

Dr. Jake Johnson:

Hello, and welcome to the On-Call Consults In Less Than 10 Minutes series on ENT in a Nutshell, a compliment to Headmirror's online survival guide. I'm your host Jake Johnson, and today we're accompanied by Dr. Garret Choby, a board certified rhinology and skull-based surgeon. In this episode, we will cover acute invasive fungal sinusitis. Let's jump right in.

Although there are a variety of types of fungal sinusitis including fungal ball, allergic fungal sinusitis and chronic invasive fungal sinusitis, acute invasive fungal sinusitis is one of the more rapidly advancing and deadly diseases that can affect the head and neck. Seen almost exclusively in immunocompromised population, this disease involves rapid progression of opportunistic fungal species such as Aspergillosis or Mucormycosis.

The pathophysiology is a pathogenic invasion of soft tissue and blood vessel walls leading to the thrombosis and tissue necrosis. This disease remains highly lethal with most studies reporting mortality well over 50%. Dr. Choby, can you take us through the differential diagnosis, including “can't miss” diagnosis when discussing this topic?

Dr. Garret Choby:

Absolutely. And I would start by saying the key “can't miss” diagnosis is actually the disease we're discussing and that's acute invasive fungal sinusitis. But a number of things are possible, including more routine acute bacterial sinusitis, or other forms of fungal sinusitis like fungal ball or chronic invasive fungal sinusitis. Rarely, malignancies can mimic this process including things like a NK/T-cell lymphoma or other sinus malignancies. And lastly, in rare cases, intra-nasal drug abuse can also appear similar to acute invasive fungal sinusitis.

Dr. Jake Johnson:

We mentioned this briefly in introduction, but can you tell us what risk factors put patients at risk for this?

Dr. Garret Choby:

Absolutely. This disease almost exclusively occurs in the immunocompromised population, which can include things like hematologic malignancies, poorly controlled diabetes, HIV, or previous bone marrow transplants. The most common scenario is a poorly controlled diabetic occurring in about 50% of cases and then additional 40% of cases are chalked up to hematologic malignancies of which AML is the most common. And lastly, there are rare scenarios where a fungal ball or a chronic invasive fungal sinusitis can transition to an acute invasive fungal sinusitis in an immunocompromised patient.

Dr. Jake Johnson:

With risk factors in mind and differential diagnosis on your mind, what things do patients generally tell you or what symptoms do they report when you discuss this with them?

Dr. Garret Choby:

I think the first thing that's very important is to keep a very high index of suspicion for this disease process when you are examining any immunocompromised patient. The symptoms they most commonly have are facial swelling, fever and nasal congestion. And the less commonly are things like

proptosis, vision changes, facial pain or headache, which in some cases can signify a more invasive version of the disease process.

Lastly, in some cases there can be cranial nerve palsies, altered mental status, or with extension to the palate necrosis, which again signify very advanced states of the disease.

Dr. Jake Johnson:

And you're missing some of the symptoms, but how exactly do you want to try to elicit these things from a patient when you go to take the history from them?

Dr. Garret Choby:

I think it's important to understand the degree of their immune system dysfunction, whether it is a reversible such as diabetes or a potentially irreversible cause like some bone marrow issues. I want to know the types of symptoms they've experienced as well as the duration of those symptoms. I'm also interested if they have a previous history of sinusitis, and especially, important to elicit things like orbital symptoms or symptoms of cranial nerve dysfunction like numbness or other things which can signify an extension of the disease.

Jake Johnson:

In prior to going to see these patients, what are some items you think about bringing with you?

Dr. Garret Choby:

Certainly there are a number of things that can be very helpful in this disease process. A very thorough intra-nasal examination is important as well as potential biopsies and so I would prepare appropriately. Certainly appropriate PPE is very important, I think a zero degree endoscope as well as a 10 or 12 for your suction can be very helpful. And in some cases, some Afrin is helpful to decongest the nasal cavity and this can also be placed on cotton pledgets.

It's very important to have things like endoscopic biopsy forceps like Blakesley forceps or through-cutting forceps, as well as some things that should be helpful in case of bleeding like fibrillar or Surgicel or in a more extreme scenario, Merocel. It's also important to make sure you have a biopsy specimen container with you that is appropriate for frozen section pathology.

Dr. Jake Johnson:

And now that you have all these tools and instruments at your disposal, what exactly do you want to take a look at on these kinds of patients?

Dr. Garret Choby:

Starting with a thorough head-neck examination is very important with special attention to the orbital exam, as well as the cranial nerve exam in particular sensation in areas like V2, V1, and V3. And then of course, a palate and oral cavity exam is very important as well to ensure there's not been extension into the palate. An endoscopic nasal exam is the key portion of this. You want to look for things, especially on the middle turbinate, which has been shown to be the most common site of involvement and look for signs of tissue infarction including loss of sensation, mucosal pallor, black or dark mucosa, or extensive nasal crusting.

And lastly, I would have a low threshold to biopsy anything that looks suspicious and including this would be urgent frozen section pathology. Now realize many of these patients may also be thrombocytopenic from their disease process, so they may bleed in which case being prepared to deal with that bleeding is also very important.

Jake Johnson:

Oftentimes when a consult has been placed on these types of patients, several steps of a workup have been begun. But what things do you consider adding to a workup or making sure that these items are present in the workup?

Dr. Garret Choby:

So aside from frozen section pathology that I've already mentioned, some lab values can be important. If it's a diabetic patient, knowing their blood glucose level and hemoglobin A1c can be very important, as well as in a patient with a hematologic malignancy, knowing the degree of their neutropenia, including a CBC with differentials is also very helpful.

Imaging is also key in these patients, although there is a general preference for MRI scan for this disease process, a CT scan is much quicker and can be used for surgical navigation. A CT scan can identify things like mucosal thickening or bony erosion, which is typically a late finding. And particular attention should be paid to areas of the pterygopalatine fossa, including change in the appearance of the fat at that particular area.

The key sequence on an MRI scan is a relative lack of T1 post gadolinium hyperintensity in mucosa, which can signal a fungal invasion of vessels in that area and lack of enhancements. And then of course it's can also examine things like the dura or intra-orbital invasion.

Dr. Jake Johnson:

That sounds like an excellent workup to evaluate these patients. Now that you've done a physical exam and you've got a thorough workup, what is the treatment process in the acute setting?

Dr. Garret Choby:

The first thing I'll mention is its important to think about this patient systematically. Most of these patients are very sick and may already be in the ICU for things like diabetic ketoacidosis or for their ongoing chemotherapy or malignancy treatment. If it is a patient with a malignancy, certainly urgent heme-onc consultation for overall consideration of their disease process, as well as consideration of Granulocyte colony stimulating factor may be important.

And then of course, ICU management of blood glucose for diabetic ketoacidosis is also very important. Although infectious disease typically manages their systemic therapy, early initiation of Amphotericin B is very important with of course, careful consideration for renal function. Then lastly, where we typically come into play is urgent operative intervention. In a patient who has biopsy proven invasive fungal sinusitis, or a high suspicion based on examination, urgency in the operating room is definitely warranted.

This typically includes for most patients, endoscopic sinus surgery with removal and debridement of all involved tissue up to the point of healthy bleeding tissue. Now an upfront discussion should be held with the patient and their family regarding the potential for extensive surgery, especially if the palate is involved or the soft tissue of the face. There is certainly a more nuanced discussion we

had in regards to intracranial and intraorbital involvement, but several studies have not shown a survival benefit from orbital exenteration when the orbit is actually involved with disease.

And lastly I'll mention there are a number of factors that have been shown to worsen survival, that includes older age, intracranial involvement and potentially hematologic malignancy. There may be a benefit improvement in patients with reversible disease like diabetes. However, this is a very devastating disease process with reported mortality rates above 50% for most patients.

Dr. Jake Johnson:

In the course of treatment, what are some things you consider as far as patient disposition, follow-up, etc.?

Dr. Garret Choby:

First of all, the majority of patients will likely expect a prolonged inpatient hospitalization with multidisciplinary care and potentially time in the intensive care unit. I will say from our perspective it is very important to return to the operating room on several occasions for repeat examinations and potential repeat debridements under general anesthesia for the majority of patients.

Dr. Jake Johnson:

All right. I think that concludes our topic on acute invasive fungal sinusitis. Thank you very much for being with us today Dr. Choby.

Dr. Garret Choby:

Thank you for having me.