CASE REPORT

Electromyography needle breaks within the perineum: a rare complication of urodynamics not reported earlier and lesson learnt

Kawaljit Singh, Ashok Kumar Sokhal, Ashok Kumar Gupta, Ankur Bansal

Department of Urology, King George Medical University, Lucknow, Uttar Pradesh, India

Correspondence to
Dr Kawaljit Singh,
kskaura@gmail.com

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SUMMARY

The urodynamic study (UDS) is nowadays frequently used by the urologist worldwide to aid in the diagnosis of various urological disorders and electromyography (EMG) is an integral part of it. EMG is performed either by using surface electrodes or concentric needle electrodes. We report an unusual case in which the concentric EMG needle was accidentally broken within the perineum of a man aged 60 years undergoing urodynamics. The needle was removed urgently in a minimally invasive manner under the C-arm guidance without any associated morbidity. This case report highlights the need of urgent intervention in such rare scenarios to help prevent any associated infectious complications. Also, vigilant behaviour during the procedure (and after) to detect such incidents along with detailed patient counselling should be included in the patient management protocol of patients undergoing UDS.

BACKGROUND

Since the use of term urodynamics by David Davis in 1954, the understanding of this study has significantly improved over time, so that the urodynamic study (UDS) is now considered an important tool in the armamentarium of the urologist.¹ Electromyography (EMG) is an important part of multichannel UDS and is being increasingly performed these days. EMG is performed either by using surface electrodes or concentric needle electrodes. We report a rare scenario in which EMG needle got broken within the perineum of the patient during UDS.

CASE PRESENTATION

A man aged 60 years with a history of transurethral resection of prostate (TURP) 1 year earlier presented with irritative lower urinary tract symptoms (LUTS) from the time of surgery which exaggerated

for last few months. Digital rectal examination showed clinical grade I prostate,² irregular, non-nodular, with decreased anal tone. The patient was non-diabetic and non-hypertensive. His symptoms did not respond to α -blockers. The patient had one episode of acute urinary retention for which the Foley catheter (16 French) was placed followed by a history of failed voiding trial. Routine blood investigations, including serum creatinine (0.9 mg/dL), were in normal range. Urine culture was sterile and serum prostate-specific antigen was 2.3 ng/L. Uroflowmetry showed a maximum flow rate of 08 mL/s at a voided volume of 190 mL. Ultrasonography of the kidney, ureter and urinary bladder showed mildly enlarged prostate (47×49×32 mm) weighing 22 g with increased postvoid residual urine (260 mL) and thickened bladder wall with the normal upper tract. In view of recurrence of symptoms within 1 year of TURP, failed voiding trial and significant postvoid residual urine, the patient was planned for UDS including EMG as per the literature recommendation.³

Multichannel UDS is performed at our centre by using the Medtronic Logic G/2 model. The procedure is performed in the sitting position (except in paraplegics/quadruplegics). The first step is retrograde filling cystometry at the rate of 80 mL/min. An 8 Fr dual micro-tipped catheter with an infusion port is placed with the distal transducer in the bladder. A Foley balloon inflated up to 2–3 mL is placed in the rectum and connected to a transducer to measure the intra-abdominal pressure.

EMG is performed using an autoclavable concentric needle electrode (Alpine Biomed) of 26 G and 30 mm size (figure 1). The needle is inserted just to the right of the midline raphe, at the midpoint between the root of scrotum and anal verge. The

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Figure 1 The concentric electromyography (EMG) needle used for EMG study.

Figure 2 The broken EMG needle (arrow showing the point of break).

Figure 3 X-ray pelvis anteroposterior and lateral view showing the broken EMG needle.

patient is placed in the sitting position and UDS is completed. At the end of the study, urethral and rectal catheters are removed. In this patient, during the removal of the EMG needle electrode, the UDS technician noticed that the needle was broken at the base and the rest of the needle was left within the perineum of the patient (figure 2). The needle was not palpable percutaneously. Immediately, plain X-ray pelvis was taken which showed the broken part of the needle in the perineum region (figure 3). The patient was immediately shifted to the minor operation theatre and needle position was traced under the C-arm (figure 4). Local anaesthetic (lignocaine 2%) was injected at the presumptive site of needle insertion and a small (0.5×0.5 cm) stab was given. Under the C-arm guidance, the needle was removed with the help of mosquito artery forceps (figures 5 and 6). The wound was so small that no suturing was required and the patient was sent home. The final urodynamic finding of the patient was detrusor overactivity with poor compliance with high pressure low flow.

OUTCOME AND FOLLOW-UP

The patient presented after 2 weeks and had completely healed perineal wound.

DISCUSSION

Since the time of its inception in early 1950s, the UDS is now frequently used by the urologists worldwide to aid in the diagnosis of urological disorders. At our centre, around 450–500

urodynamic procedures are performed per year for various causes. UDS is the dynamic study, which comprises a number of tests that collectively or individually can be used to gain information about urine storage and evacuation.⁴ The American Urological Association (AUA) has given clear guidelines regarding the indications of UDS. In patients with LUTS, UDS is performed in voiding abnormality and female patient. Similarly, UDS is also indicated in select cases of stress urinary incontinence, mixed urinary incontinence and neurogenic bladder.⁵ Disadvantage of multichannel UDS includes its cost, invasiveness, patient discomfort and risk of infection.

EMG is a preferred test to evaluate pelvic floor muscles and striated urethral sphincter and form an integral part of UDS. In the UDS setting, EMG records the depolarisation of these muscles when they are contracted using surface or needle electrodes.⁶ Since it is difficult to accurately predict when EMG information is required to explain voiding abnormalities, EMG is often included in multichannel pressure-flow UDS studies.⁷

EMG can be performed using surface patch or concentric needle electrodes. There is a controversy over which technique is better than the other. Concentric needle electrodes have difficulties associated with correct needle placement, patient discomfort and limited patient mobility during testing, resulting in the preferred use of perineal surface patch electrodes. But

Figure 4 C-arm view showing the broken needle being removed with artery forceps.

Figure 5 Intraoperative view showing the broken needle remnant being removed with the help of the C-arm.

Figure 6 Broken EMG needle remnant after removal.

concentric needle electrodes remain the standard for measuring neuromuscular activity due to their ability to isolate electrical activity from specific muscle fibres within a 0.5 mm radius of the tip. A study by Barber *et al*⁸ has shown that the separate innervation of the levator ani muscles and urethral sphincter makes the perineal measurements of levator ani by the use of surface electrodes less accurate in measurement of striated urethral sphincter muscle activity. Similarly, a study by Mahajan *et al*⁹ concluded that concentric needle electrodes are better interpreted than surface patch electrodes for determining motor unit quiescence during voiding.

Our centre caters mainly to the poor strata (lower socioeconomic status) patients where patients are provided full treatment at the government expense. Thus, mainly, the reusable concentric EMG needle is used for UDS as it is cost-effective, reusable and better interprets EMG findings as shown by the abovementioned studies. But such an incident of needle break within the perineum was never reported earlier at our institute.

Although there are few case reports available in the literature describing the self-inflicted behaviour of needle insertion in the perineum either for sexual gratification¹⁰ or in psychiatric patients,¹¹ no case of accidental breakage of EMG needle during UDS has been reported in the literature.

This case was an important learning lesson for us. Following this event, we made certain stringent changes in our patient management protocol of patients undergoing UDS. First, a thorough check-up of the needle electrode is performed by the on duty resident in addition to the concerned technician before every use; a single needle is reused multiple times as it is economical and practical in government-run institution in a developing country, like us. Second, the patient is explained before the procedure about this rare but possible complication of needle breakage during UDS and a detailed consent is taken before the procedure. We also thought of doing plain X-ray pelvis in the post-UDS period in every patient but abandoned this idea due to the risk of radiation exposure. Thus, the main

purpose of reporting this case is to highlight this rare complication that can occur in a relatively safer procedure like EMG, which if not urgently managed can result in significant morbidity in the form of exploration and infectious complications. Hence, strict vigilant attitude of the concerned resident/technician should be encouraged to detect any needle abnormality (on repetitive use) before procedure, intraprocedure and postprocedure. Also, disposable needles can be used in the setups where patients can afford.

Learning points

- ▶ Concentric EMG needle can accidentally break within the patient perineum during the urodynamic study (UDS).
- ▶ Urgent intervention (preferably minimal invasive) should be performed to remove the needle electrode.
- ▶ If left for longer duration, it can result in potential morbidity due to infectious complications.
- ▶ Thorough preprocedure needle check and vigilant behaviour regarding this uncommon complication during and after the procedure should be encouraged.
- ▶ Preprocedure detailed counselling of the patient regarding this complication should be an integral part of patient management protocol during UDS.

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REFERENCES

- 1 Davis DM. The hydrodynamics of the upper urinary tract (urodynamics). *Ann Surg* 1954;140:839.
- 2 Romero FR, Romero AW, Brenny FT, *et al*. The prostate exam. *Health Educ J* 2012;71:239–50.
- 3 Tanaka Y, Masumori N, Itoh N, *et al*. Is the short-term outcome of transurethral resection of the prostate affected by preoperative degree of bladder outlet obstruction, status of detrusor contractility or detrusor overactivity? *Int J Urol* 2006;11:1398–404.
- 4 Abrams P, Blaivas JG, Stanton S, *et al*. ICS standardisation of terminology of lower urinary tract function. *Scand J Urol Nephrol* 1988;114:5–19.
- 5 Winters JC, Dmochowski RR, Goldman HB, *et al*. Urodynamic studies in adults: AUA/SUFU guideline. *J Urol* 2012;188(6 Suppl):2464–72.
- 6 Abrams P, Blaivas JG, Stanton SL, *et al*. The standardization of terminology of lower urinary tract function recommended by the international continence society. *Int Urogynecol J Pelvic Floor Dysfunct* 1990;1:45–58.
- 7 Sakakibara R, Fowler CJ, Hattori T, *et al*. Pressure-flow study as an evaluating method of neurogenic urethral relaxation failure. *J Auton Nerv Syst* 2000;80:85–8.
- 8 Barber MD, Bremer RE, Thor KB, *et al*. Innervation of the female levator ani muscles. *Am J Obstet Gynecol* 2002;187:64–71.
- 9 Mahajan ST, Fitzgerald MP, Kenton K, *et al*. Concentric needle electrodes are superior to perineal surface-patch electrodes for electromyographic documentation of urethral sphincter relaxation during voiding. *BJU Int* 2006;97:117–20.
- 10 Floyd MSJr, Stubington SR. Deliberate self-insertion of a perineal needle for sexual pleasure: a new form of autoerotic behavior? *Arch Sex Behav* 2013;42:335–6.
- 11 Nock MK. Why do people hurt themselves? New insights into the nature and functions of self-injury. *Curr Dir Psychol Sci* 2009;18:78–83.

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