ANATOMY OF LYMPHOID NODES OF THE URINARY ORGANS

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Abstract: The aim is to study the quantitative morphometric characteristics of lymphoid follicles in the walls of the urinary tract using macromicroscopy. Lymphoid nodules are permanent structures in the walls of the ureters, bladder and urethra. The number of lymphoid structures is greatest in the first period of childhood. In subsequent age periods, regardless of the organ involved, the number of lymphoid nodules decreases with age, reaching a minimum in old age. In the 1st period of childhood, the size indicators of lymphoid nodules also reach their maximum values, increasing in the walls of the right ureter by 5.06 times, the left ureter by 5.22 times, the urinary bladder by 4.60 times, the male urethra by 4.60 times, and the female urethra by 4.65 times compared to the neonatal period ($p<0.05$).

Keywords: urinary tract, lymphoid nodules, morphometry.

INTRODUCTION

Mucosa-associated lymphoid tissue of the urinary tract, represented by lymphoid nodules and diffuse lymphoid tissue, has been studied in autopsy material to a significantly lesser extent, compared to the immune structures of the respiratory and digestive organs [1]. The materials available in the few morphological studies [2] require systematization and clarification. In particular, it seems appropriate to present data obtained by macromicroscopy, which allows us to evaluate the topography, size, and number of lymphoid nodules along the walls of all urinary tracts.

MATERIALS AND METHODS

The aim of the study was to investigate the quantitative and morphometric characteristics of lymphoid follicles in the walls of the urinary tract using the macromicroscopy method.

Table 1

Age structure of the studied material

Age period	Age range	Number of observations		
		Total	Men	Women
Newborns	1–10 days	14	7	7
Infancy	10 days – 1 year	12	6	6
Early childhood	1–2 years	12	6	6
First period of childhood	3–7 years	14	7	7
Second period of childhood	8–12 years	12	6	6
Adolescence	12–16 years	10	5	5

Youth	16–20 years	12	6	6
First period of adulthood	21–35 years	14	7	7
Second period of adulthood	36–60 years	16	8	8
Old age	61–75 years	16	8	8
Old age	76–90 years	10	5	5

RESULTS AND DISCUSSION

In total preparations of the urinary tract, lymphoid nodules after elective staining had a compact shape, round, ovoid, elongated. They were located singly, in small groups and in longitudinally oriented (in the direction of urine flow) rows. Each row was represented by 3-5 lymphoid nodules. For most of the lymphoid nodules, the absence of reproduction centers can be noted, which is associated with the relatively insignificant antigenic properties of urine, as an internal environment of the body [3]. According to our previous studies [4], lymphoid nodules in the walls of the renal calyces and renal pelvis are rare, do not have clear peripheral contours, however, they are constant structures of the walls of the ureters, bladder and urethra. The maximum content of lymphoid nodules was noted throughout postnatal ontogenesis in the walls of the male urethra (from 74.5 to 120.6, depending on age). In smaller quantities, lymphoid nodules were present in the walls of the female urethra (50.2-88.4 nodules), bladder (43.2-98.0), right (18.3-28.2 nodules) and left (18.2-27.5) ureters. Individual minimum and maximum of the number of lymphoid nodules and their area during ontogenesis increased from the neonatal period to the first period of childhood, and then gradually decreased to the old age period. This tendency, according to our data, was observed throughout the urinary tract, starting from the ureters and up to and including the urethra.

Lymph nodes are kidney shaped structures which act to filter foreign particles from the blood, and play an important role in the immune response to infection. On average, an adult has around 400 to 450 different lymph nodes spread throughout the body – with the majority located within the abdomen.

Each node contains T lymphocytes, B lymphocytes, and other immune cells. They are exposed to the fluid as it passes through the node, and can mount an immune response if they detect the presence of a pathogen. This immune response often recruits more inflammatory cells into the node – which is why lymph nodes are palpable during infection.

Lymph fluid enters the node through afferent lymphatic channels and leaves the node via efferent channels. Macrophages located within the sinuses of the lymph node act to filter foreign particles out of the fluid as it travels through.

CONCLUSION

Thus, the wall of the human urinary tract throughout postnatal ontogenesis has a pronounced lymphoid (immune) apparatus, which is well visualized when studying total preparations during macro-microscopic examination. Lymphoid nodules are a constant component of the walls of the ureter, bladder and urethra. The number and area of lymphoid nodules of the ureters, bladder, urethra throughout postnatal ontogenesis reach maximum values in the 1st period of childhood.

Regional (organ) differences consist of the minimum number of lymphoid nodules and the area of the nodule in the walls of the ureters and the maximum value of these parameters in the walls of the urethra.

The drainage of lymph begins in lymph channels, which start as blind ended capillaries and gradually develop into vessels. These vessels travel proximally, draining through several lymph nodes.

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