant to penicillin, but also to almost every antibiotic.

Therefore, these are increasingly complicated microbiological problems. We need to have microbiological surveillance of infections in the community. It is important to know the local microbiota and their patterns of resistance/susceptibility, taking care not to promote needlessly a selection of resistant microorganisms. It is important “not to be too eager” and to stick to the usual antibiotics, but also not to miss the chance of “watching out for” cases that will really need either a higher dose or another type of antimicrobial coverage.

When a child has hypersensitivity to penicillin and its byproducts, we may opt for macrolides like clarithromycin or azithromycin. I will use clindamycin in special cases, when I have practically exhausted my arsenal of drugs, because in addition to covering pneumo-resistant agents well, it also covers anaerobes. And anaerobes are important bacterial co-pathogens, particularly in those rhinosinusopathies that are not evolving well and in chronic rhinosinusopathies, which we will approach

next. These are my criteria for antimicrobials used for rhinosinusitis.

Another recommendation that I always make is not to use systemic decongestants together with antibiotics. This is a very common error, because systemic decongestants, in addition to being anti-histaminic, also have a vasoconstrictive component (phenylephrin). When you prescribe antibiotics, you want to have some vasodilatation for the antimicrobial to get into the site of infection. Therefore, using both together is antagonistic, and we want to promote drug synergy and not antagonism. I will then use antibiotics alone, without systemic decongestants. If you feel like using a systemic decongestant, or are part of the group of physicians who make use of systemic decongestants (which I definitely do not belong to), use it separately, never together with antibiotics. Analgesics/anti-pyretics and antibiotics are measures of support, along with nasal hygiene and the like. You should not allow the child to go back to school too soon; a little rest will do the child good.

Swimmers

Another situation to watch is swimming. Children who take swimming lessons (and then we always hear the same story, ‘ah, but my son swims in a chloride-free swimming pool, treated with salt or ozone) should not practice the sport during a crisis, whatever the water treatment applied to the swimming pool. They are all the same, and are certainly a risk factor in the perpetuation of the process. When can the child go back to the swimming pool? When a child has otitis media or sinusitis, s/he should not go to a swimming pool. By diving into the pool, the child will let more fluid into the paranasal sinuses you want to clear; you don’t want to add more fluid.

There is a nose clip on the market that completely blocks the entry of water into the nose. I usually recommend it to my young athletic patients who cannot be moved away from their sports activities. For children, I recommend a type that has a rubber band to hold it behind the head, and for adults, the type without the rubber band. Open swimming pools—the ones we find in clubs—are much better than those closed swimming pools typically found in private swimming schools. Of course, the weather won’t always allow for the former, because when winter comes the swimming pools are not heated, and so forth. In these cases, further attention should be given to nasal hygiene (cleaning and blowing the nose before starting the swimming class).

After swimming is over, saline solution should be sprayed into the nose several times to clean out the “chemistry” it got in contact with. Questions about swimming pools are part of the day-to-day life of a big city, where swimming is a frequent sport. However, going into a swimming pool in an acute phase of rhinosinusitis or otitis media is certainly not recommendable at all.

Chronic Rhinosinusitis

Now that we have already approached the child from the acute point of view, what can we do about chronic rhinosinusitis? Chronic rhinosinusitis must be understood on the basis of a triad of etiopathogenic causes. The important things in this triad are immunodeficiencies, biofilms, and periostitis, which is in fact almost an “osteomyelitis” of the subperiosteal part of the compromised

paranasal sinus. Frequently, there are alterations in the ostiomeatal complex, septal alterations like deviations or spurs, the middle concha bullosa, alterations of the nasal infundibulum, and hypertrophic rhinopathy tending to chronification, thus contributing to and quite often explaining the failure and impotence of pharmacological clinical treatment, and recurrence of these processes in the sinus. It is quite common to receive patients who have already taken several antibiotics, anti-histaminic drugs, and systemic decongestants, because they often have a baseline atopic status, in addition to some previously mentioned processes.

Other situations include cases of adenoid hypertrophy. These adenoids are often not very big, but work as a reservoir for microorganisms both in the middle ear (causing recurrent otitis media) and sinuses (causing repetitive sinusitis). Because of the blockade caused by the adenoids, discharges that come from the nasal fossa stop in the rhinopharynx, return, and fill in the accessory paranasal sinuses. Imaging assessment of the rhinopharynx or paranasal sinuses (X-ray) is no longer necessary, particularly when nasofibroscope is available.

In x-rays of the paranasal sinuses, the adenoid is assessed at a static moment, but in nasofibroscope we can see the adenoid both in inspiration and in expiration. Sometimes, not-so-big adenoids can touch the end of the inferior nasal concha in inspiration, thus obstructing the choana. Therefore, diagnosis has to be dynamic, and nasofibroscope provides this. *In loco* views are richer, and will give us support in the case of adenoids. Another test of extreme importance in cases of chronification or recurrence of processes in the sinus is the computerized tomographic (CT) scan of the paranasal sinuses. The CT-scans is also highly indicated in cases of acute complications in the sinus (periorbital cellulites and the like).

If we are dealing with recurring infectious processes in the sinus, with anatomical alterations involved along with hypertrophy of the concha and recurring adenoiditis (working as a reservoir for microorganisms) or adenoid hypertrophy, we can conclude we are looking at a case of clinical impotence. The otorhinologic specialist, after exhausting the arsenal of drugs, has the possibility of a surgical approach, which may consist of: (1) unblocking the rhinopharynx through removal of the adenoids (adenoidectomy); (2) clearing the nasal fossa (septoplasty and turbinectomy or turbinoplasty, reduction of the nasal concha). Turbinoplasty does not leave a large invasive area, and there are fewer crusts in the post-operative period, thus facilitating or even decreasing the number of dressings after surgery. Option 3 is to expand the ostiomeatal complex through a mini-FES (mini-functional endoscopic surgery) where the ostiomeatal complex is slightly expanded to broaden the paranasal sinuses, thus enabling more ventilation and avoiding retention of discharge so easily kept inside the sinus. The infundibulum, unciform process, and even the middle concha bullosa, if present, should be approached surgically. Naturally, surgical solutions for these cases of recurrence may be considered on a one-to-one basis when we have already exhausted all the various clinical approaches.

In this chapter, I did not focus on rhinopathies (particularly rhinitis) nor affectations of the nasal concha (turbinal bones) because that was not the theme proposed to me.

Rhinopathies accompany sinusitis. In fact, if we make an analogy to affectations of the Waldeyer lymphatic ring, it is correct to use the term pharyngotonsillitis, because the patient does not have an isolated tonsillitis but a pharyngotonsillitis. Likewise, the patient does not have an isolated sinusitis, but a rhinosinusopathy, because everything started at the nose, with allergic rhinitis. The mucous tissue is the same as that which covers the accessory paranasal sinuses. Therefore, in the case of rhinosinusopathy, where the nose and the nasal concha (turbinal bones) are stricken with rhinopathy, whether allergic or vasomotor (allergic and vasomotor easily overlap), we will probably see inflammation/infection in the adjacent sinuses.

A typical example is that of a child who is sleeping in bed, and when it is time to wake up the mother says: “Wake up: time to go to school!” The child gets up from the warm bed, goes barefoot to the bathroom, and starts to sneeze and have a blocked nose. This reaction to sudden change in temperature induces suspicion of a vasomotor rhinopathy. In adults, it is very common to hear people complaining that they will go into an air-conditioned environment and immediately feel their noses blocked. Many people undergo these changes in temperature and suffer with bioclimatology: it was hot and all of a sudden it becomes very cold on the same day—something common in São Paulo. Quite often we have four seasons on a single day, in the same 24 hours. These situations make nasal conchae increase/decrease volume. This vasomotor rhinopathy constantly overlaps with the allergic rhinopathy.

Therefore, it is very common for the patient to have an allergic rhinosinusopathy, with a vasomotor component also, and treatment of this rhinopathy will be accessory to treatment of the sinusitis. When treating rhinitis, it is worth mentioning that nasal corticoids for inhalation are extremely useful and even key to decreasing hyperplasia/hypertrophy of the nasal conchae and helping “open” the ostiomeatal complex. Oral anti-histaminic drugs, systemic corticoids, topical chromones, and antileukotrienes are useful drugs to treat rhinopathies. As an oral corticoid for the region of the middle third of the face, I recommend prednisone or prednisolone, one pulse orally for each of up to five days, adjuvant to topical treatment and antibiotics, when the situation of nasosinus edema is really important and I need some extra help. I do not use non-steroidal anti-inflammatory drugs; however if I have to use some anti-inflammatory in the case of a rhinosinusopathy, I would rather have the steroidal type, a topical or even oral corticoid, depending on the severity of the case.

Within a certain degree of simplicity and objectivity, then, this is how I treat most of these sinus pathologies.

Recommended readings

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