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BLADDER PERFUSION IN INTERSTITIAL CYSTITIS: A STUDY OF BLADDER BLOOD FLOW USING LASER DOPPLER FLOWMETRY

Hypothesis / aims of study

The symptoms of interstitial cystitis (IC) occur from ischemia in the bladder. Bladder pain is especially strong as the bladder is filling in IC patients. We measured the bladder blood flow using the laser Doppler flowmetry in IC patients and investigated the role of blood flow in bladder pain.

Study design, materials and methods

Bladder perfusion was measured in sixteen female IC patients 29 to 77 years old (mean age 57.3), who conformed to the diagnostic criteria of the National Institute of Diabetes and Digestive and Kidney Disease (NIDDK). Patients were studied using an endoscopic laser Doppler flowprobe introduced through the working channel of the cystoscope, while undergoing cystoscopy and bladder hydrodistension with lumbar anesthesia. The irrigating fluid was set at a height of 80 cm above the level of the table.

Bladder blood flow was measured at the trigone and the posterior walls in the bladder at a capacity of 100ml. and at a full capacity when leakage started. The bladder pressure was measured simultaneously. Every measurement was done twice at the first and the second hydrodistension.

Results

Mean awake maximum bladder capacity was 141 ± 58ml (range 50 to 270) in the IC patients and the mean maximum capacity under anesthesia was 418 ± 246ml (range 150 to 720) ($P<0.01$).

Bladder blood flow at a capacity of 100ml and at a full capacity at the trigone was 15.5 ± 13.3ml/min and 9.5 ± 8.0ml/min, respectively at first hydrodistension ($P<0.05$). Perfusion at the posterior bladder wall was 16.9 ± 12.4ml/min and 12.3 ± 9.9ml/min, respectively at first hydrodistension ($P<0.05$).

Bladder blood flow at a capacity of 100ml and at a full capacity at the trigone was 14.2 ± 10.0ml/min and 7.8 ±6.3ml/min, respectively at the second hydrodistension ($P<0.01$). Perfusion at the posterior bladder wall was 23.2 ± 15.3ml/min and 14.1 ± 10.8ml/min, respectively at the second hydrodistension ($P<0.01$).

The compliance (bladder pressure / bladder volume) was 0.07 ± 0.06cmH2O/ml and 0.15 ± 0.11cmH2O/ml at a capacity of 100ml and at a full capacity at the first hydrodistension and that was 0.10 ±0.05cmH2O/ml and 0.12 ± 0.06cmH2O/ml at the second hydrodistension, respectively. There was no significant difference between the first and the second times.

(Statistical significance was examined by paired t test.)

Interpretation of results

The bladder blood flow decreased at full capacity compared with that at a capacity of 100ml both the first and second times of irrigating at both the trigone and the posterior bladder wall.

Bladder blood flow increased at a capacity of 100ml at the posterior bladder wall at the second hydrodistension compared with that at the first time in significant differences ($P<0.05$), but there was no change at the trigone either before or after hydrodistension.

There were no significant differences in bladder blood flow at full capacity both at the trigone and the posterior wall at the second hydrodistension compared with that of the first time.

There was no change in the compliance after repeated hydrodistension intraoperatively.

Concluding message

The data was similar to one previous report where bladder perfusion decreased with the filling of IC patients.

The recanalization after hydrodistension improved the bladder blood flow in the posterior wall to its normal capacity although over expansion brought no change in bladder perfusion. The reason why the blood flow at trigone didn’t change at the second hydrodistension compared

with the first may be because the blood flow of the posterior wall of the bladder is most affected by filling.
The ischemia of the bladder muscle that is expanded in IC patients is one of the main reasons induced filling pain for the bladder. It may be suggested that the improvement of bladder blood flow plays an important role in the relief of their pain.

References

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