Surgery of the turbinate bones and the piriform crest

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IN contrast to operations on the septum, little has been published in the last two decades about operations on the lateral nasal wall. Yet the air patency of a hollow organ depends largely on its lumen. It was therefore natural to try and improve nose breathing by lumen-enlarging operations on the lateral nasal wall, especially on the turbinate bones and the piriform crest.

This idea is opposed by the empirically confirmed classical doctrine that lumen enlargement on the lateral nasal wall may easily lead to atrophic rhinitis. Indeed

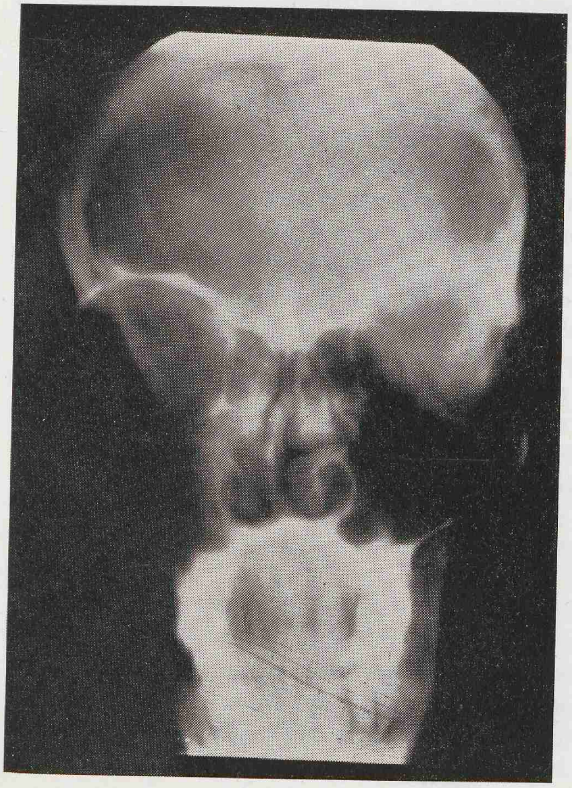


Figure 1. Compensatory hypertrophy of the left lower turbinate in septum deviation to the right. Tomogram.

everyone will agree that with his operations the rhinologist has to steer a middle course between two evils, i.e. too narrow and too wide a nose.
However, my own observations over many years have shown that the risk of atrophic rhinitis after tissue-saving operations on the turbinate structures and piriform crest is now apparently less than it was one or two generations ago. This may vary regionally and may be due above all to nutritional and general hygienic factors. We can say to-day that the compensation range of the nasal mucosa for surgical lumen enlargement by operations on the turbinate bones admittedly varies but is generally wide. What matters is correct and individually applied determination of indication.

OPERATIONS ON THE LOWER TURBINATE

In the classical physiology of nose breathing it is said that the main proportion of the inspired air goes through the middle nasal duct and only a small part through the lower. More recent flow-physiological and rhinomanometric investigations by Fischer (1969), Masing (1967) and Bachmann (1973) hae shown that this view is not correct but that the air flow goes more or less equally through the entire free transverse section of the nose. This is true also for the

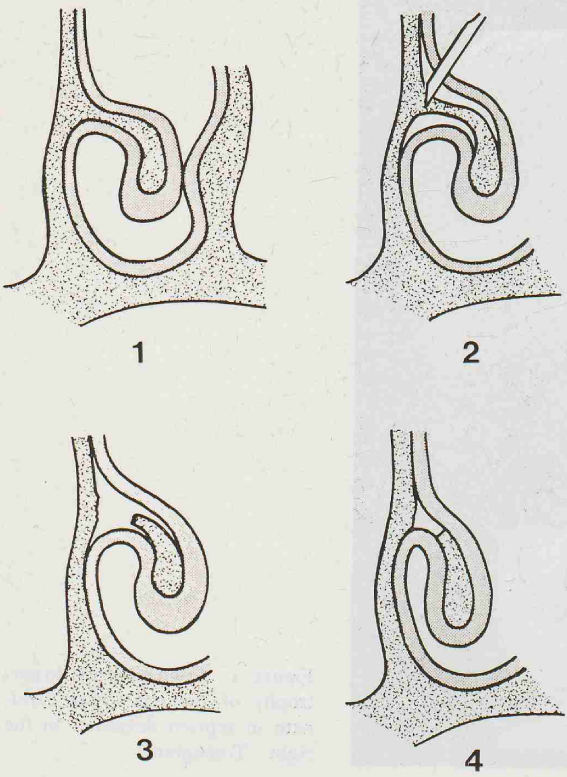


Figure 2. Lateroposition of the lower turbinate. Submucous removal of horizontal part of the turbinate framework. See text.

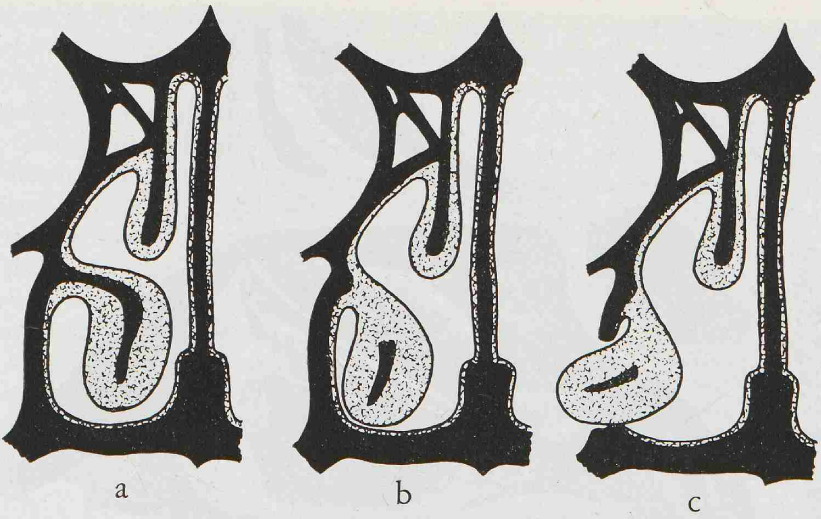


Figure 3. Lateroposition of the lower turbinate.
a. Situation before the operation.
b. State after lateroposition. The gain in lumen comprises not only the region of the lower but also the middle nasal duct.
c. Dislocation of lower turbinate into the maxillary sinus after endonasal fenestration in extreme cases of hyperplasia (see text).

lower nasal duct. In fact the lower turbinate is most liberally supplied with cavernous tissue and its physiological range of turgescence is of all parts of the inner nose the greatest, so that purely from the anatomical structure the lower turbinate must be regarded as the main regulator of nose breathing.

We know e.g. that on the concave side of a septum deviation the lower turbinate often shows compensatory hyperplasia. The hyperplasia affects not only the soft parts but the bony framework, as shown in the tomogram (Figure 1). After straightening the septum this must have a disturbing effect on breathing. This seems to me an important indication for the lateroposition of the lower turbinate as described by me (Figure 2). The piriform crest is exposed from the vestibule of the nose and the bony insertion of the lower turbinate exposed. Then the bony insertion of the lower turbinate is separated from the lateral nasal wall with a chisel and the horizontal part of the turbinate bone removed submucously with a small forceps. The gain in lumen can be seen in Figure 3. It is clear that this gain relates not only to the lower nasal duct but also particularly to the middle duct.

In cases of very marked hyperplasia the lower turbinate can be moved into the maxillary sinus through a window created endo-nasally after separation of its bony insertion, saving the mucosa. We proceed here according to Unterberger's technique of endonasal maxillary sinus operation (Figure 4). This operation produces lasting enlargement of the lumen even in severe, therapy-resistant cases. The corpus cavernosum mechanism remains intact.

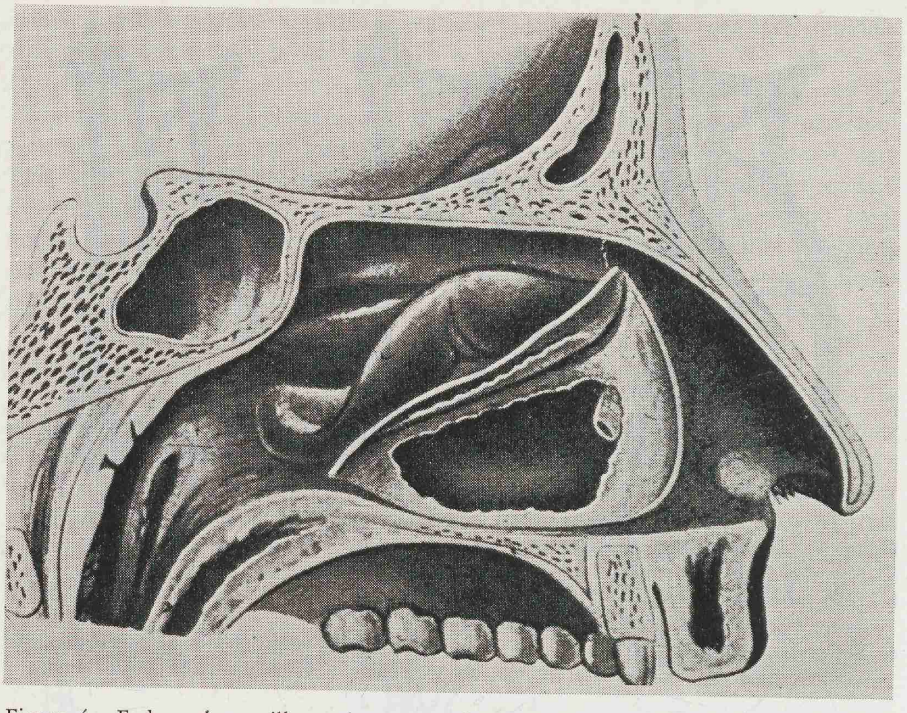


Figure 4. Endonasal maxillary sinus operation according to Unterberger. Temporary turning up of lower turbinate.

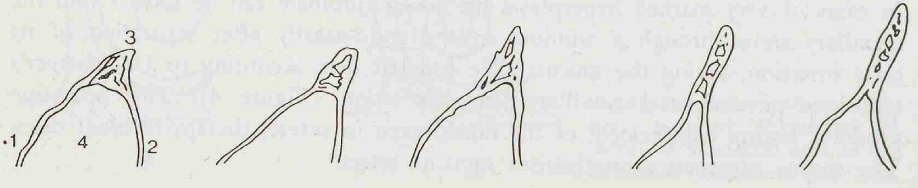
OPERATIONS ON THE MIDDLE TURBINATE

These can also be performed submucously and tissue-saving, possibly under the operating microscope (Pirsig, 1972). They are indicated mainly in concha bullosa and turbinate bones projecting too far medially. Preoperative endoscopic examination is advisable.

OPERATIONS ON THE PIRIFORM CREST

Shortening of the free edge of the piriform crest for the purpose of enlarging the lumen of the anterior nasal sector was previously performed by various

Figure 5. Shape variants of piriform crest according to Zuckerkandl.

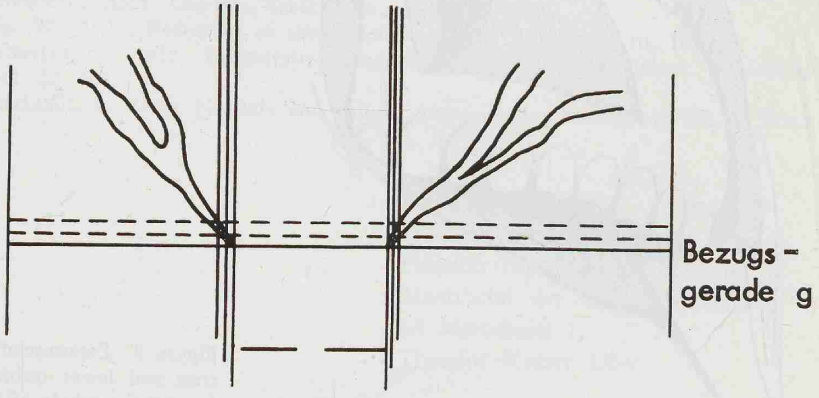


authors but obviously has not yet been generally accepted. Figure 5 shows Zuckerkandl's description of the considerable individual differences in shape of the piriform crest. Thus it was not clear up to now whether any lumen enlargement of the anterior nose can be achieved by shortening the piriform crest. To clear up this question Geuder (1972) at our clinic performed measurements of the piriform crest on 46 human skulls by means of modern impression methods (Figure 6). He was able to make quantitative statements on the extent of shape variants of the piriform crest and found that in 67% of skulls by a shortening of the piriform crest of only 2 mm a gain of lumen of an average of 1.3 mm per side was achieved. With a shortening of 4 mm an average of 3 mm lumen enlargement was found in over 90%. It is seen therefore that in most but not all cases a lumen enlargement in the anterior nasal section can be achieved by shortening the piriform crest. Preoperatively one can try to visualise the angle of the piriform crest by insertion of a tampon holder into the lower nasal duct, as for maxillary sinus puncture.

WAYS OF ACCESS FOR THE LATEROPOSITION OPERATION AND FOR SHORTENING THE PIRIFORM CREST

With endonasal incision over the piriform crest I have replaced the originally described longitudinal incision by a Z-shaped one in order to avoid the risk of diaphragm-like scar contractures in the sensitive area of the nasal isthmus (Figure 7). This endonasal approach makes it possible to operate without assistance. This advantage is countered by an important disadvantage: the endonasal incision — also the Z incision — destroys the strands of elastic fibres which, originating from the anterior edge of the lateral cartilage, run the anterior nasal

Figure 6. Lumen enlargement after shortening of piriform crest in millimetres according to lumen impressions on cadaver skulls (Geuder, 1972).



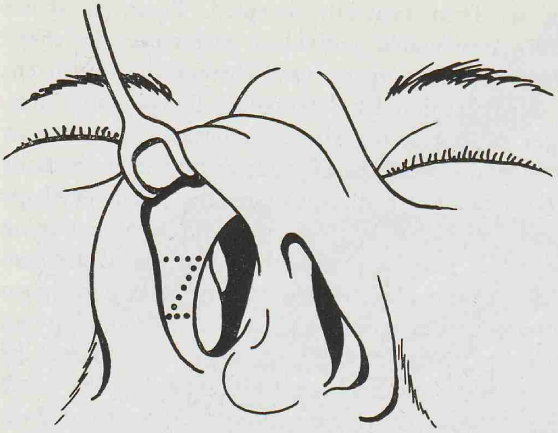


Figure 7. Z-shaped incision in the vestibule of the nose for exposure of piriform crest and lower turbinate bone.

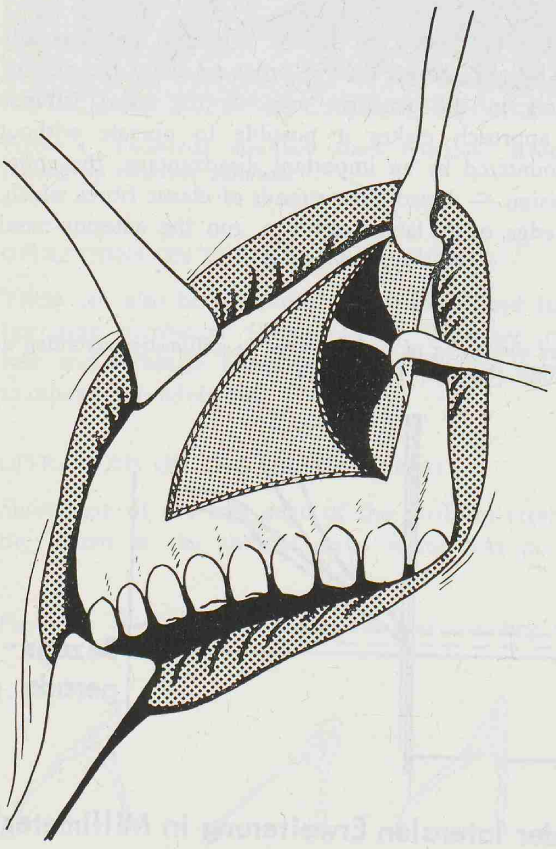


Figure 8. Exposure of piriform crest and lower turbinate bone from the vestibule of the mouth (schematic).

spine and thus form the lateral arc-shaped border of the nasal isthmus. They make possible the finely tuned play of the active and passive movement of the nasal valve. The play of the nasal valve does in fact suffer for a long time after endonasal operation. Therefore the idea suggests itself to approach lumen-enlarging operation on the piriform crest and on the lower turbinate extranasally. There are two possible ways:

1. Paranasal incision at the edge of the wing of the nose externally,
2. incision from the vestibule of the mouth, similar to the maxillary sinus operation of Caldwell-Luc (Figure 8).

The view is especially good with the approach through the vestibule of the mouth. The crest and the turbinate structure are well exposed. Opening of the nasal lumen is not necessary and scar formation is limited.

So we have to proceed differently according to the individual situation and a great number of possibilities is available. Rhinomanometric examinations before and after the operation give us information on the degree of improvement of breathing in the individual case.

The development of atrophic rhinitis was not seen by us with careful selection of indications in over 100 patients operated on.

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