

**University of Craiova, Faculty of Medicine
THE U. M. F. DOCTORAL SCHOOL IN CRAIOVA**

**CLINICAL AND THERAPEUTICAL ASPECTS IN
NASO-SINUSAL TRAUMAS**

PhD THESIS

ABSTRACT

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KEY WORDS

Nasal fractures, sinus fractures, septal lesions, clinical diagnosis, imagistic diagnosis, therapeutic aspects.

INTRODUCTION. THE IMPORTANCE OF THE THEME. THE MOTIVATION OF CHOSING THE THEME

Despite intensive efforts on the part of society to strengthen personal security, facial traumas are a frequently occurring pathology in emergency sections.

There is a varied etiopathology of nasosinusal traumas: road accidents, aggressions, accidental falls, animal aggressions, workplace accidents, home accidents.

The diagnostic and therapeutic management of a patient suffering from nasosinusal traumas implies both accurate diagnostic and therapeutic protocols ad access to high-performance equipment in order to investigate and treat the patients suffering from this type of pathology in good conditions and with optimal results.

Modern imagery techniques such as computerized tomography and nuclear magnetic resonance allowing three-dimensional reconstruction enable quick and accurate diagnose and set the premises for a proper therapeutic procedure.

An ideal management includes both the emergency procedures, on site or in the emergency units, and the immediate treatment following the patient's admission in the specialized sections, which often require multidisciplinary procedures and teamwork.

The general part of the work at hand, divided into two sections, consists of an in-depth study of the anatomy and physiology of the facial massif, of the clinical and etiopathogenetical aspects of the nasosinusal traumas, of the modern imagery investigations and of the proper therapeutical methods.

The special section consists of an anatomical, clinical and statistical study of the cases with nasosinusal traumatic pathology treated in the ENT Clinic of the County Emergency Hospital in Craiova and in the ENT and Cervicofacial Surgery Section of the County Emergency Hospital in Pitești in terms of anatomical and clinical lesions, diagnose and therapy.

The work at hand also consists of a comparative study of the nasosinusal traumatic pathology admitted in the ENT sections of the County Emergency Hospitals in Craiova and Pitești in view

of identifying a series of specific aspects which are common to both sections, in terms of addressability, etiopathogeny, imagery investigations and diagnostic and therapeutic algorithms.

CURRENT KNOWLEDGE

In this section of the work I presented an in-depth study of the nasosinusal anatomy and physiology, as well as the latest breakthroughs in the field of imagery investigations that can be used for the patients suffering from nasosinusal traumas.

Being familiar with the notions related to the nasosinusal anatomy is essential for an accurate diagnosis and for a proper treatment according to the anatomical and clinical type of the lesion.

I mentioned the main etiopathogenetical characteristics of the nasosinusal traumas, with emphasis on the ones that are specific to our country.

Also, in the section dealing with therapeutic aspects, I presented both clinical aspects of general traumatology occurring in the case of the patients suffering from multiple traumas or severe cranial and cerebral traumas, and therapeutic principles to be applied in the case of the patients suffering from nasosinusal traumas.

Treating a patients with nasosinusal traumas implies the emergency, on-site treatment, in what is called "the golden hour", the treatment received in the emergency admittance units, in the ENT section, and the treatment which is administered at a later point, as delayed emergency. Also, a significant part of the patients who suffered from nasosinusal traumas during their childhood years come back years after the trauma has occurred, in view of correcting the nasal breathing deficiencies and improving the aesthetic aspect.

OWN CONTRIBUTIONS

1. Purpose and aims of the clinical study

The purpose of this study is the detailed analysis of the patients suffering from nasosinusal traumas admitted in the ENT section in view of designing a diagnosis and treatment protocol for these patients.

The aims of the clinical study were:

- the description of the various types of nasosinusal traumas;
- the identification of the main etiopathogenetic causes for the occurrence of nasosinusal traumas;
- the search for a connection between the traumatic etiopathogeny and the anatomical and clinical aspect of the lesions;
- the identification of the clinical and imagery correlations in the patients suffering from nasosinusal traumas;
- the study of each type of trauma along with the description of the best therapeutic methods;
- the determination of the benefits and limitations of each therapeutic method;
- the comparison between the resulting numbers and those in the specialised literature;
- the design of a screening protocol and of a diagnose and therapeutic guide to be applied in the case of the patients suffering from nasosinusal traumas .
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2. Material and method

The complex and actual issue of the patients suffering from nasosinusal traumas was approached in a clinical and statistical study performed on the patients with nasosinusal traumas over a period of 5 years.

The study included two lots of patients with nasosinusal traumas: the first lot consisted of the patients admitted in the ENT Clinic in Craiova between January 2008 and December 2012, whereas the second lot consisted of the patients admitted in the ENT and Cervicofacial Surgery Section in the County Emergency Hospital in Pitești in the same period.

The people in the selected clinical cases expressed their approval to be included in the research plan, while observing the provisions of the Helsinki conventions. The patients were informed as to the detailed stages of the clinical study, the risks and benefits, the therapeutic plan and the follow-up and use of the results.

The patients were selected according to their anamnesis, clinical examination and imagery investigations.

The information used in the study at hand originate in the flyleaves, in the patient observation sheets, in the admittance sheets in the emergency section, in the surgery logs and protocols as well as in the imagery examinations.

The study method was clinical, statistical, prospective and retrospective, based on a mixed analytical and descriptive research, represented by a biostatistic and mathematical examination of the variables in relation to the respective type of trauma.

The patients were thoroughly examined, following a well-learnt protocol, in view of an accurate diagnose and proper treatment.

The lots were constituted according to an inclusion protocol, based on a standardised sheet filled in by each patient, consisting of the following information: anamnesis, ENT clinical examination, general clinical examination, para clinical, biological and imagery examinations, type of treatment: either conservative or surgical, number of hospitalisation days, imagery method used for the diagnose.

3. Working hypothesis

I have conducted a detailed, systematic research based on elements of anatomy and nasosinusal physiology, radiological anatomy, I became familiar with the various methods of imagery investigation which can be used in nasosinusal pathology while comparing the efficiency of such methods and the cost-benefit analysis, in view of including/excluding a certain imagery exploration from the investigation protocol used on the patients suffering from nasosinusal traumas, I revised similar studies in the international specialised literature and I analysed the medical documents represented by the emergency admittance sheets, the clinical observation sheets, the imagery investigations, the flyleaves, the surgical protocols used according to the research plan.

The clinical and statistical analysis of the resulting information led to the design of a diagnose and therapy protocol which helped improve the efficiency of the treatment applied in the ENT Sections in the County Emergency Hospitals in Craiova and Pitești, and therefore helped diminish the number of hospitalisation days and the related costs.

Criteria used to include the patients in the study lot:

- patients with closed nasosinusal fractures having occurred in a traumatic way;
- patients with open nasosinusal fractures having resulted from a trauma;
- patients with multiple traumas, with nasosinusal lesions, who required immediate or subsequent treatment;

- patients with septal and nasal dysmorphia having occurred affirmatively as a result of a trauma (either recently or during their childhood years).

Exclusion criteria - as this is a traumatic pathology with significant aesthetic and functional consequences if left untreated, there have been no exclusion criteria.

A standardised sheet was designed consisting of the following information:

The information we have thus obtained were used to set up a database and to perform a statistical analysis. It was done in Windows Microsoft Office and Excel 2003, and the information was used in tables, whereas the variables were represented by charts.

The following methods were used for the statistical analysis:

Descriptive statistical methods - they were used to describe the information related to the lot of patients under analysis.

Inferential analysis methods - they were used in order to express general findings related to the population based on the information gathered from the lot of patients under analysis.

The following tests were applied:

- tests of significance:

- The z test and the student test to compare the input (averages or percentages) of the characteristics of the lot of patients.
- The chi squared test was used to check whether the way of distributing the inputs of a variable can be attributed solely to the natural variations or if there are also other factors which can influence this distribution.

The following statistical sampling indicators were used for all calculations: average, dispersion, standard deviation.

4. Results and discussions

The clinical study was performed over a 5-year period, between January 2008 and December 2012.

The study consisted of 2 lots of patients admitted for traumatic nasosinusal pathology, one lot represented by the patients admitted in the ENT Clinic in Craiova for traumatic pathology, and the second lot represented by the patients admitted in the ENT Section in Pitești for the same type of traumatic lesions.

324 patients (2.99%) out of the total number of 10832 patients were admitted in the ENT Clinic in Craiova for traumatic nasosinusal pathology.

Only 265 (3.5%) out of the total number of 7564 patients admitted in the ENT Section of the County Emergency Hospital in Pitești needed hospitalisation for traumatic nasosinusal pathology.

Comparative distribution of the cases of nasosinusal traumas according to the number of admissions

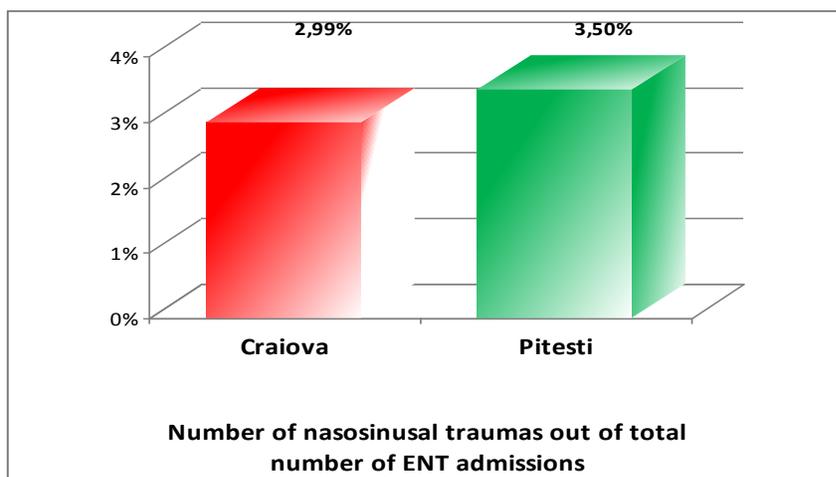


Fig.1. Comparative distribution of the cases of nasosinusal traumas according to the number of admissions

The Chi square test was performed in order to determine whether there is a percentage difference between the frequency rate of nasosinusal traumas in the ENT Clinic in Craiova and that in the clinic in Pitești. As the p input, 0.052, was higher than the maximum admitted input, 0.05, in the two lots under study, no significant difference could be noticed between the frequency rates of the traumatic pathology.

Comparative distribution of the cases according to sex

In the two lots under study, the distribution of cases according to sex shows that the males are predominant in both lots: comparatively there are 66% men in the first lot and 70% in the second lot.

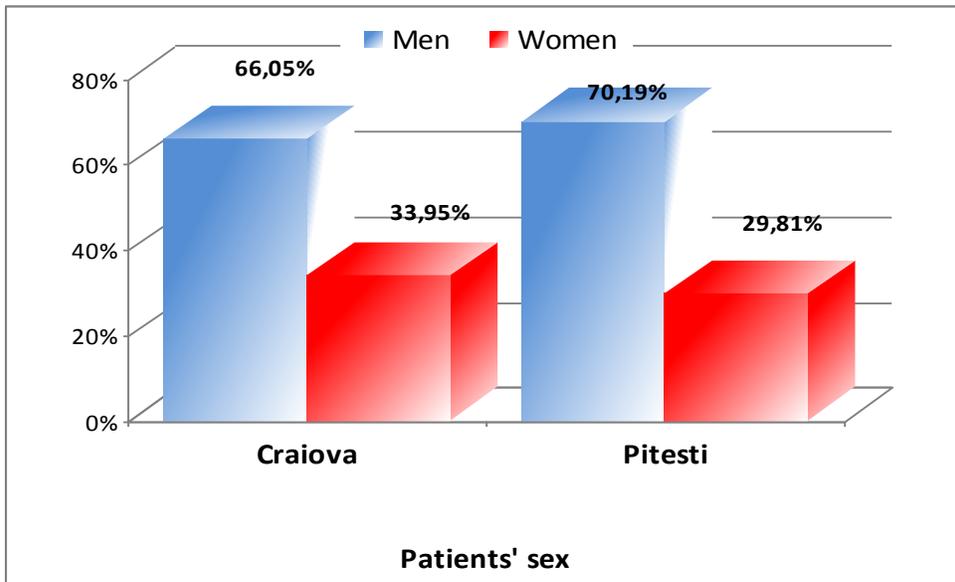


Fig.2. Comparative distribution of cases according to sex

It is worth noting the fact that the sex distribution within the two lots was significantly different from the general population distribution (54.1% women, 48.6% men), with more men in both groups, which proves the fact that men are more likely to suffer from nasosinusal traumas in particular, or cranial and facial traumas in general.

Comparative distribution of cases according to the patients' origin

The Chi square test was performed to determine whether there is a distribution difference between the two lots in terms of origin, leading to a p input of $0.0002 < 0.001$, which proves that there is a significant distribution difference in statistical terms. The lot in the ENT Clinic in Craiova consisted of more patients originating in the urban area.

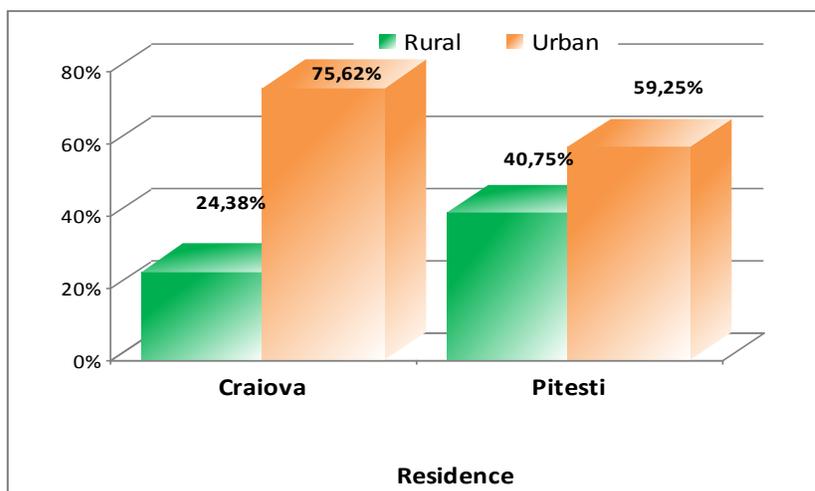


Fig.3. Comparative distribution of cases according to the patients' residence

Comparative distribution of cases according to the patients' age

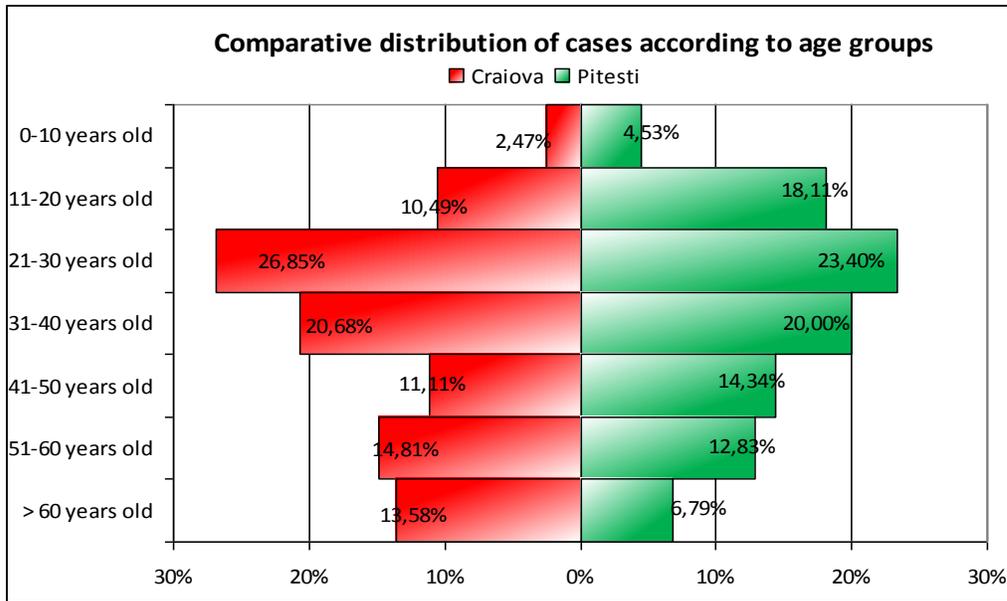


Fig.4. Comparative distribution of cases according to age groups

In both lots there is a predominant age group of 21 to 30 years old.

Comparative distribution of cases according to their ethiology

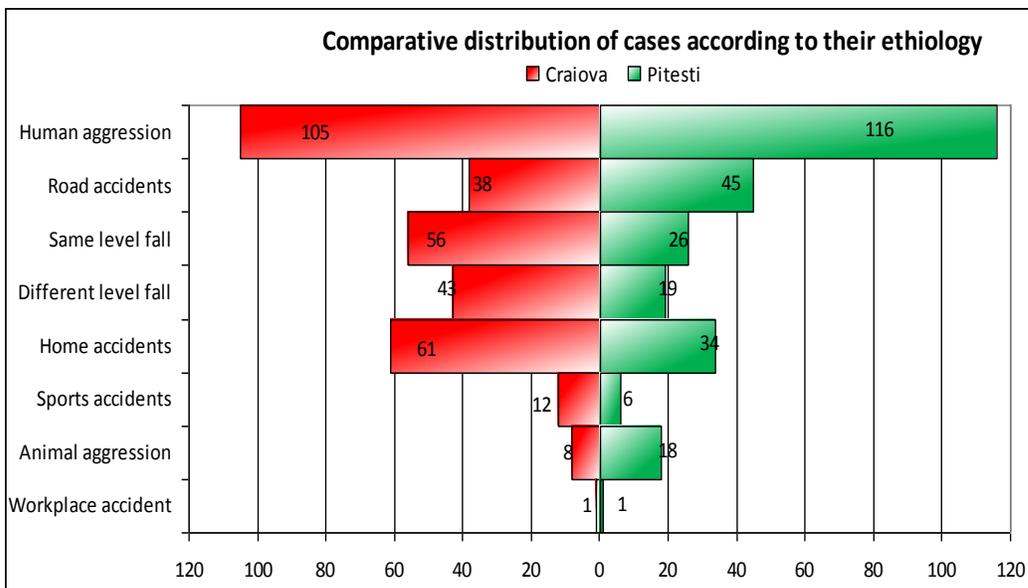


Fig.5. Comparative distribution of cases according to their ethiology

It can be noticed the fact that in both lots there is a predominant cause, aggression, as the main ethiological factor of nasosinusal traumas, followed by road accidents, domestic accidents or accidental falls.

Comparative distribution of cases according to the anatomical and clinical aspect of the lesions

Lesion distribution according to the type of fracture	Craiova	Pitești	Craiova	Pitești
Open fractures	62	42	25.20%	18.83%
Closed fractures	184	181	74.80%	81.17%
Total	246	223	100.00%	100.00%

Table 1. Comparative distribution of cases according to the anatomical and clinical aspect of the lesions

The Chi square test was performed in order to determine whether there is a percentage difference between the open and the closed fractures treated in the ENT Clinics in Craiova and Pitești. Since the p input of 0.097 was higher than the maximum admitted input, 0.05, we can therefore conclude that there is no significant difference between the two lots under study in terms of percentages of the two types of nasosinusal fractures.

Comparative distribution of cases according to the affected structures

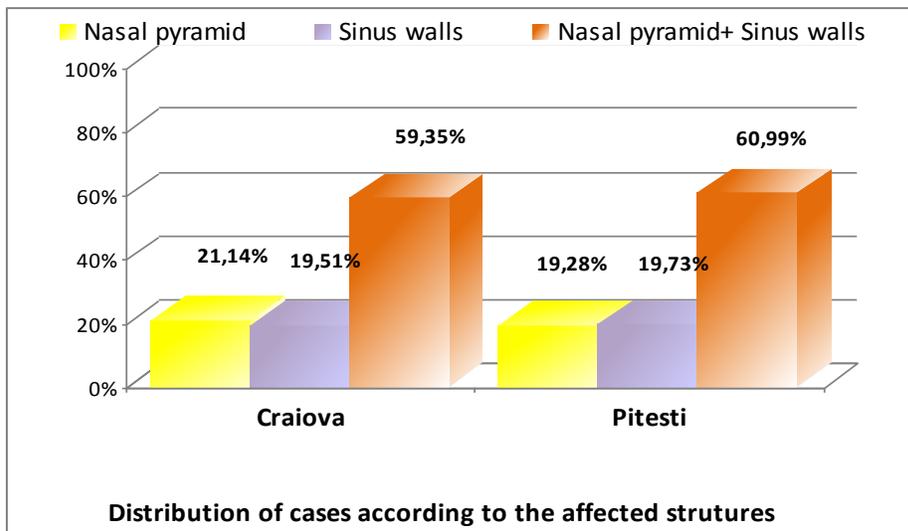


Fig.6. Distribution of cases according to the affected structures

No significant difference was noticed in terms of the distribution of the lesions according to the affected structures for the nasosinusal traumas treated in the ENT Clinic in Craiova and in the one in Pitești.

In both clinics, approximately 60% of the cases were fractures of the nasal pyramid associated with fractures of the sinus walls, and approximately 20% of them only suffered from fractures of the nasal pyramid or of the sinus walls.

Distribution of the fractures of the nasal pyramid

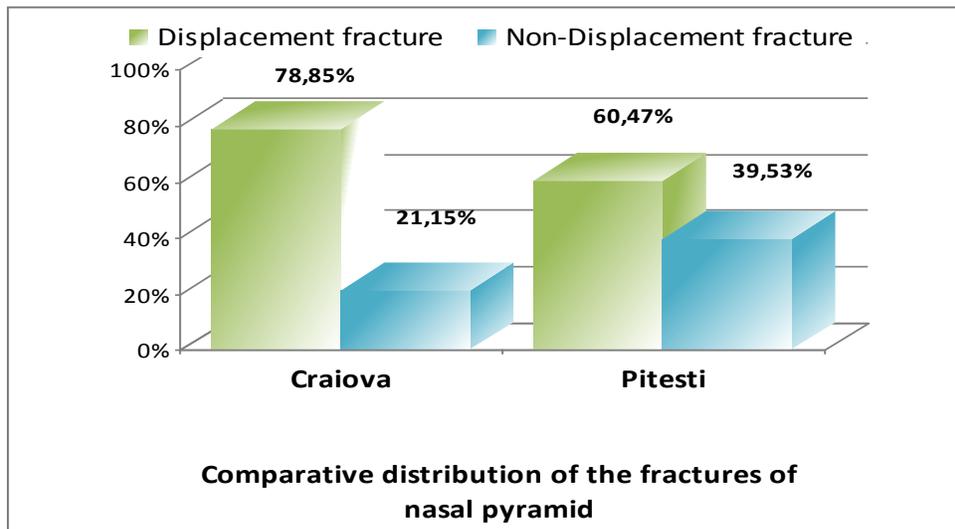


Fig. 7. Comparative distribution of the fractures of the nasal pyramid

Despite the significant differences in number and percentage, no important difference could be noticed between the distribution of the two types of fractures of the nasal pyramid: with or without displacement.

Comparative distribution of the cases of fractures of the sinus walls

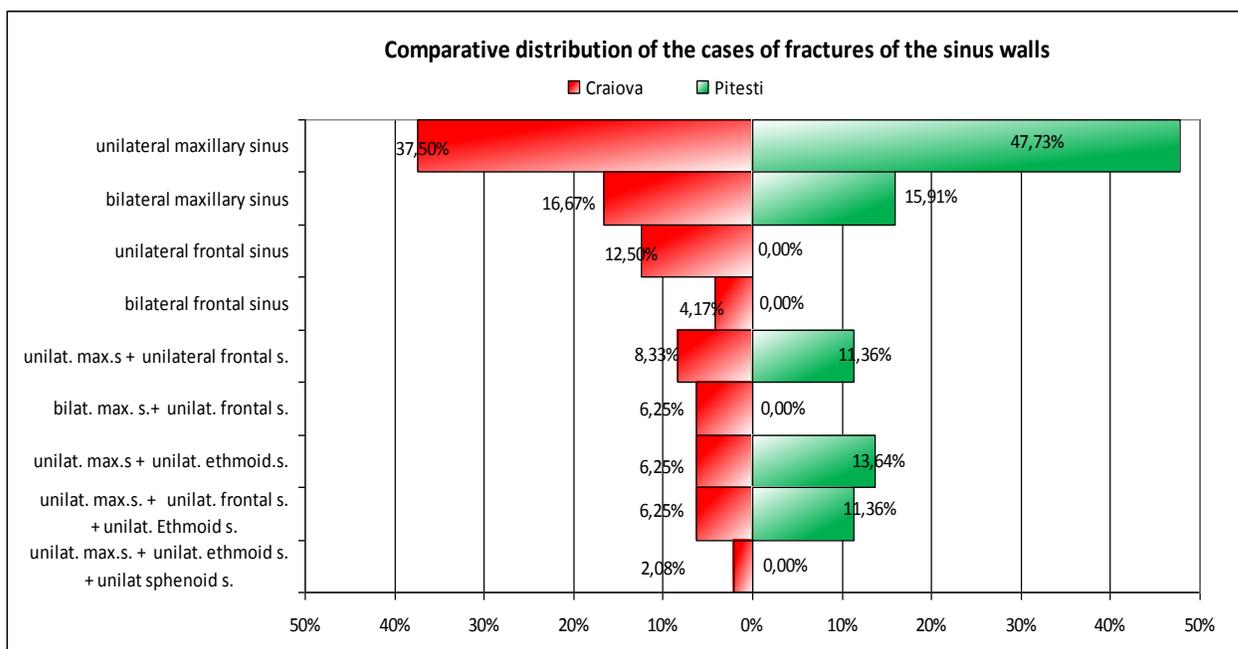


Fig.8. Comparative distribution of the cases of fractures of the sinus walls

No significant statistical difference could be noticed in the frequency rate of the various types of fractures of the sinus walls. For the cases of the patients who only suffered from this type of traumas the input of p in the Chi square test was of $0.088 > 0.05$.

Comparative distribution of the cases of nasosinusal fractures

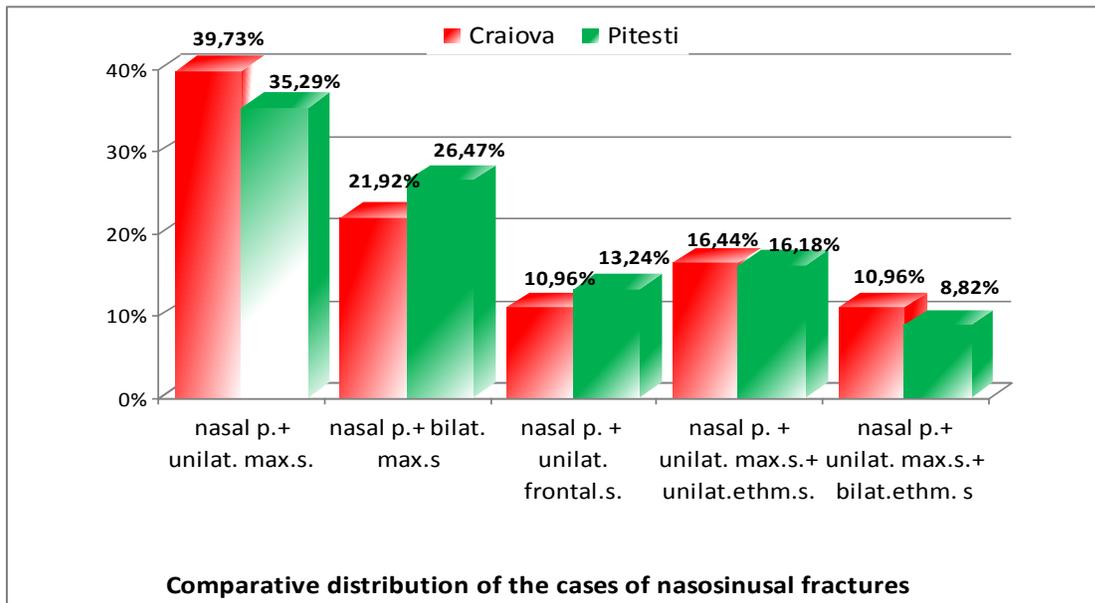


Fig.9. Comparative distribution of the cases of nasosinusal fractures

After having performed the Chi square test, we could say that there is no significant statistical difference in the distribution of the cases with various types of nasosinusal fractures between the ENT Clinic in Craiova and the one in Pitesti, the input of p being of $0.808 > 0.05$.

Distribution of cases according to the number of hospitalisation days

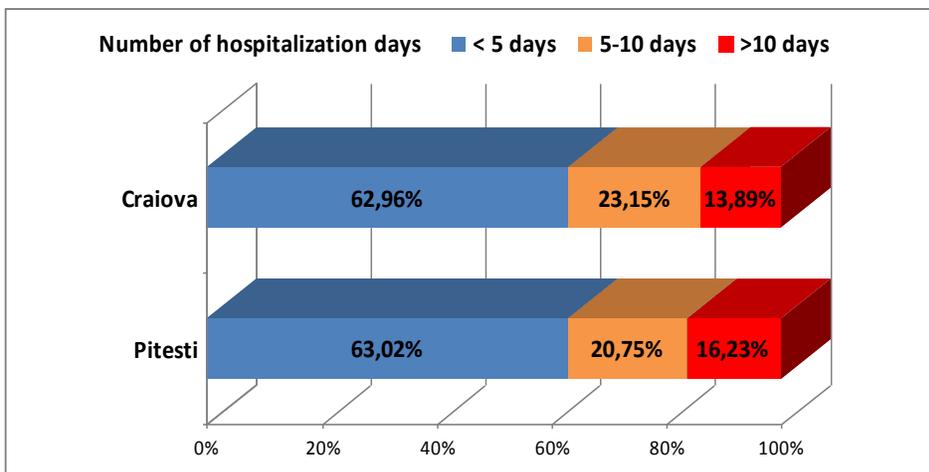


Fig.10. Distribution of cases according to the number of hospitalization days

No difference could be noticed in the hospitalization periods necessary for the cases with nasosinusal traumas treated in the ENT Clinic in Craiova and those treated in Pitești, the input of p in the Chi square test being of $0.634 > 0.05$. In both clinics, over 60% of the cases required less than 5 days of hospitalization, over 20% - 5 to 10 days of hospitalization, and only another 15% needed more than 10 days of hospitalization.

Comparative distribution of the cases according to their complexity

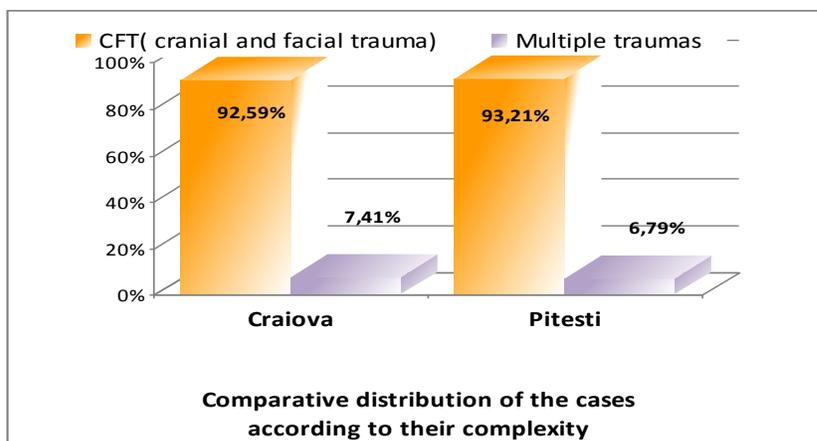


Fig. 11. Comparative distribution of the cases according to their complexity

As for the complexity of the traumas for the cases of fractures, no significant difference could be noticed between the two lots, and the input of the Chi square test, a p of $0.523 > 0.05$ confirmed the hypothesis that there are no major differences between the cases admitted in the two clinics.

Comparative distribution of the cases according to the imagery method

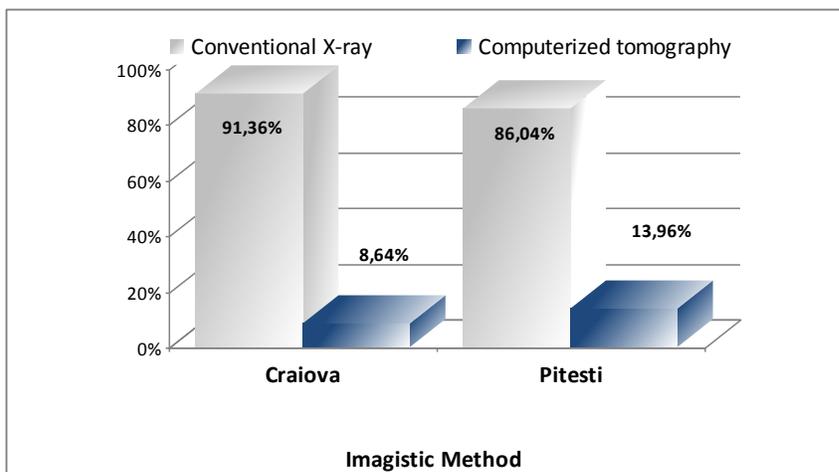


Fig.12. Comparative distribution of the cases according to the imagery method

Surprisingly there could be noticed a significant statistical difference between the ENT Clinic in Craiova and the one in Pitești in terms of the imagery methods used in the diagnose process, the input of the p in the Chi square test being $0.040 < 0.05$. CT scans are used for diagnose in 13.96% of the cases in the ENT Clinic in Pitești, whereas in Craiova the percentage is of 8.64% only.

Distribution of the cases according to the time of the treatment

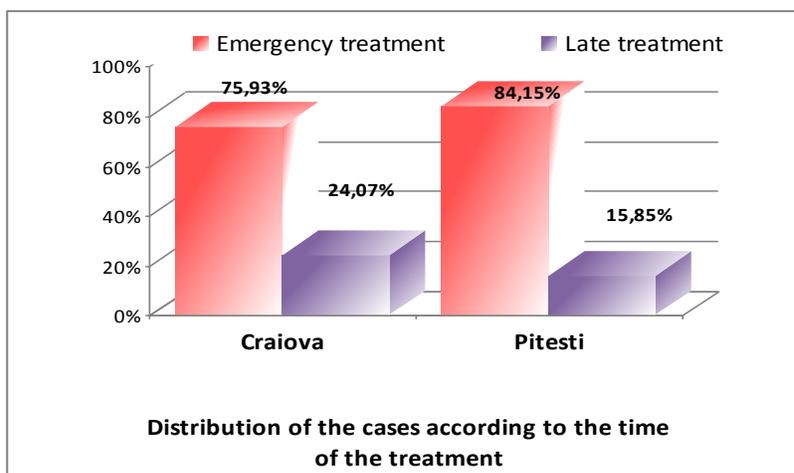


Fig. 13. Distribution of the cases according to the time of the treatment

In the ENT Clinic in Craiova there is a significantly greater number of cases of late treatment (p input of $0.013 < 0.05$), which could be accounted for by the greater number of patients who had suffered from nasosinusal traumas during their childhood years who come back for repairing procedures. These patients originate not only in the county of Dolj, but also in the surrounding counties.

General conclusions of the thesis

1. Nasosinusal traumas are medical conditions with vital and aesthetic implications.
2. The frequency rate of young men being affected by nasosinusal traumas is constantly increasing.
3. From an etiopathogenetical point of view aggressions are followed by road accidents, domestic accidents, falls, etc.
4. Ordinary nasosinusal traumas are easy to diagnose, whereas complex cranial traumas and multiple traumas require multidisciplinary investigations.
5. A symptomatology dominated by epistaxis, changes in the nasal pyramid, nasal obstruction, tumefaction of the face, along with anamnestic data and objective examinations lead to a positive diagnose.
6. An abnormal mobility of the nasal pyramid, bone cracking, an altered contour of the lower or upper orbital margin upon palpation are relevant as for the complexity of the trauma.
7. Radiological examinations emphasise the clinical form of the nasosinusal fracture and computerised scand can help identify other cranial, cerebral or facial lesions.
8. As for the clinical form of nasosinusal traumas, the traumas of the nasal pyramid occurred most frequently as displacement fractures.
9. The treatment received by each patient depended on the gravity of their lesion.
10. The traumas of the nasal pyramid received emergency care.
11. The nasosinusal traumas were repaired after a biological examination of the patient and treated surgically as belayed emergencies.
12. The association between the nasosinusal traumas and the cranial, thorax, abdominal ones required temporisation, with top priority given to the vital organs. The nasosinusal traumas were handled later both in order to restore the nose breathing function and to repair the related aesthetic deficiencies.
13. The number of hospitalisation days depended on the complexity of the trauma.
14. Maintaining nasal breathing is the major purpose in repairing the traumas of the nasal pyramid, along with an agreeable aesthetic aspect, with no scars on the face.

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