„ASPECTS REGARDING THE IMPLICATION OF URINARY INFECTIONS IN THE URINARY STONE PATHOLOGY”

The term of urinary tract infection (UTI) covers the morphological and functional alterations which occur as a result of microbial organism colonization and multiplication in the renal parenchyma, the pyelocaliceal system and the urinary excretion pathways. Urinary tract infections are associated, worldwide, with a high rate of morbidity, presenting a serious public health issue. The high frequency, the etiology diversity, the possibility of chronic evolution, of relapse, occurrence of severe complications, the therapeutic difficulties due to the resistance to antibiotics and the high cost, all point to the importance of these infections in pathology.

Because a high number of urine samples are brought daily to clinical laboratories, their microbiological examination requires a careful approach to avoid the exhaustion of resources with endless investigations or with faulty results, which can be harmful for the patient. Alongside UTI, the urinary stone disease causes at the moment, especially in developing countries, a significant economical cost to society, which justifies the efforts regarding prophylaxis and modern treatment of urinary stones. The stone disease cannot be fully controlled for now, concerning the moment of the stone formation, its evolution and outcome, whether it’s treated or not. Therefore it is very important and a real challenge to evaluate and follow the frequency of urinary stones’ colonization with different microorganisms, their phenotypic and molecular characterization, and bring them to the attention of the medical world.

The general part of the thesis offers up to date literature data regarding the etiologic agents of UTI. The first part focuses on the most frequently involved genera in the etiology of UTI. The aspects regarding epidemiology, pathogenicity factors and treatment, as well as particular aspects of UTI typical to the involved microbial species are presented separately for each genus and species. Further on, microbial species that are less frequently involved in UTI are presented, many of them being capable to induce aggressive forms of urinary infections, such as urosepsis, or forms with negative hemocultures, in which case the diagnosis is established with great difficulty. The possible etiology of UTI is extremely broad, the detailed implication of over 50 microbial genera being presented (coagulase negative staphylococci, streptococci, enterobacteria, non fermentative Gram negative bacili, Gram negative cocci, anaerobic bacteria, acid-alcohol resistant bacteria, fungi).

The personal contribution part is made of 3 separate studies and one final part, which presents the discussions describing a few selected studies among recent articles, which can be the starting point in discovering new aspects regarding the pathogenesis of urinary lithiasis. The part of personal research starts from well defined hypothesis, regarding the steps of the disease’s pathogenesis: the UTI is the most important risk factor in the initiation of urinary lithiasis, the evolution of UTI is typical related to the microbial genus, species and strain.
The first study focuses on the bacterial etiology and the pharmacoresistance of the isolated germs from urocultures. From the local data, the microbial etiology of urinary infections was presented, the distribution of different bacterial species involved in the medical and surgical wards of the Emergency County Hospital, the distribution of isolated bacterial species according to gender, age and the antibiotic resistance of the isolated strains from urocultures. It is concluded that the main isolated bacteria from urocultures were enterobacteria and enterococci, which are also the main etiologic agents of UTI, and compared to other countries, the local antibiotic resistance is increased in the majority of bacterial species, especially in wards with invasive procedures (ICU).

The second study is a retrospective analysis of UTI cases from the following wards of the Emergency County Hospital Tg.Mures: Internal Medicine, Surgery, Nephrology, Intensive Care Unit, Pediatrics, Urology, Lithotripsy, TBC, Ortopedics, Endocrinology, Psychiatry, Oncology. The goal was to create a statistically comparative study, to establish the microbial etiology of the cases, and their distribution according to time period, wards, gender and age groups.

The third study is an original experimental study which brings new elements to help understand and solve the pathogenicity mechanisms that lead to the initiation and evolution of urinary lithiasis, and focuses on the evaluation of the pathogenicity of different bacterial strains involved in the two pathologies. Therefore, in the second part of this thesis I set out to perform an experimental study regarding the bacterial spectrum of the urinary lithiasis, the chemical composition analysis of kidney stones, as well as the correlation between the microbial agents involved in UTI and those of the infected stones.

Thus a vicious circle is created, as cited by many authors in the specialty literature, the infection has an important part in the pathogenesis of urinary stones, and the formation of urinary stones brings infection.

The conclusions of the thesis are edited in an original and concise manner at the end of each experimental chapter.

The PhD thesis will be concluded with the presentation of several discussions describing a few selected studies among recent articles, which can be the starting point in discovering new aspects regarding the pathogenesis of urinary lithiasis.