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The clinical significance, diagnosis and treatment of bulla formation in the nose

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SUMMARY

Nasal stenosis as a result of a bulla formation in the middle concha and uncinate process, together with hypertrophy of the bulla ethmoidalis, is described on the basis of 4 case histories. The condition obstructs drainage from the paranasal sinuses and produces an unphysiological airstream through the nose. This results in a disease complex which is dominated, in particular, by nasal stenosis, a feeling of pressure with radiating pains to the neighbouring regions, together with chronic infection of the upper and lower airways.

It appears to be difficult to make the diagnosis clinically and from routine x-rays. The importance of the differential diagnosis from nasal polyps and mucosal hypertropy is emphasized. It is suggested that the term "bulla cavi nasi" be employed as a common name for bulla formation in the nose.

Bulla formation (osseous cysts), in the middle concha and uncinate process, together with hypertrophy of the ethmoidal bulla (Ballenger, 1971), is a pathoanatomical condition which can give rise to a symptom complex which results mainly from the nasal stenosis which it produces (Pirsig, 1972).

A number of terms have been employed for bulla formation in the middle concha, among them: concha media bullosa, concha cellulosa (de Almeida, 1929), cellulae conchoethmoidales, cellulae ethmoidoconchales (Radoievitch and Javanovic, 1959), and turbinal bulla (Pirsig, 1972).

Ethmoidal bulla is, as a rule, the largest of the most anterior ethmoidal cells. It mushrooms out somewhat below the middle concha in the nasal cavity (Andreasen, 1974; Feneis, 1970) and is, accordingly, a normal anatomical structure. The term "ethmoidal bulla" is often clinically interpreted as "hypertrophy of the structure".

The nasal sinuses are formed by the mucosa of the nose growing inwards into the adjacent bone, thereby breaking down the bone substance and spreading out where there is room to do so (Andreasen, 1974), i.e. where the least resistence is to be met. The drainage to the nose from the maxillary and frontal sinuses and the anterior ethmoidal cells, takes place through openings of varying

form, situated between the anterior part of the middle concha and the inferior conchae.

During inspiration, in the main, the air current passes this area (Proetz, 1953). The site of drainage, the ethmoidal infundibulum, is bordered upwards, by the ethmoidal bulla, downward, by the uncinate process, and medially at varying distances from the middle concha (Andreasen, 1974). The mucosa is particularly sensitive to pain at the site where the drainage takes place (Scott-Brown, 1971). It is stated that the nasal mucosa produces 1 litre or more, of secretion every 24 hours (Proetz, 1951). The volume of the paranasal sinuses varies considerably, but is considered to be, on average, approximately 50 ml (Ballenger, 1971; Proetz, 1953). More than half the area of the nasal mucosa is to be found in these paranasal sinuses, and this fact duly emphasizes the importance of free drainage. Owing to bulla formation, nasal stenosis involves the risk of the development of a chronic infection in both the upper and lower airways, frequently attended by a very irritating condition (Ballenger, 1971; Scott-Brown, 1971). The symptoms will often comprise: nasal secretion, crust formation, facial pain radiating to the frontal, temporal and zygomatic regions, and ear pain (referred pain) (Scott-Brown, 1971); poor hearing, an olfactory sense reduced or diminished to extinction, disturbances of speech in the form of nasal clang and a flat voice, constant irritation of the naso-pharynx and throat, with coughing, and even a tendency to bronchitis (Ballenger, 1971). The disease can be aggravated by other conditions producing nasal stenosis, frequently allergic or vasomotoric rhinitis, polyps, together with congenital or traumatic deformations of the nasal skeleton.

The reason why bulla formation brings about such drastic changes in the physiology of the nose is, that it develops in an area where it compromises the drainage from the nasal sinuses and changes or, in the most serious cases, prevents the passage of air through the nose. Nasal stenosis appears to start a vicious circle: the area of mucosa over which the air passes is reduced, this causes increased local evaporation with drying out of the mucosa (Stoksted, 1959), in which event the cillial movement is slowly decreased or stopped (Ballenger, 1971; Proetz, 1953). This again, results in stagnation of secretion and crust formation, thereby inducing a good basis for infection of the mucosa. The natural corollary of this is that further congestion occurs and produces additional nasal stenosis, and so on.

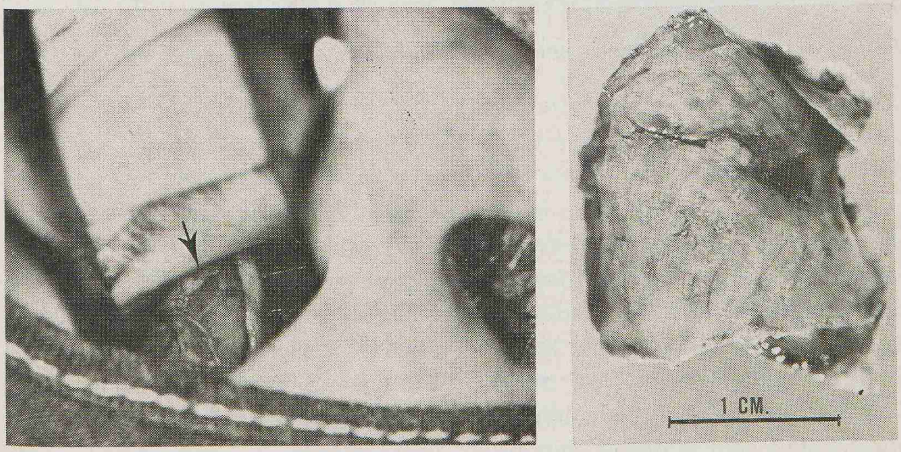
One can visualize the following as being the cause, origin and growth, of a bulla a) that the embryonal process becomes re-activated, b) that epithelial proliferation contingent on inflammation, with enclosure of a part of the mucosa, takes place (Radoievitch and Jovanovic, 1959). The goblet cells continue to produce secretion, with which the pressure on the walls of the bulla is increased and enlargement occurs. Treatment of bulla formation in the nose,

consists of submuco-periostal resection of the bulla (de Almeida, 1929; Hinderer, 1971; Pirsig, 1972; Stoksted, 1977). It is often necessary to supplement this with resection of the hypertrophic mucosa, removal of any polyps and correction of existing nasal deformities (Stoksted, 1977). An attempt should be made to provide sufficient passage through the nose and to re-establish drainage from the paranasal sinuses, at the same time endevering to retain intact as much as possible of the nasal mucosa, so that the normal physiology of the nose is re-established (House, 1951; Pirsig, 1972; Stoksted, 1959), bearing in mind that there is a risk of atrophic rhinitis developing, together with a tendency to crust formation and throat irritation, if too much space is created (Hinderer, 1971; House, 1951; Stoksted, 1959).

CASE HISTORY I

A 35 year old asthmatic was referred to the department owing to recurrence of polyps in the nasal cavity, increasing nasal stenosis, with nasal secretion for the last 3–4 years, as well as a nasal clang and flat voice. She employed increasingly larger quantities of a shrinking agent, finally without obtaining any relief, and suffering from constant dryness and irritation in the mouth and throat. In her profession as a teacher, she was seriously hampered by the nasal clang and flat voice. She suffered from a feeling of pressure in the middle of the face, with radiation of pain, particularly to the forehead.

On admission, both nasal cavities were almost totally occluded by hypertrophic middle conchae, with polypous changes of the mucosa. Large ethmoidal

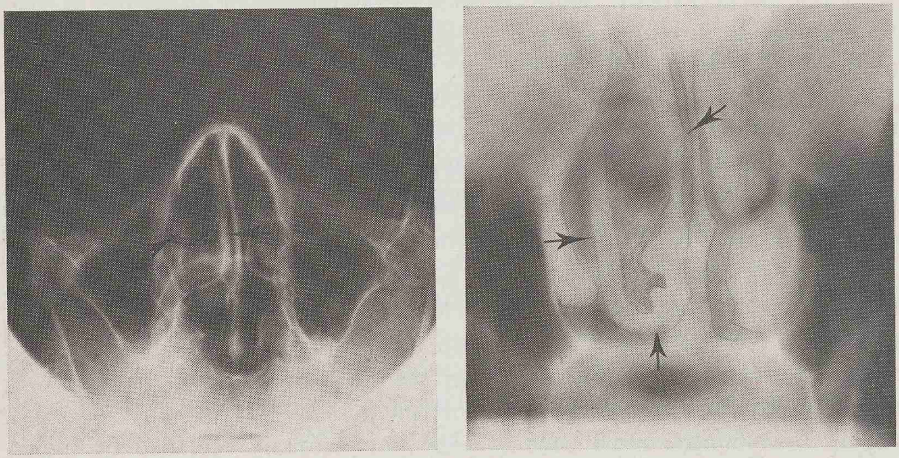


a. b.

Figure 1. Bulla formation in the middle concha of a 35 year old woman, case history I.
a. prior to extirpation, the bulla (arrow) in the right side reached the nasal vestibule.
b. the bulla extirpated in toto; the ossious skeleton is uncovered.

bullae were removed from both middle conchae (Figures 1a. and 1b.) during submucoperiostal resection. In addition, the hypertrophic mucosa was also removed.

Postoperatively, there was normal air passage through the nose. The pressure and pain in the forehead disappeared. The voice became normal and the nasal secretion stopped. There was no tendency to crust formation. She had no further attacks of asthma after the operation.



a. b.

Figure 2. Bulla formation in the middle concha of an 81 year old woman, case history III.
a. routine x-ray of the nasal sinuses provided suspicion of bulla (arrows) in the right nasal cavity.
b. tomography revealed bulla formation (arrows) in the right middle concha (slight retouching has been carried out).

CASE HISTORY II

A 42 year old man who had been plagued for 15 years by increasing nasal stenosis with a continually decreasing effect of shrinking compounds. He had almost constantly suffered from a cold with pharyngitis, retro-nasal secretion, and coughing. In addition, he had pronounced disturbances of speech with a nasal clang, which seriously impeded him in his work. On examination, a deviation and dislocation of the nasal septum was found, together with bilateral hypertrophy of the middle conchae. A large bulla was removed from the right middle concha during rhinoplastic nasal surgery.

Microscopical examination revealed hyperplasia of the glands in the mucosa of the bulla.

Follow-up examination will be carried out later.

CASE HISTORY III

An 81 year old woman with increasing stoppage of the right nostril and frontal nasal secretion for 18 months. She had been treated previously without any effect with electro-coagulation and large amounts of a shrinking agent, owing to mucosal hypertrophy. She was referred to the department for conchotomy. Examination revealed a very large right-sided middle concha, which pressed the septum to the left, at the same time compressing the inferior concha. X-ray with supplementary tomography showed a bulla in the middle concha (Figure 2a. and 2b.).

After extirpation of the very large bulla (approximately $2 \times 1 \times 1$ cm) normal conditions were restored in the nose. The nasal secretion disappeared post-operatively.

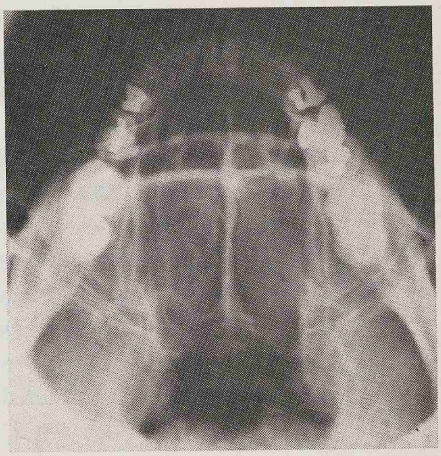


Figure 3. Routine x-ray of the nasal sinuses (case history I) did not give suspision of bulla formation.

CASE HISTORY IV

A 20 year old woman with several previously untreated nasal traumas. She had a tendency to frequent colds, with an occluded nasal passage, nasal clang and frontal secretion. Dryness and irritation of the mouth and throat were present, together with reduction of the olfactory sense.

The nose was found to be short and broad with poor support. Deviation and dislocation of the nasal septum were also present.

During rhinoplastic operation, the middle concha on the right side was found to be wedged between the septum and a hypertrophic ethmoidal bulla. The latter was extirpated. Postoperatively there was normal space and passage in the nose and the voice improved.

DISCUSSION

The case histories demonstrate the clinical importance of bulla formation in the middle part of the nose.

The bullae removed were found to be covered with airway epithelium, and, in 2 cases, there was hypertrophy of the glands. In one case the lumen was found to be full of viscous mucous secretion.

In all the cases mentioned, x-ray photographs were taken of the nasal sinuses. In only one case was bulla formation suspected (Figure 2a). In this instance the diagnosis of right middle concha bulla was made from the subsequent x-ray tomography (Figure 2b). In the other cases the x-ray diagnosis was sinusitis or nasal septum deviation. Even in the most pronounced case (case history I) bulla formation was not suspected on routine x-rays of the sinuses (Figure 3). Under normal conditions, the inferior concha is often so large that it obscures the view of the central portion of the nose (Scott-Brown, 1971). It is not until shrinking agents have been employed that one is able to obtain a satisfactory view. Bulla formation will often present as a solid tumour which does not react to attempts at shrinking; this is in contrast to concha hypertrophy. The mucosa of the bulla will often have the same appearance as the surrounding nasal mucosa, which is in contrast to nasal polyps which are most frequently of a pale grey colour and mobile in addition.

In the cases described here, the therapeutical effect of extirpation of the bulla formation has been very satisfactory.

CONCLUSION

Based on the case histories referred to here, the importance of considering the presence of bulla formation in cases of nasal stenosis that are resistent to conservative treatment cannot be stressed too strongly. This, often plaguing condition, can frequently be eliminated by a relatively simple surgical procedure. The diagnosis in the cases described has first been made with certainty, per-operatively, however, in one case, pre-operatively, by means of x-ray tomography of the nasal sinuses. However, routine x-ray photographs of the nasal sinuses do not appear to be well-suited for making a diagnosis.

As mentioned in the introduction, a number of terms are in use for pathological bulla formation in the nose, in a single case, somewhat misleading. As it does not appear to be of any great consequence, from the clinical point of view, where the bulla formation originates (Ballenger, 1971; Pirsig, 1972; Scott-Brown, 1971) it is suggested that the term "bulla cavi nasi" be employed as a common name for the condition.

ZUSAMMENFASSUNG

Nasalstenose als Folge bullöser Umbildung der Concha media und des Processus uncinatus sowie Hypertrophie der Bulla ethmoidalis wird an Hand von vier Krankengeschichten beschrieben. Der Zustand verhindert den freien Abfluss der paranasalen Sinus; die Luftstromrichtung wird unphysiologisch.

Das Krankheitsbild ist geprägt von der Stenose, einem drückenden Gefühl mit ausstrahlenden Schmerzen in naheliegende Gebiete sowie chronischen Infektionen der oberen und unteren Luftwege.
Die Diagnosenstellung bei klinischen und radiologischen Rutineuntersuchungen hat sich in unserem Krankengut als schwierig erwiesen. Auf die Bedeutung der Differentialdiagnose gegenüber Nasalpolypen und Schleimhauthypertrophie wird hingewiesen. Die Benennung des Krankheitsbildes als "Bulla cavi nasi" würde den pathoanatomischen Verhältnissen entsprechen.

RÉSUMÉ

A base de quatre histoires cliniques on mentionne la sténose nasale causée par une formation de bulla dans la concha media et le processus uncinatus et aussi l'hypertrophie de la bulla ethmoidalis. Ces conditions compromettent l'exutoire du sinus paranasale et change le passage de l'air à travers le nez dans une direction non-physiologique. On voit alors apparaître un tableau clinique caracterisé spécialement par une sténose nasale, oppression dans la face avec des douleurs rayonnant aux régions voisines et des infections chroniques dans les voies respiratoires hautes et basses.
Il paraît que c'est difficile de faire un diagnostic par une examination de routine clinique et radiophotographique. On doit ponctuer l'importance d'un diagnostic differential quant aux polypses des fosses nasales et une hypertrophie des membranes muqueuses. Comme une désignation générale pour la formation de bulla on propose employer le terme: "Bulla cavi nasi".

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