BACTERIAL MICROBIOLOGY
OF RHINOSINUSITIS IN GORJ AREA
PhD Thesis Abstract

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Sinusitis is an important public health problem with an increasing incidence and prevalence in developing countries, resulting in impressive cost of diagnosis and treatment of this disease.

Rhinosinus inflammatory disorders is a very common disease in both children and adults that treated unfairly expose to chronicization and became outbreaks of chronic rhinosinusitis.

The activity of the otorhinolaryngology department in the Emergency County Hospital Tg.Jiu for bacterial species found mostly in acute bacterial rhinosinusitis: Streptococcus pneumoniae, Haemophilus influenzae and Moraxella catarrhalis - amoxicillin (40 mg/kg/2 doses / day) for 10-14 days, according to treatment guidelines developed in 1997 by the American Academy of Head and Neck Surgery, was the first choice in uncomplicated acute bacterial rhinosinusitis.

The results were unsatisfactory in many cases so we introduced a second line of antimicrobial agents (antimicrobial line potent on secreting betalactamase microorganisms and antibiotic-resistant Streptococci pneumoniae) in the following situations:

1. no response to amoxicillin after three days of therapy,
2. immediate likelihood of complications rinosinusale,
3. presence of severe symptoms of acute bacterial rhinosinusitis,
4. use of other antibiotics in the month / previous months,
5. high prevalence of antibiotic resistance in the community.

The combination of amoxicillin (40 mg/kg/2 doses / day) with clavulanic acid or cefpodoxime and cefuroxime axetil, also according to practice guidelines, were used, covering secreting betalactamase microorganisms and Streptococci pneumoniae with intermediate resistance to penicillin. In general the results were slightly better, but we also had failures.

For patients non-responsive to the second line, and for patients with recurrent acute bacterial rhinosinusitis along with those who had chronic rhinosinusitis non-responsive to medical treatment according to international treatment guidelines developed in 1997 by the American Academy of Head and Neck Surgery, we decided to develop a deeper scientific study, as complex, following elements and clinical manifestations, histological and immunohistochemical aspects in chronic hyperplastic and suppurated bacterial rhinosinusitis, assuming that the bacterial strains have changed over time sensitivity and aggression on the rhinosinus mucosa.

Pathology of acute and chronic rhinosinus inflammation in Gorj area was found more frequent in women (62%) than males (38%) and regarding the environment of origin for patients with acute and chronic inflammatory rhinosinus disease, we found its predominance in individuals from urban areas (56%) than rural (44%).

Rhinosinus inflammatory pathology of bacterial etiology, studied in the past five years in Gorj area, predominantly affected adults, is growing from around the age of 23 years, peaking close to 48 years, to find continuous decrease on seniors age but to quite significant percentage rates.

In terms of annual percentage distribution during the study shows a downward trend in the number of new or recurrent disease due to bacterial etiology of rhinosinus inflammation which is due to the emergence of new classes of antibiotics, so in 2006 we quote 35% from total number of cases studied (298 patients) in 2007 following approximately 20% (169 patients), 17% in 2008 (145 cases), 16% in 2009 (136 patients) and 13% (about 102 cases) in 2010.

The germs involved in the ethio-pathogenesis of bacterial rhinosinusitis studied were represented by: Haemophilus influenzae in 28% of cases, Moraxella catarrhalis in 23% of cases, in 31% of the cases studied streptococcus (viridans subspecies in 13% and pneumoniae in 18% of cases), 12% of cases being involved Staphylococcus aureus, the remaining 6% of
cases belonging to anaerobic microorganisms, alone or in various combinations involving aerobic-anaerobic with or without viral association.

Our clinical and statistical study revealed the following anatomoclinical forms of rhinosinusitis: catarrhal sinusitis 255 cases, 284 cases simple suppurated sinusitis, hyperplastic polypoid sinusitis in 97 cases and hyperplastic suppurated sinusitis in 214 cases, 34% showing unilateral sinus disease and the remaining 66% owned to bilateral sinus damage.

The patients symptoms consisted in fronto-maxillary headache with different intensity, nasal obstruction syndrome, mucopurulent anterior or posterior rhinorrhea in a lesser amount or more and fetid emphasized.

Antibiotic drug therapy, nonsteroidian inflammatory, antiallergic and nasopharyngeal disinfectant applied to 32% of the cases studied resulted in complete healing, while 45% of cases, to obtain the same results were required for maxillary sinus puncture and also evacuatorii implementation of physiotherapy treatment. The remaining 23% of the cases studied, symptoms improved only after 14 punctures performed simultaneously with maxillary sinus evacuatorii drug therapy (antibiotics, NSAIDs, antiallergic, disinfectant nasopharyngeal) applied general way associated physiotherapy treatment (six sessions per region ultrashort front plus 6 sessions of aerosols), these patients ultimately undergoing surgical treatment is curative (radical cure maxillo-ethmoid unilateral or bilateral depending on the case).

Antibiotic treatment, applied as the result of sensitivity testing was performed by: amoxicillin and clavulanic acid to 34.5% of cases (296 patients), quinolones (ciprofloxacin) in 28% of cases (238 patients), cefoperazone + / - sulbactam in 17.5 % of cases (152 patients), ampicillin, amoxicillin at 9.5% of the cases studied (81 patients), cefuroxime axetil in 6.5% of cases (54 patients), ofloxacin 2.5% of cases and oxacillin 1% of cases (8 patients).

Exirpated sinus mucosa was studied in terms of histology and immunohistochemistry, as mucosal histopathologic study showed bacterial rhinosinusale abused:

• In large areas of erosions were seen covering epithelium, extended in depth, down to the basal cells or up to conjunctivo-epithelial junction. We believe that epithelial erosions were produced by direct action of pathogens. Epithelial erosions were frequently exceeded by putting basement membrane in direct contact with the external environment chorion sinus mucosa, opening the way for pathogens entering the internal environment.
• Metaplastic lesions were rarely seen in the sinus mucosa and is a chronic reaction in response to local aggression.

• In the chorion was observed the presence of a rich inflammatory infiltrate composed of mononuclear round cells and macrophages limfoplasmocitar type. Also, the chorion showed a marked vascular congestion associated with blood suffusions and even microhemorrhages therefore a strongly infiltrated chorion with immune cell type and angiogenesis capillary in hyperplasic suppurative sinusitis.

• Chronic suppurative sinusitis is accompanied by complex changes both in the chorion and mucosa, ranging from hyperplasia to deep epithelial erosion associated with a chronic inflammatory process in the chorion, vascular congestion and angiogenesis phenomena.

• Through mature vessels were highlighted young angiogenesis blood vessels under cellular cords form with upward trajectory, consisting of angioblasts, which suggests a stimulation of reparative and regenerative processes to restore local homeostasis.

**Immunohistochemical study of the bacterial injured rhinosinus mucosa showed:**

- Increased participation of the immune system’s cells in the pathological process within chronic sinusitis, cells that are part of the local reparatory system.

- In those areas where coverage epithelium showed erosion or discontinuities, the number of B lymphocytes that have infiltrated the underlying chorion was significantly higher than in the rest of the connective tissue of the sinus mucosa, which indicates that in those areas the antigens are much more numerous regarding quality and quantity, the epithelial barrier becoming severely impaired.

- Physiologically, the surface of the sinus mucosa is covered by an cilia cylindrical pseudolayered epithelium with caliciform cells, which represents a physiological barrier in the way of pathogenic agent’s penetration, represented by bacteria, viruses or fungus reaching the respiratory route in the sinus cavity. Injuries of the surface epithelium reveal a higher aggressiveness of the bacterial pathogenic agents, but also a large amount in their accumulation.

- Various local and systemic factors can predispose or lead to the malfunctioning of local protection mechanisms of the sinus mucosa. Out of these we mention the dysfunction of the mucociliary defense system, which in turn causes inflammation by reducing the possibility of physiological drainage of the sinuses.
B lymphocytes had a heterogeneous distribution in the inflammatory infiltrate, being more abundant in the perivascular areas of epithelial erosion. Sometimes the inflammatory infiltrate had a tendency of follicular organization, areas in which B lymphocytes were more abundant in the central parts of these structures.

T lymphocytes appeared to be more abundant than B lymphocytes, localized mainly in subepitelial and perivascular areas.

Macrophages were identified both in coverage and subepitelial epithelium.

As far as it concerns the process of angiogenesis, immunohistochemical techniques have revealed the existence of a greater number of young blood vessels than classical histological techniques have in the connective tissue of the sinus mucosa within chronic sinusitis.

Therefore the emergence of bacterial rinosinusities results primarily from the depreciation of two main mechanisms, absolutely necessary to maintain healthy the functions of the sinuses, namely:

- Maintaining open the sinus ostium and
- Normal mucociliary function.

Narrowing of sinus ostium and mucociliary dysfunction causes inflammation of the mucosa by reducing the drainage routes of the sinuses. The blockage of the ostium causes the emergence of a local environment characterized by hypoxia, hypercapnia and low pH. The combination of these factors with an accumulation of intrasinusal secretions initially mucous, evolving into mucopurulent ones, produced by the degradation of inflammatory mediators and toxic substances (e.g., factors 3 and 4 of serum complementum, proteolytic enzymes), results in the loss of ciliary motility, the emergence epithelial lesions and, finally, a decrease in mucociliary clearance. Inflammation and retention of intrasinusale secretions cause a vicious circle that creates an ideal environment for bacterial growth and exacerbation of their pathogenicity.

Regarding the information obtained in our study, we conclude that despite high accessibility towards the treatment, the hospitalization period is relatively high for this condition; the only explanation we have concerning these results being excessive virulence of these germs and their resistance developed over time to antibiotics.
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