

Development of bladder control in a population that is potty trained early – A follow-up study in
Vietnamese children

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This thesis is based on the following papers, referred to in the text by their Roman numerals

- I Thi Hoa Duong, Ulla-Britt Jansson, Gundela Holmdahl, Ulla Sillen, Anna-Lena Hellstrom. Development of bladder control in the first year of life in children who are potty trained early. *J Pediatr Urol*, 2010. 6(5): p. 501-5.
- II Thi Hoa Duong, Ulla-Britt Jansson, Anna-Lena Hellstrom. Vietnamese mothers' experiences with potty training procedure for children from birth to 2 years of age. *J Pediatr Urol*. Received 19 April 2012; accepted 29 October 2012. Published online 26 November 2012. e-pub ahead of print Nov. 2012.
- III T.H. Duong, U.-B. Jansson, G. Holmdahl, U. Sillen, A.-L. Hellstrom. Urinary bladder control during the first 3 years of life in healthy children in Vietnam - A comparison study with Swedish children. *J Pediatr Urol*. 2013 Jun 8. doi:pii: S1477-5131(13)00119-8.10.1016/j.jpuro.2013.04.022. [Epub ahead of print]
- IV Thi Hoa Duong, Gundela Holmdahl, Duy Viet Nguyen, Ulla Sillén, Ulla-Britt Jansson, Anna-Lena Hellström. Micturition pattern in young boys with posterior urethral valves -a pilot study in boys who are potty-trained from infancy. *Submitted*

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Development of bladder control in a population that is potty trained early –
A follow-up study in Vietnamese children

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The overall purpose of this thesis was to advance the knowledge of bladder function development in children with the focus on early onset of potty training.

Specific aims:

- To describe, longitudinally, the development of the micturition pattern in healthy children who are potty trained early, from birth to the age of three (Papers I and III)
- To describe mothers' experiences of an ongoing potty training process in healthy children and how children communicate their needs (Paper II)
- To compare, longitudinally, the voiding pattern and emptying ability of healthy children who are potty trained early with children who are potty trained late (Paper III)
- To investigate if potty training already from infancy can affect bladder dysfunction in boys with posterior urethra valves (PUV) (Paper IV)

Participants: Papers I-III. Forty-seven healthy children, 0-3 years of age, were followed longitudinally every 3 months. Paper IV. Seventeen children born with (PUV), 0-4 years of age, 18 months follow-up.

Methods: Quantitative follow-up using 4-hour voiding observation and qualitative interviews. Comparisons are made between age groups and between healthy children and children with PUV.

Results: Infants in Vietnam rarely used diapers; daily potty training was applied to most of them from the age of 3 months and daily to all the children at the age of 12 months. Compared with the Swedish children, none had started potty training at that age (Papers I and III). By the age of 24 months, potty training had been completed for 98%. In the Swedish group, 5% had started daily potty training by the age of 24 months and by the age of 36 months 55% had completed potty training. The difference was significant ($p < 0.001$). Potty training performed daily affected the emptying ability positively: at the age of 9 months, no residual urine was found in the healthy children. These results differ significantly from the group of Swedish children. The frequency of voiding was lower in the Vietnamese children than in the Swedish group. Bladder volumes increased by age in both groups, but in the Vietnamese children it was significantly lower than in the Swedish children. The potty-training process showed communication developing between the mother and child (Paper II). In the child's first months of life, the mothers tried to recognize signs of the need to urinate. The mothers supported these signs using a whistling sound at certain times as a reminder. Furthermore, findings from the 4-hour voiding observation showed few signs of dysfunctional bladder in the Vietnamese boys with PUV, including residual urine even if there were significant more of dysfunction compared with the healthy Vietnamese boys (Paper IV).

Conclusions: It is possible to perform potty training in infant children by learning to communicate needs. Potty training performed daily affected the emptying ability positively in all children including the boys with PUV: at the age of 9 months, no residual urine was found in healthy children. The frequency of voiding and the bladder volumes were lower in the Vietnamese children than in the Swedish group. Early potty training reduced the symptoms of bladder dysfunction in boys with PUV.

Key words: Bladder, children, communication, content analysis development, potty training, reference values, signs urethra valves, urination

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