

## CASE REPORT

# Urodynamic or video-urodynamic assessment in patients with spinal cord injury: this is not a question!

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**Study design:** Case report.**Objectives:** The objective of this study was to demonstrate the additional value of combined video-urodynamic investigations compared with urodynamic investigation alone in patients with neurogenic lower urinary tract dysfunction due to spinal cord injury (SCI).**Setting:** The study was conducted in a spinal cord injury rehabilitation center in Switzerland.**Methods:** A patient with complete SCI since 1984 evacuated the bladder by reflex voiding. Owing to the lack of clinical symptoms, he refused urologic controls for 15 years. In July 2014, he was referred to our hospital with acute septicemia.**Results:** The hydronephrosis responsible for the septicemia was successfully treated by intravenous antibiotics and ureteral stenting. Subsequently, a neuro-urologic assessment was performed. Urodynamic examination was normal. Video-urodynamics, however, revealed massive morphologic alterations of the lower and upper urinary tracts, which were responsible for the septicemia.**Conclusion:** Our case demonstrates the necessity of regular video-urodynamic controls even in asymptomatic SCI patients. Persons using triggered voiding may be at a higher risk for secondary changes, as a sustained detrusor pressure is necessary for this technique. *Spinal Cord* (2015) **53**, S22–S24; doi:10.1038/sc.2014.224

## INTRODUCTION

Virtually every patient with spinal cord injury suffers from neurogenic lower urinary tract dysfunction (NLUTD). The type of NLUTD depends, among others, on the level and completeness of the lesion.<sup>1</sup> In particular, neurogenic detrusor overactivity in combination with detrusor sphincter dyssynergia carries a high risk for renal damage.<sup>1</sup> The aim of NLUTD treatment is to protect renal function, to prevent secondary complications and to ensure quality of life.<sup>2</sup> As changes in lower urinary tract function are frequent in patients with NLUTD,<sup>3</sup> regular neuro-urological examination is mandatory.<sup>2,4</sup> Video-urodynamics is the 'gold standard' to evaluate a patient with NLUTD. Intuitively, urodynamic investigation without fluoroscopy is of lesser diagnostic value, as it cannot combine functional results with morphologic findings. Nonetheless, there are no studies evaluating the additional value of video-urodynamics, and, as the technical equipment is not available everywhere, urodynamics alone is used for the diagnosis of NLUTD. We describe a case that impressively underlines the additional value of simultaneous fluoroscopic imaging.

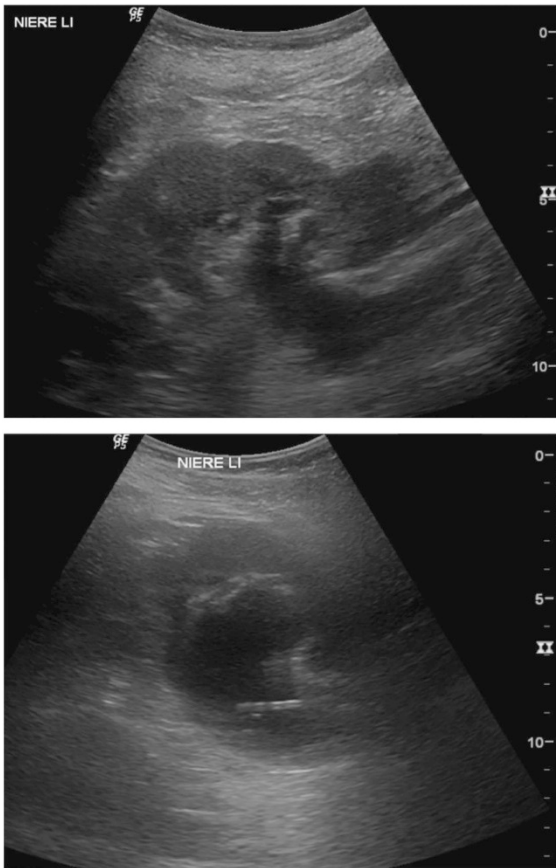
## CASE REPORT

In July, 2014, a 54-year-old male patient with complete tetraplegia, lesion level below C5 (AIS A) since 1984, was admitted to our hospital with acute urosepsis. For bladder management, he performed triggered reflex voiding. For 15 years, the patient refused any urologic control, as he did not have any clinical symptoms. Initial clinical and laboratory examination revealed a severe septicemia (leukocytes:  $19.4 \times 10^9 \text{ l}^{-1}$  C-reactive protein:  $48 \text{ mg l}^{-1}$ , procalcitonin:  $0.99 \text{ ng ml}^{-1}$ )

with renal insufficiency (glomerular filtration rate:  $35 \text{ ml min}^{-1}$ ). The initial ultrasound revealed a massive dilatation of the left kidney (Figure 1a). A ureteral stent was inserted, antibiotic treatment was initiated and the patient was transferred to the intensive care unit. After improvement of general health, a video-urodynamic examination was performed. Urodynamics revealed a normal bladder capacity (450 ml), with unaffected compliance ( $87 \text{ ml cm}^{-1} \text{ H}_2\text{O}$ ) and no detrusor overactivity during the filling phase. After triggering, the bladder was emptied with a maximum detrusor pressure of 102 cm  $\text{H}_2\text{O}$  and a detrusor leak point pressure of 66 cm  $\text{H}_2\text{O}$  despite the presence of detrusor sphincter dyssynergia (Figure 2). Despite these seemingly acceptable parameters, the corresponding fluoroscopy demonstrated severe morphologic alterations of the lower and upper urinary tracts, with multiple diverticula, chronic dilatation of the left kidney and a thickened bladder wall with compression of the distal ureter over a distance of 1.8 cm, which was responsible for the obstruction of the left kidney (Figures 3a and b). No infravesical obstruction by prostatic enlargement was detected. Owing to renal insufficiency and the irreversible changes of the urinary tract, the patient underwent cystectomy and ileal conduit formation.

## DISCUSSION

This case highlights the utmost importance of regular video-urodynamic controls to detect changes in the NLUTD. Only on the basis of the functional, as well as on the morphologic, findings treatment can be adequately modified to prevent deterioration of the upper urinary tract. In the mentioned case, the most probable reason for renal damage is a hypertrophic detrusor wall leading to obstruction



**Figure 1** (a and b) The initial ultrasound revealed a dilatation of the left kidney. (b) The result after insertion of the ureter stent, with a persisting dilatation of the left kidney.

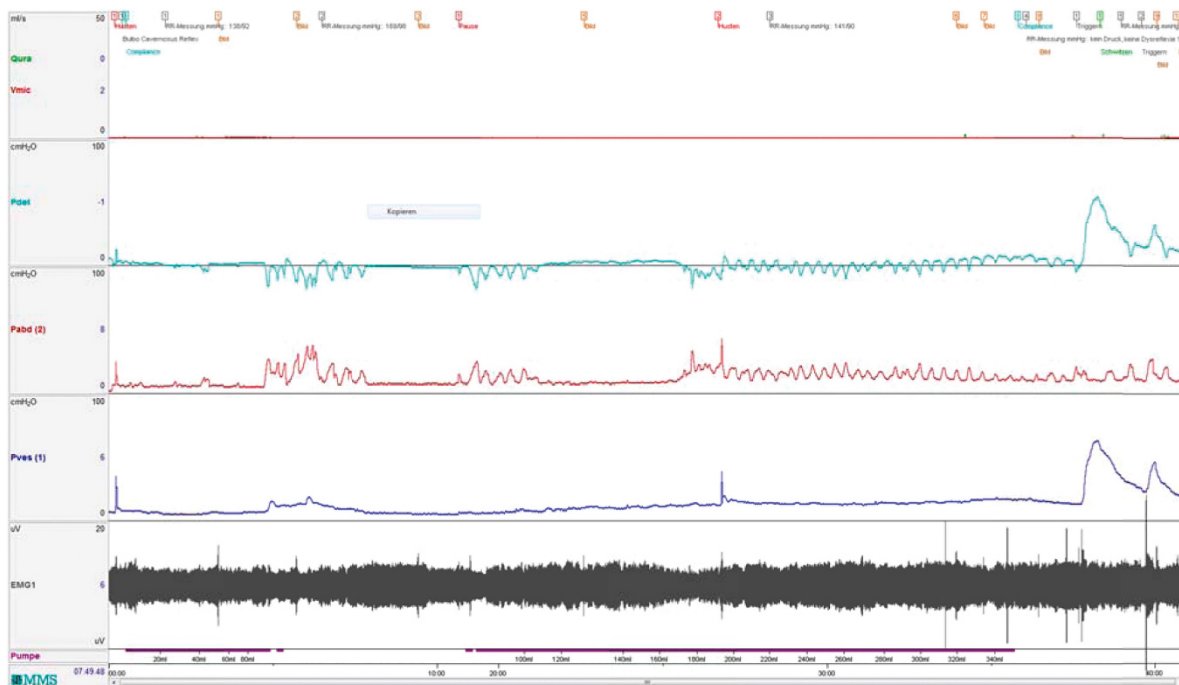
of the upper urinary tract. In our opinion, triggered detrusor activity, which was used for bladder evacuation 6–8 times per day for a long period of time has significantly contributed to these secondary morphologic changes, as it may lead to unnoticed detrusor thickening and fibrosis. Strikingly, urodynamics alone could not identify a high risk for upper urinary tract damage, as neither compliance nor detrusor pressure during the storage phase was outside normal ranges.

According to the relevant guidelines, video-urodynamics is the best available tool for the assessment of LUT function today.<sup>2</sup> However, it is time-consuming and it carries the risk of urinary tract infection.<sup>4</sup> Thus, patients tend to avoid this examination. To ensure compliance, patients must be thoroughly informed about the risks and irreversibility of renal damage.

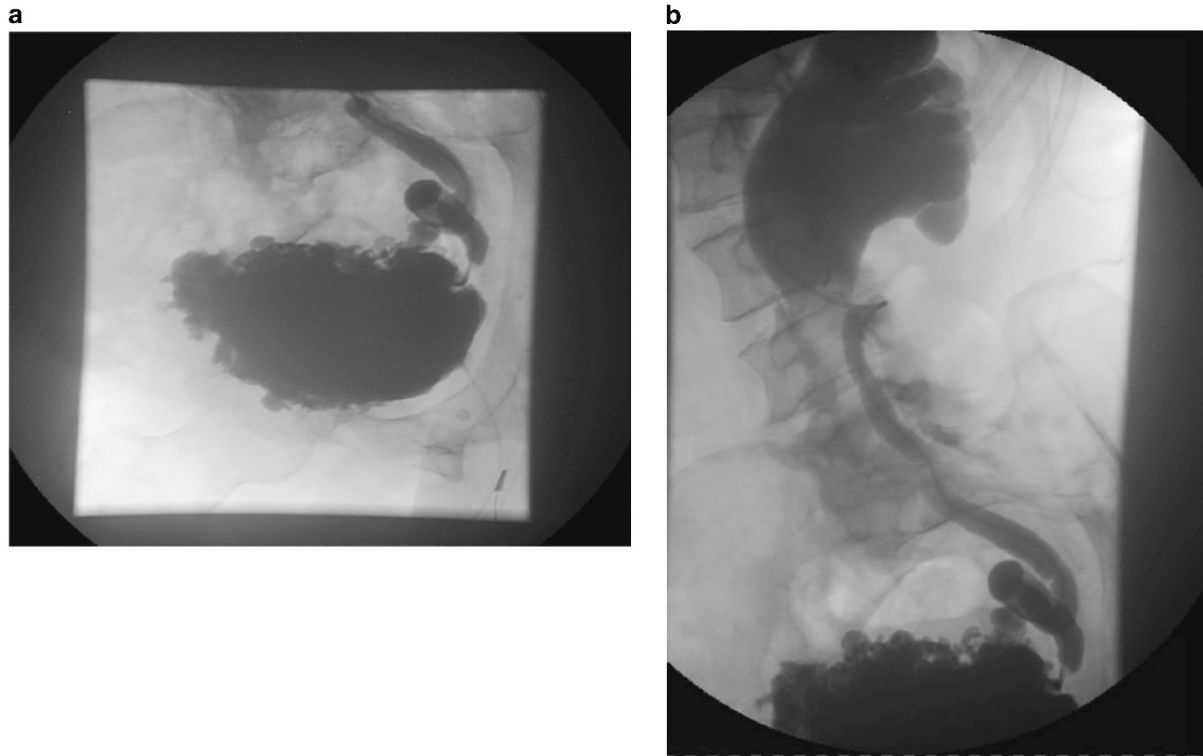
In particular, tetraplegic patients seem to be at a higher risk for upper urinary tract deterioration. Owing to impaired dexterity, triggered reflex micturition instead of intermittent catheterization is an alternative for male tetraplegic patients in order to avoid permanent indwelling catheters with their well-known associated risks.<sup>2</sup> As not only disease-related changes occur, but also age-related obstructive prostatic enlargement may aggravate functional obstruction by detrusor sphincter dyssynergia, regular controls are strongly recommended to detect potential changes and to adapt bladder management.

### CONCLUSION

Regular video-urodynamic follow-up in spinal cord injury patients is mandatory also in asymptomatic patients to prevent irreversible deterioration of the urinary tract. Urodynamic controls alone do not seem to be sufficient in all patients. Especially patients with detrusor sphincter dyssynergia using stimulation of detrusor pressure for bladder management, as in our patient, may be at a higher risk for renal failure despite urodynamic controls. Therefore, we recommend regular video-urodynamic investigation in patients with spinal cord injury.



**Figure 2** The video-urodynamic assessment indicated a normal bladder capacity, with unaffected compliance and no observable detrusor overactivity.



**Figure 3** (a) Fluoroscopy of the lower urinary tract during the video-urodynamic assessment. (b) Complete deterioration of the left kidney.

#### CONFLICT OF INTEREST

The authors declare no conflict of interest.

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