



Venetian Pointe Dentistry

A Newsletter Prepared by Richard C. Rampi, DMD

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Maxillary Sinusitis A Potential Source of Pain for Upper Teeth

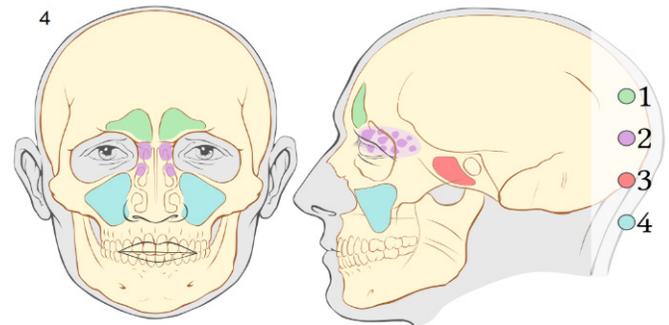
What would you guess are the symptoms associated with a sinus infection? Watery eyes? A stuffy nose? Post nasal drip? While these are all likely the most common ones that come to mind, you might be surprised to learn that when the maxillary sinus is involved, sometimes the only symptom is pain involving upper teeth.

According to the textbook related to root canal treatment *Ingle's Endodontics 6*, inflammation of the maxillary sinus cavity is the most common cause of dental pain not directly related to the teeth themselves.¹ In fact, as a dentist, I have certainly found this to be the case. Conversely, I would venture to say that any experienced ENT physician has seen what their patient thought was a sinus infection which was actually the result of a dental infection. The fact is, the maxillary sinus and the roots of the upper teeth often fit like "hand-in-glove".

The purpose of this newsletter is to explain the anatomy of the maxillary sinus, why inflammation of the maxillary sinus can be misconstrued as a toothache, how to determine the difference between the two, and the measures taken when this condition affects the neighboring teeth. While inflammation and infection of the maxillary sinus may be included in the differential diagnosis of dental pain, it should be clear that a definitive diagnosis and the actual treatment of the sinuses requires the service of a physician.

THE ANATOMY OF THE MAXILLARY SINUS

In anatomy, "sinus" generally refers to a cavity within a bone or other tissue. When thinking of "the usual" sinuses associated with a stuffy nose or other sinus-related symptoms, this group of sinus cavities are referred to as the "paranasal sinuses" (named this since they surround the nasal cavity). The paranasal sinuses are a group of four paired air-filled cavities. As shown in Diagram 1, the four sinus cavities are: 1) the frontal sinuses (above the eyes); 2) the ethmoidal sinuses (between the eyes); 3) the sphenoidal sinuses (behind the eyes); and 4) the maxillary sinuses (under the eyes and just above the upper



teeth)⁴. The many roles the sinuses include: to decrease the weight of the skull, to increase resonance of the voice, to provide a buffer against trauma to the face, to insulate surrounding structures, to warm and humidify inspired air, and to provide immune defense by trapping and filtering particles such as dust, spores, and bacteria. The paranasal sinuses communicate with the nasal cavity via small openings called "ostia" ("ostium" for singular).¹

THE CONNECTION BETWEEN THE MAXILLARY SINUS AND TOOTH PAIN

The maxillary sinus is the paranasal sinus which can be responsible for tooth pain. This is the largest of the sinus cavities and is the one most prone to infection. Again, this sinus cavity is located under the eyes and just above the upper teeth; the cavity for the maxillary sinus is located in the bone felt when the area of the cheek is palpated.^{1,2}

The ostium leading from the maxillary sinus to the nasal cavity has a high concentration of nerve endings and, therefore, is extremely sensitive when inflamed during sinus-related episodes. Blockage of the ostia leading to the nasal cavity is commonly caused by an inflammatory response to an allergen (e.g. pollen), a virus (e.g. from a common cold), or bacteria. This blockage can also be the result of an anatomic obstruction (e.g. a polyp) or a foreign body (e.g. dried mucous). In any case, the blockage results in an accumulation of mucous secretions normally expelled through the ostium and into the nasal cavity. This environment, in turn, creates an environment for bacteria to colonize. The resulting inflammatory response of the sinuses is called sinusitis.¹

DISTINGUISHING BETWEEN TOOTH PAIN AND MAXILLARY SINUSITIS

As usual, proper diagnosis begins with a complete review of a patient's medical and dental history. A common finding when reviewing the patient's dental history is a dull aching pain that is difficult to localize to a specific tooth. Because of swelling of the affected sinus cavity, upper teeth can be physically displaced from their normal position. This, in turn, can result in a painful response to pressure (chewing) and/or hyper-sensitivity to cold due to a cause-and-effect response to the nerve(s) of the affected teeth. There is often a feeling of pressure in the patient's cheeks and below their eyes. This can be detected during the examination of the patient by palpating the affected tissues (primarily the patient's cheek bones). Unlike inflammation of the other paranasal sinuses, sinusitis of the maxillary sinus is usually an unilateral event (the condition affects the left or right side of the mouth and face but not the other).^{1,2}

**ALSO IN THIS NEWSLETTER:
"This and That" from the Office!
From the Doctor's Desk**

A common finding for patients experiencing maxillary sinusitis is the pain associated with this can be aggravated by changes in position such as when lying down and usually when lying on one side more than the other. The pain can come and go in "waves" in which case the pain can be severe then suddenly relieved if the sinus pressure is alleviated. While an x-ray is crucial whenever diagnosing tooth pain, the diagnosis of tooth pain or pain originating from the sinus cannot be determined from the dental radiograph alone.¹

It is important to note that for the same reason maxillary sinusitis can affect upper teeth and result in tooth pain, the reverse is also true; dental infection of an upper tooth can extend directly through the floor of the maxillary sinus and can result in a secondary infection of the maxillary sinus. In this case, the condition is technically referred to as maxillary sinusitis of dental origin (MSDO). In fact, dental infections account for approximately 10 to 15% of cases involving acute maxillary sinusitis. In this case, sinus healing will not occur unless the infected tooth is treated with root canal treatment or the tooth is extracted. For this reason, it is important for a physician treating maxillary sinusitis to consider the teeth as a plausible source of the condition.^{1,2}

A summary of symptoms and clinical signs distinguishing between tooth pain and maxillary sinusitis are as follows. When the tooth is cause of the pain: 1) the pain does not typically vary according to postural positions; 2) one tooth in particular is especially tender to percussion (when the teeth are tapped on); 3) the area of the cheek bone is typically not especially tender to touch; and 4) dental pathology is seen clinically including the existence of tooth with deep

Studies have shown that the average thickness of the bony partition between the lining of the maxillary sinus cavity and the root tips of an upper molar is less than 1mm (not even the thickness of a credit card). Because of this intimate relationship, increased sinus pressure during sinusitis involving the maxillary sinus can produce the sensation of pain and pressure involving the upper teeth. Pressure on the affected teeth produces acute tenderness (e.g. from chewing) due to the direct transfer of shock pressure to the inflamed sinus tissues and the highly innervated ostium. According to Ingle's Endodontics 6, "oftentimes for patients the most sensitive trigger for sinus pain [of the maxillary sinus] is by manipulation of the maxillary posterior [upper rear] teeth leading them to believe with near certainty that teeth are the source of their pain". In fact, sometimes the only symptom associated with maxillary sinusitis is tooth pain.^{1,2}

Over all, sinusitis of the paranasal sinuses "is the single most common chronic medical condition in the United States affecting 16% of the population and accounting for up to 5% of all visits to primary care physicians". When considering inflammation of the maxillary sinus, it has been found that "the symptom with the highest specificity for maxillary rhinosinusitis was a maxillary toothache" [an upper tooth]. As stated previously, sinusitis of the maxillary sinus is the most common cause of tooth pain not directly related to the tooth itself.¹

While not an exact analogy with maxillary sinusitis, imagine the Great Lakes³ being the nasal being the nasal passage and paranasal sinuses. If so, Lake Huron in the center would be the nasal cavity whereas the other four lakes would be the sinus cavities. Now imagine the southern shore of Lake Michigan being the maxillary sinus; if so, the city of Chicago would be the roots of an upper molar tooth, and South Bend, Indiana would be the root(s) of an upper premolar tooth. The relatively small waterways connecting the surrounding lakes to Lake Huron would be the ostia and ships would be the mucous. If the channel connecting Lake Michigan with Lake Huron were blocked (say ... frozen), the ships would have no way of accessing the other lakes and the ocean!!!

