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## Preventive Effect of Hydrogen Water on the Development of Detrusor Overactivity in a Rat Model of Bladder Outlet Obstruction

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### Abstract

**Purpose:** Bladder ischemia and oxidative stress contribute to the pathogenesis of bladder dysfunction caused by bladder outlet obstruction. H<sub>2</sub> reportedly acts as an effective antioxidant. We investigated whether oral ingestion of H<sub>2</sub> water would have a beneficial effect on bladder function in a rat model of bladder outlet obstruction.

**Materials and methods:** H<sub>2</sub> water was made by dissolving H<sub>2</sub> gas in ordinary drinking water using a hydrogen water producing apparatus. The bladder outlet obstruction model was surgically induced in male rats. Rats with obstruction were fed H<sub>2</sub> water or ordinary drinking water. On week 4 postoperatively cystometry was performed. Oxidative stress markers and the bladder nerve growth factor level were determined. Bladder tissues were processed for pharmacological studies and histological analysis.

**Results:** The micturition interval and micturition volume significantly decreased in obstructed rats given ordinary drinking water. These decreases were significantly suppressed by oral ingestion of H<sub>2</sub> water. Increased post-void residual volume in obstructed rats was significantly reduced by H<sub>2</sub> water. Obstruction led to a significant increase in bladder weight, oxidative stress markers and nerve growth factor. H<sub>2</sub> water significantly suppressed these increases without affecting bladder weight. There was no significant difference in histological findings between rats with bladder obstruction given H<sub>2</sub> water and ordinary drinking water. Decreased responses of detrusor muscle strips from obstructed bladders to KCl, carbachol and electrical field stimulation were reversed by H<sub>2</sub> water ingestion.

**Conclusions:** Results suggest that H<sub>2</sub> water could ameliorate bladder dysfunction secondary to bladder outlet obstruction by attenuating oxidative stress.

**Keywords:** bladder neck obstruction; drinking water; hydrogen; oxidative stress; urethra.

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