

BACKGROUND

- Targeted drug delivery (TDD) with Intrathecal (IT) pumps administer medications directly to the cerebrospinal fluid.
- Moderate to severe pain refractory to oral, transdermal, and buccal opioids is challenging to manage, especially considering the systemic and adverse effects of increasing opioid dosages.
- They are effective in managing many different chronic pain conditions, including cancer-related pain and severe spasticity¹.
- There are no standard guidelines converting from IT opioids to an IV/PO regimen

PURPOSE

- This case examines the challenges of tapering high-dose intrathecal medications, transitioning from IT to oral/IV opioids, managing withdrawal, and addresses safety concerns with an irreplaceable pump with the need for a multimodal approach.

CASE DESCRIPTION

- 46-year-old male with HTN, T2DM, and HLD with chronic left-sided abdominal pain after complications from previous hiatal and diaphragmatic hernia repairs multiple revisions in 2013.
- An IT pain pump was first placed in 2015 with the most recent catheter/pump revision performed 3 weeks prior to presentation.
- He presented with an RLQ pain and drainage around the implantable pulse generator (IPG) incision concerning for infection (Figure). His initial medication regimen is outlined in Table 1.



Figure. Photo of the patient's pump infection on presentation

TABLES/FIGURES

Table 1. Patient's initial opioid regimen from outside pain clinic.

Medication (Route)	Dose	OME	OME Total
Fentanyl (Troche Lozenges)	9600 mcg/day	1,248	2,341
Fentanyl (Intrathecal)	1600 mcg/day	533	
Dilaudid (PO)	32 mg/day	240	
Methadone (PO)	40 mg/day	320	

OME: oral morphine equivalent; PO: per os; mcg: micrograms; mg: milligrams.

Table 2. Patient's medication regimen and corresponding OME throughout hospitalization.

Before Pain Pump Explantation	Immediately After Explantation	Upon Discharge
- Ketamine gtt – 0.2 mcg/kg/hr - Ketamine IM – 10 mg q6hr PRN - Methadone PO – 10 mg q6hr (OME 188) - Fentanyl Transdermal patch – 12.5 mcg q72hr (OME 30) - Dilaudid PO – 8 mg q6hr (OME 160) - Acetaminophen PO – 1000 mg q8hr - Gabapentin PO – 300 mg TID - Methocarbamol PO – 500 mg q6hr - Tizanidine PO – 4 mg TID	- Ketamine gtt – 0.5 mcg/kg/hr - Ketamine IM – 10 mg q6hr <i>for breakthrough pain</i> - Methadone PO – 20 mg q6hr (OME 80) - Fentanyl Transdermal patch – 200 mcg q72hr (OME 480) - Dilaudid PO – 8 mg q4hr <i>for moderate pain</i> or 12 mg q4hr <i>for severe pain</i> (OME 240-360) - Acetaminophen PO – 1000 mg q8hr - Gabapentin PO – 300 mg TID - Methocarbamol PO – 750 mg TID - Tizanidine PO – 4 mg TID - Fentanyl gtt – per ICU team - Dexmedetomidine gtt – 0.2 mcg/kg/hr - Clonidine PO – 0.3 mg q8hr - Toradol PO – 15 mg IV q6hr x 5 days	- Ketamine oral solution – 2 mL (20 mg) q8hr PRN <i>for breakthrough pain</i> - Ketamine IM – 100 mg q4hr - Methadone PO – 10 mg daily (OME 47) - Dilaudid PO – 8 mg daily (OME 40) - Acetaminophen PO – 650 mg q6hr - Methocarbamol PO – 1000 mg q6hr - Fentanyl Troche Lozenges – 950 mcg q2-3hr (OME 790-988) - Morphine (suppository) – 10 mg q2hr PRN - OME 120 - Tizanidine PO – 4 mg q6hr - Clonidine PO – 0.1 mg BID PRN <i>for hypertension</i> - Alprazolam PO – 1 mg BID PRN <i>for insomnia</i>
378 Total OME	800-920 Total OME	877-1075 Total OME

gtt: drops; q: every; hr: hours, PRN: pro re nata; mg: milligrams; mcg: micrograms; kg:

kilogram; BID: twice a day; TID: three times a day; IV: Intravenous; IM: intramuscular; PO:

per os; OME: Oral morphine equivalent.

DISCUSSION

- IT pump infection rates are relatively rare with reported median infection rates around 4%, typically occurring within 2 to 4 weeks after insertion of the pump².
- There are no standard guidelines for converting from IT opioids to an IV/PO regimen, leaving clinicians to rely on clinical gestalt, past experiences, case reports, and expert opinion^{3,4}.
- Patients with high opioid requirements pose significant challenges due to their high tolerance and dependence. Transition to an equivalent dose of oral and intravenous opioids could lead to adverse effects such as sedation, respiratory depression, and opioid-induced hyperalgesia (OIH).

DISCUSSION (cont.)

- Ketamine, an NMDA antagonist at 0.5mg/kg/h was successfully used to treat IT pump failure in another patient receiving nearly 1000 OMEs daily⁶.
- Dexmedetomidine, an α2-adrenergic agonist, was used to manage clonidine withdrawal symptoms, with a previous case report documenting stress-induced cardiomyopathy related to clonidine pump failure⁷.
- Methadone, μ-agonist with NMDA receptor antagonism and incomplete cross-tolerance, has been shown to have potent analgesic effects in chronic pain patients^{8,9}.
- Other modalities used in this multimodal approach included lidocaine patches, gabapentin, methocarbamol, tizanidine, ketorolac, and acetaminophen.

CONCLUSION

- This case highlights the complexities of managing high-dose IT opioid withdrawal and conversion to alternative pain regimens after an infected pump.
- A multimodal approach with methadone, ketamine, and non-opioid agents, was key to preventing withdrawal symptoms and opioid-induced hyperalgesia while ensuring effective pain control.

REFERENCES

- Bhatia G, Lau ME, Koury KM, Gulur P. Intrathecal Drug Delivery (ITDD) systems for cancer pain. F1000Research. 2013;2:96. doi:10.12688/f1000research.2-96.v4
- Yogev R, Tan TQ. INFECTIONS RELATED TO PROSTHETIC OR ARTIFICIAL DEVICES. In: Feigin and Cherry's Textbook of Pediatric Infectious Diseases. Elsevier; 2009:1108-1134. doi:10.1016/B978-1-4160-4044-6.50090-X
- Gorlin AW, Rosenfeld DM, Maloney J, Wie CS, McGarvey J, Trentman TL. Survey of pain specialists regarding conversion of high-dose intravenous to neuraxial opioids. J Pain Res. 2016;9:693-700. doi:10.2147/JPR.S113216
- Kim DD, Patel A, Sibai N. Conversion of Intrathecal Opioids to Fentanyl in Chronic Pain Patients With Implantable Pain Pumps: A Retrospective Study. Neuromodulation Technol Neural Interface. 2019;22(7):823-827. doi:10.1111/ner.12936
- Kulkarni S, Glover M, Kapil V, et al. Management of hypertensive crisis: British and Irish Hypertension Society Position document. J Hum Hypertens. 2022;37(10):863-879. doi:10.1038/s41371-022-00776-9
- McDonald WM, Wilkinson MM, Jain A, Cohen SP. The use of ketamine infusion to dramatically reduce opioid requirements in a patient whose high-dose intrathecal opioid pump was inadvertently cut during surgery. Pain Pract Off J World Inst Pain. 2023;23(8):978-981. doi:10.1111/papr.13258
- Lee HMD, Ruggoo V, Graudins A. Intrathecal Clonidine Pump Failure Causing Acute Withdrawal Syndrome With "Stress-Induced" Cardiomyopathy. J Med Toxicol Off J Am Coll Med Toxicol. 2016;12(1):134-138. doi:10.1007/s13181-015-0505-9
- Wilson SH, Hellman KM, James D, Adler AC, Chandrakantan A. Mechanisms, diagnosis, prevention and management of perioperative opioid-induced hyperalgesia. Pain Manag. 2021;11(4):405-417. doi:10.2217/pmt-2020-0105
- Gebhardt R, Kinney M. Conversion from intrathecal morphine to oral methadone. Reg Anesth Pain Med. 2002;27(3):319-321. doi:10.1053/rapm.2002.31937