

FUNCTION OF THE URINARY TRACT IN 134 ADULT PATIENTS WITH SPINAL DYSRAPHISM: A CROSS-SECTIONAL STUDY

Hypothesis / aims of study

There is a paucity of evidence with regard to long-term outcomes of the urinary tract in spinal dysraphism (SD). A lack of proper conducted urodynamic studies and investigation of the upper tract greatly impairs the quality of available evidence.[1,2] The aim of this study was to investigate the long-term outcomes of bladder function and renal function in adults with both open spinal dysraphism (OSD) and closed spinal dysraphism (CSD) and to evaluate differences in outcomes between several patient categories.

Study design, materials and methods

For this study, Ethical Review Board approval was obtained. All patients visiting our specialized outpatient clinic for adults with spinal dysraphism (aged > 18 years) between January 2011 and March 2013 were invited to undergo evaluation of both the upper and lower urinary tract. After comprehensive history taking, ultrasonography of bladder and kidneys, serum creatinine and estimated glomerular filtration rate (eGFR)-assessment using the Cockcroft-Gault-formula, ⁹⁹Tm-DMSA-scintigraphy/SPECT and video urodynamic studies (VUDS) were done. Continence was scored, except for patients with an indwelling catheter or ileal conduit. Renal functioning was scored according to the Chronic Kidney Disease (CKD)-classification. Two categories were defined: CKD 0 (eGFR > 90 ml/min., no evidence of unilateral kidney damage) versus CKD 1-5 (any degree of renal damage; CKD 5 = end-stage renal disease). Based upon UDS, bladder compliance (poor defined as <10 ml/cm H₂O)[3], end-filling-pressure (EFP, high EFP defined as ≥ 40 cm H₂O), cystometric bladder capacity (low capacity defined as <300 ml) and presence of detrusor overactivity (DOA) were determined. Patients were subdivided by having open or closed SD, the presence of hydrocephalus, and being wheelchair-bound or not. To study the influence of these factors on urinary tract outcomes, univariable and subsequent multivariable binary logistic regression was used, with $p < 0.05$ regarded as statistically significant at multivariable analysis. This was done using SPSS® version 20.0.

Results

In all, 134 patients who visited the outpatient clinic underwent a work-up. Median age at time of follow-up was 32.2 years (interquartile range 24.7-44.2). The majority of patients had OSD (67.9%). Of all patients, 53.7% had hydrocephalus, 41.8% were wheelchair-bound. CI(S)C was used for bladder emptying in 76.9%, whereas 11.3% of patients voided spontaneously without any aids. Indwelling catheters were used by 4.5%; three patients had an ileal conduit; 53.7% of patients were incontinent. Usage of containment material was reported by 29.9%. In the group as a whole, poor compliance was seen in 20.0%, high EFP in 18.3%, small cystometric bladder capacity in 17.9% and DOA in 60.2%. By multivariable analysis, being wheelchair-bound gave a significantly higher risk of being incontinent ($p = 0.026$; OR 2.73). Being in a wheelchair also gave a higher risk of having poor compliance ($p = 0.009$; OR 4.6). The categorized compliances per subgroup are shown in **Figure 1**. A further specification of incontinence per time-unit and per subgroup is shown in **Figure 2**.

Completely preserved kidneys were found in 57/130 (43.8%) patients. CKD5 was present in 3/134 patients (2.2%), with two having undergone previous renal transplantation, one currently on haemodialysis and one on peritoneal dialysis. For renal damage, no significant differences between the subgroups were found; results can be seen in **Figure 3**.

Interpretation of results

In adult patients with SD incontinence is frequently found, where end-stage renal disease is rare these days. Being wheelchair-bound predisposed to incontinence and poor compliance. It is matter for debate to what extent adults with SD are bothered by their incontinence. Furthermore, the relevance of some urodynamic and renal findings can be questioned. Therefore, more research is needed. The favourable results with regard to renal functioning may be due to survival-bias.

Figure 1. Categorized compliance per subgroup. CSD = closed spinal dysraphism; HC = hydrocephalus; OSD = open spinal dysraphism; WC = wheelchair.

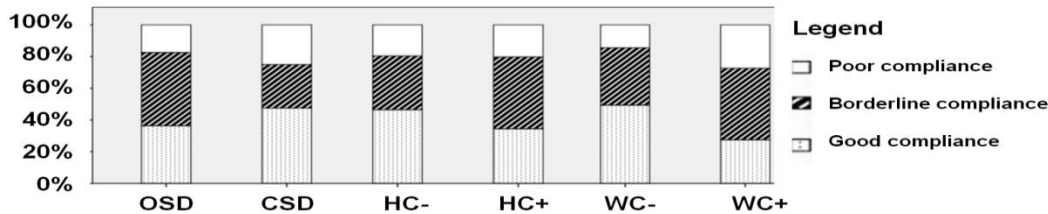


Figure 2. Incontinence quantified per time-unit, divided by subgroup.

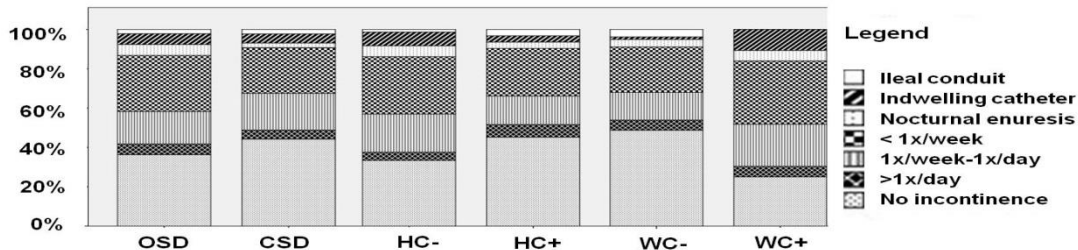
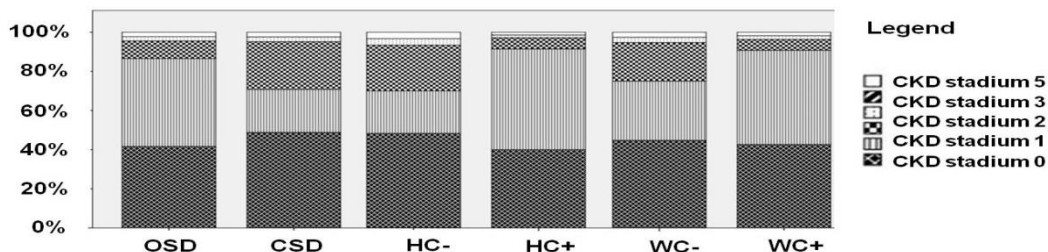


Figure 3. Renal function scored by the CKD-classification per subgroup.



Concluding message

In this cohort of adult patients with SD, Incontinence was a frequent finding. Urodynamically, detrusor overactivity was common, but pressures were generally safe. Being wheelchair-bound increased the chance of being incontinent and having poor compliance. Renal function was generally well preserved.

References

1. Veenboer PW, Bosch JL, Van Asbeck FW, De Kort LM. Upper and lower urinary tract outcomes in adult myelomeningocele patients: a systematic review. PLoS One. 2012;7(10):e48399. doi: 10.1371/journal.pone.0048399. Epub 2012 Oct 31
2. Veenboer PW, Bosch JL, Van Asbeck FW, De Kort LM. Paucity of evidence regarding urinary tract outcomes in occult spinal dysraphism: a systematic review. submitted
3. Gammie A, Abrams P. Bladder compliance – a review of practice. Non-discussion poster at ICS 2009. <http://www.icsoffice.org/Abstracts/Publish/47/000571.pdf>. Retrieved at January 31, 2012.

Disclosures

Funding: This study was in part funded by Hoogland Medical. **Clinical Trial:** No **Subjects:** HUMAN **Ethics Committee:** METC UMC Utrecht (Medical Ethical Committee University Medical Center Utrecht) **Helsinki:** Yes **Informed Consent:** Yes