

## Bimeatal sinuscopy, technical and diagnostic improvements

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### SUMMARY

*Technical inadequacies associated with conventional sinuscopy have been overcome by equipping sinusscopes with Hopkins lenses. To make full use of the superior properties of these air lens systems, the preferred entry into the maxillary sinus proved to be through the ventral wall. The bimeatal sinuscopy offers an expansion of the technique of maxillary sinus endoscopy.*

*The method permits for the first time the performance of both diagnostic (especially biopsies) and minor therapeutic procedures within the maxillary sinus under direct control of the eye.*

UNLIKE other endoscopic procedures in medicine, endoscopy of the maxillary sinus has never received the attention it deserves (Nehls, 1955; Bauer and Wodak, 1957; Rosemann, 1961; Wodak, 1969 and Hütten, 1970). The method is simple, can be performed relatively easily and is superior to all other diagnostic techniques for the maxillary sinus, since it permits inspection under direct vision. Technical inadequacy has been primarily responsible for the fact that sinuscopy — in spite of its obvious advantages — has never become very popular:

1. The depth of focus of the optics hitherto in use was not sufficient for the greatly varying distances within the sinus (we found distances from 2 to 50 mm in one and the same maxillary cavity).
2. A narrow sector of view and rather poor light, decreasing quadratically with distance, made orientation difficult for the inspecting surgeon.
3. The generally preferred technique of entering the maxillary sinus through the lateral wall of the inferior meatus of the nose did not permit a full view of the entire cavity, especially with respect to the exit area.
4. Biopsies, swabs and other diagnostic procedures within the sinus could only be performed blindly, if at all.
5. A satisfactory photographic documentation, also for didactic purposes, could not be made.

These technical difficulties have been described by Slobodnik (1930, 1932),

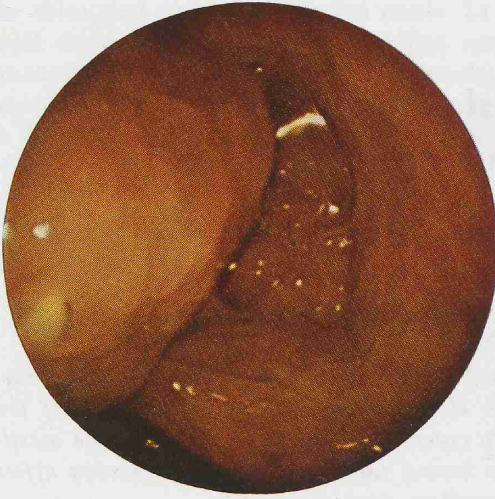


Figure 1. Left maxillary sinus. Medial wall, recessus pterygopalatinus and parts of cavity roof and posterior wall. Top center: sinus exit.

Lüdecke (1932), von Riccabona (1955), Bauer and Wodak (1957, 1959, 1969), Timm (1956, 1961) and Rosemann (1961).

The equipment of sinusoscopes with Hopkins lenses opened up new possibilities for sinuscopy. The optic properties of this air lens system are far superior to those of the conventional crystal lens systems (Figures 1, 2 and 3). The Hopkins sinuscope\* used by us has a depth of focus that is unlimited for all the distances encountered in the maxillary sinus. Compared with the old system this new sinuscope covers a much larger field of view (about three times greater) and offers, when combined with a cold light source, an intensity of light six times more powerful. The resolving capacity and color correction of this optic system meet all requirements. The instruments are the same as for the conventional sinuscope, except that the sheath of the trocar is 0.5 mm larger in diameter.

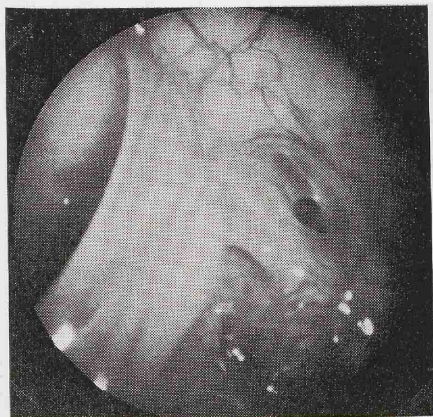
To make full use of the superior optical properties of this new sinuscope, we have abandoned the trepanation of the sinus by way of the lower lateral wall of the nose and have chosen as more appropriate entrance the ventral wall of the maxillary sinus.

Besides the other advantages, the ventral approach guarantees better inspection of the entire cavity and in particular gives a full view of the very important exit area (Figures 1 and 3), which is a crucial element in the physiology and pathology of this sinus (Guillerm et al., 1971).

Under local anesthesia, the fossa canina is punctured by rotating movements of the four-cornered trocar. Even in cases with an unusually thick ventral wall, trepanation is achieved quickly and without the difficulties (Rosemann, 1961), encountered quite often when entering the sinus from the inferior meatus of the nose.

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Black and white reproductions of color slides photographed through a Hopkins sinuscope. Figure 2. Sail-like scar tissue formation of the orbital floor after blow-out fracture.

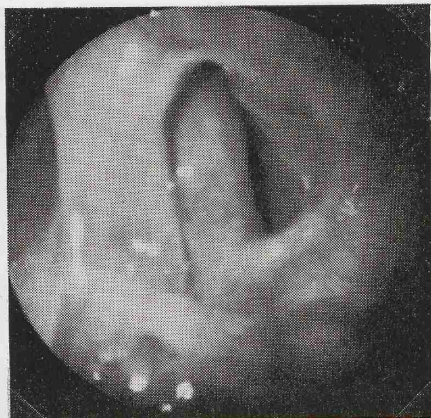


Figure 3. View of the entire exit area of the maxillary sinus.

According to our observations, the ventral approach is normally tolerated better by the patient than the nasal access. We found that two months after sinuscopy, the round perforation in the ventral wall of the sinus had been closed by bone. To avoid the only known complication, i.e. emphysema of the soft tissues of the cheek, the patient should be told to be careful for the next two or three days when blowing his nose.

The ventral approach offers another important advantage. Several authors have repeatedly regretted not being able to carry out diagnostic procedures within the maxillary sinus under control of the eye (Timm, 1961, 1965), especially with regard to biopsies. To overcome this considerable disadvantage, we now insert a second trocar into the sinus by way of the conventional inferior meatus of the nose in addition to the ventrally introduced sinuscope as described above. Through this second access, it is easy to introduce into the sinus, the instruments (from the tympanoplasty set or the microlaryngoscopy set) with which specimens can now be taken for the first time under complete visual control (Figures 4 and 5).

We call this method the bimeatal sinuscopy. It offers amplification as well as improvement to the technique of maxillary sinus endoscopy. Involving no greater surgical effort, this technique is of considerable value, especially for the diagnosis of tumors, but also for the differentiation of the pluriformity of sinus diseases. In addition to these diagnostic measures, minor therapeutic procedures can also be carried out easily under direct view through the new sinuscope.

Hitherto, photographic documentation (Timm, 1965, 1965), has rarely been possible due to the inadequacies of the crystal lense sinusscopes (Wodak, 1969, mainly with respect to depth of focus, sector of view, and intensity of light required for the black and white photographs. Satisfactory photographs of sinus diseases could not be taken for didactic purposes (Nehls, 1955; Bauer and Wodak, 1957, 1959; Timm, 1965).

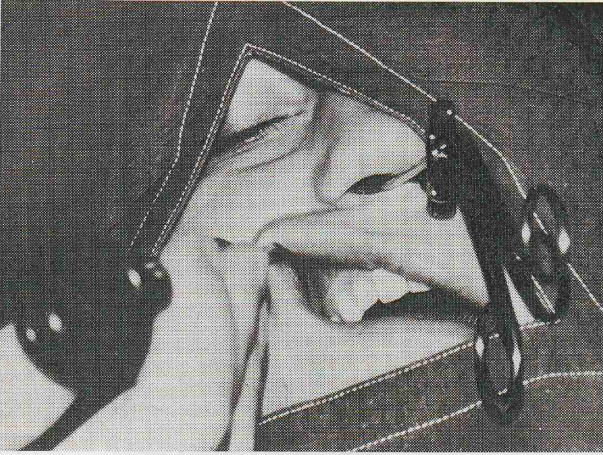


Fig. 4. Bimeatal sinuscopy. Sinuscope introduced ventrally through the fossa canina; second trocar sheath with instrument inserted into the sinus through the inferior meatus of the nose.

Attempts were made to overcome this disadvantage by painstakingly putting together sections of several photographs which had to be copied over and colored by so-called academic painters (Bauer and Wodak, 1959; Wodak, 1969).

This problem was solved by combining the Hopkins sinuscope with a flashlight source. The ocular of the sinuscope is adapted to the objective of a reflex camera by an adapter ring. This system gives sufficient illumination of the object to permit the use of commercial color film (25 or 50 ASA).

A further technical improvement of the sinusoscopic photographic documentation is given by the interposition of a flexible glass fiber co-observer between the camera and the sinuscope. This system makes it possible to place the camera outside the surgical field, and thus an assistant will be able to co-inspect the interior of the maxillary sinus through the viewer of the camera and take photographs without disturbing the surgeon.

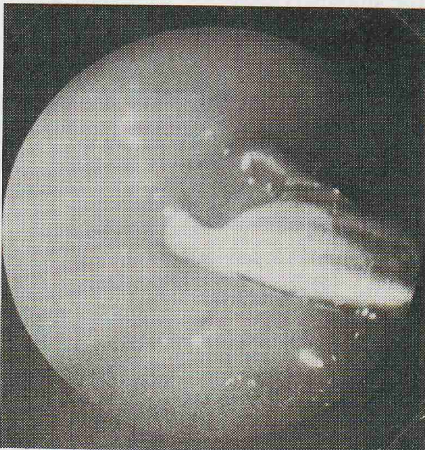


Figure 5. Biopsy within the maxillary sinus under direct view through the sinuscope.



We believe that the previously existing inadequacies of the sinuscopy have been overcome by these new technical improvements of the equipment and by the addition of the bimeatal approach with its new possibilities.

## RESUME

Les insuffisances techniques de la sinuscopie classique, qui existaient jusqu'à présent, ont été résolues en équipant les sinusoscopes avec les objectifs de Hopkins. Dans le but d'utiliser pleinement les possibilités supérieures de ces systèmes de lentilles, il s'est avéré que le meilleur accès dans le sinus maxillaire est la face antérieure de celui-ci. Avec la sinuscopie biméatale, une extension de la technique de l'endoscopie du sinus maxillaire est proposée. Pour la première fois, cette méthode permet le diagnostic (particulièrement des biopsies), aussi bien que des procédés thérapeutiques intra-sinusiens mineurs sous le contrôle de la vue.

## ZUSAMMENFASSUNG

Durch Ausrüstung von Sinuskopen mit Hopkins-Optiken konnten bisher bestehende technische Unzulänglichkeiten der konventionellen Sinuskopie beseitigt werden. Um die überlegenen Eigenschaften dieser Luftlinsen-Optiken voll auszunützen zu können, erwies sich der Zugangsweg durch die Kieferhöhlenvorderwand als der geeignetste. Mit der bimeatalen Sinuskopie wird eine Erweiterung der Technik der Kieferhöhlenendoskopie vorgeschlagen, die es erstmals ermöglicht, unter direkter Sicht des Auges diagnostische (vor allem Probeexzisionen), aber auch kleinere therapeutische Eingriffe in der Kieferhöhle auszuführen.

## RESUMEN

Equipando sinuscopios con ópticas Hopkins las imperfecciones técnicas existentes hasta la fecha en la sinuscopia convencional pudieron ser sobrevenidas. Para poder hacer el mejor uso posible de las cualidades superiores de estas ópticas de lentes de aire se escogió como la entrada más apropiada en el seno maxilar el acceso a través de la pared delantera. Con esta sinuscopia bimeatal se propone una amplificación de la técnica de endoscopia del seno maxilar, mediante la cual es posible, por primera vez, efectuar intervenciones diagnósticas en el seno maxilar — ante todo tomas de prueba — así como pequeñas intervenciones terapéuticas controladas por la vista directa del ojo.

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