Do Anaerobes Bacteria Play a Role in Staghorn Nephrolithiasis?

Introduction and Objectives: The different species of urea-splitting microorganisms are known to play an important role in of staghorn stones formation. Currently, the importance of nonclostridial anaerobes in pathophysiology of staghorn stones is not determined.
Materials and Methods: Urine samples for bacteriological examination were obtained from 101 patients (age 50.4±5.9 (25–73)) from the Southern part of Russia with staghorn calculi. The primary stones were found in 62.9% patients, recurrent nephrolitiasis was seen in 37.1% cases. Of patients, 58.4% were residents of mountainous areas, and 41.6% lived on the plains - 41.6%. All patients had undergone percutaneous nephrolithitomy. Medium Blaurokk, Shaedler Agar and Schaedler broth, Bacteroides Bile Esculin Agar for quantitative determination of bacteriuria and isolation anaerobes were used. The stone composition was determined using X-ray phase analysis.
Results: In 89.5% cases bacteriuria was determined (table 1). Mean level of aerobic and anaerobic bacteriuria was 10^4 CFU/ml and 10^3 CFU/ml, respectively. In 78% the different bacterial association was isolated. Nonclostridial anaerobes included Peptostreptococcus sp., Peptococcus sp., Veillonella sp., Propionibacterium sp., Eubacterium sp. In all cases, nonclostridial anaerobes in combination with other aerobes and anaerobes were found. In recurrent nephrolithiasis significant increase of the urea-splitting microorganisms and nonclostridial anaerobes levels ($p<0.05$) and decrease of incidence of Gram-positive bacteria was determined. In recurrent nephrolitiasis in most cases nonclostridial anaerobes in combination with apatite (40%) and whewellite (30%) were seen. In 28.8% cases residual stones were found, while in patients with nonclostridial anaerobes significant increase of residual calculi was found. X-ray phase analysis revealed that chemical composition of residual calculi in patients with nonclostridial anaerobes contained predominantly apatite (35.8%) and whewellite (35.8%).
Conclusions: In the majority of patients with staghorn calculi mixed bacteriuria was seen. In recurrent and residual nephrolithiasis incidence of nonclostridial anaerobes was significantly higher, compared to primary nephrolithiasis. Numerous virulence factors of nonclostridial anaerobes can influence on phosphate (apatite) and oxalate (whewellite) stagborn calculi formation.

Table 1

Microorganism	Primary cases	Recurrent stones	Plain area	Mountainous area	Residual stones
Gram-positive bacteria, %	45.0	26.3	47.8	30.8	33.4
Urea-splitting, %	27.5	36.8	26.1	46.2	29.2
Nonclostridial anaerobes, %	15.0	26.3	15.2	23.1	29.2
Gram-negative bacteria, %	7.5	10.6	6.5	0	4.1
Fungus, %	5.0	0	4.3	0	4.1