Unilateral pathological lesions of paranasal sinuses removed by endoscopic surgery

Introduction: The aim of this study was to analyze the incidence and nature of unilateral pathological lesions of paranasal sinuses in patients who had endoscopic sinus surgery performed in ENT. Materials and methods: In the years 2006–2011 endoscopic sinus surgery for unilateral pathological lesions of paranasal sinuses was performed in 1847 patients (838 women and 1009 men). The enrollment of patients was based on the findings of otolaryngological clinical and subjective examinations, assessment of the paranasal sinuses on three-dimensional CT scans, and laboratory examinations. Based on the analysis of medical history data, including gender, age, the type of surgical procedure performed, and histopathological findings the cases were finally analyzed. Results: Pathological lesions of the paranasal sinuses were localized on the left side in 132 (57%) patients, and on the right side in 100 (43%) patients. Of the 232 patients with unilateral pathological changes, 41.8% subjects underwent endoscopic sinus surgery for polypotic changes in the ethmoid and maxillary sinuses; 28.4% for the maxillary sinus; 10.8% for the ethmoid, maxillary and frontal sinuses; and 8.6% patients for all paranasal sinuses on one side. The number of operations of only one sinus was considerably lower: sphenoid sinus, 4.7%; ethmoid sinus, 2.2%; and frontal sinus, 1.7% patients. The histopathological analysis of unilateral pathological lesions removed by endoscopic surgery showed chronic paranasal sinusitis with polyps in 56.5% patients; chronic paranasal sinusitis in 28.4% of the maxillary sinus; 10.8% for the ethmoid, maxillary and frontal sinuses; and 8.6% patients for all paranasal sinuses on one side. The number of operations of only one sinus was considerably lower: sphenoid sinus, 4.7%; ethmoid sinus, 2.2%; and frontal sinus, 1.7% patients. The histopathological analysis of unilateral pathological lesions removed by endoscopic surgery showed chronic paranasal sinusitis with polyps in 56.5% patients; chronic paranasal sinusitis in 22.8% patients; and maxillary sinus cyst was confirmed in 11.6% patients. In 5.1% patients inverted papilloma was diagnosed and in 2.2% patients the presence of osteoma was found. Conclusions: Unilateral paranasal pathological lesions, leaving aside rather typical maxillary sinus cysts, require a particularly thorough pre-operative diagnosis and a precise histopathological assessment.

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Introduction

Endoscopic nasal and paranasal sinus surgery is a safe and effective method that allows removal of pathological lesions in the nasal cavity and paranasal sinuses. The commonly held preference for conservative treatment for chronic inflammatory lesions, as well as for nasal and paranasal sinus polyps does not diminish the importance of surgical treatment. Deciding on surgery depends on the progress of the inflammatory lesions, the extent to which openings into paranasal sinus and nasal cavity are blocked or the patient's response to conservative management [1-3].

The development of endoscopic sinus techniques stems from the progress of new technologies, especially from scientific advances in the area of the pathophysiology of paranasal sinuses and the development of a new concept of the basic pathomechanism responsible for the development of paranasal sinusitis. The development of chronic paranasal sinusitis depends on a number of different factors, of which viral and bacterial infections, allergies, the environmental impact of irritating agents (exhaust fumes, tobacco smoke), anatomical variations in the septum or nasal lateral wall, and gastro-oesophageal reflux disease appear to be the most important. They lead to persistent swelling of the ostium of the paranasal sinus, making ventilation and drainage difficult, thus facilitating the penetration of bacteria into the sinus lumen. Nasal polyps present chronic inflammatory disease of the nasal mucosa, manifested by swelling, interstitial infiltrations of specific inflammatory cells [4-6].

The number of publications on the role of disorders with an immunological basis in the etiology of chronic paranasal sinusitis has recently been growing. It is thought that the effect of exogenous environmental factors may lead to the development of this disease for those who are genetically predisposed [7]. There have been numerous studies aimed at finding genetic markers for risk. Such markers in this case may be polymorphisms of gene coding proteins responsible for the development of inflammatory processes. Paranasal sinusitis is probably induced by the activation of the immune system through mobilization and proliferation of T cells, synthesis of cytokines and activation of chronic and destructive inflammatory processes in the mucosa.

The large number of general factors affecting the mucous membrane and leading to this pathology means that the development of bilateral lesions seems to be a natural process. On the other hand, if the major pathomechanism by which inflammation develops is regarded as the ostium-ductal complex, the unilateral appearance of changes of inflammatory etiology in the paranasal sinuses is logical and understandable [8-11].

The aim of this study was to analyze the incidence and nature of unilateral pathological lesions of paranasal sinuses in patients who had endoscopic sinus surgery performed in the Department of Otolaryngology and Laryngological Oncology, Medical University of Lodz.

Materials and methods

In the years 2006-2011 endoscopic sinus surgery for unilateral pathological lesions of paranasal sinuses was performed in 1847 patients (838 [45.4%] women, aged 15–82 and 1009 [54.6%] men, aged 17–87; mean, 48.6 years) admitted to the Department of Otolaryngology and Laryngological Oncology, Medical University of Lodz.

The patients were enrolled on the basis of the findings of otolaryngological clinical and subjective examinations, assessment of the paranasal sinuses on three-dimensional CT scans, and laboratory examinations. All surgically removed tissues were referred to the pathological laboratory for histopathological examination. Based on the analysis of medical history data, including gender, age, the type of surgical procedure performed, and histopathological findings the cases were finally analyzed. Prior to the operation each patient had a seton saturated with 2% solution of xylocaine and ephedrine (1:1) placed in the nose. The 0, 30, 45 and 70 degrees endoscopes with visual trajectory and debrider were used in endoscopic sinus surgery. Each time the paranasal sinuses in which CT imaging documented the presence of unilateral pathological lesions were qualified for surgical treatment. The type of surgical treatment, as regards individual sinuses, was modified intra-surgically, depending on the changes in the lumen inside the affected sinuses. Tamponade was adopted to the extent of the incision, using setons in rubber gloves, merocel dressings 8-10 cm long for the tamponade of the whole nasal duct and 4-5 cm long for the tamponade of the middle nasal meatus or the space after removal of the cells of the ethmoid sinus. The postoperative management involved the application of mucosal decongestants for 7-10 days and targeted antibiotic therapy when necessary. After mucosal healing nasal glycolcorticosteroids were being administered for three months. The patients in whom pathological lesions were diagnosed in one or in all unilateral paranasal sinuses were selected for the analysis.

Results

Pathological lesions of paranasal sinuses on either side were diagnosed in 232 patients, constituting 12.6% of all the patients who underwent endoscopic sinus surgery (Table I).

Pathological lesions of paranasal sinuses localized on the left side were found in 132 (57%) patients, including 58 (43.9%) women and 74 (56.1%) men, and on the right side in

| Table I - Incidence of unilateral and bilateral pathological lesions in patients who underwent endoscopic paranasal sinus surgery |
|-----------------|--------|--------|-----|
| Pathological lesions of paranasal sinuses | Women | Men | Total |
| Bilateral lesions | 741 | 45.9 | 874 | 54.1 | 1615 |
| Unilateral lesions | 97 | 41.8 | 135 | 58.2 | 232 |
100 (43%) patients, including 39 (39%) women and 61 (61%) men (Fig. 1).

Of the 232 patients with unilateral lesions 97 (41.8%) patients were operated for polypotic changes of the ethmoid and maxillary sinuses. This was followed by 66 (28.4%) patients who underwent endoscopic maxillary sinus surgery. In 25 (10.8%) patients the maxillary, ethmoid and frontal sinuses; and in 20 (8.6%) patients all the paranasal sinuses on one side were operated. A much lower number of patients had only one sinus operated; sphenoid, 11 (4.7%); ethmoid, 5 (2.2%); and frontal, 4 (1.7%) patients (Fig. 2).

Histopathological analyses of the surgically removed pathological tissues localized unilaterally revealed chronic paranasal sinusitis with polyps in 131 (56.5%) patients and chronic paranasal sinusitis without polyps in 53 (22.8%) patients; the maxillary sinus cyst was confirmed in 27 (11.6%) patients; inverted papilloma was diagnosed in 12 (5.1%) patients; osteoma in 5 (2.2%) patients; and squamous epithelial carcinoma was found in 4 (1.7%) patients (Fig. 3).

Chronic unilateral inflammatory lesions were also analyzed in the patients in whom nasal septum surgery was performed at the same time. Of the 131 patients operated for chronic unilateral sinusitis with polyps, 77 (57.1%) patients had the nasal septum operated, whereas of the 53 patients with chronic unilateral paranasal sinusitis, 37 (69.8%) had the nasal septum operated at the same time (Fig. 4).

**Discussion**

Although unilateral pathological lesions of paranasal sinuses are intuitively treated more fearfully by patients, more thoroughly diagnosed by the otolaryngologist prior and during the operation and emphasized in selective histological referrals, in our study group tumors were infrequently diagnosed, occurring in 6.4% of cases. These included papillary changes (4.7%) and malignant tumors (1.7%). However, in the whole group of patients operated for hypertrophic changes in paranasal sinuses neoplasms were found in 0.8% of cases, including papillary changes (0.6%) and malignant tumors (0.2%), which gives almost a tenfold higher incidence of neoplastic changes in the unilateral pathological lesions of sinuses [12–15].

Based on the histopathological examination of surgically removed tissues squamous epithelial carcinoma was diagnosed in 4 patients. In all these cases lesions were found in the maxillary and ethmoid sinuses, however, there were no clinical or radiological indications suggesting the development of a malignant tumor. Endoscopic surgical technique was not applied as a surgical method for malignant tumors diagnosed earlier. As regards the papillary changes observed in 12 (2.2%) patients, in some cases radiological imaging or
Macrosopic pictures of intra-operationally removed tissue suggested a hypertrophic lesion, which was later confirmed by histopathological examination. We regarded the histopathological findings in some of these cases as surprising. Thus it seems that radiological imaging and even extensive surgical experience cannot substitute for the histopathological examination of tissues removed [16–19].

Many studies provide evidence that the coexistence of chronic paranasal sinusitis and septal deviation or anomalies of the lateral nasal wall is quite frequent. We place different weight on septal deviation in chronic rhinitis and paranasal sinusitis with and without polyps despite the fact that both qualify for surgery. As regards chronic rhinitis and paranasal sinusitis with polyps, the fact of their coexistence is not regarded as a major cause of inflammation [20, 21]. The primary objective of surgical treatment is to obtain a better nasal flow patency and good conditions for intranasal drug distribution as an element of the further conservative treatment regarded as essential. The confirmation of the coexistence of anatomical abnormalities of the septum or lateral nasal wall with chronic paranasal sinusitis without polyps presents quite a different situation. In such cases it seems that they exert a much greater effect on the development of chronic inflammatory changes in paranasal sinuses [22–24]. In our own cases of chronic unilateral paranasal sinusitis without polyps, nasal septum surgery...
was performed in 69% of cases, while in chronic unilateral paranasal sinusitis with polyps in 57.1% of cases.

Many studies, including our own [25–29] find that inflammatory changes in the paranasal sinuses occur most frequently on both sides of the maxillary and ethmoid sinuses. In the frontal and sphenoid sinuses unilateral inflammatory lesions are much more common, but they occur parallel to bilateral lesions of remaining sinuses. These observations confirm the results of the study presented here, where isolated inflammation of the frontal and sphenoid sinuses was operated in only 15 patients, with sphenoid sinus constituting 4.7% and frontal sinus 1.7%.

The mechanisms by which unilateral nasal polyps emerge and develop have not as yet been elucidated. Some authors postulate that another disease somewhat different from bilateral polyptic lesions may be responsible. Allergic catarrh and asthma were statistically more frequent in patients with unilateral nasal polyps. Allergic inflammatory lesions in the paranasal sinuses occur most frequently, but they are not easy to document this observation reliably, bearing in mind that inflammatory changes in the paranasal sinuses with or without polyps did we find indications for further surgery.

Conclusions

Unilateral pathological lesions of paranasal sinuses, leaving aside rather typical maxillary sinus cysts, require a particularly thorough pre-operative diagnosis and a precise histopathological assessment.

Authors’ contributions/Wkład autorów


Conflict of interest/Konflikt interesu

None declared.

Financial support/Finansowanie

None declared.

Ethics/Etyka

The work described in this article has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans; EU Directive 2010/63/EU for animal experiments; Uniform Requirements for manuscripts submitted to Biomedical journals.

REFERENCES/PIŚMIENICTWO


