

RELATION BETWEEN SINUSITIS AND BRONCHIECTASIS

Jerzy Szpunar, Kraków, Poland

The problems connected with the interdependence between the upper and lower respiratory passages are very complex because they involve many physiopathologic factors whose influences vary to a great extent under different physiologic and pathologic conditions. One of the best examples of this interdependence is the well known relation between sinal and bronchial pathological changes. Many clinical and anatomical degrees of these changes are grouped together under the name: sinobronchitis. There is no doubt that allergy plays a significant role in the arising of at least some types of sino-bronchitis.

It is not rare for sinobronchial changes to lead to the sinusitis-bronchiectasis syndrome. It is this relation between sinusitis and bronchiectasis that will be discussed here in more detail.

For many years it was assumed, without going into the matter deeply, that the existence of purulent secretions in the upper respiratory passages creates favorable conditions for arising of persistent infection of the lower respiratory passages. According to this descending theory purulent nasal secretions easily get into the tracheobroncheal tree and cause chronic bronchitis, from which purulent bronchorrhea and eventually bronchiectasis may develop. Often, however, clinical facts do not accord with this theory. In the first place, the sinusitis-bronchiectasis syndrome frequently occurs in young children of 3-5 years, in whom bronchial deformative changes are already well established. It is not reasonable to assume that in such young children all the above-mentioned steps of descending infection could have taken place, the more so when the sinal changes are often not very marked and not always persistent. Another possibility is ascending infection of the upper respiratory tract. Those holding this view, foremost among them English authors (Ormerod, Hogg and Brock) have shown experimentally that contrast fluids injected into the bronchial tree during standard bronchography could very often be visualized, after a few hours, in the nose, nasopharynx and nasal sinuses. According to the theory of ascending infection the upper air passages are "bombarded" during coughing by infectious particles from the bronchial "septic tank", contained in the bronchiectatic changes. In such circumstances acute and later chronic purulent sinusitis very easily develops. This theory is supported by the fact observed by some authors that sinusitis frequently disappears after resection of pulmonary tissue containing purulent bronchiectasis.

When studying problems connected with the relation between sinusitis and bronchiectasis it seems almost certain that both mechanisms, either that of the ascending or of the descending mode of infection may be in operation,

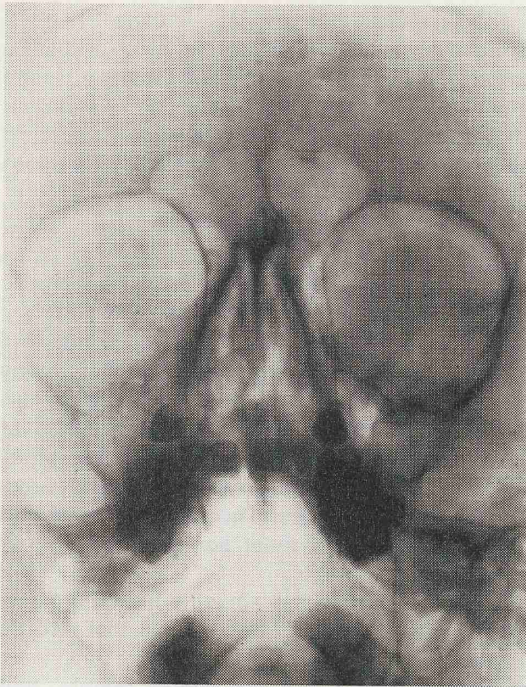


Figure 1. S.U., aged 7, with bilateral saccular bronchiectasis. Rhinoscopy: Typical allergic changes of the mucosa, from time to time some mucopurulent secretions.

X-ray of the sinuses: Cloudiness of the right antrum and the right frontal. Marked thickening of the antral mucosa on the left, leaving a very small lumen.

Antrum puncture: some mucopus on the right.

depending on the phase of the disease. The most important point, however, is which mechanism is predominant in a given stage of development of the sinusitis-bronchiectasis syndrome.

There is no doubt that all these problems are best studied in small children where pathologic changes in the sinuses and in the bronchi are not yet fully developed.

Own investigations

In the Pneumologic Centre for Children in Rabka, Poland, we have examined and treated 176 children, 3-15 years of age, with purulent bronchiectasis. Treatment in the Centre was either medical or surgical; in 76 cases more or less extensive resections of pulmonary tissue were performed. The children remained under our treatment from 4 months to 4 years. Bronchiectasis were of various localisations, most often cylindrical, next saccular or of a mixed type.

In each child repeated rhinologic and radiologic examinations of the sinuses were performed. In all children in whom rhinoscopy showed marked pathology or the X-ray picture — any change, an antrum puncture was performed and eventually repeated as many times as was necessary.

RESULTS

In 45 children (25%) we found purulent, acute or chronic, sinusitis, often bilateral. In 40 cases bacteriologic examination of antral secretions, removed by aspiration during the puncture, was performed. At the same time sensitivity

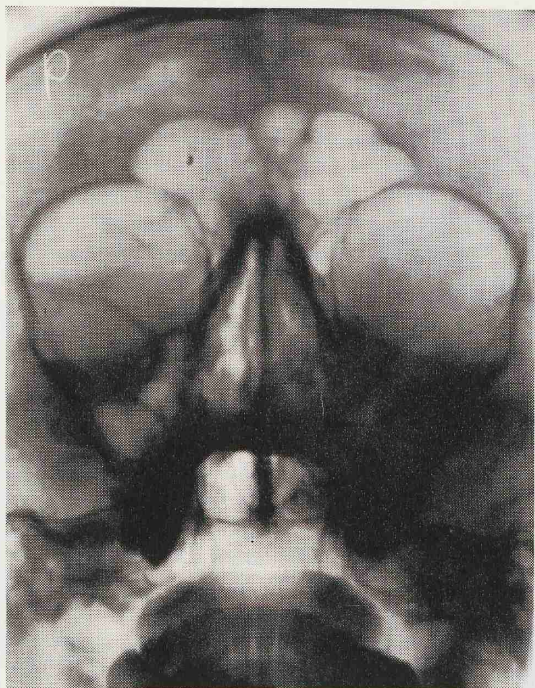


Figure 2. The same patient, after 2½ years. Massive cloudiness of the left antrum, together with diminished aeration of the left side of the nose. Marginal thickening of the right antral mucosa.

of the bacterial flora to antibiotics was determined to enable appropriate (guided) antibiotherapy. In the same 40 cases purulent secretions, obtained from the bronchial tree during bronchoscopy, were also subjected to culture and sensitivity tests. Correlation of the results of both examinations showed a remarkable congruence between the sinusal and bronchial bacterial flora in the majority of cases examined (72%). The most commonly encountered pathogen was a coagulase-positive staphylococcus, frequently in association with streptococcus viridans or beta-hemolytic.

In the remaining children without evident sinusitis some radiologic changes in the sinuses could be found — at repeated examinations — in an overwhelming majority of cases (in only 10 children did X-rays show no changes at all). These radiologic changes were often bilateral; they ranged from slight haziness or marginal thickening of the mucosa to massive cloudiness of the antrum and sometimes also of all sinuses of the same or both sides. Often signs of diminished aeration of the corresponding side of the nose coexisted. All these changes were variable and often of rather short duration: during repeated radiologic examinations different pictures were found in the same child. In these children rhinologic examination as a rule showed typical signs of nasal allergy: edematous, pale and boggy mucosa, watery or thick secretions and often marked nasal eosinophilia. In only 5 cases polypoid changes of the mucosa in the region of the middle meatus were found.

For illustration I have chosen a series of sinusal radiograms in a case of purulent bronchiectasis, showing considerable variability of the radiographic pictures, characteristic of nasosinusal allergy (Figures 1-3).

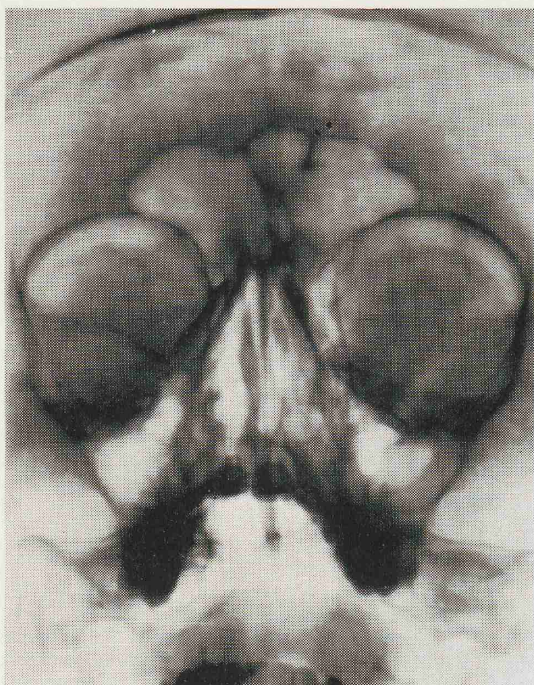


Figure 3. The same patient, 3 months later. Marked thickening of the left antral mucosa, slight thickening of the right.

Treatment

In cases of purulent sinusitis associated with bronchiectasis we usually administered one of the broad-spectrum antibiotics intramaxillary and, sometimes, also systemically. Hydrocortisone was routinely added to an antibiotic solution introduced into the antrum by puncture, once or twice a week. If the therapeutic response was not prompt we changed the antibiotic to that suggested by the sensitivity test. In almost all cases we obtained clearing of the sinusal infection although, apart from removal of some polypi in 3 cases, no operation on the sinuses was ever performed. Still, in a considerable percentage of cases edematous, allergic changes in the nose and in the sinuses persisted for weeks or months, long after an infection of the sinuses had been brought under control. Thus we came to the conclusion that the control of infection is here but the first stage in the treatment of nasosinal disease which should be continued until a complete normalisation of the X-ray picture and rhinoscopic appearance is obtained.

In cases of nasosinal disease of apparently allergic origin we applied an energetic and prolonged antiallergic treatment. It consisted, in the main, in specific and nonspecific desensitisation, usually in the form of stock- or, more rarely, of auto-vaccines, and sometimes in histamine injections in small dosage. When performing an antrum puncture hydrocortisone was introduced into the sinus. Results of treatment were good but often only temporary and the treatment had to be repeated. In the group given only medical treatment lasting normalisation of rhinoscopic and radiologic picture was obtained in only 12%. This was to be expected as with medical treatment of bronchiectasis lasting

absence of bronchial suppuration is not often obtained. Still, we believe that energetic antiallergic treatment is here of considerable value because it prevents recurrences of purulent sinusitis or later infections of the sinuses. In the group of children who underwent operative elimination of bronchiectasis a complete cure of nasosinal disease was obtained in 60%. We should, however, bear in mind that with thoracic surgery, even when indications are very strict and the operative technique is the best, lasting elimination of all bronchial disease is not always attained. In our case-material, too, we noted some recurrences after apparently successful resections. Thus we believe that definite operative removal of all bronchiectatic changes, together with energetic antiallergic treatment almost always leads to a cure of nasosinal disease.

SUMMARY

1. The almost constant presence of well developed signs of nasosinal allergy in bronchiectatic children gives evidence of their causal relationship.
2. The rather moderate amount (25%) of sinal suppuration in this material supports the assumption that nasosinal allergy develops in the great majority of children with established bronchiectasis, and sinal suppuration arises here as a complication of allergy (infected allergy). This assumption is further supported by the fact that these purulent inflammations of the sinuses usually respond well to appropriate medical treatment.
3. When bronchiectasis suppuration has been completely eliminated by thoracic surgery or, at least, medically controlled complete cure of the nasosinal disease is almost always obtained. This, together with the former points, are convincing arguments that when sinusitis is associated with bronchiectasis the primary source of infection lies, in the majority of children, in the bronchial "septic tank". Thus ascending infection here plays a dominant role.
4. Intensive, general and local treatment of nasosinal allergy associated with incurable bronchiectasis gives good although sometimes only temporary results. This is understandable because when the bronchial source of infection is not completely eliminated a favorable opportunity still exists for further allergisation of the mucosa of the upper respiratory tract by a continuous exposure to bacterial antigens. Nevertheless, such treatment is of considerable value because it prevents later infections of the sinuses.

RÉSUMÉ

1. La présence à peu près constante de signes nets d'allergie nasale chez des enfants bronchectasiques suggère une relation évidente.
2. La quantité assez modérée (25%) de suppuration sinusienne permet de penser que l'allergie naso-sinusienne se développe chez une majorité d'enfants, avec des dilatations bronchiques confirmées, et la suppuration sinusienne se présente là comme une complication de l'allergie (allergie infectée). Cette supposition est en plus appuyée par le fait que cette inflammation purulente des sinus réagit habituellement bien à un traitement médical.
3. Quand la suppuration bronchique a été complètement éliminée par une chirurgie thoracique, ou du moins par un traitement médical, la guérison complète de l'affection naso-sinusienne est presque toujours obtenue.

Ceci, avec ce qui précède est un argument convaincant que, lorsqu'une sinusite est associée à une bronchite, la source primaire de l'infection réside, chez la majorité des enfants, dans la «poche septique» bronchique. Par conséquent l'affection ascendante joue ici un rôle dominant.

4. Un traitement intensif, général et local de l'allergie naso-sinusienne dans des cas de bronchectasie incurables, donne cependant de bons résultats, bien que quelquefois temporaires. Ceci est compréhensible parce que la source bronchique d'infection n'a pas été complètement supprimée. Le facteur favorisant existe pour de nouvelles réactions d'allergie au niveau de la muqueuse des voies aériennes supérieures, en présence d'une exposition continue aux antigènes bactériens. Néanmoins un tel traitement est d'un grand intérêt parce qu'il prévient la réinfection des sinus.

Kraków, Krowoderska 24, Poland.