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Severe urinary retention secondary to intrathecal morphine pain pump: A case report

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ABSTRACT

Intrathecal opioid pain pumps (IPP) are sometimes prescribed for treatment of chronic nonmalignant pain. Severe urinary retention is not a commonly reported side effect of the IPP. In this case, an elderly female with multiple comorbidities presented with acute onset of severe urinary retention immediately following morphine IPP placement for chronic peripheral neuropathy. Multiple management strategies for urinary retention were employed. However, the urinary retention only fully resolved once the IPP was disabled. This case highlights the need to closely monitor chronic pain patients with complex medical histories who may be uniquely predisposed to opioid-mediated severe urinary retention.

1. Introduction

Urinary retention is a well-recognized side effect of opioids administration via Intrathecal pain pumps (IPP) for chronic nonmalignant pain. Mild urinary retention, not requiring intervention, following intrathecal morphine administration has an estimated incidence of approximately 42% in nonmalignant pain patients[1,2]. Severe urinary retention in this context is less common. A large retrospective study on intrathecal morphine in 39 nonmalignant chronic pain patients describes a single case of severe urinary retention (2.6%) as a complication of intrathecal analgesia requiring system removal.[2]

We were able to identify only one case report in the literature which focused on management strategies for resolving urinary retention secondary to IPP placement.[3] In this case report, we present our experience with a case of a neurogenic bladder which presented as severe urinary retention immediately following IPP placement for chronic peripheral neuropathy in an elderly female with multiple comorbidities.

2. Case presentation

A 70-year-old female underwent placement of a morphine Prometra IPP (Flowonix, Mt. Olive, NJ) for chronic peripheral neuropathy. The IPP was implanted by her pain management specialist. The patient's history was significant for chronic pain syndrome, peripheral vascular disease, prior cerebrovascular accident with no residual deficits, hypertensive disorder, 10-year history of type II diabetes, and spastic pelvic floor muscles. At the time of symptom onset, the patient had no history of urinary retention, voiding dysfunction, pelvic organ prolapse, or urinary incontinence.

The patient initially presented to urogynecology 4 days after morphine IPP placement complaining that she was "unable to void without assistance." Urinalysis and urine culture were negative for infection. Voided volumes were less than 100 cc. Her postvoid residual volumes (PVRs) were approximately 600 cc, consistent with acute urinary retention. The patient, a former nurse, began intermittent self-catheterization (ISC) upon its onset and began a trial of tamsulosin. Experiencing no benefit with the tamsulosin one week later, the patient declined to continue ISC and stopped the medication. An indwelling urinary catheter was placed. Nitrofurantoin was prescribed for infection prophylaxis while the indwelling catheter was in place.

Multiple voiding trials were performed for up to three weeks following symptom onset. Further diagnostic testing was performed. Cystoscopy showed diffuse inflammation and moderate trabeculations. Urodynamics demonstrated decreased bladder compliance during filling with a decreased bladder capacity. Fig. 1 Voiding pressure studies revealed minimal detrusor contraction with a valsalva effort and an intermittent voiding pattern with minimal output. Fig. 2 EMG demonstrated no abnormalities during testing.

To determine if the morphine IPP was related to the patient's urinary retention, the pain management specialist decreased the basal rate of the

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IPP from morphine sulfate 100 mcg daily to 90 mcg daily. However, the basal rate was increased back to the initial rate within 5 days due to patient complaints of burning in her legs related to peripheral neuropathy.

After completion of the urogynecology workup which failed to demonstrate any evidence of other etiology to account for retention complaints, recommendations were made to turn off the pain pump. Ultimately, the IPP was disabled and a voiding trial was performed 48 hours later. The patient was then able to void spontaneously with PVRs less than 150 cc. During this time, the patient took one tablet of acetaminophen 300 mg-codeine 30 mg orally every 6 hours. Morphine sulfate was identified as the cause of urinary retention. She was transitioned to intrathecal fentanyl for pain management. She repeatedly demonstrated both objective and subjective evidence of adequate voiding with post-void residuals of approximately 150 cc.

3. Discussion

Our patient was likely predisposed to experience severe urinary retention given her complex medical history. The following basic physiology is recognized as the scientific basis of severe urinary retention in the setting of intrathecal opioid administration: the opioids receptors involved in the urodynamic effects are μ and δ. Intrathecal opioids acting on opioid receptors in the spinal cord decrease the parasympathetic firing in the sacral region and decrease the afferent inputs from the bladder to the spinal cord which results in an inhibitory modulating effect on the release of acetylcholine that causes detrusor contraction.[1,2] Some speculate that there is a dose-dependent mechanism by which intrathecal opioids cause side effects like urinary retention.[1] Other sources describe a primary dose-independent activation of opioid receptors.[1–5] A randomized, double-blind study by Raffaeli et al.

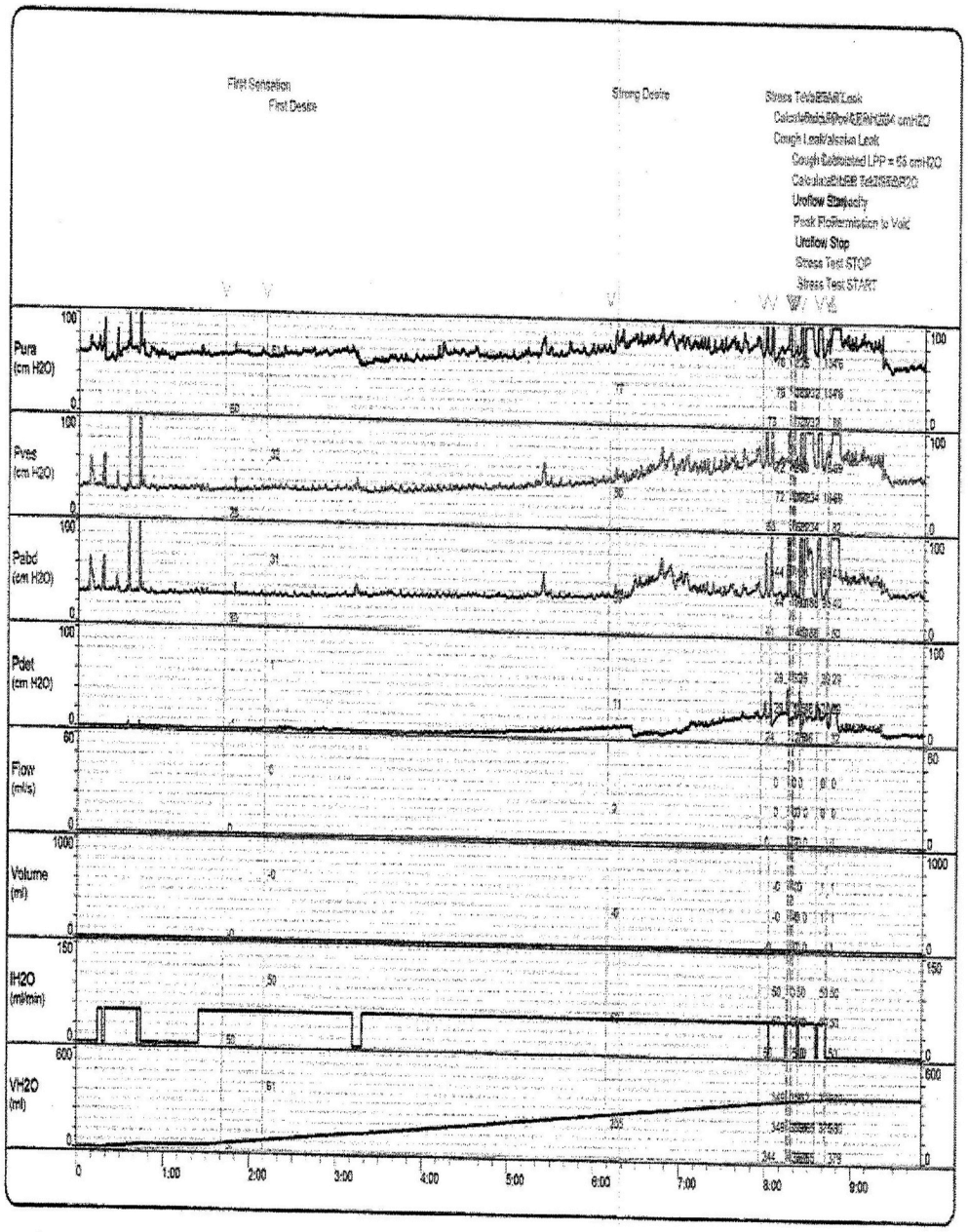

Fig. 1. Urodynamic testing demonstrating decreased bladder compliance during filling with a decreased bladder capacity.

concluded that side effects of intrathecal opioid like urinary retention can be considered as a patient-dependent effect of the drug, suggesting the presence of a primary dose-independent excitatory component that might be related to the theory of the bimodal activation of opioid receptors. Our case supports this latter theory because dose reduction did not improve the patient's severe urinary retention.

4. Conclusion

Morphine sulfate was successfully identified as the cause of the new-onset urinary retention after turning off the morphine IPP. This patient has a complex medical history may have contributed to her susceptibility to severe urinary retention. The patient's initial complaint of difficulty urinating and her urodynamic testing findings may reflect the influence of intrathecal opioid administration as opioids are known to decrease bladder function by suppressing detrusor contractility and decreasing the sensation of urge.[4,5] Of note, different types of opioids may uniquely affect bladder storage and emptying demonstrated during urodynamics. For instance, drugs like fentanyl are more lipophilic than morphine and thus undergo greater systemic uptake. As a result, there is less rostral spread in the central nervous system and less influence on storage and voiding as demonstrated by multichannel urodynamics. Published research also supports replacing morphine with an alternative narcotic such as sufentanil in a regional anesthetic regimen to mitigate the risk of postoperative urinary retention.[5]

This case report highlights that chronic pain patients with multiple comorbidities affecting the nervous system may be uniquely predisposed to severe urinary retention with IPP use. Intrathecal morphine may be

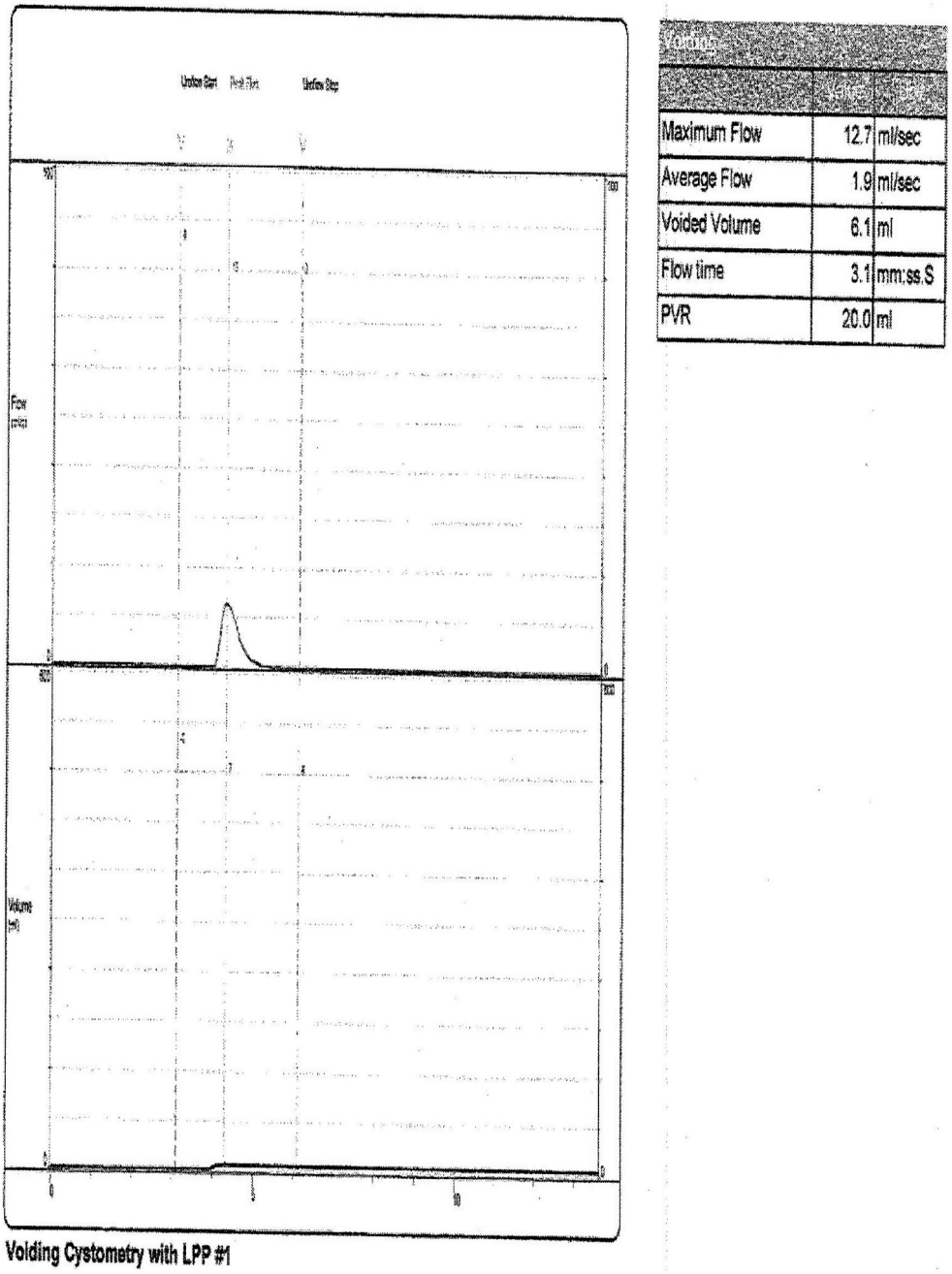

Fig. 2. Voiding pressure studies demonstrating minimal detrusor contraction with a valsalva effort and an intermittent voiding pattern with minimal output.

more likely to precipitate urinary retention in such a patient. We believe that patients with a morphine IPP in retention should undergo a trial of an alternative narcotic as a primary management strategy to resolve the urinary retention and maintain the benefit of the IPP.

IRB committee approval statement

This research activity was determined to be exempt or excluded from Institutional Review Board (IRB) oversight in accordance with current regulations and institutional policy. Our internal reference number for this determination is 2021-727.

Disclaimer

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Conflict of interest for all authors-

None.

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