

Morphometric Parameters of Inflammatory Infiltration in Renal Tissue and Personality Characteristics of Patients at Risk of Pyelonephritis Attack after Percutaneous Nephrolithotomy

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A correlation between personality traits and the type of inflammatory infiltration in the renal pelvicalyceal system was revealed in patients with nephrolithiasis. The study demonstrated the possibility of indirect evaluation of the inflammatory process in the pelvicalyceal system and preoperative prediction of acute pyelonephritis attack after percutaneous nephrolithotomy on the basis of patient's psychological status.

Key Words: *inflammatory infiltration of renal pelvicalyceal system; personality traits; percutaneous nephrolithotomy; postoperative acute pyelonephritis attack*

Acute inflammation is paralleled by the development of a stereotyped complex of behavioral symptoms known as sickness behavior (SB) [2,6,7]. Important components of SB are loss of interest and development of social passiveness. The severity of these symptoms directly depends on the severity and dissemination of the inflammatory process [7]. We assumed that psychometric evaluation of the personality traits can be informative for the diagnosis of latent exacerbation of a chronic inflammatory process. In the present study we verified this assumption on patients with latent pyelonephritis accompanying nephrolithiasis and inducing an attack of acute pyelonephritis (AAP) after percutaneous nephrolithotomy (PNL) [4].

MATERIALS AND METHODS

Thirty-eight patients with nephrolithiasis hospitalized at Endourology Department for planned PNL were examined. One day before surgery the personality traits of patients were evaluated using Cattell 16 PF questionnaire [4]. Tissue fragments of the pelvicalyceal

system (PCS) of the kidney for pathomorphological analysis were collected during surgery with a biopsy forceps. Extravascularly located neutrophilic granulocytes, macrophages, and lymphocytes were counted on hematoxylin-eosin stained PCS preparations. Morphometry of the inflammatory infiltration was performed as described previously [1]. Forty visual fields were analyzed at $\times 1000$ and the results were expressed as the mean number of cells per visual field. Parallel morphometrical evaluation of PCS preparations from 10 cadavers without urolithiasis and renal inflammations was carried out (control; material was obtained from forensic medicine bureau).

Standard preoperative clinical laboratory tests verified the absence of acute inflammatory processes in all patients. Retrospectively, a realized risk group including patients with PNL-induced AAP was isolated on the basis of postoperative clinical status. The data of morphometry of PCS biopsy specimens and preoperative psychometric examination of this group were compared with those in patients without PNL complications. The significance of differences was evaluated using the Student and Mann-Whitney tests. Statistical relationships were evaluated by correlation analysis.

RESULTS

The postoperative period after PNL was complicated by AAP in 34.2% (13 of 38) cases. Morphometry of PCS biopsy specimens showed inflammatory infiltration both in the realized risk group and in patients with uneventful postoperative period (Table 1). It should be emphasized that parameters of macrophage-lymphocyte infiltration of PCS in nephrolithiasis patients virtually 10-fold surpassed the corresponding control values (1.96 ± 0.17 lymphocytes and 0.10 ± 0.03 macrophages per visual field, both $p < 0.001$, Table 1). This indicated chronic pyelonephritis accompanying nephrolithiasis [3].

The severity of inflammatory infiltration of PCS depended on the risk of postoperative AAP (Table 1). The index of macrophagal infiltration in the realized risk group was higher than in the group with uneventful postoperative period by 56.5%. Still more pronounced (5-fold) differences were observed for neutrophilic granulocyte counts in PCS biopsy specimens. Control PCS specimens contained no neutrophils.

These results indicate a more severe course of chronic pyelonephritis and its latent exacerbation during the preoperative period in the realized risk group. Despite the absence of clinical symptoms of pyelonephritis exacerbation before PNL, psychological status of these patients conformed to the SB concept. SB-like personality traits in these patients were relative decrease in A, H, Q₃ scores and secondary extraversion score, paralleled by a relative increase in Q₂ score (Table 1). Generally, psychometric analysis demonstrated introversion, decreased interest, and passiveness in social contacts in patients of the realized risk

group [5]. It should be emphasized that these personality features correlated with morphometric parameters of PCS infiltration: macrophagal infiltration inversely correlated with A and H scores ($r = -0.56$ and -0.68 , respectively, both $p < 0.05$), and lymphocytic infiltration inversely correlated with C score (emotional stability, $r = -0.61$; $p < 0.05$). No correlations of this kind were observed in the patients with uncomplicated postoperative period. The data obtained in the correlation analysis suggest that macrophage-lymphocyte infiltration of PCS in the realized risk group produced well-known SB mediators (interleukin-1 β and tumor necrosis factor). Some these factors transported to the nervous tissue induce intracerebral cytokine expression and the development of SB-like symptoms [6,7].

Infiltration of the PCS with acute inflammation effectors (neutrophilic granulocytes) correlated with parameters of the psychological status in both groups of patients. In the realized risk group this parameter inversely correlated with dominance (E scale) and suspiciousness (L scale) indices ($r = -0.64$ and -0.59 , respectively, both $p < 0.05$). In patients without complications the count of polymorphonuclear leukocytes in PCS inversely correlated with Q₁ score (radicalism, $r = -0.39$, $p < 0.05$). These correlations suggest that sequestration of neutrophilic granulocytes in PCS is associated with the release of neutrophil-derived factors possessing neurodepriming activity into the circulation. This hypothesis agrees with the data on suppressive effect of a secretory product released by latex-activated neutrophils (neutrophilokine) on the open field behavior in rats [3].

Our findings suggest that cells of the inflammatory infiltration (neutrophils, macrophages, and lym-

TABLE 1. Severity of Inflammatory Infiltration of PCS and Preoperative Personality Traits in Patients with Different Course of the Postoperative Period after PNL ($M \pm m$)

Parameter	Course of postoperation period	
	uneventful ($n=25$)	complicated with acute pyelonephritis attack ($n=13$)
Cell count in visual field:		
lymphocytes	17.54 ± 2.93	21.16 ± 4.54
macrophages	1.08 ± 0.20	$1.69 \pm 0.25^*$
neutrophilic granulocytes	0.13 ± 0.05	$0.67 \pm 0.17^*$
Cattel 16 PF scores:		
A (affectothymia)	5.20 ± 0.34	$3.85 \pm 0.42^*$
H (boldness)	6.56 ± 0.25	$4.92 \pm 0.51^*$
Q ₂ (self-sufficiency)	3.72 ± 0.32	$5.15 \pm 0.44^*$
Q ₃ (behavioral self-control)	5.92 ± 0.40	$4.38 \pm 0.40^*$
secondary extroversion scale	6.36 ± 0.26	$4.31 \pm 0.41^*$

Note. The table presents only personality traits differing significantly between patient's groups. * $p < 0.05$ compared to uneventful postoperative period.

phocytes) can be regarded as a source of humoral factors inducing SB-like personality changes in patients with nephrolithiasis. Hence, evaluation of personality traits in patients with nephrolithiasis is a pathogenetically justified indirect approach to evaluation of the severity and type of inflammatory infiltration in PCS. This shifts in psychometric parameters associated with pronounced macrophage and polymorphonuclear leukocyte infiltration in PCS are predictors of AAP after PNL.

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