

## BILATERAL PELVIC FLOOR EMG: A USEFUL ADJUNCT TO URODYNAMIC PRACTICE

### Hypothesis / aims of study

Pelvic floor asymmetry as judged by clinical examination is common in patients with urinary symptoms including frequency, urgency, incontinence and incomplete bladder emptying. We have observed improved clinical outcomes with Interstim® therapy when the lead is implanted on the less versatile side. To explore the role of asymmetry, we have added an additional module to our urodynamic equipment (MMS, Medical Measurement Systems®) to allow simultaneous bilateral recording of pelvic floor EMG during video urodynamic studies including filling and voiding phases. Bilateral EMG provides additional quantitative data about neuromuscular function and might help guide clinical decision making.

### Study design, materials and methods

In June 2009, a second EMG module (model PE05) was added to the MMS Solar Silver (750BN51) urodynamics machine. Since that time all video-urodynamic studies have included simultaneous bilateral recordings of pelvic floor EMG using standard methodology and surface electrodes. Signal acquisition rate 60Hz. No changes were needed to the consent which contains language about EMG recordings. Care is used to clean and prepare the skin before applying patch electrodes which are placed equidistant from the anal margin. Each side has a positive and negative electrode placed and secured with tape and an independent grounding electrode placed on the medial aspect of the ipsilateral knee. The EMG channels are color coded and marked to designate laterality. To date, we have studied 215 patients with this method.

### Results

Technically satisfactory recordings were obtained in 162 patients. Displacement and loss of signal was a common problem at first, but less so after improved securing of the leads. Fifty-two patients (33%) demonstrated evidence of significant asymmetry during filling and/or voiding studies. Asymmetrical features included abnormal recruitment patterns including spontaneous intermittent burst activity with “fish bone” appearance present only on one side and not the other. Unilateral high amplitude involuntary activity was noted in some patients and unilateral failure of relaxation during the voiding effort was also observed. Figures demonstrate examples of normal (1) and abnormal (2) bilateral EMG patterns.

### Interpretation of results

In at least a third of patients, bilateral EMG contributed useful information about asymmetry that was not always appreciated on clinical examination. We will choose to place the lead on the same side as the recorded EMG abnormalities. We have used only qualitative and not quantitative measures in this study and we have focused only on aspects of asymmetry. Further refinement of the methodology is needed including increased signal acquisition (>2 KHz) and quantitative analysis. This preliminary work with bilateral EMG recordings does provide new insights about the initial condition of our patients and might improve our understanding of pelvic floor dysfunction.

### Concluding message

The pelvic floor, like the face, has an innervation only from the right and the left. As we use implantable technology such as Interstim®, it is appropriate to examine whether bilateral EMG measurements might offer an advantage in helping to target the therapy for improved outcomes. We now use this information to help guide clinical decision making and the side of Interstim® lead placement. Based upon preliminary data and experience, we strongly assert the utility of bilateral EMG recording at the time of urodynamic study. We urge urodynamic equipment manufacturers to consider increasing signal acquisition rates to optimize EMG recording and making bilateral EMG capability more readily available for clinical and research use.

Figure 1: Bilateral EMG tracing with symmetrical profile

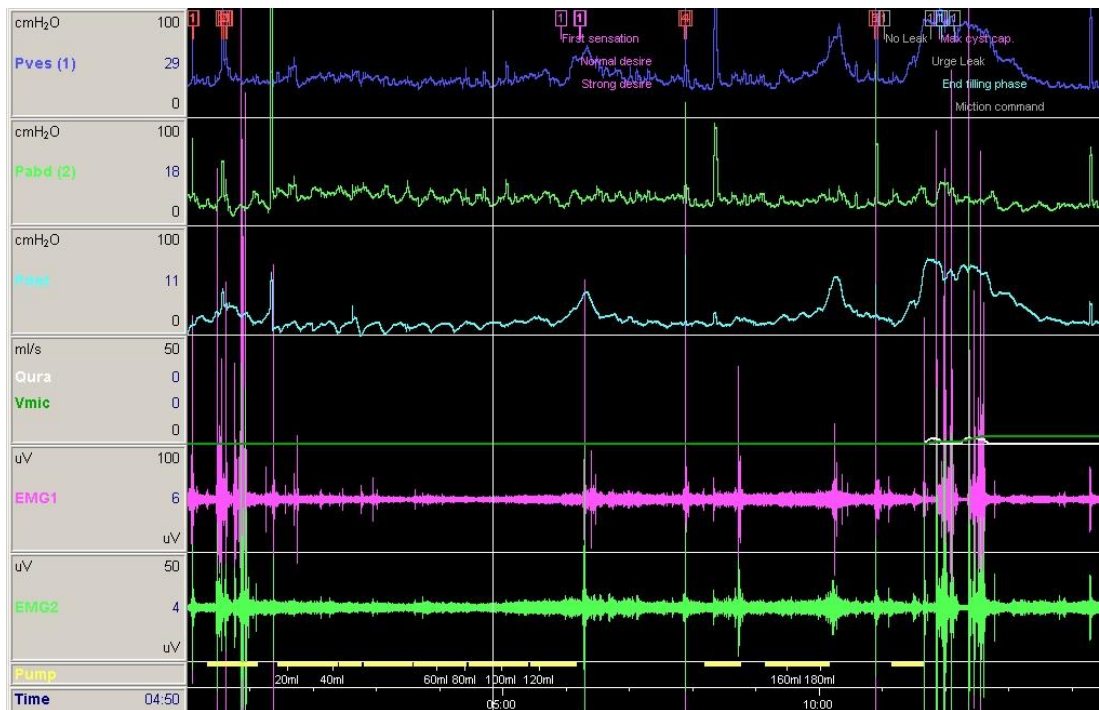
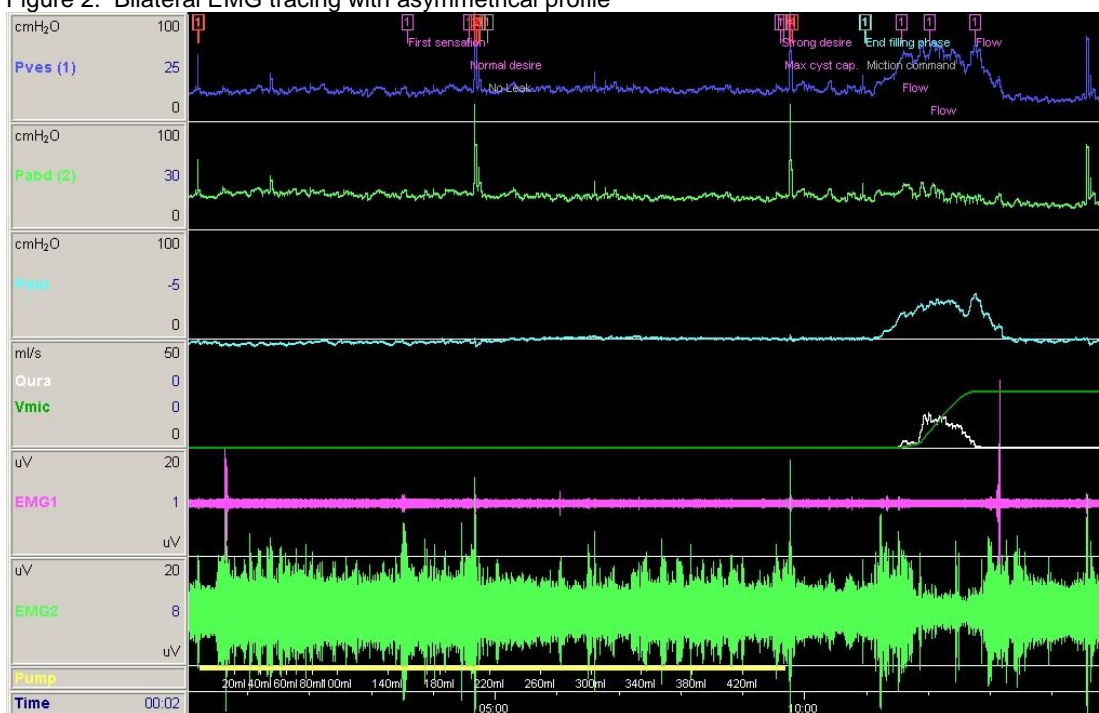


Figure 2: Bilateral EMG tracing with asymmetrical profile



<b>Specify source of funding or grant</b>	None
<b>Is this a clinical trial?</b>	No
<b>What were the subjects in the study?</b>	HUMAN
<b>Was this study approved by an ethics committee?</b>	Yes
<b>Specify Name of Ethics Committee</b>	Emory University Institutional Review Board
<b>Was the Declaration of Helsinki followed?</b>	Yes
<b>Was informed consent obtained from the patients?</b>	Yes