

# The Micro-Anatomical Features of the Lymphoid Structures of the Urinary Bladder

Huseynova Gulgiz Agahasan\* and Nasirova Zarifa Djahangir

Department of Human Anatomy and Medical, Terminology of Azerbaijan Medical University, Baku, Azerbaijan

## Abstract

The lymphoid structures of human urinary bladder are investigated by a macro-microscopy with Helms and histology methods by staining with HxE, at the age from the period newborn to senile age of the postnatal ontogenesis. The lymphoid structures of the urinary bladder are characterized by age, regionally, individuality peculiarities. Lymphoid structures as much as possible develop at early child's age. After those periods a morphological regress of a lymphoid tissue and involution of lymphoid structures are noted. After this, individually features characterize lymphoid structures of the human urinary bladder. Their broad individual variability at mature, elderly and senile ages is established. At all stages of a postnatal ontogenesis the quantity of lymphoid structures in the lower part of a urinary bladder are more than in upper and the middle parts. The quantity and morphometric indexes of lymphoid structures in a sphincter more those near a sphincter.

**Keywords:** Lymphoid structures type • Features • Human • Urinary bladder

## Introduction

Wall components of tubular and cavity organs include lymphoid derivatives, along with internal nerve and veins [1-10]. Information on the normal features of the wall structure of tubular organs allows us to think about the regularities of their path morphogenesis [11-15]. Postnatal ontogenesis has been carried out to investigate the lymphoid structures of various tubular organs and their morphological regularities have been identified [16,17]. The results reflecting the morphological features of the lymphoid derivatives on the walls of these organs, meeting the requirements of immunomorphology [18-21].

## Materials and Methods

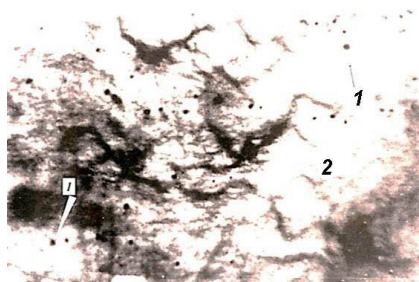
The lymphoid structures are investigated by a macro-microscopy with Helms methods and by histology methods by staining of HxE on preparations of the urinary bladder walls, 77 persons received from corpses, victims from the casual reasons (a trauma, an asphyxia, etc.) at the age from the period newborn to senile age. We investigated variants of the form of lymphoid structures of a urinary bladder; regionally feature of its in different parts proximal, middle, distal thirds of a wall of organ. The glands were investigated with the application of stereomicroscopic-binocular microscope MBS-9(x16). Statistical data processing included calculation of arithmetic-mean values, their errors, confidential intervals. When studying micro

preparations for biometrics, IBM 486 SX33 computers were used with the help of the Morphologist application package, working in the Windows environment lymphoid nodules occur singly or in clusters or small chains.

## Results and Discussion

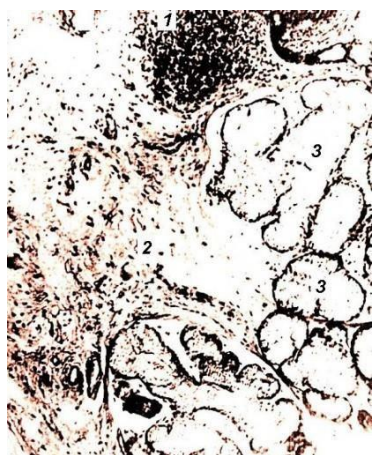
In investigation age, individually, regionally, involution features of the lymphoid structures in walls of the human urinary bladder were established. The structure of the wall elements of the tubular organs is typical to the morphology of lymphoid structures of the urinary bladder. On the lymphoid structures of the urinary bladder wall revealed the unique morphological features of this organ [5,18,19]. In all ages of postnatal ontogenesis, lymphoid nodules and diffuse lymphoid tissue are found on the wall of the urinary bladder. The shapes of the lymphoid nodules are varied: oval, round, irregular. Lymphoid nodules occur singly or in clusters or small chains (Figure 1).

\*Address to correspondence: Dr. Huseynova Gulgiz Agahasan, Department of Human Anatomy and Medical, Terminology of Azerbaijan Medical University Baku, Azerbaijan, Tel: +99451 510-55-56; E-mail: gulqiz65@mail.ru



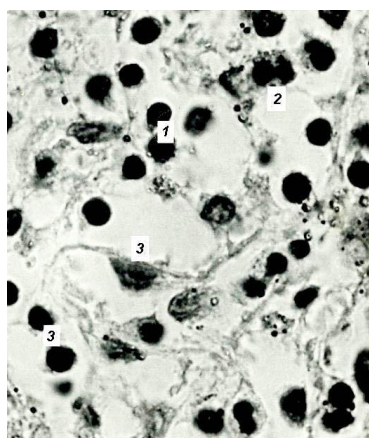
**Figure 1.** The lymphoid nodules in the upper part of the urinary bladder in a woman 54 years old. 1 lymphoid nodules; 2-mucous membrane. By Hellman's method. Increase 5 x.

These structures prevent the microorganisms and pathogenic creatures from leaking into the wall depths of the urinary bladder and eventually into the internal environment. Lymphoid nodules near the glands duct apparat and diffuse lymphoid tissue cells near the alveolar glandulocytes perform immune surveillance, guarding activities (Figure 2).



**Figure 2.** The lymphoid nodules in the upper part of the urinary bladder in a woman 24 years old. 1 lymphoid nodules; 2-mucous membrane; 3-alveoli of glands. By HxEx staining. Increase 100x.

Lymphoid nodules and diffuse lymphoid tissue have the same cellular structure as other peripheral organs of the immune system [14,15]. The lymphoid tissue contains small and medium lymphocytes, reticular cells, lymphoblast's, macrophages and plasmatic cells is determined (Figure 3).



**Figure 3.** The diffuse lymphoid tissue cells near in the micropreparation of the lower part of the urinary bladder in a woman 19 years old. 1 small lymphocytes; 2-mitotic cells; 3- reticular cells. By HxEx staining. Increase 800x.

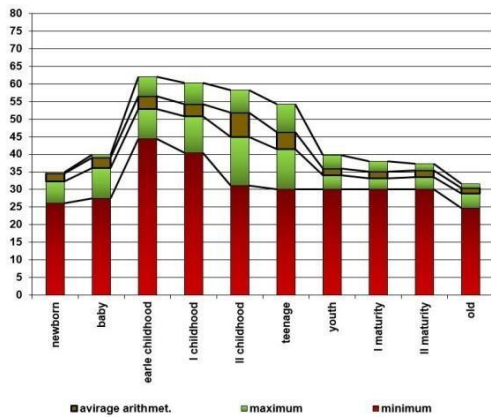
The reproductive centers have not mentioned in the lymphoid nodules. This is due to the poor antigen activity of urine in the internal environment. Only, in the elderly and senile ages in the upper part of urinary bladder, lymphoid nodules are not detectable or are episodic (Table 1).

**Table 1.** The quantity of lymphoid nodules in different parts of urinary bladder in postnatal ontogenesis (X+Sx; min-max).

Age	n	The quantify of lymphoid nodules			
		Upper part	Middle part	Lower part	Organ
Newborn	7	20.0+1.9	34.2+1.1	36.0+1.9	90.0+4.4
		15-34	26-37	28-47	72-116
Baby	6	24.2+2.1	36.5+1.3	42.0+2.1	102.7+5.0
		16-37	28-41	29-50	75-125
Early childhood	7	35.8+3.8	56.2+1.8	62.0+2.7	154.0+7.3
		20-58	44-62	49-76	117-190
I childhood	7	32.3+3.3	52.0+1.4	58.1+1.7	142.3+5.7
		19-52	42-56	45-62	110-167
II childhood	7	22.1+3.1	51.1+2.4	52.1+3.5	125.3+8.0
		19-50	32-56	35-58	107-160
Teenager	7	18.1+5.7	42.1+3.9	49.6+3.9	109.8+11.3
		12-50	30-56	32-58	75-160
Youth	7	20.0+2.4	42.1+3.1	49.6+3.1	111.7+7.7
		10-30	30-56	32-58	76-140
I maturity	6	20.1+2.0	42.1+2.6	49.6+2.6	111.8+6.4
		10-30	30-56	32-58	76-140
II maturity	7	20.4+2.4	42.1+2.3	46.2+1.4	108.7+6.2
		7-31	29-52	30-54	70-132
Old	8	15.0+3.2	34.0+1.5	43.2+2.2	92.2+4.3
		7-39	24-39	32-54	87-130
Senile	8	-	-	20.1+1.9	20.1+1.9
		-	-	14-33	14-33

Note: n-the number of the observations; X+Sx-the middle arithmetic; min-max-individual variability; (-) the absence of lymphoid nodules in preparation.

In the walls of the lower third of the urinary bladder, the thickness of the lymphoid nodule increases in early childhood by 1.7 times ( $p < 0.05$ ), reaching the ontogenetic maximum (Figure 4). Compared with early childhood, the thickness of the nodule decreases in adolescents and in the 1st period of adulthood by 1.3 times ( $p > 0.05$ ), in old age-by 1.4 times ( $p > 0.05$ ), in old age- 1.5 times ( $p > 0.05$ ).



**Figure 4.** The thickness of the lymphoid nodules in the walls of the urinary bladder in postnatal ontogenesis.

Another common feature of the lymphoid structures in the wall of the human urinary bladder is regionally peculiarities. Regardless of age, the quantity of lymphoid structures increases in the lower part of the bladder [2,5]. During the same age of postnatal ontogenesis, the quantity of lymphoid nodules in the lower part of the bladder increases by 1.4-1.8 times compared to the upper part (Table 1). This feature applies to other dimensions as well. This feature is not accidental. It is associated with the microtopographic association of lymphoid tissue with the gland in the bladder wall and the potential for urogenic infections [8]. This is due to the location in the lower part of the urinary bladder the internal urethral sphincter, the right and left ureters sphincters. The sphincters of the cavity organs are autonomous parts and participate in the removal of the need, the physiological discharge of the organ, and are involved in enhancing ant reflux activity [8,14]. It is characterized by thickening of the circular muscle layer, contraction of the organ, increased nerve and vascular, microcirculation, glands and lymphoid tissues density [8,15]. In the areas of the sphincter of the human urinary bladder, found "glandular ring" and near there are lymphoid nodules [18]. This is a morphological regularity characterized by an excess of the quantity and morphometric parameters of the lymphoid structures in the area of the urinary bladder sphincters, relative to the sphincter trophic area. Thus, in the inner sphincter of urethra the lymphoid nodules quantity in the 1.5-time increases, but on outside these sphincters. The right and left ureters sphincters have with the same structure principle. In the sphincters, zones the lymphoid nodules and diffuse are located densely. Without dependence from age, microanatomy parameters of the lymphoid nodules of the sphincters of urinary bladder more than in outside. Dimensional indicators at right and left ureters sphincters almost correspond. It is connected by a similar design. At senile age, lymphoid structures in sphincters of a urinary bladder are single or absent.

In postnatal ontogenesis, the lymphoid structures of the urinary bladder the involution regularity is typical. At birth, the urinary bladder already has a well-developed gland and lymphoid structures. Maximal development of the lymphoid structures is in early childhood period. This is explained by the adaptation to living conditions at the intended age [18,21].

## Conclusion

In the postnatal ontogenesis the lymphoid structures of the urinary bladder are characterized by age, regionally, individuality peculiarities. Lymphoid structures as much as possible develop at early child's age. After those periods a morphological regress of a lymphoid tissue and involution of lymphoid structures are noted. After this, individually features characterize lymphoid structures of the human urinary bladder. Their broad individual variability at mature, elderly and senile ages is established. At all stages of a postnatal ontogenesis the quantity of lymphoid structures in the lower part of a urinary bladder are more than in upper and the middle parts. The quantity and morphometric indexes of lymphoid structures in a sphincter more those near a sphincter.

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