

THE IMAGING OF LEAKAGE OF RED BLOOD CELLS FROM SUBMUCOSAL CAPILLARY AFTER BLADDER OVERDISTENTION -EFFECT OF α_1 BLOCKER FOR HEMATURIA AFTER ACUTE URINARY RETENTION-

Hypothesis / aims of study

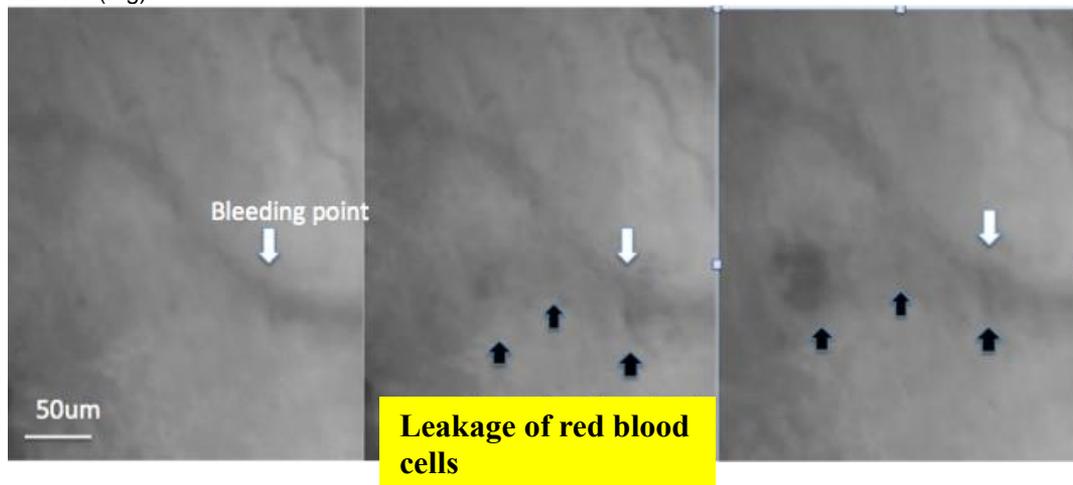
We previously reported the effect of α_1 blocker on blood flow in the submucosal capillaries of the bladder (SCB) in microcirculation of catheterization after the overdistention as a rat ischemia-reperfusion model, evaluated by pencil lens charge-coupled device microscopy system^(1,2). In the present study, we investigated the effect of α_1 blocker on hematuria as reperfusion injury in same condition and methodology, experimentally and clinically.

Study design, materials and methods

Changes in blood flow through the SCB were measured during bladder filling using the PLCMS. One week after starting infusion of either physiological saline or tamsulosin, blood flow in the bladder was halted by bladder overdistention via an infusion of physiological saline. The bladder was then emptied to be reperfused with blood. Changes in blood flow through the SCB during ischemia and reperfusion were measured using a PLCMS, and the data obtained for the pre-treatment (PT) of α_1 blocker (tamsulosin group) (n=6), the no-treatment (NT) (n=6), and sham (n=6) with only catheterization groups were compared respectively. Moreover, we investigated 56 patients with acute urinary retention on hematuria, PT and the bladder capacity at catheterization, from September 2009 to August 2012.

Results

The leakage of red blood cells from the capillary in catheterization after the overdistention could be clearly visualized using the PLCMS (Fig).



The percentage of the leakage in the α_1 blocker (tamsulosin) group decreased compared to the control group. Sham (n=6) group with only insertion of catheter did not show the micro and macrohematuria. The bladder capacity in microhematuria group (n=33) of acute urinary retention patients were significantly much larger than in non-microhematuria group (n=13) (827.8 ±427.7 vs 526.9±322.5ml, p=0.0149). The percentage of PT in non-macrohematuria group (42.9%;15/35) were much higher than in macrohematuria group (13.3%;2/15).

Interpretation of results

The results of the present study suggest that α_1 blocker protects the submucosal capillaries of the bladder from ischemic injury, experimentally and clinically. We estimated that SCB protect via reduction of hypertension of SCB by dilatation of the vascular smooth muscle and suppression of sympathetic nervous system by α_1 blocker.

Concluding message

The PLCMS image showed that leakage of red blood cells from submucosal capillary of the bladder after bladder overdistention.

References

1. Mizuno H, Yamamoto T, Okutsu H, et al. Effect of tamsulosin on bladder microcirculation in a rat ischemia-reperfusion model, evaluated by pencil lens charge-coupled device microscopy system. *Urology*. 2010;76:1266.e1-1266.e5.
2. Mine S, Yamamoto T, Mizuno H, et al. Effect of tamsulosin on bladder microcirculation in rat model of bladder outlet obstruction using pencil lens charge-coupled device microscopy system. *Urology*. 2013 Jan; 81:155-9

Disclosures

Funding: none **Clinical Trial:** No **Subjects:** ANIMAL **Species:** Rat **Ethics Committee:** the Regulations for Animal Experiments at the Nagoya University Graduate School of Medicine