Dr. Jake Johnson:

Hello, and welcome to another edition of the on-call consults in less than 10 minutes series on ENT in a nutshell, a compliment to Head Mirror's online survival guide. I'm your host, Jake Johnson, and today we are joined by Dr. Garret Choby, a board certified rhinologist and skull-base surgeon. In this episode, we'll cover the complications of sinusitis. Let's jump right in.

Sinusitis can refer to both acute bacterial rhinosinusitis as well as a bacterial flare in the setting of chronic rhinosinusitis. Complications of sinusitis are relatively rare due to the widespread availability of antibiotics, but are important to understand given the ophthalmologic and neurologic consequences. Complications of sinusitis occur more frequently in children and adolescents, as well as immunocompromised patients. Sinusitis complications can generally be broken down into the three anatomic areas they affect: bone, orbit, and the intracranial space. The proximity of the ethmoid cavity and thin nature of the lamina papyracea allow for easy extent into the orbit. The flow of veins from the frontal sinus to the intercranial space allow for easy intercranial spread and have the greatest flow during the second and third decades of life.

Dr. Choby, could you take us through a differential diagnosis, including can't miss diagnoses that you consider when seeing a patient with this phenomenon?

Dr. Garret Choby:

Sure. And as you mentioned, I think it's ideal to break these down into anatomic regions. So I think of them in the sense of bony, orbital, and then intracranial spread. So in regards to bony disease, a Pott's puffy tumor, or osteomyelitis with possible abscess of the frontal bone, is one you can think about. Osteomyelitis, and then, of course, an infected mucocele or mucopyocele can occur as well.

In regards to orbital complications, these are more common in adolescents and are commonly broken down according to Chandler's classification. This refers to a spectrum of disease ranging from preseptal cellulitis, or Chandler class one, to post septal cellulitis, or Chandler class two, and then progressing to a class three, which is a sub periosteal abscess. Further extension or class four includes an orbital abscess. And then lastly, Chandler class five would be a cavernous sinus thrombosis. These are most commonly caused by infections with staph and strep. And then, of course, a cavernous sinus really is the junction from the orbit to the intracranial space, which brings us to that third category of intercranial spread of disease. And this can range from things including epidural abscess, or meningitis, to subdural abscess, or even in rare cases, intracranial abscesses.

Dr. Jake Johnson:

And we discussed this a little bit at the beginning, but what are some risk factors for patients to suffer one of these consequences?

Dr. Garret Choby:

Certainly, these occur more commonly in children or adolescents and tend to occur more commonly in boys than girls. This is thought to be potentially due to extension of frontal sinusitis to the intracranial space via those valve-less diploic veins. Certainly, in immunocompromised patients, these can occur more commonly or in a patient with a history of CRS with multiply resistant, more aggressive bacteria.

Dr. Jake Johnson:

So with those factors in mind, how do patients present oftentimes?

Dr. Garret Choby:

Oftentimes, the patients have a vague history of sinusitis or nasal congestion. This is especially common in kids, and they may even have some previous treatment for it if things have not improved. When things spread to the bone, to the orbit, or intracranially, they tend to have more symptoms of headache and may have eye pain, edema, or proptosis even. Certainly, when there is orbital spread, we think about things like loss of visual acuity or diplopia. And when there's intercranial spread, we think of things like meningismus, worsen headaches, or even in some cases, focal neurological defects.

Dr. Jake Johnson:

And so as you go down to see this patient, or if you're a provider in the ED, what sort of things do you want to ask them? And what are some specific questions you really want to try to tease out from them?

Dr. Garret Choby:

I think it's important to discuss things like how long the symptoms have been for and what their previous treatments have been. Of course, if they had a lot of previous treatments, you'd be worried about things like antibiotic resistant bacteria. You always want to know the state of their immune system and whether any immunocompromise is present. I also think it's important to talk about previous complications of sinusitis or other issues such as sinus surgery, orbital surgery, intracranial surgery, or a previous history of maxillofacial trauma. It's, of course, important to recognize things like visual changes or double vision. And then, of course, talking with the child or the parent listing things like confusion, changing mental status, or alterations in alertness or orientation.

Dr. Jake Johnson:

And after you've taken that history or are on your way to take that history, what are some items that you want to gather with you to conduct your examination or gather any cultures or things like that?

Dr. Garret Choby:

So it's very important to have proper PPE for these kinds of consultations, including a mask, eye protection, gloves, and potentially a gown. You're going to end up looking in their nose, so things like a zero degree endoscope is very helpful. You may want to use things like Afrin or oxymetazoline, as well as a numbing agent like leidacane. And then, of course, having things for culture is also important in many of these scenarios.

Dr. Jake Johnson:

So now that you have your key supplies, what are some things that you're looking for when you examine this patient?

Dr. Garret Choby:

I think it's very important to perform a very thorough head-neck examination with special attention to a cranial nerve examination, including cranial nerves three, four, and six, as well as gross visual acuity, peripheral vision. A close examination of the periorbital soft tissue is very important. A pupillary exam, as well as a careful exam of the conjunctiva and sclera. A neurologic exam is also important, including asking questions about alertness and orientation and general gross motor strength in all four extremities, especially if you're worried about intracranial extent of disease. And then, of course, a rigid

endoscopy is important. Looking for things like purulence in middle meatus or sphenoethmoidal recess. And you may consider directed culture swabs when appropriate.

Dr. Jake Johnson:

Now, oftentimes as an ENT on call or the otolaryngologist in consultation, there may be a CT scan or something like that along those lines already performed. But if you're the first provider to see this patient, what are you considering in terms of diagnostic workup?

Dr. Garret Choby:

I think starting with a very quick CT sinus without contrast is appropriate in most cases. This will help to tell you the extent of the intra-nasal and sinus disease. It may give you clues to things like orbital involvement or bony infection. If there is dehiscence or breakthrough in bones to the skull base or the posterior table of the frontal sinus, this can also be shown in this particular scan. And if there's significant intracranial extension, things like a midline shift or epidural abscess maybe would have picked up on a CT scan.

However, in many cases an MRI scan is a nice adjunct to this. This can show you things like enhancement along the meninges or a contrast enhancing ring where an abscess is present. It's also helpful to look for things like cavernous sinus involvement, which can be really key in this population. And then lastly, there are certain scenarios when a CTA or an MRA/MRV may be necessary. And again, this is especially helpful for worrisome things like a cavernous sinus thrombosis or a dural sinus thrombosis.

Dr. Jake Johnson:

And so as you establish a diagnosis and determine what anatomic areas and structures are involved with a patient, what are some things that you consider as far as initiating treatment with these in the acute setting?

Dr. Garret Choby:

Absolutely. The first thing I'll mention is that it is, of course, very important to treat these in a multidisciplinary fashion. So if there's any worry about orbital involvement, I think ophthalmology consultation is very important. And any worry about intracranial extension, of course, neurosurgical opinions are also very important. If this is the case, and you think that there's some sort of extension of disease, certainly early initiation of broad spectrum antibiotics with good CNS penetration is very important. Although infectious disease will typically manage these, a good thought on outset of management would be some combination of ceftriaxone, metronidazole, and vancomycin. This gives excellent broad coverage, and all penetrate the CNS system fairly well.

As far as the nasal care goes, certainly getting a little saline in or some decongestant sprays early on may help to improve drainage naturally. When we think about intraorbital involvement, some of the early Chandler classifications may be observed, things like Chandler classification one and two. However, when a subperiosteal abscess develops, depending on its size and whether the patient's exam is surgical, intervention may be warranted.

Certainly, if there is a large abscess or further extension from there, surgery would likely be done in a semi urgent fashion. This typically involves some sort of endoscopic sinus surgery, as well as potentially external approaches by oculoplastic surgery. If there is intracranial extension of disease, again, in most cases, you want to address the sinuses for source control. This can be accomplished via

endoscopic sinus surgery. However, this can be challenging due to the acute inflammation and bleeding that can accompany these infections. So in some cases, for instance, if there's a frontal sinus infection resulting in a subperiosteal abscess behind it in intracranial extension, you may consider a quick trephination in the operating room, which can deliver antibiotics locally and drain the infection without resorting to a full endoscopic sinus surgery. And of course, input from neurosurgery is very important. And postoperative care would depend a lot on the extent of their disease, but typically, rinses are utilized post-operatively, and you may tailor antibiotic therapy based upon culture results.

Speaker 3:

I think that's a really nice quick summary of going down to see a consult that deals with the complications of sinusitis. We really appreciate your time today, Dr. Choby, thank you for being with us.

Dr. Garret Choby:

Thank you very much.