DOCTORAL THESIS
NOVELTIES IN THE CLINICAL AND
PARACLINICAL DIAGNOSIS IN MASTOIDITIS

ABSTRACT

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Mastoiditis, cholesteatomatous chronic otitis media, clinical diagnosis, imaging diagnosis.

INTRODUCTION

Worldwide, the pathology of otitis holds one of the first places in incidence, afferent costs and impact on quality of life. Therefore, there are many studies focused on researching the clinical-anatomical forms of the disease and especially the new diagnostic and treatment methods.

Mastoiditis is an inflammatory process that includes the middle ear and mastoid cells. Most often, mastoiditis occurs as a complication of a chronic otitis media, incorrectly treated. The introduction of antibiotics in the treatment of otitis media reduced the incidence of mastoiditis occurrence as a complication of acute otitis media, from 50% to 0.4%.

GENERAL CONSIDERATIONS

CHAPTER I
MIDDLE EAR ANATOMY

The middle ear is located between the external and internal ear, being carved out in the petro-mastoid part of the temporal bone. It is made up of the following regions:

- tympanic cavity region with the eardrum ossicular system;
- adito-antral-mastoid region (aperture of mastoid antrum and the antral-mastoid cellular system);
- auditory tube.

CHAPTER II
PHYSIOLOGY AND PATHOPHYSIOLOGY OF MIDDLE EAR

The functions of the middle ear are to transform the aerial vibrations that reach the tympanum in pressure vibrations, in the inner ear fluids and to carry out an adaptation of the
impedance between the aerial environment and these fluids. CAE directs the sound waves to the middle ear (tympanum, tympanic cavity and ossicular chain).

CHAPTER III

CLINICAL FORMS OF CHRONIC SUPPURATIVE OTITIS MEDIA

III.1. Simple chronic suppurative otitis media

The chronic suppurative otitis media is an inflammatory and progressive disease of the middle ear, characterized by advanced histological changes in the tympanic mucosa, which lose their character of reversibility. The walls of tympanic cavity and the ossicular chain are kept.

The chronic suppurative otitis media (osteitis, mesotympanitis condition) differs from the simple chronic otitis media with the advanced degree of histopathologic changes of the mucosa, by the mucopurulent or purulent draining ear, usually permanent, resistant to local treatments, by its dragging evolution, which reaches to healing under the form of some sclerotic-adhesive sequelae (12, 15, 47, 50).

III.2. Chronic suppurative otitis media

The otoscopic test will observe the general appearance of the eardrum, perforation place, its sizes, the appearance of the inside mucosa, the presence of polyps or cholesteatoma. Perforation is sometimes difficult to trace, because it is covered by secretions, by crusts (especially in small epitympanic perforation), and the polyp can cover all the duct lumen

III.2.1. Cholesteatomatous chronic otitis media

Macroscopically speaking, the most common aspect is the circumscribed formation, with cystic appearance, bag shaped with an epithelial matter. The usual starting point is located at the level of external attic, the externalization of the formation being made through Shrapnell’s membrane or through a posterior-superior marginal perforation.

The activity of the cholesteatoma upon the surrounding anatomical structures manifests itself through a process of destruction and bone resorption with both histological changes with a dominance of the osteoclasts activity and the release of enzymes such as collagenase, protease, phosphatase (125, 140).
CHAPTER IV
CLINICAL DIAGNOSIS OF MASTOIDITIS

IV.1. Clinical diagnosis of acute mastoiditis

The tympanum aspect is of extreme importance for the diagnostic, therefore the tympanic membrane should be well highlighted by a careful otoscopy, the duct vacuuming and repeated cleaning. The tympanum presents changes in shape, color and surface. It is congested, infiltrated and bulged. The perforation is small and placed on top of a protuberance located in the posterior-inferior and posterior-superior quadrant (64, 103, 119).

IV.2. Clinical diagnosis of chronic mastoiditis

The symptomatology of the chronic suppurative mastoiditis is clinically “removed” and is manifested by the draining ear or ear suppurative syndrome (purulent, piosanguinolet or fetid draining ear), the presence of the eardrum perforation in Shrapnell’s membrane or in the posterior-superior quadrant, of marginal type and a more or less important erosion of the attic wall. On aspiration, the purulent secretions are easily recovered.

CHAPTER V
METHODS OF RADIOLOGY IMAGING EXPLORATION IN MASTOIDITIS

V.1. Conventional radiology

Schüller's incidence of the tympanic part of the temporal bone allows an excellent view of the degree and extension of the mastoid pneumatization, trabecular bone structure and the relationships with the vertical portion of the lateral sinus.

V.2. Computed tomography

The Computed Tomography (CT) can diagnose most malformation, traumatic, inflammatory or tumor diseases, affecting the different structures of the squama of the temporal
bone and their intra or extra temporal extensions (34, 41, 87). The use of contrast agents increases the diagnostic value of the CT, being useful in vascular anomalies, otogenic brain abscess and in all kinds of tumors, except osteomas.

V.3. Magnetic resonance

The magnetic resonance with diffusion portions can play an important role in the evaluation of primary cholesteatoma of the middle ear (98, 99, 137).

PERSONAL RESEARCH

CHAPTER I

AIM, OBJECTIVES AND MOTIVATION OF THE RESEARCH

The aim of this paper is to analyze the current new courses of clinical and paraclinical diagnosis in mastoiditis of a group of patients with inflammatory mastoiditis diseases, hospitalized and treated within the Otorhinolaryngology Clinic within the Emergency County Hospital of Craiova during the period 2003-2007.

The major problem of this research is the ear pathology, especially the acute and chronic mastoiditis. The experiences up to this moment demonstrate the existence of some patients with severe otitis that do not respond adequately to the treatment administrated or which rate of recurrence and developing complications is greatly increased. These are the matters which the theme of this study derives from, following the anatomic variables that confer specificity to the therapeutic plan, in relation to the modern imaging investigations (CT/RM).

CHAPTER II

CLINICAL-STATISTICAL STUDY

II.1. Material and methods

The paper approaches a retrospective clinical-statistical study conducted over a period of 5 years (2003-2007) on a study group of 292 patients with acute and chronic otitis pathology, hospitalized within the Otorhinolaryngology Clinic of the Emergency County Hospital of Craiova.
II.2. Results and discussions

II.2.5. Clinical aspects and their statistical analysis

The analysis of the cases revealed a chronic onset of the mastoiditis in 214 cases (73.29%), while 78 cases had an acute onset (26.71%) (Table 9).

<table>
<thead>
<tr>
<th>Type of disease</th>
<th>Number of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute</td>
<td>78</td>
<td>26.71%</td>
</tr>
<tr>
<td>Chronic</td>
<td>214</td>
<td>73.29%</td>
</tr>
</tbody>
</table>

Table 9. Distribution of the patients suffering from otomastoiditis depending on the type of disease, within the period 2003-2007

The complications can be divided into extracranial and intracranial complications. We can note that some complications mainly occur among young people, for example the extracranial abscesses and meningitis are found in a high percentage among those aged under 20, compared with other complications; the cerebral abscess and extradural abscess is very frequent in patients aged over 20.

The most frequent complication in elderly patients is facial paralysis. The cerebral abscess and the labyrinthine fistula are found in approximately equal percentages in both age ranges. The same issues are quoted in other papers in the field, where there is stressed the occurrence of extracranial abscesses and meningitis in particular among young people under 20 (38, 59, 106, 113, 115).

II.3. Additional paraclinical investigations used in order to determine a diagnosis

<table>
<thead>
<tr>
<th>Paraclinical tests</th>
<th>Number of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteriological study with antibiogram</td>
<td>190</td>
<td>65.06%</td>
</tr>
<tr>
<td>Anatomical pathological test of the polyp, cholesteatoma or mucosa fragments</td>
<td>218</td>
<td>74.65%</td>
</tr>
<tr>
<td>Audiometric test</td>
<td>292</td>
<td>100%</td>
</tr>
<tr>
<td>Classical radiologic test</td>
<td>292</td>
<td>100%</td>
</tr>
<tr>
<td>Imaging test (CT, RM)</td>
<td>153</td>
<td>52.39%</td>
</tr>
</tbody>
</table>

CHAPTER III
ANATOMICAL-CLINICAL ASPECTS

III.1. Material and method

The methods used for the diagnosis of histopathological lesions at the level of the tympanum cavity's mucosa, surgically sampled, have been represented by using hematoxylin-eosin stain, Van Gieson's method and immunohistochemical techniques, in order to identify the cells of the immune system present in the inflammatory infiltrate: CD3 (Dako clone, F7) for T lymphocytes, CD20 (Dako clone, L26) for B lymphocytes and CD68 (Dako clone, KP1) for macrophages.

III.2. Results

Anatomical and clinical forms of mastoiditis found in the study were: cholesteatoma forms (41.10%) in 120 cases, polypoid forms (23.29%) in 68 cases, simple suppurated forms (21.92%) in 64 cases, and combined cholesteatoma suppurated polypoid forms (13.70%) in 40 cases.

The histopathological study revealed, in 41.10% of cases of the study group, a much altered mucosa, consisting of a keratinized squamous epithelium, resembling in structure to the epidermis. The epithelial thickness was variable from one case to another and even from one area to another of the same case.

By means of the immunohistochemical study we tried to emphasize the types of cells present in the stromal inflammatory infiltrate. Of the present cells of the immune system, the most numerous were the T lymphocytes, then the B lymphocytes, and the macrophages were less numerous. The cells distribution in the inflamed chorion had an uneven distribution, which shows a varied distribution of antigens. In addition, the immunohistochemical study showed that the cellular immunity seems to be dominant in chronic mastoiditis.
CHAPTER IV
RADIOLOGY IMAGING STUDY

IV.1. Conventional radiology

X-rays of the petrous portion of the mastoid were performed in all studied patients, using Schüller's incidence of the tympanic part of the temporal bone bilaterally compared, this incidence representing the first exam in the middle ear exploration, particularly in inflammatory processes.

Discussions

Also, according to the studies in the field, we also noted in this paper a gap between the clinical symptoms and radiological aspect, the persistence of pathological radiological aspects maintaining long after the decrease of the clinical symptoms (120, 157). Therefore, repeated radiological tests are necessary.

IV.2. Computed tomography and magnetic resonance

A computed tomography examination was performed in a number of 153 patients, native and/or iodate post-contrast given intravenously, taking into account the absolute contraindications for this examination. The technique involved the examination in the supine position, making acquisitions at the axial level. Both the soft parts and bone structures were taken into account in interpreting the images.

Discussions

The intra or extracerebral complications of the mastoiditis are well emphasized by the computer tomography, so that this imaging method is a first choice in evaluating the acute mastoiditis, the intra or extracranial complications and in evaluating the coalescence of the mastoid cells.

The magnetic resonance examination usually follows an examination by computer tomography and it is indicated also in the cases of mastoiditis accompanied by severe complications, the invasion in the brain substance, representing the most important aspect to supervise in these cases (146, 154, 156, 160).
Also, the association with angiography and/or venography by magnetic resonance effectually improves the diagnosis of the complications with vascular involvement. All these imaging aspects have an important role in the correct approach of the surgical treatment.

CHAPTER V
GENERAL CONCLUSIONS

1. The study group does not significantly differ in terms of gender distribution of the patients suffering from mastoiditis, the annual distribution of the cases during the five years in the study being balanced.

2. Chronic diseases predominate compared with the diseases of acute stage.

3. The histopathological study for cholesteatoma forms revealed the presence of an epithelium of malpighian type, with keratinization with the structure similar to epidermis, and a chorion dominated by a chronic inflammatory infiltrate, made up of lymphocytes, plasma cells and macrophages.

4. Radiology imaging methods represent the compulsory paraclinical exploration, the results representing one of the basis for the development of an accurate and correct diagnosis.

5. Overall, the study aimed to specify the clinical symptoms, intra or extracranial complications emphasizing the imaging features characteristic to this pathology.

6. The correct determination in diagnosing mastoiditis involves an interdisciplinary collaboration, the clinical condition, the histopathological aspect and the imaging aspects contribute to the success of the treatment in the patients suffering from mastoiditis.
SELECTIVE REFERENCES