Management Acute Implanted Drug Pump Failures

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Background

Intrathecal drug pumps are a treatment option for refractory persistent cancer and chronic non-cancer pain and spasticity.

Aims

We describe 4 scenarios to illustrate the clinical management of sudden failure of implanted spinal drug pumps.

Methods

Electronic case note review. Literature Review

Case 1

A patient with persistent post spinal surgery pain had a Medtronic Algomed patient activated drug pump implanted in 1997.

The pump was abandoned a year later in 1998 because of intractable nausea and vomiting with bolus morphine administration in favour of spinal cord stimulator (SCS).

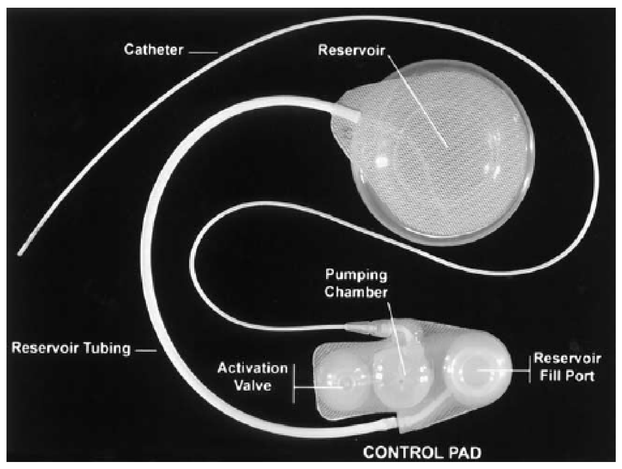
The pump was “reactivated” and refilled with 40mL 0.5% bupivacaine in November 2000 during an exacerbation of back pain.

The pump failed after the chest wall activator button was pressed, due to scar tissue holding the button open. The bupivacaine was delivered continuously over the next 4 days at home causing anaesthesia and weakness.

The patient was admitted to hospital anaesthetised below T4. The patient was conscious, haemodynamically stable, breathing spontaneously but could not move.

Treatment consisted of pressure care, IV fluids and emptying the pump!

The pump was explanted electively. The exacerbation of back pain resolved after a radiofrequency neurotomy and the patient resumed using SCS.



Case 2

The patient’s second Medtronic Synchromed EL 20mL drug pump stopped suddenly at 12 months with the onset of opioid withdrawal symptoms and hospitalisation.

A side-port contrast study, ‘rotor’ test and telemetry were passed. An external pump was connected to the side-port using a 25g Quinke point needle bent to 90^{o} for pain relief. The pump sideport was damaged, allowing CSF backflow and accumulate as a seroma around the pump.

This fluid surrounding the pump was mistaken by the clinician doing the refill for pump contents and the ‘test refill’ of n-saline (luckily) was injected outside the pump.

The pump was subsequently refilled properly with n-saline and a ‘fast run’ test found no actual delivery and the failed pump was replaced under warranty

Case 3

After emptying 25mL solution from a Medtronic Isomed 60mL spinal drug pump during a routine refill in November 2005, hydromorphone 300 mg, bupivacaine 300 mg and clonidine 24 mg to 60mL was injected into the pump reservoir refill with a Medtronic 24g Huber point non-coring needle .

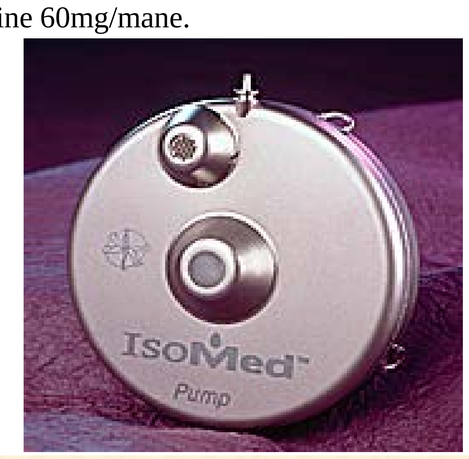
On removing the needle blood stained fluid “squirted”, like a ‘whale spout’, 10cm above skin.

The pocket appeared swollen, 9mL solution was aspirated from the pocket. The patient became sleepy but awakened instantly on stimulation. Ambulance assistance requested.

After transfer to hospital another 2mL solution was emptied from pocket and 49mL emptied from pump.

The patient required a GTN infusion to control rebound hypertension, intermittent atropine for extreme bradycardic episodes and naloxone to maintain adequate respiratory rate.

The patient was discharged on Fentanyl TTL 25mcg/h patch without withdrawals. 10 years later remains stable on Durogesic 50mcg/h, pregabalin 150mg bd and duloxetine 60mg/mane.



Literature Review

A literature search on intraspinal/intrathecal therapy and overdose was performed.

Coyne et al 2004 reported a bimonthly refill of 540mg hydromorphone was injected into the subcutaneous pocket with rapid onset of nausea and feeling sleepy. She was successfully managed with a 12 hour naloxone infusion at 0.1mg/h.

Frye & Vance (2000) described a failed refill in which 48mg hydromorphone and 12mg clonidine was injected subcutaneously causing sedation, blurred vision, bradypnoea, tachycardia and hypertension. She had a hypertensive crisis and had a short duration tonic-clonic seizure and anteroseptal infarct after receiving naloxone. Clonidine at doses less than 1mg/day is hypotensive due to α2-adrenergic effects; at doses above 7mg/day it stimulates α1 and α2 adrenergic receptors producing vasoconstriction and hypertension which can be hard to treat.

Perruchoud et al (2013) describe a lady presenting with confusion, hallucinations and hypertension 2 hours after unremarkable pump refill with clonidine using a 24g Huber point non-coring needle. Inspection of the pump found severe damage to the silicon septum and multiple gouges to the pump due to needle scratching.

Case 4

After emptying 9mL solution during a routine refill using a Medtronic 24g non-coring Huber point needle from a Medtronic Isomed 35mL spinal drug pump in September 2015, the patient started complaining of pruritus with mild redness around needle entry as the pump was being refilled with 35mL solution of hydromorphone 200mg, bupivacaine 150mg and midazolam 30mg.

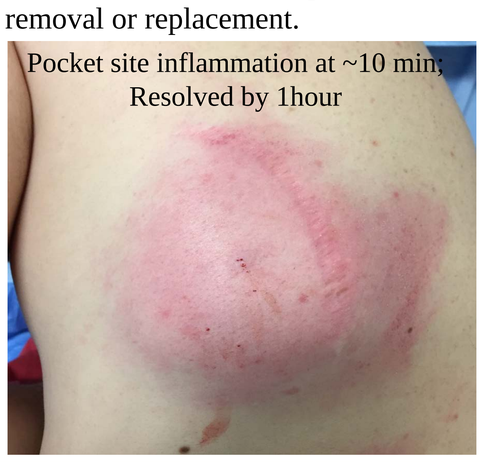
During a syringe change the pump pocket was noted to be swollen and red. 20mL of 25mL injected solution was immediately aspirated from around the pocket and pump emptied. I thought it was a pump failure but needle dislodgement is not excluded.

The patient became unresponsive 10 minutes later and required 0.2mg naloxone to awaken. The pocket became erythematous which I believe allowed rapid drug absorption. Ambulance assistance requested.

The patient was transferred to hospital for overnight observation but required no further naloxone or treatment.

The patient was discharged on 30mg IR morphine tablets bd prn. Scheduled for a trial of occipital nerve stimulation and pump removal or replacement.

Pocket site inflammation at ~10 min; Resolved by 1hour



Discussion

Acute pump failure or massive subcutaneous refills outside the pump can create a life threatening situation.

Non-coring Huber point needles reduce but as seen in Case 3, potentially Case 4 and Perruchoud’s case do not always prevent septal damage.

Obesity and the seroma fluid around the pump require increased vigilance to prevent misfills.

Early recognition, resuscitation equipment, emergency drugs, planning, assistance and skilled management are needed to avoid a bad outcome.

Lessons

Vigilance and avoiding distraction is necessary during refills to minimise and recognize problems.

Pumps can leak despite non-coring Huber point needles

Basic resuscitation equipment and drugs are needed onsite as problems occur quickly

In the event of a suspected misfill or pump failure empty the pocket & pump ASAP and turn pump off to minimise further drug absorption.

Call for help, according to your local plan to assist with monitoring and treatment.

References and Reprints

Available on request from: mtaverner@phcn.vic.gov.au