

Advanced Neuro-Urology



Marcus Drake

Bristol Urological Institute

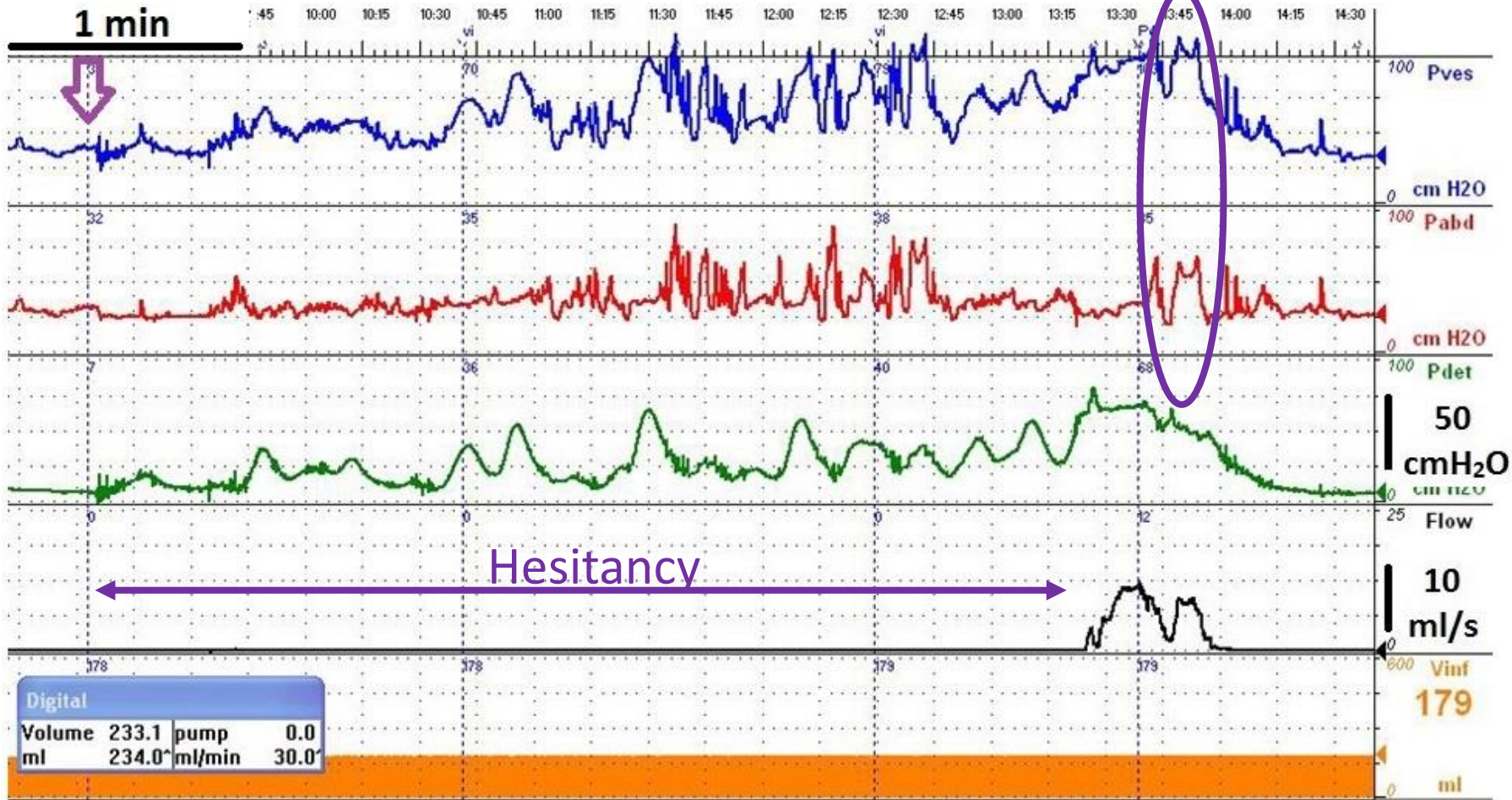
Focus on the voiding phase

- Normal voiding uses a good bladder contraction and there is proper sphincter relaxation
- Neurological disease may weaken the bladder and/ or stop proper sphincter relaxation
- Underactive
- Straining
- Triggered
- DSD (involuntary)
- Dyssynergic voiding
- Fixed sphincter obstruction

Impaired bladder function

Underactive detrusor

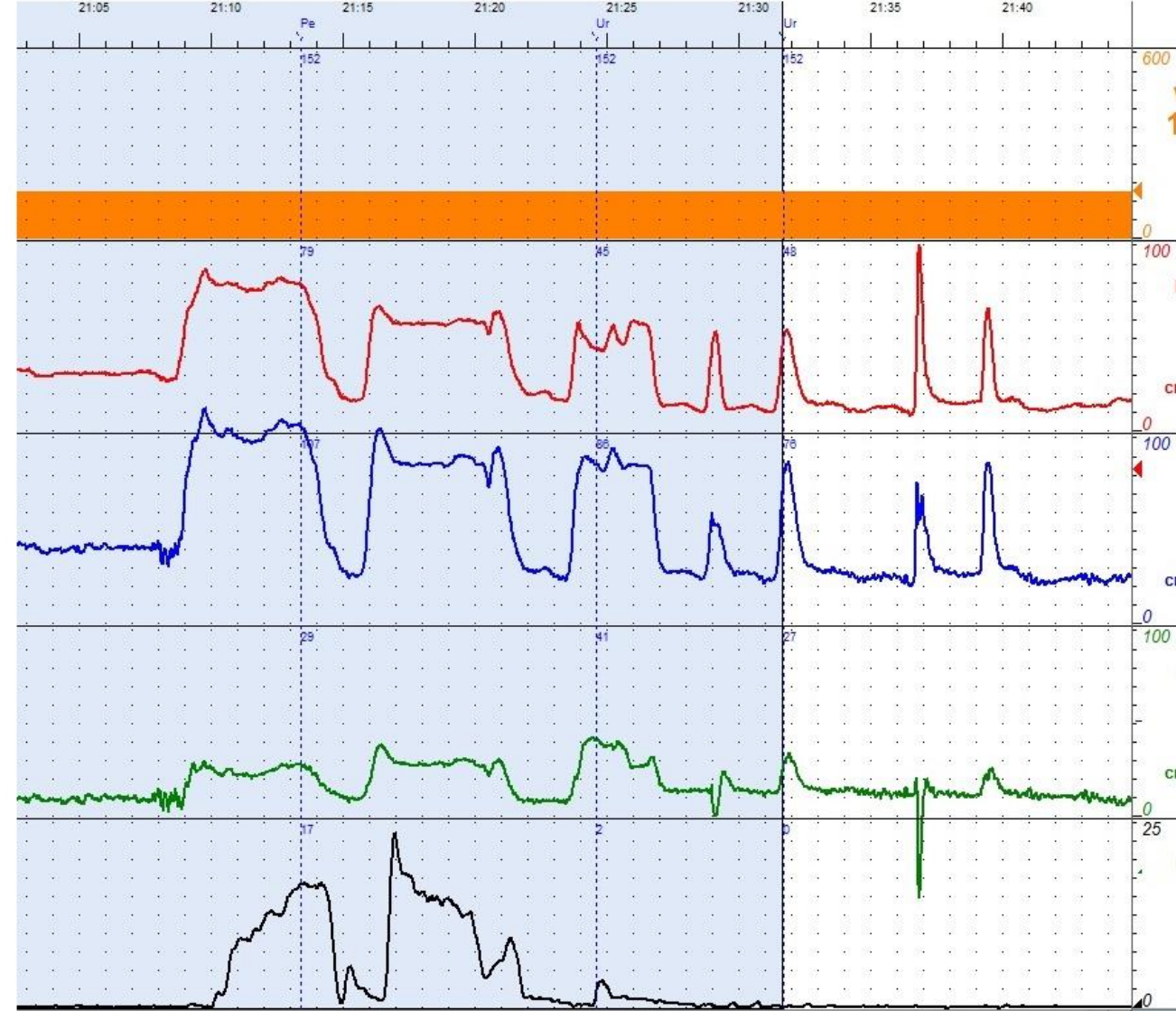
Straining



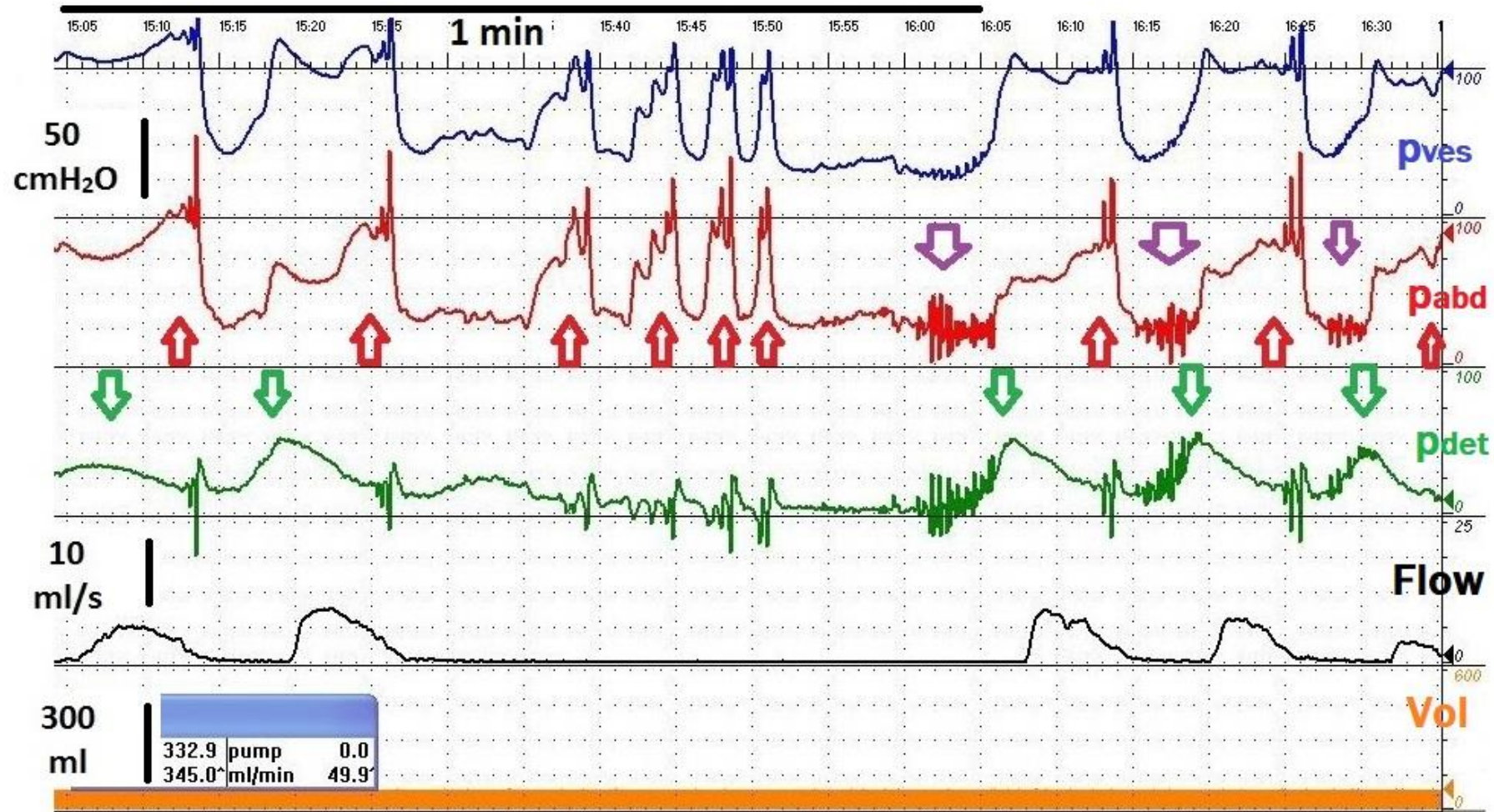
PFS of a male patient with MS reporting voiding symptoms. Purple arrow is permission to void. Severe hesitancy and fluctuating detrusor contraction makes this functionally underactive, though actually his bladder contractility index is above the threshold 100.

Straining

- The flow rate happens with rise in p_{abd} and p_{ves} at the same time
- p_{abd} is not being detected as well as p_{ves} , so p_{det} trace is misleading- there is actually no detrusor contraction happening



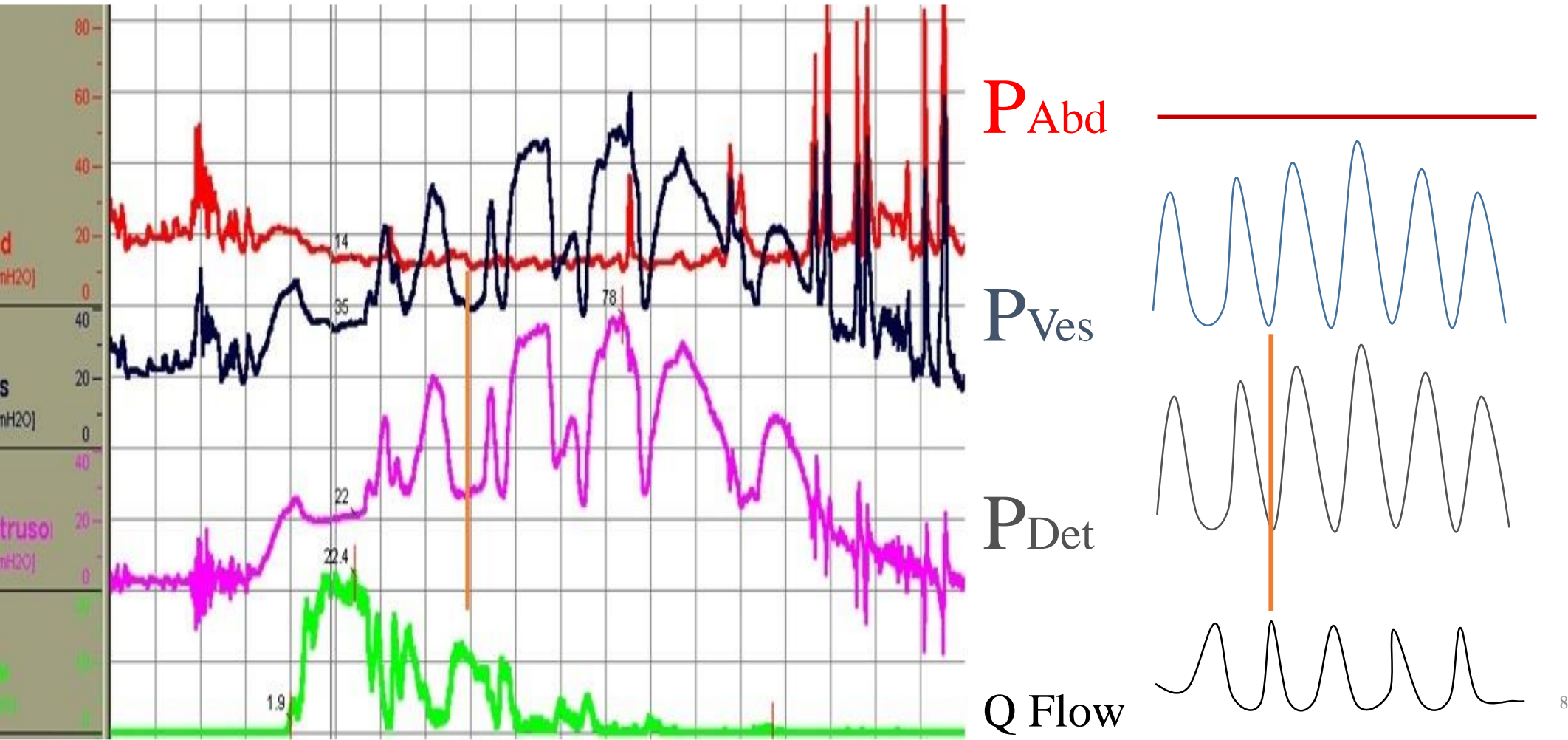
Triggered voiding



Suprapubic “tapping” (purple arrows) used to trigger DOI (green arrows). Each purple arrow indicates 3 or 4 thumps. This man used “tapping” to conclude his bladder emptying. Red arrows indicate straining, which he used at the end of each DO wave to try and perpetuate the flow.

Impaired sphincter function

DSD; interrupted flow pattern, where flow is associated with a drop in p_{ves}/p_{det} in a person with a neurological disease affecting the suprasacral spinal cord. Generally happens spontaneously when the bladder reaches a certain volume



DSD vs dyssynergic voiding

DSD

- Severe or complete spinal cord lesion, unable to initiate voiding
 - Unlikely to have muscular strength/ co-ordination to be able to strain
- DO of high amplitude triggers bladder emptying

Dyssynergic voiding

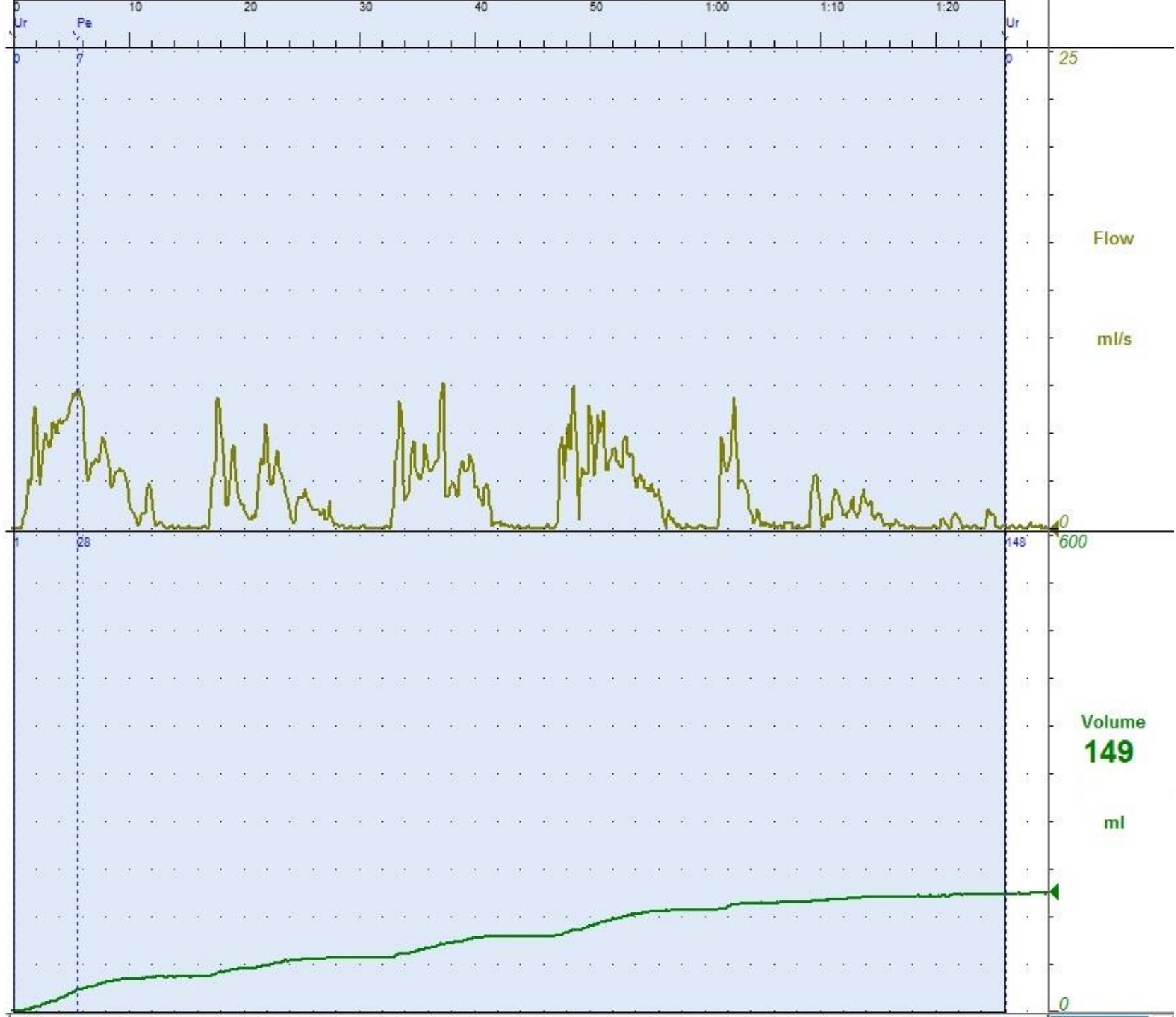
- Brainstem deficit or incomplete spinal cord lesion, where the patient is able to initiate voiding
- Co-ordination of the spinal centres is impaired, but there is likely to be some input from pons to sacral spinal cord, so less severe pattern than full-blown DSD
- Straining may be possible since the neurological deficit is less

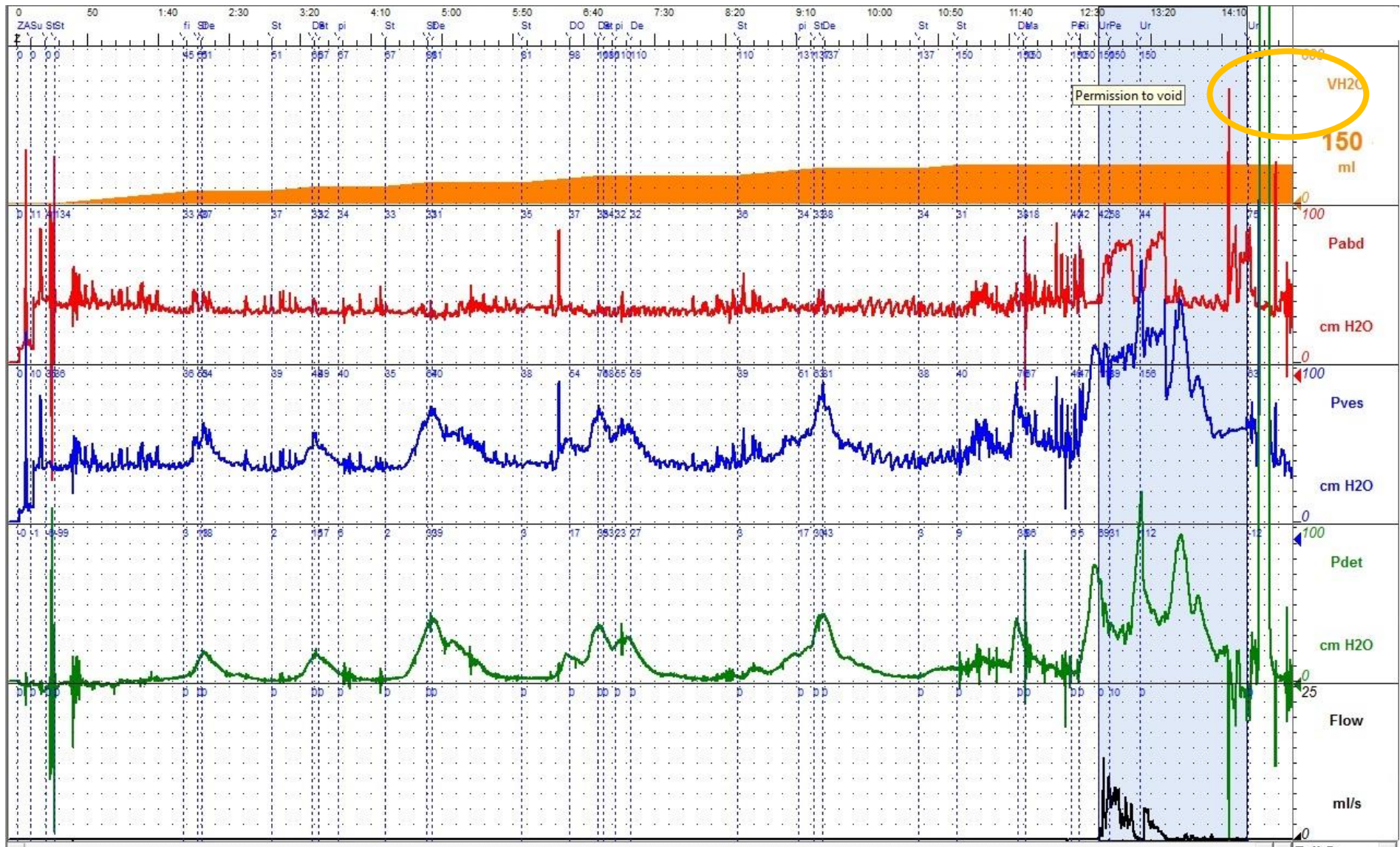
51 year old male; leukodystrophy, involving the destruction of myelin

Diagnosis:

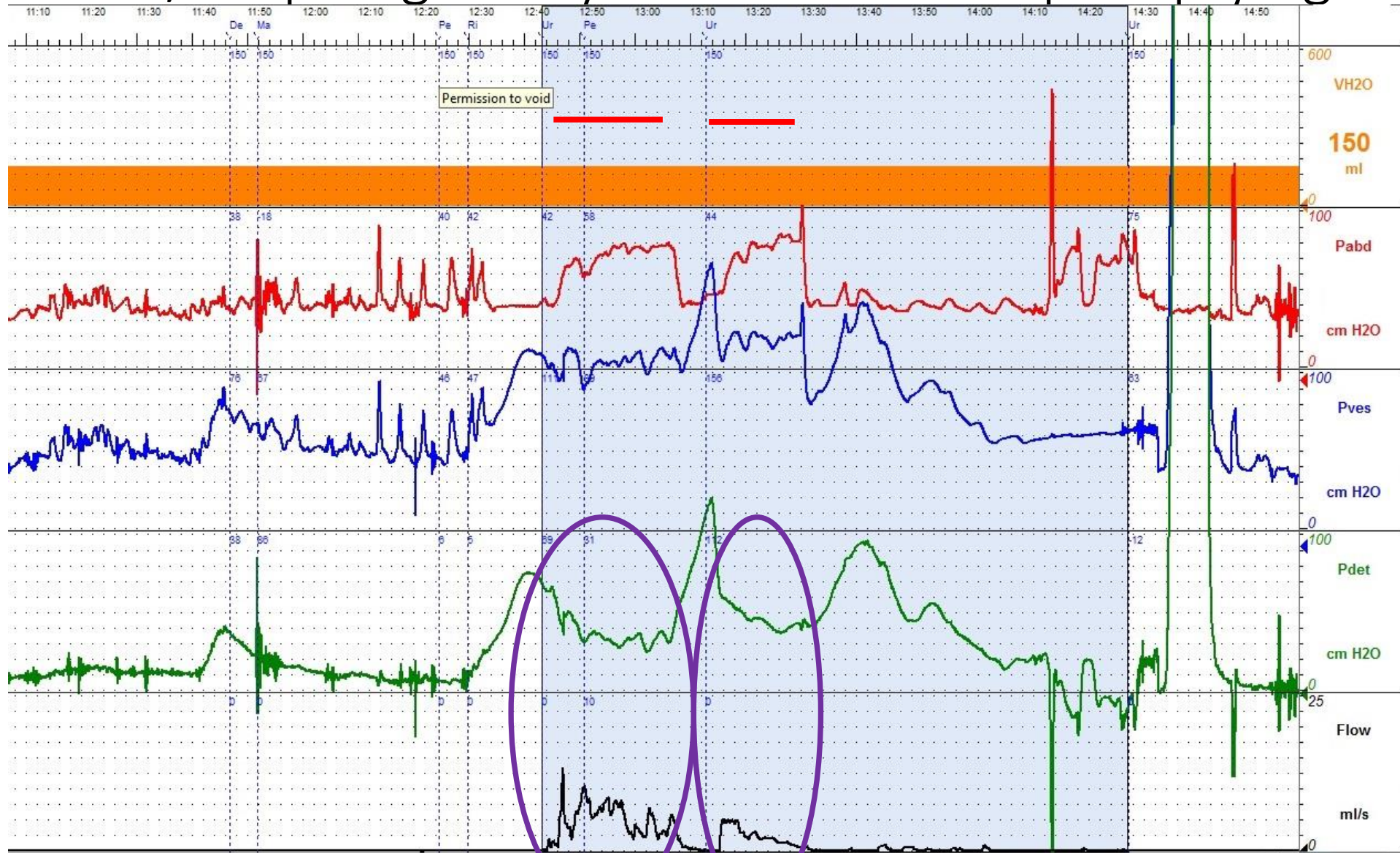
- Adult-onset Alexander disease
- Lower urinary tract symptoms, flows suggestive of possible detrusor sphincter dyssynergia with complete emptying
- Flexible cystoscopy, normal urethra, small prostate, trabeculated bladder with early diverticular formation.

He has been diagnosed with adult Alexander syndrome which affects the brainstem and causes atrophy and neurological symptoms. He did however have preceding lower urinary tract symptoms. He had urodynamics back in 2004 that appear to show an overactive detrusor but recently his main problem has been reduced urinary stream which is intermittent and straining.



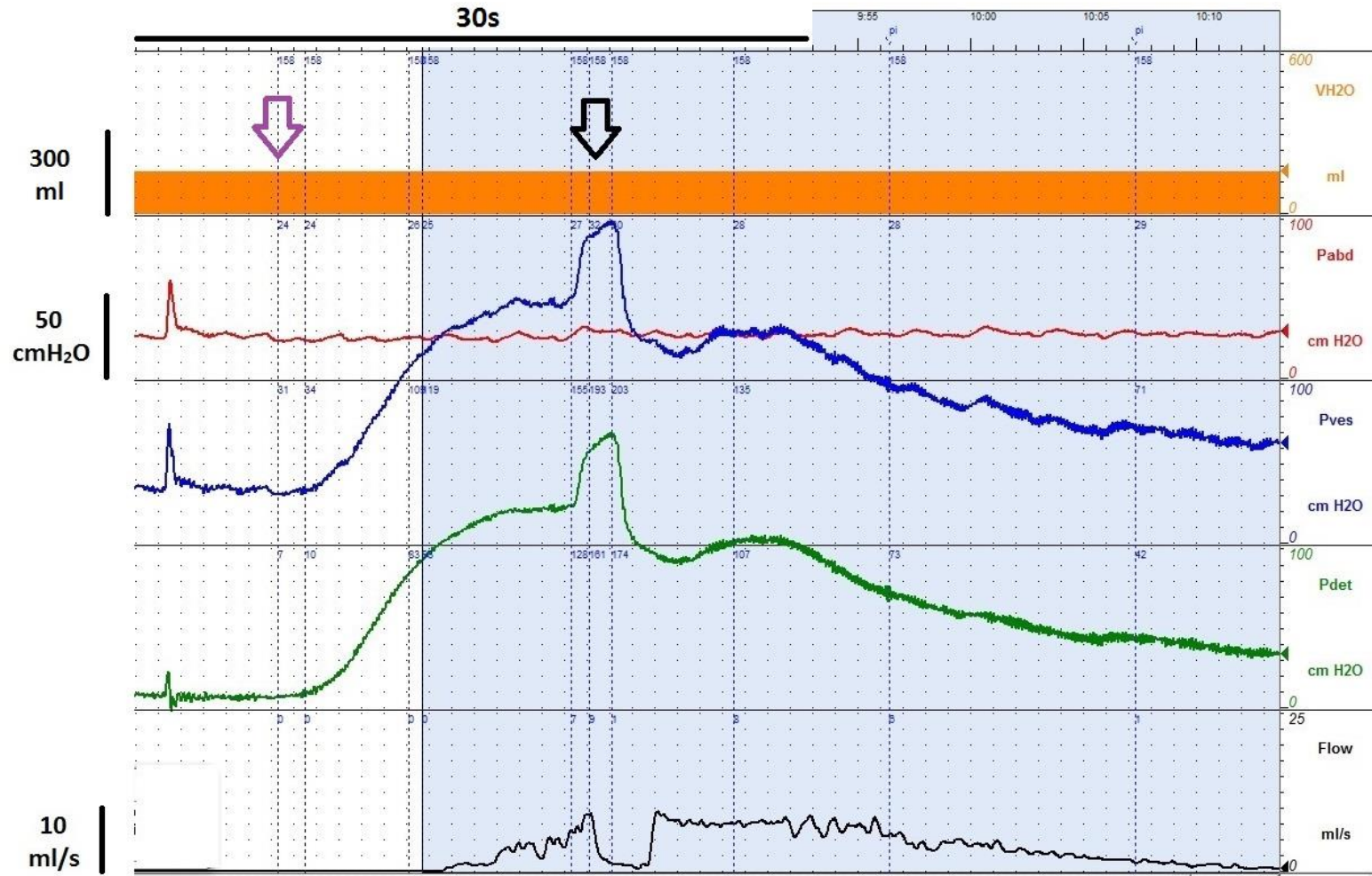


During DSD, a person who can contract their abdominal muscles/ diaphragm may also strain to help emptying





Fixed sphincter obstruction

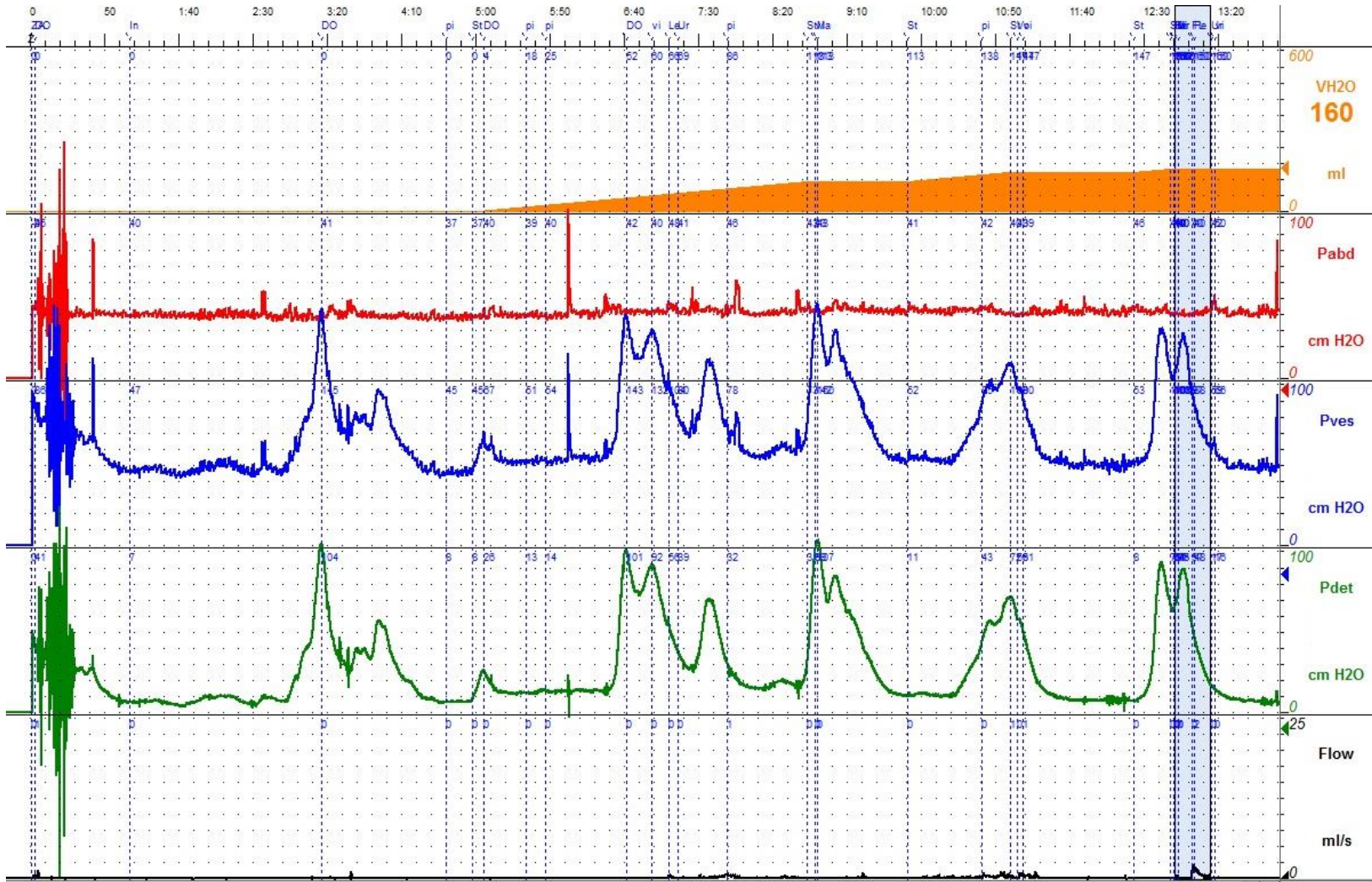


Non-relaxing urethral sphincter causing partial obstruction in a man during pressure flow study (purple arrow= permission to void). High pressure and slow flow. A flow interruption resulted from a non-voluntary increased sphincter contraction (black arrow).

63 yr man; thoracic spinal cord partial lesion

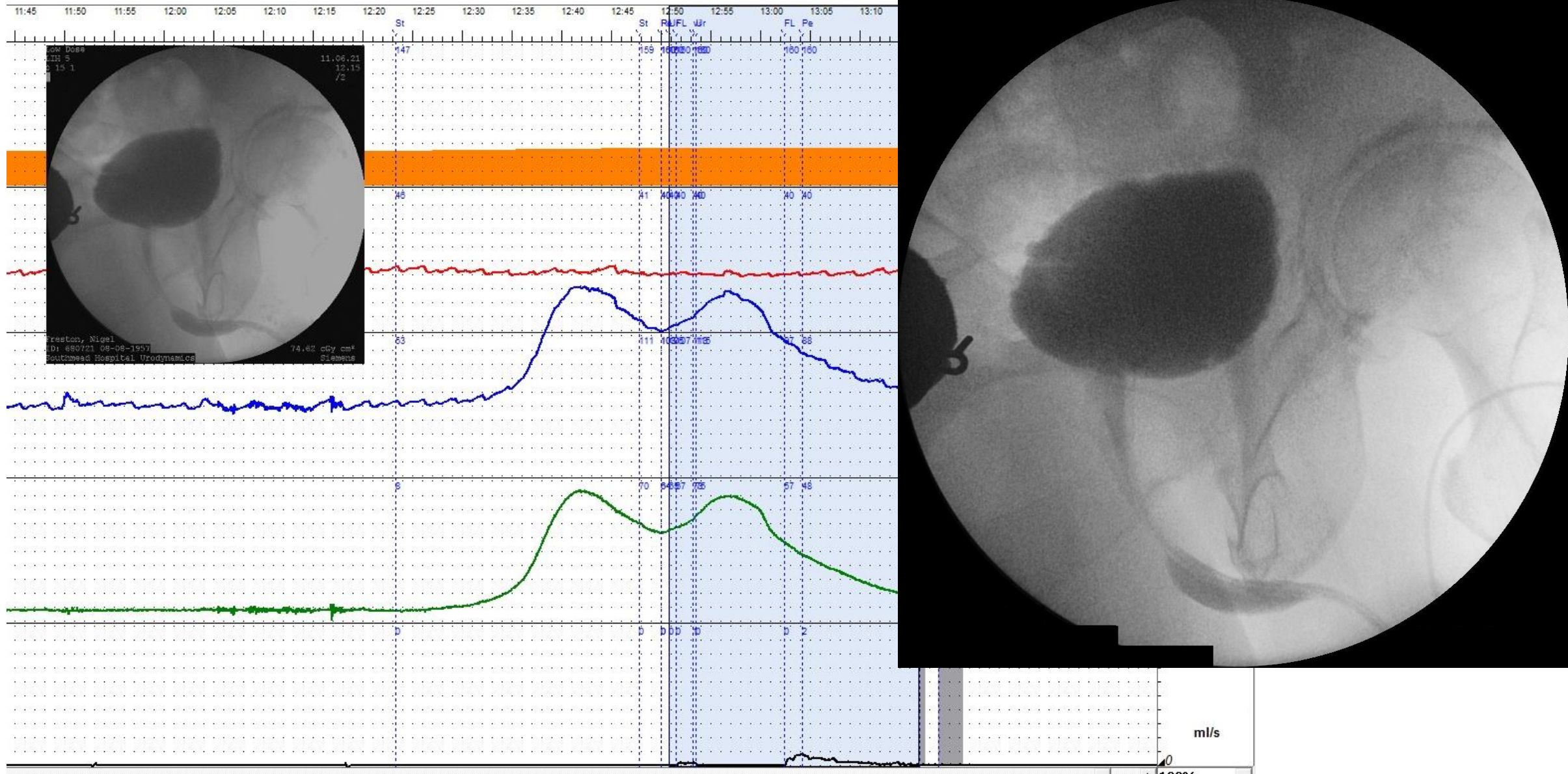
- Spinal cord lesion of uncertain mechanism. Acute neurological event in October 2020, with a working diagnosis of spinal stroke. Prior to that no LUTS, bladder sensations normal, no urgency.
- Now; experiences urgency with short warning time
- Does not get normal bladder sensations (i.e. filling, normal/ strong desire to void).
- When urine is passed, the stream stops typically twice. Straining can help increase flow a bit.
- Urethral sensation is preserved (sensation of urine flow, and also sensation from instiligel).
- On questioning; no stress incontinence, no enuresis, no postural hypotension, no headaches, normal lower limb sweating, erections can initiate uses Viagra to maintain, ejaculation normal but volume reduced. He has had a couple of episodes of faecal incontinence.
- Pinprick absent S2 dermatomes and below on the left, and S3 and below right side.
- No seminal vesicle reflux (note history of epididymitis).

63 yr man; thoracic spinal cord partial lesion



Urgency with short warning time;
able to resist with pelvic floor contraction
for only about a minute, would leak if
does not then have toilet available.

This is how he voids; he cannot initiate
in the absence of urgency- and voiding
was worse when he was taking solifenacin



- CONCLUSIONS; DO and DSD suggests a spinal cord lesion partly interrupting the brainstem regulation of the sacral spinal centres.

The voiding phase in neurological deficits

- Straining
- Underactive
- Triggered
- DSD (involuntary)
- Dyssynergic voiding
- Fixed sphincter obstruction

