

Function and surgery of the ostia of the paranasal sinuses

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The two main functions of the nasal accessory sinus ostia are participation in the transport of secretions and the ventilation of the sinuses. Participation in the ventilation is merely to allow gas exchange providing the sinus most suitable circumstances rather than to actively rule or regulate it (Aust and Drettner, 1974). The transport of secretion definitely varies between different ostial canals as Messerklinger (1966, 1967) has shown. In the frontal ostial canal the moving superficial layer of the secretion film forms a kind of eddy so that part of the stream rises back to the frontal sinus. The stream on the lateral wall of the nasal frontal ostial canal leads into the nasal cavity, but a great part of the moving layer on the medial wall returns to the sinus. A less complicated type of streaming, resembling that in the ethmoidal and maxillary sinus ostia, may occur in frontal sinuses originating evolutionally from the ethmoidal cells instead of the frontal recess of the nasal cavity which is the regular type of origin. The moving layer of the secretion from the ethmoidal, maxillary and sphenoidal sinuses travels more or less spirally through their ostial canals into the nasal cavity.

Attitudes towards procedures on nasal accessory sinus ostia have been generally very restricted. Aims of operative procedure directed at the ostia may be:

- to totally obstruct an ostium
- to diminish the size of an ostium
- to enlarge an ostium
- to open a totally obstructed ostium

The obstruction of an ostium is indicated in the case of an accessory sinus obliteration operation like the Goodale osteoplastic method for frontal sinus obliteration. In trials to obstruct the ostial canal a recanalization of the ostial canal after obliteration may be more evident in the case of ostia other than in the frontal sinuses.

As far as I know an exceptionally large ostium does not cause any unfavorable effects and therefore there are no reasons to try to diminish the size of the ostial lumen.

The most common surgical procedure on ostia would thus be the enlargement of a totally obstructed ostium or of an ostium that easily and repeatedly becomes obstructed in connection with even slight inflammation. When the task is that of reconstruction of the nasofrontal duct a reference to the complicated mechanism

of the secretion transport in this region explains why this reconstruction so easily fails. Success may more safely follow a totally new arrangement of the drainage of the frontal sinus as one would expect it to be elicited by the reconstruction methods eponymically called e.g. Lynch, Barany or Uffenorde plastic methods of nasofrontal duct reconstruction. I personally, however, would very carefully consider whether an obliterative technique would be more preferable in the rare cases in which a surgical procedure for frontal sinusitis may be indicated.

Next I would like to contemplate the enlargement of the maxillary sinus ostium. Such a procedure might be more often indicated, if the theory of the decisive role of ostial-meatal insufficiency in the pathogenesis of maxillary sinusitis is accepted (Naumann, 1966). My personal experience, however, is that relatively often a patent ostium is found in spite of the fact that an obstinate retention of secretions is prevailing in the involved sinus.

With ostial insufficiency in mind, I started to apply enlargening procedures to the maxillary sinus ostium about 8 years ago. As my early trials to only make a large ostium by ethmoidectomy had mostly failed, a method of long-term tubing of the maxillary ostium was adopted (Kortekangas, 1969, 1971).

In this long-term tubing method a stiff curved Silastic tubing was introduced into the maxillary sinus through an enlarged ostium. The tubing was left in the ostial canal for a period of 5 to 8 weeks, sometimes even longer with the purpose that, after regeneration, a wider and more safely functioning ostial canal would be produced. When performed endonasally this procedure is a minor one and well endured by the patients under local anesthesia. During the intubation period only ventilation, if even that, can be assumed to occur through the tubing. The mucosa of the involved sinus has to clear the secretion mostly by resorption. Generally the conditions within the sinus are not worsened by this procedure as the ostium had previously been permanently obstructed.

We have applied this procedure to 31 patients with a follow-up of at least 3 years. Three of them were failures in which the inflammation did not respond to the procedure. In four patients a primary recovery for one to three years was observed, but later respiratory infections initiated an irreversible inflammation in the involved sinus. Among the remaining 24 patients about every second has considered himself to be totally cured, some of them also from the accompanying asthmatic or bronchitic symptoms. All these patients have, of course, had respiratory infections, but they have recovered without further operative procedures. A sinus wash via the enlarged ostium has been easily applicable in all the cases and without exception the patients have given preference to this type of irrigation compared with the usual puncture and irrigation via the inferior meatus, of which they all have ample experience.

After having applied long-term intubation of the maxillary ostium for longer than seven years I think it is an alternative in the therapy of a proved permanent ostial obstruction. Whether one can promise a cure of sinusitis and reversibility of the secretion transport is very hard to predict. In our clinical experience about 50 per cent of properly selected cases can be expected to respond with a

cure. In 30 per cent an apparent improvement and certainly more agreeable washings, when needed, can be promised. Still, about 20 per cent can be expected to be failures. Unfortunately, it is hard to predict how each individual will respond. A prerequisite for this kind of therapy is that every patient is given special attention during the intubation period and especially immediately after extraction of the tubing. If this attention can be provided this type of procedure can be recommended with the aim of restoring the impaired physiology of this nasal region.

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