

DIFFERENCES IN BLADDER SENSATION BETWEEN HEALTHY VOLUNTEERS AND PATIENTS WITH OVERACTIVE BLADDER SYMPTOMS

Hypothesis / aims of study

By means of a waterload protocol the development of bladder sensation can be studied in a non-invasive manner¹. Using this method we evaluated differences in sensation between healthy volunteers and patients with overactive bladder (OAB) symptoms.

Study design, materials and methods

Eleven volunteers and 10 OAB patients participated in this study. To ensure a constant high diuresis a water loading protocol was given. One hour before the start of the protocol they were asked to drink 1000mL of water. The water loading was continued during the whole protocol by asking them to drink another 200mL every 10 minutes, with a maximum of an extra 1000mL during the protocol. All subjects graded their bladder sensation every ten minutes and whenever they noticed any change on an empty graph with time on the X-axis and intensity of sensation on the Y-axis. The protocol ended when the subjects indicated an absolute need to void. The voided volumes were measured. This protocol was conducted 3 times with 10 days interval.

The difference in continuous variables between sessions are compared using Wilcoxon signed rank test with Bonferroni correction. Differences between patients and volunteers were tested with independent-samples test or Mann-Whitney U-test if the distributions were clearly non-normal (histogram). To adjust for correlated measurements within individuals, linear mixed models were used to evaluate the effect of study group on introspection curves and on bladder volume. A p-value ≤ 0.05 was considered as statistically significant.

Results

The mean development of bladder sensation during the third session for the patients and volunteers is shown in figure 1, which is not different from the data from session 1 and 2. The comparison between the mean curves for both groups is shown in figure 2. The difference in slope between the two average curves is 0.178 which is statistically significant ($p=0.005$).

The average natural forced diuresis for patients (6.9 ± 3.1 ml/min) was significantly lower than the diuresis for volunteers (12.1 ± 3.4 ml/min) ($p<0.001$). The volume of a first sensation was lower for patients than volunteers (91 ± 98 vs 219 ± 143 ml; $p=0.029$) but the indicated intensity of the first sensation was higher for patients than volunteers ($27\% \pm 24$ vs $8.6\% \pm 5.0$; $p<0.041$). The time at which a first sensation was noted was not different between the groups.

The mean voided volume at absolute need was 746 ± 223 mL for volunteers and 333 ± 109 mL for patients ($p<0.001$). Between the three sessions, no change was noted in forced diuresis, volume of first sensation and absolute need within each subgroup.

Figure 1 shows the introspection curves of the third session for each participant

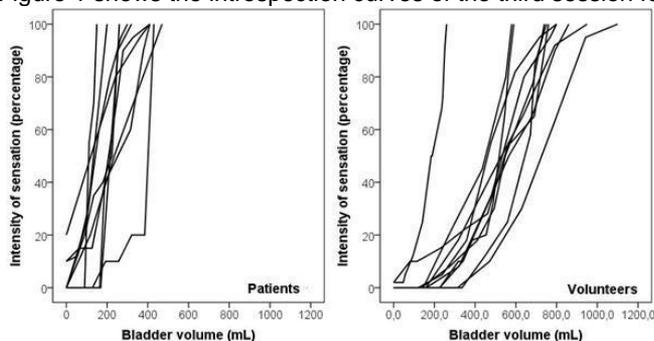
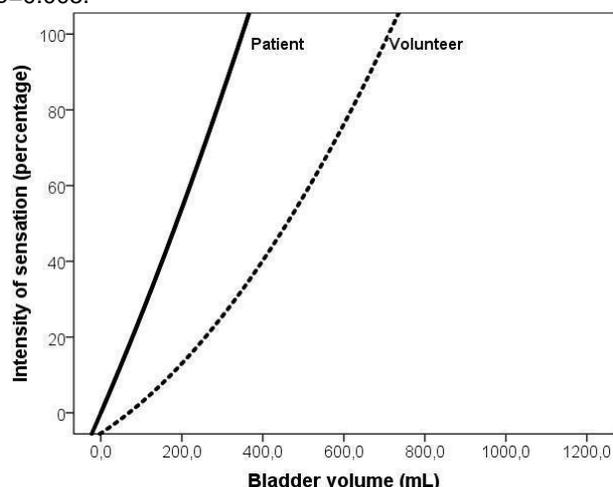


Figure 2 shows the overall curve for both study groups. The difference between these two curves is statistically significant with $p=0.005$.



Interpretation of results

Bladder sensation develops differently in volunteers than OAB patients: sensation starts at lower bladder volumes and the intensity of the sensation progresses more rapidly (eg. steeper line) in OAB patients. Although this difference has been suggested many times, our study using forced diuresis is the first to demonstrate the difference in sensation development non-invasively. The difference in diuresis after the water load protocol suggests a negative fluid balance in OAB patients. How this can influence the sensation development is currently under investigation.

Concluding message

This study shows that pattern of bladder sensation development is different for healthy volunteers and patients with OAB.

References

1. Heeringa R; van Koevinge G.A.; van Kerrebroeck P.E.V.; Gillespie, J.I.; de Wachter S.G.G: Forced diuresis as a tool for the non-invasive evaluation of bladder sensation; *Neurourol Urodyn* 29: 909, 2010.
2. Heeringa, R., van Koevinge, G. A., Winkens, B., van Kerrebroeck, P.E.V., de Wachter, S.G.G. : Degree of urge, perception of bladder fullness and bladder volume: how are they related? *J Urol*, submitted January 2011

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Is this a clinical trial?	Yes
Is this study registered in a public clinical trials registry?	Yes
Specify Name of Public Registry, Registration Number	Clinical Trials.gov, NCT01114412
Is this a Randomised Controlled Trial (RCT)?	No
What were the subjects in the study?	HUMAN
Was this study approved by an ethics committee?	Yes
Specify Name of Ethics Committee	Ethical Committee of the Maastricht University Medical Centre
Was the Declaration of Helsinki followed?	Yes
Was informed consent obtained from the patients?	Yes