

# Diagnosis Algorithm in Single Sided Nasal Masses

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## Abstract

Unilateral nasal masses are common clinical conditions in Ear, Nose, and Throat clinics, which may be difficult to diagnose due to their symptomatic similarities with rhinosinusitis. The diagnosis and management of these masses are important because of their relationship with cerebrospinal fluid or cerebral parenchyma and because they are more likely to be premalignant or malignant than bilaterally observed inflammatory masses and may have originated from vascular structures. This study aimed to present the diagnostic algorithm for unilateral nasal masses with literature review.

**Keywords:** Nasal cavity, nasal obstruction, nose diseases, nose neoplasms, paranasal sinuses

## INTRODUCTION

Bilateral inflammatory lesions constitute the majority of nasal masses. Unilateral masses are rarely seen, and unlike bilateral inflammatory lesions, they are more likely to be malignant or premalignant (1-4). Some authors have reported that unilateral nasal masses should be considered malignant until proven otherwise (1, 5). Among unilateral nasal masses, fungal ball; antrochoanal polyp; inflammatory masses, such as HPV-associated polyp type papilloma; inflammation due to chronic rhinosinusitis and polypoid degeneration; premalignant lesions, such as Schneiderian papilloma; masses originating from vascular structures; meningocele associated with head base or meningoencephalocoele locating at the nasal passage; nasal carcinoma; or sarcoma type tumors and metastases can be counted (6-9). Unilateral nasal masses, which are in a wide range of etiological and histopathological aspects, may be difficult to accurately diagnose without losing time. Moreover, some issues need to be considered during the diagnosis stage. In this study, we aimed to present the diagnostic protocol used in the treatment of unilateral nasal masses in adult patients in our ENT clinic.

## OUR CLINICAL PROTOCOL IN UNILATERAL NASAL MASSES

In all adult patients with unilateral nasal masses diagnosed at the Otorhinolaryngology clinic in our tertiary level university hospital, both rhinological and visual-related symptoms are questioned in detail in terms of the onset time and severity, and the information obtained is written on the polyclinic form. After taking the medical history, detailed physical examinations of the patients are conducted. Visual acuity is evaluated by counting fingers of the physician from a 3 m distance, and eye movements are evaluated by following the index finger of the physician while the head is immobile. Patients with suspected visual functions are referred to the ophthalmology department. Photographic images of patients with facial deformity detected during the inspection are taken and archived. Sensory examination is performed in the areas of the facial skin that fits the trigeminal nerve dermatome. At this stage, infraorbital nerve involvement is specifically evaluated. In anterior rhinoscopy, the findings evaluated in the oral cavity examination are noted, and subsequently, endonasal diagnostic examination is conducted.

In the endonasal diagnostic examination, firstly, the discharges that accumulated in the nasal passage is removed, and then topical decongestant and anesthetic are applied. We use xylometazoline for decongestion and lidocaine for topical anesthesia. To date, we have not detected any unexpected effects from these substances. In the endonasal examination, the area covered by the mass in the nasal passage, its origin, septum, nasal floor, nasal roof and its relationship with the nasopharynx, macroscopic appearance, whether pulsatile or not, and its vascularity are evaluated and noted. If there is a suspicion of meningocele or meningoencephalocoele caused by the nasal cavity during endoscopy, the patient is subjected to Valsalva maneuver, and the size and pulse of the mass are examined. An increase in mass size with Valsalva maneuver (Furstenberg sign) is a typical finding for meningocele or meningoencephalocoele. In the inductional diagnostic examination, the other passage is also definitely examined, and the presence of a push

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in the septum, the posterior state of the nasopharynx, and the presence of bilateral disease are examined.

If there is a suspicion of non-neoplastic inflammatory disease in patients with detailed history and physical examination, we perform high-volume, low-pressure nasal washing and administer nasal topical steroid, antibiotics, and, if necessary, oral steroid treatment. After 2 weeks, we reevaluate these patients by the state of the symptoms, physical examination, and diagnostic nasal endoscopy. In the absence of clinical improvement and with the continuing suspicion of malignancy, we request cross-sectional imaging.

If there is no exception, all patients with unilateral nasal masses undergo both contrast-enhanced computed tomography (CT) and contrast-enhanced magnetic resonance (MR) imaging. Computed tomography evaluates features, such as bone walls and aerations of the paranasal sinuses, skull base and orbital wall, and contrast enhancement of the mass. The destruction of bone structures due to invasion or the presence of expansion due to mechanical repulsion is examined. Magnetic resonance imaging evaluates the mucosa of the paranasal sinuses, the presence of fluid in the sinus, anterior fossa dura and brain parenchyma, orbital fat tissue and periorbital muscles, pterygomaxillary region, masticator region, infratemporal fossa, vascularity of the mass, and contrast material involvement. In imaging, intracranial masses such as meningocele, meningoencephalo-

cele, or vascular lesions with high blood supply, which may be related to cerebrospinal fluid, are absolutely identified, and biopsy is not performed in these cases. Otherwise, it should be noted that catastrophic results may be encountered.

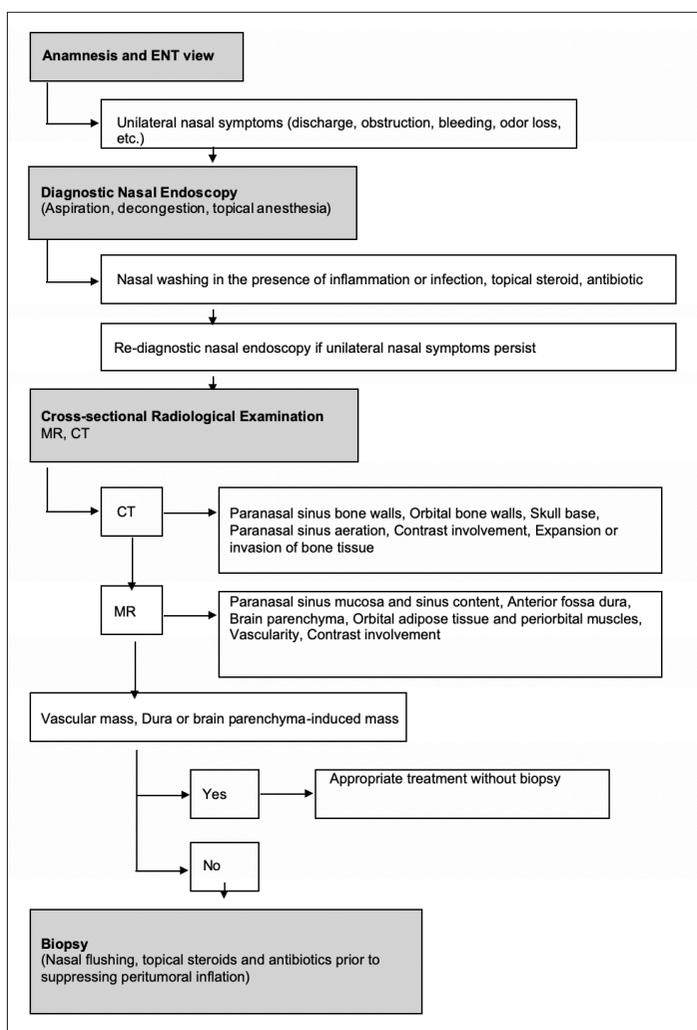
Biopsy procedures of the patients that can be reached by local and topical anesthesia are performed in the outpatient clinic. Deep biopsies are planned for the other patient group under operating room conditions. The relationship between the mass and CSF and the blood supply pattern are re-evaluated by cross-sectional imaging. The patient is informed about the procedure, and written consent is obtained. Drugs used are re-evaluated to avoid possible side effects. It is made certain that the patient does not use any medicine that causes bleeding diathesis. Before the procedure, the patient rests in the sitting position for a few min, and the blood pressure is measured if necessary. During the procedure, necessary precautions are taken against possible severe bleeding and syncope development. Pre-biopsy preparation of all patients is performed as described in the diagnostic nasal endoscopy stage. During the biopsy phase, due to drainage problems, maximum attention is paid not to perform biopsies in the peritumoral regions with inflammation and polypoid degeneration. If there are signs of intense inflammation that may be able to label the biopsy result, short-term (no more than 1 week), high-volume, low-pressure nasal wash is performed on the patient, and nasal topical steroid, antibiotics, and, if necessary, oral steroid treatment are administered. Otherwise, false negative results are encountered, and the diagnosis may be delayed. Once the area to be biopsied is adequately visualized, a large number of tissue samples are taken using punch forceps. Biopsy is not performed in necrotic areas due to the possibility of being non-diagnostic. After the procedure, lidocaine and adrenaline pads are placed in the nasal passage whether there is bleeding or not, and the patient is followed up for at least 15 min. After removing the pads, the patient is asked to remain in a sitting position in the waiting room for at least half an hour to check for possible bleeding aftershocks. After this period, if the patient has no complaints and the examination is normal, the patient is discharged from the polyclinic by calling for control with the result of pathology.

The diagnostic algorithm used in unilateral nasal masses in our clinic is presented in Figure 1.

## DISCUSSION

The majority of nasal masses are caused by inflammatory events. These inflammatory masses are often bilateral, and the primary treatment is medical (7, 10, 11). However, in some cases, the true diagnosis may be delayed in patients who have been accepted as an inflammatory event due to misevaluation and have been given medical treatment. Therefore, it is crucial that the patient is adequately questioned and examined in the first stage. It should be noted that a possible malignant or premalignant lesion can often mimic an inflammatory mass. Even more, we believe that every malignant lesion will cause an inflammatory reaction by creating drainage problems.

All nasal masses, whether unilateral or bilateral, produce similar symptoms (12, 13). Almost every patient has nonspecific symptoms, such as runny nose, nasal obstruction, bleeding, and pain. These symptoms provide no diagnostic information about the underlying disease. The most important clue for the clinician is the presence of unilateral symptoms. Unilateral symptoms may develop in relatively better prognosis, such as foreign object, choanal atresia, antrochoanal polyp, or fungus ball, or may occur in malignant masses with a much worse prognosis. A detailed examination



**Figure 1.** Diagnosis algorithm for single sided nasal masses

is necessary to avoid a possible malignancy. However, it should be noted that in some cases, such as angiofibroma, meningocele, or meningoencephalocele, there are some issues that need to be taken into consideration during diagnosis.

In malignant processes, it is more likely that the surrounding tissues, such as those in the eye, brain, palate, and face, are affected more frequently than benign lesions (14-16). Visual and neurological symptoms should definitely be examined in suspected patients. We argue that orbital involvement should be examined in all patients with unilateral nasal masses, and therefore, we evaluate eye movements and visual acuity especially in the presence of proptosis in this patient group.

Many lesions, such as mucocele, rhinosinusitis, fibrous dysplasia, nasal polyp, osteoma, and neoplasia, originating from the paranasal sinuses may cause orbital symptoms (17-19). The most common clinical finding, especially in patients with mucocele, is proptosis. Proptosis may develop in all masses that cause increased pressure in the orbit. Depending on the location of the disease in the paranasal sinuses and the relation to the orbit, it can be detected in findings such as pain, edema, limitation of eye movements, diplopia, and vision loss (17, 19, 20). In our clinical practice, we use eye movements in order to evaluate orbital involvement and finger counting to evaluate visual acuity. In case of doubt, we ask for an ophthalmology consultation. We do not use exophthalmometry for proptosis, but we believe it is an easy and reliable test for clinical practice.

Deformities due to intranasal masses may develop from time to time in the face area. Facial asymmetries may be caused by a benign pathology, such as nasal dorsum enlargement due to the nasal polyposis or hypertelorism due to mucocele, but they may also develop due to bone invasion of a malignant tumor. In order to document the current findings of all patients with facial deformities, we archive photographic images in accordance with patient privacy in our practice.

Other important steps in the evaluation of unilateral intranasal masses are infraorbital nerve paresthesia, palate involvement or submucosal mass in oral cavity examination and anterior rhinoscopy findings. The most important step in the physical examination is the diagnostic nasal endoscopy.

We think that the most critical findings in unilateral masses at this stage are vascularity and pulsation of the masses. Although different histopathological types of vascular tumors, such as hemangioma and angiosarcoma, can be seen in the nasal cavity, the most common lesion that should be noted is, of course, nasopharyngeal angiofibroma (21, 22). Angiofibroma should be the initial diagnosis, especially in young male patients with recurrent bleeding attacks. Because of severe bleeding in these patients, biopsy should be avoided, and diagnosis should be achieved by radiological examinations. In cross-sectional imaging, if a mass with hypervascular character is observed, diagnosis can be supported by angiographic examinations (23, 24).

Meningoceles or meningoencephaloceles originating from the anterior skull base are other conditions in which biopsy should not be performed (25, 26). In these cases, CSF leakage may develop iatrogenically if biopsy is performed. Again, cross-sectional imaging methods should be used for diagnosis. Soft tissue densities extending from the bone defect in the skull base to the nasal passage on computed tomography and the extension of the hyperintense CSF appearance, especially in T2 images, from the bone defect to the nasal passage on magnetic resonance imaging are the typical findings of the disease (23, 24).

In our clinical practice, we perform biopsy in all unilateral nasal masses, which are not of vascular origin and are not associated with CSF. We believe that another important condition that requires paying attention during biopsy is peritumoral inflammation. The development of inflammation due to the deterioration of sinus drainage may sometimes make it difficult to detect the actual tumor on endoscopic examination. Biopsy from the peritumoral region, rather than from the tumor itself, may cause false negative results. Therefore, biopsy should be taken from as many and deep tissues as possible in cases with suspected malignancy.

The main and most important objective in the diagnostic process in unilateral intranasal masses is the detection of a possible malignancy. Malignant sinonasal tumors rarely develop and account for approximately 6% of all head and neck tumors (8, 27-29). Although a wide range of different types of masses can be seen histopathologically, epidermoid carcinoma and less frequently adenocarcinoma, minor salivary gland carcinomas, undifferentiated carcinoma, neuroendocrine carcinomas, and nonepithelial malignancies are detected (29, 30). The most common symptoms are nasal obstruction, hyposmia, nosebleed, and runny nose (31). The unilateral presence of symptoms is an important finding. The treatment of these tumors is difficult due to the complex nature and variations of the anatomy of the region (8, 30, 31). Orbital or intracranial involvement may be observed. Multidisciplinary approach may be required in the treatment planning of these cases. We are also evaluating patients in the head and neck cancers councils, which consist of otorhinolaryngology, medical pathology, radiation oncology, medical oncology physicians and, if necessary, radiology, neurosurgery, pediatric oncology, and ophthalmology physicians.

The algorithm we have mentioned in our study covers adult patients, but it can also be applied in pediatric patients, except for some special cases. In pediatric patients, nasal masses are classified as non-neoplastic and neoplastic masses similar to adult patients. Unlike adult patients, in this age group, non-neoplastic congenital masses, such as nasolacrimal duct mucocele, dermoid cyst, meningocele, meningoencephalocele, and nasal neuroglial heterotopia, and benign neoplastic masses, such as juvenile nasopharyngeal angiofibroma and infantile hemangioma, are more frequent (32, 33). In these cases, cross-sectional radiological examinations as mentioned in the diagnostic algorithm are necessary. If typical findings are detected, biopsy should not be performed in these cases. Malignant neoplastic masses, such as rhabdomyosarcoma and esthesioneuroblastoma, are another group of diseases that differ in frequency from adult patients in pediatric age (32). In these cases, biopsy is indicated to confirm the diagnosis after radiological examination.

## CONCLUSION

Unilateral sinonasal masses should be evaluated as malignant until otherwise proven by biopsy. However, in these patients, intracranial origin or tumors with high vascularity should be distinguished by clinical and radiological evaluation before biopsy, and biopsy should be avoided in suspected patients in order to avoid catastrophic results. In patients with malignancy, no biopsy should be performed on inflammatory tissues or in necrotic areas around the tumor. Performing biopsy in these areas may produce false negative results.

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