



Case #86

NAME Educational Activities Committee

Submitted by:

Dr. Amy E. Theriault (PGY-2) and Dr. Dan Atherton (Associate Professor)
University of Alabama Heersink School of Medicine
Birmingham, AL

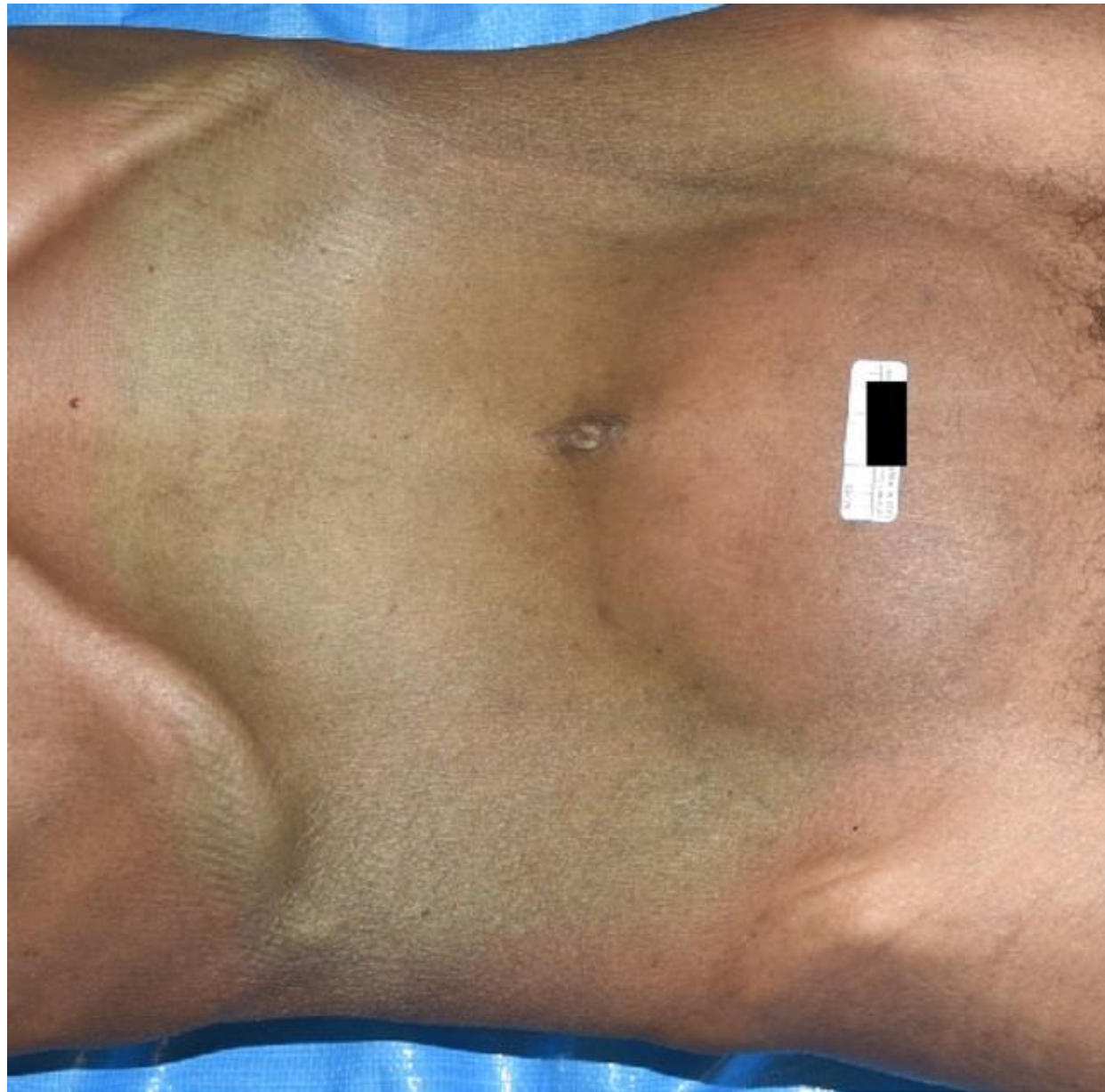


Image 1

1. A 43-year-old woman was found dead with a syringe in her left hand. Postmortem blood toxicology detected 6-monoacetylmorphine, codeine, and morphine. What is the mechanism for the finding shown in this picture?

- Inhibition of mu and delta receptors of the parasympathetic nervous system
- Inhibition of nicotinic receptors of the parasympathetic nervous system
- Flat urothelial carcinoma in situ
- Autoimmune-induced glomerulonephritis
- Gas production by bacteria

Answer...

A. Inhibition of mu and delta receptors of the parasympathetic nervous system (CORRECT ANSWER; 55.73% responses)

There are four opioid receptor systems: mu, delta, kappa and opioid receptor like-1 (ORL1). The most commonly used opioids act on mu receptors inducing central and peripheral side effects. Central effects include nausea, sedation, respiratory depression, and hypotension. Peripheral effects include constipation, hives, bronchospasm, and increased urinary retention. By binding mu and delta receptors, opioids inhibit parasympathetic innervation of the bladder, which increases the tone of the urinary sphincter and decreases bladder detrusor tone. The sensation of bladder distention is also diminished which can lead to the finding of bladder distention shown in the photograph. Pelletier and Andrew (2017) found in a study group of individuals who died from opiate/opioid intoxication excluding fentanyl, bladder distention had a high specificity and positive predictive value.

Other responses:

B. Inhibition of nicotinic receptors of the parasympathetic nervous system (15.21% responses)

Nicotinic receptors are not acted on by opioids. They are located on post-synaptic skeletal neuromuscular junctions and are bound by acetylcholine. Excess levels of acetylcholine can result in muscle fasciculations and flaccid paralysis. Organophosphate and carbamate insecticides are the most common causes of cholinergic toxicity.

C. Flat urothelial carcinoma in situ (7.01% responses)

Flat urothelial carcinoma in situ is a flat, grossly erythematous granular or cobblestone mucosal lesion. Typically no mass is present, and the lesion may involve large areas of the mucosal surface, ureters and/or urethra. This would not cause the bladder distention shown in the photograph.

D. Autoimmune-induced glomerulonephritis (1.03% responses)

Autoimmune glomerulonephritis can be acute or chronic. Post-streptococcal glomerulonephritis and infection by *Staphylococcus aureus* can lead to acute renal symptoms. However, underlying immune processes including lupus nephritis, IgA nephropathy and anti-glomerular basement membrane glomerulonephritis can lead to chronic glomerulonephritis. These conditions may present with gross hematuria, proteinuria, and reduction in creatinine clearance. Such functional changes cause intravascular volume expansion, edema, and systemic hypertension. None of these sequelae would lead to bladder distention.

E. Gas production by bacteria (21.03% responses)

Bloating from decomposition is caused by production of gases during postmortem proliferation of bacteria. These include methane, hydrogen sulfide, carbon dioxide, and hydrogen. This causes the body to bloat. Bloating decomposition looks different than this. The whole abdomen is typically swollen, and there are other accompanying decompositional changes like skin slippage and discoloration.

References

Al-Hasani R and Bruchas, M. Molecular mechanisms of opioid receptor-dependent signaling and behavior. *Anesthesiology* 2011; 115:1363-81.

Kazi AM, Hashmi MF. Glomerulonephritis. [Updated 2023 Jun 26]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK560644/>

Lott EL, Jones EB. Cholinergic Toxicity. [Updated 2022 Dec 5]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK539783/>

Pelletier DE, Andrew TA. Common findings and predictive measures of opioid overdoses. *Academic Forensic Pathology* 2017; 7(1): 91-98.

Roychowdhury M. Carcinoma in situ. PathologyOutlines.com website. <https://www.pathologyoutlines.com/topic/bladdercis.html>. Accessed November 28th, 2023.