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CASE REPORT

A case report of a mucocele

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Abstract

Frontal sinus mucoceles can present with a multitude of symptoms including ophthalmic disturbances. In benign conditions, they tend to expand by eroding the surrounding bony walls that displace and destroy structures through pressure and bony resorption. It becomes inflamed and filled with pus (pyocele) or a combination of both (mucopyocele). Due to its expansile nature, mucocele is important for diagnosis. Frontal mucoceles are benign and curable. Early recognition and management are important, as they can cause local, orbital, or intracranial complications. The purpose of this paper is to report a case of mucocele and emphasize the importance of radiological imaging, especially CT-Scan and MRI, in supporting the diagnosis of frontal sinus mucocele, detecting invasive processes to surrounding tissues and their extension to the intraorbita/intracranial, planning before surgery/biopsy, and evaluating the results of therapy.

Keywords: sinus frontalis, mucocele, expansile

Introduction

A frontal sinus mucocele is an abnormality in the frontal sinus in the form of a cyst-shaped collection of fluid with characteristics of mucus retention that is chronic, expansile, and, if infected, can become a mucopiocele. Mucoceles occur due to disturbance or blockage of the sinus ostium caused by anatomical abnormalities, infections, allergies, trauma (including surgery), and benign or malignant tumors. Mucoceles are divided into primary and secondary types, based on their occurrence. Primary mucoceles occur when the mucus flow is obstructed by inflammation, cystic degeneration, blockage of the secretory duct, and dilatation of the mucous glands. Secondary mucoceles occur due to intranasal or external trauma and are considered to play a role in mucocele formation. Paranasal sinus mucosae are commonly found in frontal sinuses. Mucocele that grow and fill the orbital cavity can cause pressure on the orbit, resulting in visual disturbances, proptosis, and limitations in extraocular movement.

In the Rhinology Polyclinic of the Department of ENT at Dr. Cipto Mangunkusumo Hospital, it was reported that during the period from January 2010 to July 2010, there were 10 cases of paranasal sinus mucosa, four cases of frontal sinus mucosa, four cases of fronto-ethmoid mucosa, two cases of maxillary sinus mucosa, and no cases of mucosa in the sphenoid sinus. The role of radiological examination in establishing the diagnosis of mucosa is very important because it is expensive and has the ability to erode bone, including the base of the head bone and extending to the intracranial region. The mucosils can also involve the orbital cavity, causing proptosis and third nerve involvement. Mucosils can be infected and filled with pus (pyosil) or mucus (mucopiosil).

The purpose of this paper is to report a case of mucocele and emphasize the importance of radiological imaging, especially CT-Scan and MRI, in supporting the diagnosis of frontal sinus mucocele, detecting invasive processes to surrounding tissues and their extension to the intraorbita/intracranial, planning before surgery/biopsy, and evaluating the results of therapy.

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Literature Review

Paranasal sinuses are organs that are difficult to describe because their shape varies greatly from individual to individual. The sinuses are located on the front of the face, namely, the forehead, between the eyes, and on the cheekbones. The sinus is an air-filled cavity lined with mucosa. The development of these sinuses has started since the womb, especially the maxillary and ethmoid sinuses. Embryologically, the paranasal sinuses originate from mucosal invagination of the nasal cavity, and their development begins from the fetus at the age of 3–4 months, except for the sphenoid sinus and frontal sinus. The ethmoid and maxillary sinuses are already present at birth, while the frontal sinus develops from the anterior ethmoid sinus in children aged approximately 8 years. Pneumatization of the sphenoid sinus starts from the age of 8 to 10 years and originates from the posterosuperior part of the nasal cavity. These sinuses generally reach their maximum size between 15-18 years of age. The paranasal sinuses were divided as follows.

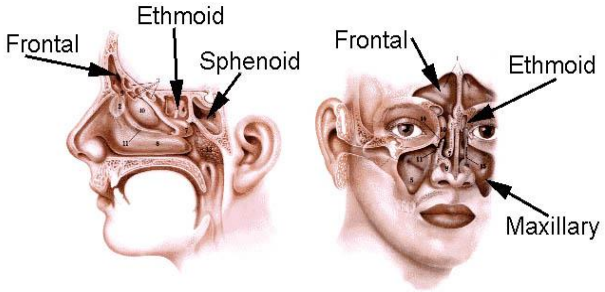

Figure 1. Anatomy of the paranasal sinuses

Maxillary sinus—The maxillary sinus is the largest paranasal sinus; at birth, the maxillary sinus has a volume of 6-8 ml, and then develops very quickly and finally reaches a maximum size of 15 ml in adulthood. The anterior wall of the sinus is the infra-temporal surface of the maxillary os, the medial wall is the lateral wall of the nasal cavity, the superior wall is the base of the orbit, and the inferior wall is the processus alveolaris and the palate. The ostium of the maxillary sinus is superior to the medial wall of the sinus, and empties into the semilunar hiatus through the ethmoid infundibulum. Most of the blood supply occurs through the branches of the maxillary artery.

Frontal sinus—The frontal sinus located on the frontal os begins to form from the 4th month of the fetus, derived from cells of the frontal resessus or ethmoid infundibulum. The size of the frontal sinus is 2.8 cm in height, 2.4 cm in width and 2 cm in depth. The frontal sinuses are usually insulated and the edges of the sinuses are notched. The frontal sinuses are separated by relatively thin bone from the orbit and anterior cerebral fossa, so infections from the frontal sinuses easily spread to this area. The frontal sinus drains through its ostium, which is located in the frontal sinus. The fronatal resessus is part of the anterior ethmoid sinus. Blood supply is obtained from the supraorbital and supratrochlear regions, which originate from the internal carotid. Mucosal innervation is supplied by the supra-and supratrochlear branches of the frontalis nerve, derived from the trigeminal nerve.

Ethmoid sinus—In adults, the ethmoid sinus resembles a pyramid, with its base in the posterior. Its size from anterior to posterior 4.5 cm, 2.4 cm high and 0.5 cm wide in the anterior part and 1.5 cm in the posterior part. The ethmoid sinus is hollow and consists of cells that resemble a wasp's nest, which is found in the lateral mass of the ethmoid os located between the media concha and the medial wall of the orbit. These cells varied in number between 4-17 cells (average 9 cells). Based on its location, the ethmoid sinus is divided into the anterior ethmoid sinus, which empties into the medius meatus, and the posterior ethmoid sinus, which empties into the superior meatus. At the forefront of the anterior ethmoid sinus is a narrow section called the frontal resessus, which is associated with the frontal sinus. The roof of the ethmoid sinus, called the fovea ethmoidalis, borders the lamina cribrosa. The blood supply comes from the nasal branch of the sphenopalatina, and mucosal innervation comes from the ophthalmic and maxillary divisions of the trigeminus nerve.

Sphenoid sinus—The sphenoid sinus is located in the ossphenoid behind the posterior ethmoid sinus. The ethmoid sinus is divided by a partition called the sphenoid septum. It measures 2 cm in height, 2.3 cm in depth and 1.7 cm in width. Its volume varied from 5 ml to 7.5 ml. Its boundaries are superior to the media cerebral fossa and pituitary gland, inferior to the roof of the nasopharynx, laterally adjacent to the cavernous sinus and internal carotid (often appearing as an indentation), and posteriorly adjacent

to the posterior cerebral fossa in the pons area. Blood supply comes from A. carotis interna and externa. Mucosal innervation comes from the nervus trigeminus.

Paranasal sinus mucosa occurs due to obstruction of the sinus ostium caused by anatomical abnormalities, infection, surgery, trauma, allergies, nasal polyps, and tumors; however, some literature reviews state that the cause of the frontal sinus mucosa is unknown. Mucosils grow slowly and aggressively at the lesion site due to the accumulation and retention of mucus due to the loss of sinus mucosal epithelial flow. Mukossils that grow in the paranasal sinuses when they hit the ostium can cause obstruction. Infected mucoceles can cause abscesses leading to orbital and intracranial complications. In general, 60-89% of mucoceles are found in the frontal sinuses, 8-30% in the ethmoid sinuses, and less than 5% in the maxillary sinuses. Rarely, mucoceles are found in the ethmoid sinus.[1–3] Mucoceles form when the air in the sinus cavity decreases due to blocked ostium flow, usually involving one sinus, but can also extend to adjacent and associated sinuses.[4,5] Large mucoceles can cause sinus volume to decrease and erode the orbital wall, causing proptosis, visual disturbances, diplopia, and facial asymmetry. The literature review states that orbital and intracranial infiltration in frontal sinus mucosal cases is around 27% - 61%.[1,6]

The frontal sinus mucosa has a wide variety of shapes and sizes: a) Type 1 (limited to the frontal sinus with or without extension to the orbit); b) Type 2 (frontoethmoid mucosa with or without extension to the orbita); c) Type 3 (erosion of the posterior wall is further divided into no intracranial extension or minimal intracranial extension and intracranial extension); d) Type 4 (erosion of the anterior wall of the sinus); and e) Type 5 (erosion of the anterior and posterior walls of the sinus subdivided into no intracranial extension or minimal intracranial extension and intracranial extension).[1,2] Frontal sinus mucositis is generally expansile and rare, with incidence occurring at any age, but is most common in the third and fourth decades between the ages of 20-70 years where the ratio between men and women is equal.[1–3,6] Early symptoms of frontal sinus mucositis are usually characterized by headache, visual disturbances, facial pain, nasal discharge, proptosis, diplopia, exophthalmus, and epiphora. Expansion of the mucocele can cause sinus wall bulging and compression of the optic nerve.[1–3,6,7] Intracranial extension can cause meningitis or cerebrospinal fluid fistula. Clinical manifestations of paranasal sinus mucositis depend on the vital structures affected.[1–3,6,7]

Radiological examination modalities are the gold standard for establishing the diagnosis of frontal sinus mucositis. CT Scan and MRI play an important role in supporting the diagnosis of frontal sinus mucositis, detecting invasive processes in surrounding tissues and their extension into the intraorbita/intracranial, planning before surgery/biopsy, and evaluating the results of therapy. CT- Scan is the modality of choice for frontal sinus mucosal examination because CT is able to visualize the anatomy of the paranasal sinuses in detail and show the extension of infection from the frontal sinus mucosal.[8,9] MRI is used to visualize soft tissue and extension of the lesion to the extrasinus; however, MRI has limitations in visualizing the bone. Plain photography is the initial modality for examining abnormalities in the paranasal sinuses. CT and MRI have an important and complementary role in mucosal examination.[7–9]

Conventional radiologic examinations commonly used for paranasal sinus projections include Caldwell (posteroanterior), Waters (occipitomental), and lateral projections. Caldwell is used to view the frontal and ethmoid sinuses, while to view the maxillary sinuses, it is best with Waters' projection. In the lateral projection, we can see the anterior and posterior walls of the frontal sinus and masila, as well as the sphenoid sinus. Conventional examination usually aims to diagnose frontal sinus mucoceles and determine whether there is invasion into the orbit.[1,4,8] CT scans play a role in determining benign and malignant lesions as well as in determining the location of mucoceles, intracranial extension, inflammation, and bone erosion. The best examination for paranasal sinus mucoceles is to use coronal and axial sections.[4,8,10] Similarly, the CT-Scan examination of the SPN uses two types of cuts (axial and coronal) (see Figure 2 and 3).

On examination without the use of contrast, CT scan images of the frontal sinus mucosae are slightly cloudy, soft, round, well-defined, cyst-like sinus images and are seen as homogeneous lesions. The density of mucosae varies from a low to a high absorption value. The content of mucoceles is demonstrated as homogeneous mucoid with attenuation (10-18 HU), but in mucoceles that have been formed over a long period of time and have a high protein content, the attenuation is (20-40 HU). On contrast-enhanced examination, it is usually characterized by rim-like peripheral enchancement.[1–4,9] Assessment of the CT scan

image is to assess the anatomy and variants, look at the origin of the mass, and extend to the orbit or cranium. Extension of the lesion to the orbit may cause proptosis and diplopia.[3,7]

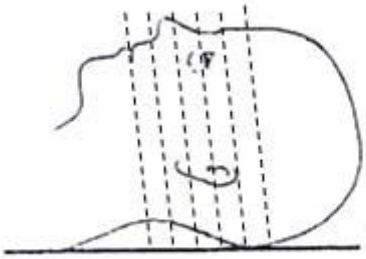

Figure 2. Axial cut patient position

Patient position: The patient lay supine on the examination table. Both arms are on the sides of the body, the legs are straight down, and the head is on the headrest. The patients were positioned as comfortably as possible.

Object position: The head is placed directly on the gantry tunnel, in the mid-sagittal plane in line with the center of the table. The mid-axial head is at the source of the gantry tunnel (Weisberg, 1984).

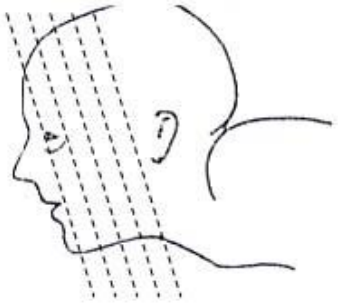

Figure 3. Coronal cut patient position

Patient position: The patient lay prone on the examination table with the shoulders propped up with pillows. The head is moved backward (hyperextended) as much as possible by aiming towards the vertical direction. The gantry was aligned with the facial bones.

Object position: The head is upright or moved back (hyperextended) as much as possible and given a fixation device so that it does not move (Lowge, 1989).

MRI examination of the paranasal sinuses starts with coronal sections without the use of SE T1-W1 and TSE T2-W2 contrasts. The aim was to distinguish soft tissue from serous and mucous fluid retentions. On administration of high-resolution contrast, axial and coronal SE T1-W1 cuts were used to compare soft tissue structures, tumors with mucosa, or polyps. In addition, the mass can extend intracranially or intraorbitally.

The role of MRI in mucosal examination is to assess orbital or cranial extension. MRI is used when diagnosis is doubtful. Usually, the characteristic mucocele on MRI is a well-demarcated, expansile lesion with low intensity on T1 and high intensity on T2. The signal intensity spectrum of the lesion produced by MRI depends on the viscosity and protein content of the mucin. The signal intensity of the mucosa varies because it contains proteins or blood. At T1W1, if the mucosa contains a large amount of water, it produces a low signal intensity at T1. If it contained a large amount of protein, the T1 signal intensity was high. On T2W1, if the mucosil contains a lot of water, the T2 signal intensity will be high. An examination using contrast does not appear warm. If there is thickening of the periphery, it is believed to be infected with mucosils.

Contrast-enhanced MRI was performed to illustrate the shape of the mucocele. On examination without contrast, to determine the cause of the lesion, for example, due to obstruction or tumor. When contrast was applied, the mucocele appeared warm at the edges owing to the remaining active mucoperiosteum. MRI cannot provide detailed information about the bone.[1,2,4,6,9] Abnormalities that show a radiologic picture similar to the mucosal radiologic picture are:

Allergic fungal sinusitis is an invasive disease often found in chronic sinusitis that does not respond to antibiotic treatment. The location can be unilateral or bilateral, and the picture may vary. Most often, it affects the maxillary and ethmoid sinuses. It is rare to find a picture of air fluid levels; if found, then suspect a bacterial infection. Affected bone is usually thickened, sclerotic, eroded, or remodeled. CT tomography shows allergic fungal high-attenuation sinusitis with hypodense sinus opacity in the mucosa. Sinus expansion with new bone growth and erosion. On contrast, the peripheral mucosa was warmed. Magnetic resonance imaging (MRI) showed T1W1: low or moderate signal due to the removal of water and protein components. On T2W1: hypointense signal.[6]

Sinonasal polyposis is a chronic inflammatory condition characterized by polyps filling the sinuses and nasal cavity, mostly in the lateral nasal wall, nasal roof, nasal cavity, and ethmoid sinus. Usually, it is

multiple and bilateral, but can also be unilateral, with varying sizes. CT scan features: multiple polypoid soft tissue masses in the nasal cavity and paranasal sinuses, hyperdense with high protein and low water content. Areas of bone erosion may also be present. The air fluid level signals a superinfection or marelly trapped fluid. On contrast administration, there is mucosal invasion around the polyps, but not central invasion, as in neoplasms. On MRI images at T1W1 the mucosa containing high water is hypointense and at T2W1 hyperintense.[3,6]

Retention mucous cysts are small cysts commonly found in the maxillary sinus. It is usually found in patients with a history of inflammatory diseases. It is commonly observed in 10% of the population. Retention cysts are usually asymptomatic and are usually found incidentally. If the cysts are large and fill the sinus cavity, they usually cause sinus flow obstruction and turn symptomatic.[3,6] On CT imaging, it is a homogeneous, well-demarcated lesion with hypo-isodense density. On MRI, T1W1 is usually hypointense and T2W1 is hyperintense.

Management of frontal sinus mucositis with endoscopic sinus surgery. The main goal of mucosal management is to widen the flow as much as possible and save the mucosa around the lumen. Surgery is divided into two categories: radical and conservative. Surgery was performed based on the size, location, and extension of the mucocele. As the lesion may extend intracranially and intraorbitally, surgery should ideally not be performed in a state of infection, and antibiotics should be indicated.

Surgical therapy is an external approach (Lynch-Horwath frontoethmoidectomy) or esteoplastic flaps with obliteration of the sinus cavity. This procedure has significant morbidity and cosmetic deformity, or is associated with a significant recurrence rate. The frontal sinus mucosa is usually treated with an osteoplastic flap procedure, which includes cleaning the sinus epithelium and sinus cavity with a fat graft. Endoscopic procedures are used to drain the mucocele and restore sinus outflow.[8]

The most common complication of frontal sinus mucositis is loss of vision due to compression of the eyeball, which injures the optic nerve and the posterior lid. Reported complications include spinal fluid leakage, orbital infection, meningitis, osteomyelitis, and chronic sinusitis. Cagigal et al reported that the rate of mucosal recurrence is low and the prognosis is good. CT-Scan and MRI are highly recommended for long-term follow-up of patients with mucositis to evaluate recurrence.[3,6,8]

Case Report

Mrs. L, female, 25 years old, came to Dr. Cipto Mangunkusumo Hospital on June 26, 2010. The patient presented with the chief complaint of a lump in the left eye and forehead 3 years ago; the nose often feels blocked and arises with a sense of mucus flowing into the throat. The lump in the left eye was felt 3 years ago, which became increasingly bigger. The patient was scheduled for surgery in January 2007 because of the same complaint, but the patient refused because at that time the patient was 5 months pregnant, and surgery was planned after the patient gave birth. However, after giving birth, the patient did not return to the rhinology department.

During this time, the patient sought treatment at an eye clinic. The patient underwent eye surgery in January 2007 with a diagnosis of proptosis OS, such as meningocele. Postoperatively, a lump remained on the forehead and left eye, and the patient was referred to the ENT department. The patient complained of headache and nasal congestion on the left side, with a feeling of mucus flowing through the throat. Visual disturbance (-). History of allergy or trauma was ruled out.

The patient had a history of eye surgery in January 2007, with a diagnosis of proptosis, including meningocele, DM (-), hypertension (-), asthma (-), and heart (-). There was no family history of the disease. Social history: The patient worked as a housewife and sought treatment with a poor certificate.

On general examination, consciousness: Compos mentioned, good general condition with normal vital signs, and good nutritional condition. On physical examination, the skin and hair were within normal limits. Eyes: ODS 6/60, lump (+) size 9 x 6x 5 cm, soft feeling, on the left forehead, a lump extending to the upper left eyelid and pushing the left eyeball anteriorly and inferiorly, tenderness (-). Ear: LTAD: cerumen (-), secret (-), RT intact, Rc (+). LTAS: cerumen (-), secret (-), RT intact, Rc (+). NADS: photo (-). throat was

within normal limits. Complete blood test results were within normal limits. The HST examination results were within the normal limits. The blood chemistry profile was within normal limits.

On radiologic examination, the thorax photograph was found to be impressive: the cor and pulmo were within normal limits. CT scan examination of the paranasal sinuses: There was a well-demarcated heterogeneous isodense lesion measuring 5.2 x 5 x 4.3 cm in the left frontal sinus that destroyed the medial side of the left frontal sinus wall, the lateral side of the left ethmoid sinus wall, causing bowing and erosion of the sinistra frontal bone wall and pushing into the intracranial (frontal lobe), left ethmoid sinus and left orbital cavity thus pushing the eyeball anteroinferiorly. Impression: Benign mass in the frontal sinus with extension to the left ethmoid sinus, urging posteriorly (frontal lobe), and to the left orbital cavity pushing the eyeball anteroinferiorly.

MRI examination of the head, a mass with heterogeneous intensity (cystic and solid) with fluid levels in the left frontal, sphenoid and left ethmoid sinuses, relatively firm boundaries, lobulated, 5.01 x 3.91 x 4.6 cm in size, which intensified after contrast administration in the solid part. The mass appeared to deconstruct the left frontal os and the left orbital roof. The mass entered intracranially, urging the left frontal lobe, and no infiltration into the brain parenchyma was observed. The mass is seen urging the bulbus oculi anteroinferiorly. There was no infiltration of the mass into the recti oculi sinistra. Thickening of the left and right maxillary sinus walls was also observed, which did not increase after contrast administration. Impression: Left frontal, ethmoid, and sphenoid sinus tumors with frontal lobe and left bulbus oculi suppression and bilateral maxillary sinusitis.

On PA examination, the preparation comes from the mucocele capsule of the frontal sinus, frontal bone, and ethmoid, which is deconstructed consisting of pieces of tissue rather than the cyst wall, which is a small part layered with cuboidal to flat epithelium and collagenous connective tissue. Sudden and chronic inflammatory cells were scattered across the area. Cholesterol crystals with foreign body Datia cells were also observed. Also found "reactive bone formation" does not appear malignant signs. Impression corresponds to a paranasal sinus mucocele.

Endoscopic sinus surgery was planned but failed because during tampon removal at the media concha, the brownish mucoid fluid fluctuated out of the slit of the uncinatus processus and meatus medius. BSEF surgery and exploration of the frontal, ethmoid, and left maxillary sinuses were also performed. The patient was treated for 3 days and tampons were removed; nasoendoscopic examination revealed that the ethmoid sinus ostium and maxillary sinus ostium were open, and there was no secretion.

Discussion

A 25-year-old female patient was reported, based on Anamnese, who complained of nasal congestion accompanied by mucus flowing through the throat, which sometimes hurts. The clinical picture obtained in this patient is in accordance with the literature, which states that the clinical picture of frontal sinus mucosa is characterized by headache, visual disturbances, facial pain, nasal secretions, proptosis, diplopia, exoptalmus, and asymmetrical face. Mukossil can occur at any age but is most common in the third and fourth decades between the ages of 20-70 years with an equal ratio of men and women.

From the results of the CT-Scan examination on 03-06-2010, the results of a benign mass in the frontal sinus with extension to the left ethmoid sinus pushing posteriorly (frontal lobe) and to the left orbital cavity pushing the eyeball anteriorly are in accordance with the literature, which states that the role of CT-Scan in the paranasal sinus mucosal is to determine benign or malignant lesions. Location of the lesions and lesion expansion

The patient also underwent an MRI examination to see the possibility of expansion of the lesion to the intracranial region that was not detected on CT-Scan scan, but no intracranial pathological lesions were found. CT-Scan examination of the paranasal sinus can be performed to evaluate patients with suspected paranasal sinus mucositis with symptoms of headache, nasal congestion, facial pain, proptosis, exophthalmus diplopia, and visual disturbances. When CT-Scan imaging is suspected of intraorbital and intracranial invasion, the examination is continued with MRI.

Accurate information about the clinical picture, physical examination, and supporting examinations that have been performed is helpful in selecting modalities and imaging techniques to make a diagnosis.

The diagnosis of frontal sinus mucositis is based on anamnesis, physical examination, and radiological examination. Radiological examination is the gold standard for the diagnosis of frontal sinus mucositis. CT-Scan can be used to determine the anatomy and extent of the lesion, especially intracranial extension and bone erosion, while MRI is helpful in distinguishing mucosal lesions from neoplasms.

Conclusion

This case report presents a 25-year-old female patient with clinical symptoms and supporting examination results of paranasal sinus mucositis. The frontal sinus mucocele showed a radiologic picture of a well-circumscribed, rounded expansile lesion that was benign and slightly cloudy. Although the diagnosis of frontal sinus mucositis can be confirmed through histology and culture examination, CT Scan and MRI can complement each other and play an important role in supporting the diagnosis, detecting expansion, and assisting in surgical planning and evaluation of therapy. CT scan imaging has a role in showing detailed bony anesthesia and detecting calcification and bone erosion, whereas MRI is superior in assessing soft tissue and detecting extrasinus extension of the lesion. When we suspected a paranasal sinus mucosal lesion, we started CT and continued MRI.

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