

## MICROCIRCULATION IN THE URINARY BLADDER WALL IN OAB FEMALE PATIENTS

### Hypothesis / aims of study

Results of recent researchers has proved significant role of microcirculation disorders in the urinary bladder wall with consequent ischemia in development of OAB symptoms. Ischemia in the urinary bladder wall is supposed to provoke morphological changes in detrusor and urothelium which affect intramural nerves and cause denervation of detrusor leading to urinary bladder dysfunction. General assessment methods to estimate microcirculation in the urinary bladder are Doppler ultrasonography, pelvic rheometry, vesicocervical rheometry. During last few years to estimate microcirculation high frequency Doppler ultrasonography has been used. This method had not been used for assessment of microcirculation in the urinary bladder wall before but positive experience of it's utilization to examine microcirculation in lower extremities, oral cavity and respiratory airways has been accumulated. Thus examination of microcirculation in the urinary bladder wall in OAB female patients and definition of it's correlation with intensity of OAB symptoms were primary goals of our research.

### Study design, materials and methods

Examination of microcirculation in the urinary bladder wall was performed in 48 female OAB patients, age varied from 24 to 78 years old (mean age 52,8±1,8 years). 32 females from 28 to 63 years (mean age 54,3±2,6 years) without urination disorders were included in the control group. Microcirculation was registered using 100 MHz intravesical sensor which was inserted in vesical triangle. Procedure was stopped as bladder volume reached 100 ml. All patients were underwent complete urological examination. Intensity of OAB symptoms was assessed by 3-day voiding diaries reports.

### Results

Examination revealed disturbances in arterial, venous and capillary circulation. OAB patients experienced decreased linear speed of arterial and venous microcirculation ( $p < 0,05$ ) and decreased capillary circulation flow rate ( $p < 0,05$ ) in comparison with females from the control group. Correlation analysis revealed negative impact of hypertension, ischemic heart disease, and chronic constipation on microcirculation in the urinary bladder wall ( $p < 0,05$ ). More significant correlation was found between arterial linear speed and circulation flow rate in the urinary bladder wall and degree of pelvic organs prolapse ( $p < 0,01$ ). We observed negative correlation that signifies as more advanced degree of pelvic organs prolapse patient has as more microcirculation in the urinary bladder wall is impaired. Correlation between degree of pelvic organs prolapse and venous and capillary circulation was not observed.

Correlation between microcirculation in the urinary bladder wall in OAB patients and clinical manifestations of OAB was evaluated. Negative correlation between parameters of arterial microcirculation and number of urgencies was noted ( $p < 0,05$ ). Any reliable correlation between parameters of venous and capillary circulation and number urgencies was not revealed. Correlation between other except of urgency OAB symptoms and decreased arterial circulation was not found. Venous and capillary circulation correlated well with frequency of urination ( $p < 0,05$ ). We observed negative correlation that indicates as more venous and capillary flow rate is decreased as greater number of frequency would be.

### Interpretation of results

Reliable differences of microcirculation in the urinary bladder wall in OAB patients and females from the control group confirmed role of microcirculation disorders in pathogenesis of OAB. Revealed microcirculation disorders lead to ischemia of the urinary bladder wall which is seems to be one of the principal factors provoking OAB symptoms. Among factors affecting microcirculation pelvic organs prolapse plays a significant role. Presence of this correlation could explain the fact that women suffering from pelvic organ prolapse are more disposed to OAB symptoms development. Correlation between degree of impairment of microcirculation and intensity of OAB symptoms was observed in our research. Correlation between decreased arterial flow rate and number of urgencies was revealed as well as it between disorders in venous and capillary circulation and number of frequencies. To explain our results further investigations are recommended.

### Concluding message

Intravesical Doppler ultrasonography helps to evaluate microcirculation disorders in the urinary bladder wall in OAB patients and revealed correlation between it, intensity of OAB symptoms and degree of pelvic organs prolapse. Examination of microcirculation in the urinary bladder wall seems to be perspective for better understanding pathogenesis of OAB.

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<b>Was this study approved by an ethics committee?</b>	<b>Yes</b>
<b>Specify Name of Ethics Committee</b>	<b>Local Ethics Committee of St Petersburg State Medical Pavlov University</b>
<b>Was the Declaration of Helsinki followed?</b>	<b>Yes</b>
<b>Was informed consent obtained from the patients?</b>	<b>Yes</b>