



Fatal Transdermal Fentanyl Patch Overdose in a Child

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Introduction

- **Transdermal fentanyl** is commonly used for chronic pain management in oncologic patients, allows for prolonged and continuous administration
- longevity of a single patch can last up to **72 hours**
- Previously worn patches may **retain up to 28-84%** of the initial potency of the drug
- An FDA report reviewing cases between 1990 (the year the first fentanyl patch received approval) and 2012 identified **30 cases** of accidental pediatric exposure, **10 leading to death**
- In these cases, children had encountered patches that had either been loosely attached, fallen off, or improperly stored/discarded.

Case Description

- A previously healthy **3-year-old girl** was brought into the ED after being found **unresponsive at home**
- She had reportedly requested to sleep with her grandmother for a morning nap
- Upon grandmother returning to check on her, she found the child had likely been asleep for **approximately 5 hours**
- Per Grandmother, lips had reportedly **turned blue and she was not breathing**
- A **fentanyl patch** was found attached to the child's lower back
- Grandmother had been using **75 mcg fentanyl patches** for pain management, reported difficulty keeping the patch adhered

Objective Data

Initial Exam by EMS	• Palpable pulses, slow respirations, O2 saturation of 80%, pinpoint pupils bilaterally , chest compressions started and begun on bag-mask ventilation
Exam upon arrival to ER	• Remained unresponsive, GCS score of 3 , agonal respirations and hypotension noted • Pupil size noted to be 2mm in diameter and reactive bilaterally • Intubated then transferred to PICU after initial interventions and head CT
Upon Arrival to PICU	• Remained intubated with GCS of 3 • Fundoscopic exam with pupils nonreactive and dilated to 5mm, bilateral papilledema • Neurologic exam revealed no response to maximum stimulation in all extremities, no cough or gag reflex, and absent corneal reflex • No outward signs of trauma • adhesive residue present on the lower back where grandmother reported to have found the fentanyl patch

Hospital Course

- EMS initially responded and performed chest compressions, and patient was started on bag-mask ventilation en route
- From the EMS to ER, received total of **3 doses of naloxone**, showed no improvement after any dose
- Resuscitation included treatment for both increased intracranial pressure as well as for sepsis, patient was **intubated** and rapidly transferred to our PICU
- Neurosurgery evaluated given concern for brain death based on exam and imaging but deemed **no surgical intervention indicated**
- Medical therapies to maintain hemodynamic stability were continued, but patient continued to show **no improvement after 48 hours** of medical treatment
- Non-accidental trauma workup (including skeletal survey and ophthalmologic exam) returned negative
- On **hospital day 3**, the **first brain death exam** was completed, second exam completed on day 4, **both confirming brain death**
- Patient was ultimately declared brain dead by brain death criteria secondary to a **fentanyl overdose**

Imaging and Labs

Test	Patient's value	Reference Range
Sodium (mmol/L)	150	135-145
Potassium (mmol/L)	3.4	3.6-5.2
Chloride (mmol/L)	124	100-108
Bicarbonate (mmol/L)	13	22-29
Blood urea nitrogen (mg/dL)	23	8.0-24
Creatinine (mg/dL)	1.08	0.8-1.3
Calcium (mg/dL)	8.1	8.6-10
Phosphorus (mg/dL)	3.8	2.5-4.5
Magnesium (mg/dL)	2.3	1.3-2.4
Alanine aminotransferase (U/L)	131	0-40
Aspartate aminotransferase (U/L)	846	8-48
Albumin (g/dL)	3.9	3.5-5.0
Direct bilirubin (mg/dL)	<0.2	0.1
Total bilirubin (mg/dL)	<0.2	0.6
Serum ethanol	Undetectable	-
Serum acetaminophen	Undetectable	-
Serum salicylates	Undetectable	-

TABLE 1: Patient's biochemical testing results including CMP and serum ethanol, acetaminophen, and salicylates

Urine Test	Patient's Value	Cutoff value
Fentanyl (ng/mL)	2.7	0.5
Norfentanyl (ng/mL)	48.8	0.5

TABLE 2: Specific urine studies sent out to look for fentanyl



FIGURE 1: Head CT showing global cerebral edema

Amphetamines	Negative
Barbituates	Negative
Benzodiazepines	Negative
Cocaine	Negative
Opiates	Negative
Phencyclidine	Negative
Oxycodone	Negative

TABLE 3: Urine Drug Screen Results

Discussion

- Fentanyl can have up to **75-100 times** the potency of morphine
- A 75mcg fentanyl patch in our 15kg patient was equivalent to a **running infusion of 5 mcg/kg/hr**
- **Synthetic opiates such as fentanyl will not read as positive** on routine urine drug screen; require specific urine assays to examine for levels
- Toddlers continue to be at the highest risk for mistaking used patches for stickers, pretend tattoos, or bandages.
- As of September 2013, the FDA began requiring colored patches to **increase visibility**.
- The FDA advises that patients wearing a fentanyl patch add an **additional adhesive** over the patch and administer patch checks multiple times per day.
- Regarding patch disposal, the FDA has placed fentanyl patches on its **"flush list"** and advises folding them in half and flushing them down the toilet after use.

Learning Points

- While not a novel case, sadly serves as important reminder for physicians
- Emphasizes **anticipatory guidance and precautionary care** with regards to transdermal medication management safety.
- Imperative to remind physicians of the **limitations of standard urine drug screens**
- Used fentanyl patches may still contain enough fentanyl to cause **respiratory distress and subsequent death** in a pediatric patient

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