Measurements of the ostial size and oxygen tension in the maxillary sinus

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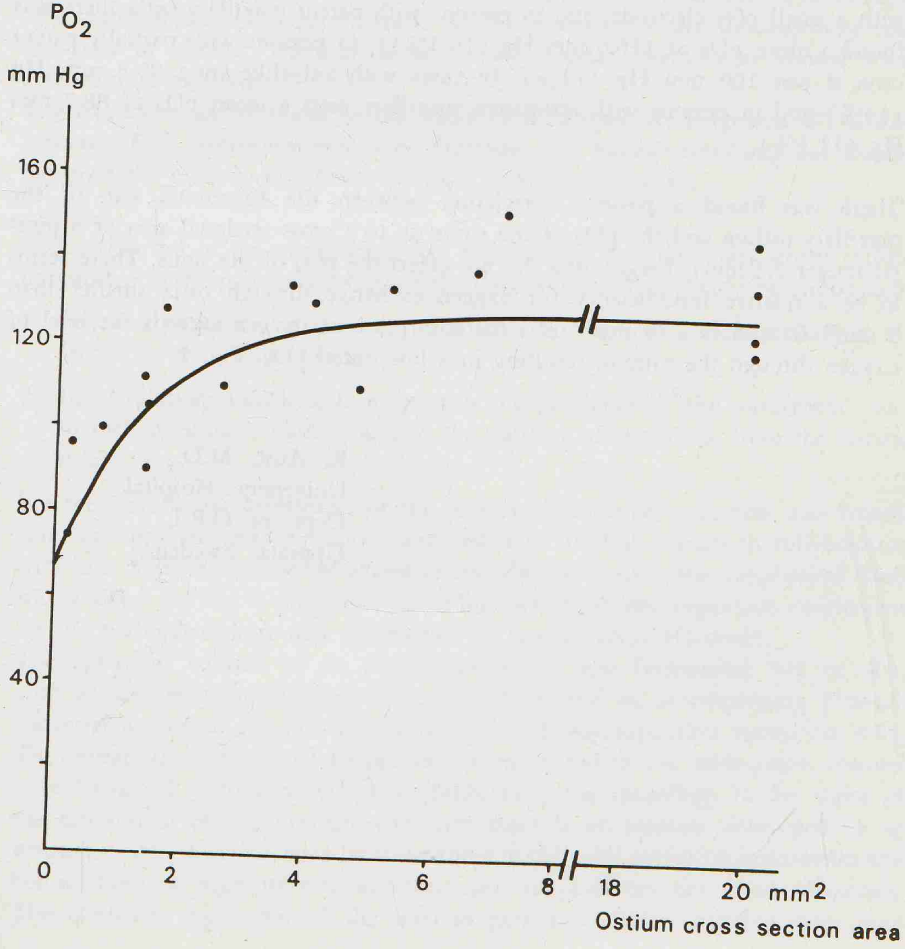
The maxillary ostium is a canal with a length of 1 - 6 mm and a diameter of 0 - 6 mm or more. In most human beings there is only one ostium, but one or more auxiliary ostia are not uncommon.



Earlier measurements of the maxillary ostium have been performed on cadavers. These measurements are not quite appliable on living subjects due to post mortal changes and shrinking.

Docent B. Drettner and I have elaborated a method for measurements of the cross section area of the maxillary ostium in living man. The method is manometrical and is based on measurements of the pressure rise in the maxillary sinus with a patent ostium. The pressure rise is caused by an airstream of known flow introduced into the investigated sinus. This pressure rise is negatively correlated to the size of the ostium or ostia of the antrum. The result of the measurement is called the functional size of the maxillary ostium.

A clinical study on 37 healthy persons showed that the mean ostial size was 5 mm^2, corresponding to a diameter of 2.4 mm.

There was no significant difference between men and women and no correlation between ostial size and antral volume.

In the clinical study the oxygen tension in the maxillary sinuses was determined with a small pO_2 electrode, and in persons with patent maxillary ostia there was found a mean pO_2 of 116.6 mm Hg (16.3%)), in persons with partially patent ostia it was 100 mm Hg (14%). In cases with valvelike ostia 99.8 mm Hg (14%) and in persons with obstructed maxillary ostia a mean pO_2 of 88.7 mm Hg (11.3%).

There was found a positive correlation between the functional size of the maxillary ostium and the pO_2 of the sinus up to a cross sectional area of 5 mm^2 (diameter 2.4 mm). Larger ostia did not effect the pO_2 of the sinus. There seems to be a relative insufficiency for oxygen exchange through ostia smaller than 5 mm^2. In sinuses with small ostia the absorption of oxygen exceeds the inlet of oxygen through the ostium, resulting in a low antral pO_2. Fig. 1.

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