Gynecology & Obstetrics

Hoboken et al., Gynecol Obstet 2013, 3:3
http://dx.doi.org/10.4172/2161-0932.1000153

Case Report Open Access

A Case of Acute Cholinergic Poisoning after Treatment for Post Operative Urinary Retention with Low Dose Bethanechol

Andrea Hoboken[1]*, Katherine Sandhu[2] and Hines BJ[2]

[1]Department of Obstetrics and Gynecology, Stamford Hospital, Columbia University College of Physicians and Surgeons, Stamford Hospital, USA
[2]Department of Obstetrics and Gynecology, Stamford Hospital, Columbia University College of Physicians and Surgeons, Urogynecology and Pelvic Surgery, L.L.C, USA

Abstract

Background: Bethanechol has been a well-tolerated medication used to treat urinary retention secondary to surgical procedures, medications, or medical conditions.

Methods: We present a case report of acute cholinergic toxicity requiring hospital admission and treatment with ropinul (glycopyrrolate) secondary to low dose oral bethanechol prescribed for urinary retention after midurethral sling placement and intravesicular Botox injection.

Results: The patient was treated successfully and discharged approximately 30 hours after presentation to the emergency room.

Conclusion: Bethanechol, an accepted, efficacious, and useful treatment for urinary retention, can in rare cases lead to toxicity. It may be reasonable to advise patients to report any symptoms that may suggest the onset of such cholinergic poisoning.

Keywords: Bethanechol; Bethanechol poisoning; Cholinergic poisoning; Intravesicular botox; Midurethral sling

Case Report

AG is a 49-year-old P2 who presented to her urogynecologist with mixed urinary incontinence. She had no significant medical history. She had a history of two prior vaginal deliveries and a tubal ligation. She was not taking medications. Her exam was notable for a post void residual of 20 cc, urethral hypermobility, and POP-Q of Aa: -3, Ba: -3, Ap: -3, and Bp: -3. She underwent urodynamic evaluation revealing an absence of detrusor instability, a maximal urethral closure pressure of 80 cm of water, and an initial sensation to void at 200 cc.

We previously reported on the safety of combined Botox injection and midurethral sling placement for mixed incontinence [1]. She successfully underwent placement of a MONARC® (American Medical Systems, Inc.) midurethral sling. Concomitantly we used 100 units of BOTOX® (Allergan, Inc.) diluted in 10 mL normal saline and injected this via cystoscopy at 10 different locations in the dome of the bladder, avoiding the trigone and path of the ureters.

She was unable to void in the immediate post-operative period, and was taught to self catheterize. On postoperative day 9, she was self catheterizing and presented to the office with dysuria. Her UA revealed moderate blood, positive nitrates, small leukocyte esterase, 16-25 white blood cells and moderate bacteria. A urine culture showed 100, 000 colonies of E. coli, sensitive to Bactrim. She was treated with Bactrim DS and pyridium. She was also started on 25 mg PO BID bethanechol for urinary retention.

Post-operative day fourteen the patient presented to the emergency room with complaints of severe nausea, vomiting, diarrhea, diaphoresis, shaking and light headedness. She denied fever, chills, and loss of consciousness, shortness of breath, chest pain, palpitations or abdominal pain. Her pulse ranged from 51-73, her respirations were 23-24 breaths per minute, her blood pressure 117-139/64-97 and her temperature was 36.3. Her CBC was significant for a white blood cell count of 10.7 with no left shift. Her metabolic panel revealed sodium of 149, potassium of 2.5, chloride of 125, creatinine of 1.4, CO2 of 15, BUN of 24, and calcium of 6.0. Her LFTs, alkaline phosphatase, bilirubin and lactic acid were normal. The symptoms and findings on presentation were consistent with acute toxicity to bethanechol.

She was admitted to telemetry. Her EKG was normal sinus rhythm. She was hydrated with normal saline and her electrolytes were repleted. She received a dose of glycopyrrolate. She was observed for 30 hours, and at that time her acute reaction to the medication appeared to be clinically resolving.

On POD # 26 she was seen in the office. She reported resolution of her mixed incontinence, was able to void comfortably, and showed no lasting sequelae of cholinergic poisoning.

Discussion

Bethanechol is a parasympatho-mimetic choline carbamate selective for muscarinic receptors. It acts on the smooth muscle of the gastrointestinal tract and bladder to produce contractions. Within the bladder it can elicit contraction of the detrusor and subsequent micturition. It is a medication that has been used to treat urinary retention secondary to surgical procedures, medications, or conditions such as diabetic neuropathy, with good efficacy [2]. In general it has proven to be safe and well tolerated. Side effects include GI upset, nausea, vomiting, dizziness, difficulty in visual accommodation, bradycardia, hypotension or diaphoresis, but these are not typically seen in doses less than 50 mg [2].

Contraindications are related to its action on muscarinic receptors. These include asthma, COPD, urinary obstruction, GI obstruction, peptic ulcer disease, hypothyrodism, and cardiovascular disease that may cause hypotension or bradycadia.

***Corresponding author:** Andrea Hoboken, Department of Obstetrics & Gynecology at Stamford Hospital, Columbia University College of Physicians and Surgeons, Stamford Hospital, USA, 30 Shelburne Rd, Stamford, USA, Tel: 203-276-1000; E-mail: Ahoboken@stamhealth.org

Received June 03, 2013; **Accepted** July 01, 2013; **Published** July 08, 2013

Citation: Hoboken A, Sandhu K, Hines BJ (2013) A Case of Acute Cholinergic Poisoning after Treatment for Post Operative Urinary Retention with Low Dose Bethanechol. Gynecol Obstet 3: 153. doi:10.4172/2161-0932.1000153

Upon review of literature, we were unable to identify a specific description of bethanechol poisoning or obvious risk factors that might predispose one to toxicity. In fact, the elimination and half-life of bethanechol are not well understood. However, other cholinergic compounds such as carbamates or organophosphates, which are cholinesterase inhibitors, have a characteristic toxidrome that is well described. While these cause muscarinic, nicotinic and CNS toxicity, their muscarinic toxicity is similar to the side effects described for bethanechol. This can include vomiting, diarrhea, abdominal pain, bronchospasm, miosis, bradycardia, excessive salivation, and sweating. In severe cases there may be fluid deficits significant enough to cause hypovolemic shock. In this situation treatment is supportive and includes fluid resuscitation, management of electrolyte abnormalities, maintenance of an open airway and appropriate ventilation. Atropine is an antidote to treat the muscarinic effects in carbamate or organophosphate poisoning. It can be given at a dose of 0.5 to 2 mg IV, with repeated doses every 5 minutes until symptoms appear to be improving [3]. Glycopyrrolate is another parasympatholytic agent that works by blocking the acetylcholine from binding at muscarinic receptors. Unlike atropine, a tertiary amine, glycopyrrolate is a quaternary amine that is unable to cross the blood brain barrier in significant quantities. Therefore it is less likely to cause altered mental status and tachycardia that can be associated with atropine. It may be a preferred choice to treat peripheral cholinergic symptoms [4]. Glycopyrrolate can be dosed up to 0.2-0.3 mg in adults, but typically comes prepackaged as a 0.2 mg/ml solution [5].

We present a case of acute cholinergic poisoning secondary to bethanechol administration. This appears to be a rare but dangerous adverse reaction. Our patient suffered severe vomiting, diarrhea and diaphoresis that lead to electrolyte abnormalities including hypokalemia, hypernatremia and hyperchloremia requiring treatment. She was noted to have pre-renal failure secondary to volume depletion. She was bradycardic and tachypneic. She required admission and treatment with an anticholinergic.

This patient was a healthy individual without significant medical history. She was not on medication. The bethanechol was prescribed in a low dose commonly used for urinary retention. It is unclear why she would rapidly develop these severe symptoms after 5 days of treatment.

Upon review of the literature cholinergic toxicity with bethanechol is not well described. This potential reaction should be reviewed with patients upon prescribing the medication in order to aid in prompt recognition of an adverse reaction. Timely recognition and treatment can result in complete resolution of the signs and symptoms of toxicity.

Consent

Written informed consent was obtained from the patient for publication of this case report.

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