Acute urinary retention due to pseudoephedrine hydrochloride in a 3-year-old child

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Pseudoephedrine hydrochloride (PEH) is a sympathomimetic agent that is widely used in common cold disease in children. Though side effects of PEH are well known, it is preferred by many pediatricians in order to benefit from its symptomatic relief in common cold disease. A case of acute urinary retention due to PEH in a three-year-old boy is reported. The aim of this case report is to emphasize the clinical importance and differential diagnosis of PEH overdose in children and to discuss the appropriate treatment approach to PEH overdose in the emergency department.

Key words: urinary retention, pseudoephedrine hydrochloride, children.

Pseudoephedrine and ephedrine are mixed sympathomimetics that act via alpha and beta adrenergic receptors[1,2]. Although these agents have been widely used in the treatment of common cold disease in children, severe side effects can be recognized during treatment.

We report a three-year-old boy who developed acute urinary retention after administration of an excessive dose of pseudoephedrine hydrochloride (PEH). Urinary retention is a considerable but rare side effect of PEH.

The aim of this case report was to emphasize the clinical importance and differential diagnosis of PEH overdose in children and to discuss the appropriate approach in the emergency department.

Case Report

A three-year-old boy was admitted to the emergency department with complaints of abdominal pain and voiding difficulty for the last 12 hours. He had no other symptoms like nausea, vomiting or constipation. In his past medical history, he had common cold 10 days before and had been administered only PEH (Sudafed^{R}, GlaxoSmithKline) three times a day (90 mg/day) for the last 10 days without any physician recommendation. On admission, his weight was 11 kg (3%) and height was 92 cm (<25%). His axillary temperature was 37°C, heart rate 110/bpm and blood pressure 100/60 mmHg.

His physical examination revealed suprapubic mass despite normal external genital examination. There was no abdominal tenderness, defense or rebound. His genital examination was also normal. After urinary catheterization, 750 ml of urine was discharged. All laboratory evaluations including complete blood count, liver and renal function tests, and urinalysis were within normal limits.

Radiologic evaluation revealed normal lumbosacral graphs. There was no hydronephrosis or urethral dilatation in renal ultrasonography. The patient was diagnosed as acute urinary retention due to excessive dose of PEH. Further urologic investigations were planned after urethral catheterization and cessation of PEH administration. There were no other symptoms or signs of PEH overdose, especially in cardiac and neurologic examinations. Twelve hours after the last dose of PEH, voiding difficulty was resolved, and the patient was discharged from the hospital at the end of a 12-hour follow-up period.

After an uneventful one-week period, we performed voiding cystoureterography, retrograde ureterography, cystometry and uroflowmetry to exclude other causes of urinary retention. Voiding

cystoureterogram and retrograde ureterography revealed normal bladder capacity without vesicoureteral reflux or urethral obstruction. Cystometric capacity was 110 ml, compliance 0.15 ml/cmH_2O, and Q max 16 ml/s in urodynamic study. Uroflow metric evaluation revealed normal voiding time and flow time (32 s and 21 s, respectively).

Discussion

Pseudoephedrine hydrochloride is a sympathomimetic agent that is used to treat congestion associated with allergies, hay fever, sinus irritation and common cold[3]. PEH is a stereoisomer of ephedrine that acts via alpha and beta adrenergic receptors[1,2]. They relieve symptoms of the common cold by decreasing the blood flow in nose and lungs and mucous membranes of other organs[3].

Although PEH is widely used for the common cold in childhood, it has a series of adverse events. Restlessness, nervousness, dizziness, stomach pain, vomiting, difficulty in breathing, palpitation, hallucination and weakness are the common adverse events defined for PEH[4]. Rhabdomyolysis, ataxia, cerebral hemorrhage, disseminated intravascular coagulopathy, dyskinesia, hepatotoxicity, erythrodermia and toxic epidermal necrolysis can also be encountered in severe PEH intoxication. Urinary retention is also one of the adverse events of PEH and is the result of both relaxation of detrusor muscle (beta receptors) and contraction of bladder trigone and sphincter (alpha receptors)[4]. This is one of the mainstays of incontinence treatment in adults[5].

In childhood, PEH is used with a daily dose of 4 mg/kg (between 2-5 years, 15 mg four times a day)[2]. PEH is not recommended under two years of age and is used only seven days for decongestion[2]. Peak effect of PEH starts in 30-60 minutes and lasts between 8 to 12 hours. PEH has renal excretion and limited liver metabolization. Although excessive use of sympathomimetics results in significant adverse effects, they are steadily used in pediatric clinical practice. In the present case, PEH was administered twice the recommended daily dose and for more than one week, which is extremely excessive for a three-year-old, low-weight child.

Boston et al.[6] reported the first case of an adult who had voiding difficulty and dysuria during PEH treatment. That was followed by a report from Glidden et al.[4] of urinary retention due to PEH in children in 1977. There is limited data in the literature about adverse events of PEH in children. PEH overdose usually appears to be an emergency entity with wide spectrum of clinical features, ranging from cardiac arrhythmia to coma[4]. We report the first case of PEH overdose in a child associated with urinary retention without any other clinical features.

Urinary retention due to PEH was first used in the treatment of incontinence in 1948 by Rashbaum[7]. Brookfield [8] used ephedrine to treat childhood enuresis based on this observation. In the treatment of urinary incontinence, therapeutic dose of PEH is similar to that used as decongestant. Although urinary retention can be detected in lower doses of PEH, only a limited number of patients developed urinary retention. The fact that most of the patients did not develop urinary retention is controversial. Urinary retention due to PEH was the only adverse event in the present case, and we suggest that urinary retention is related with the prolonged PEH treatment rather than the PEH overdose. PEH treatment used in incontinence is longer than that used in the common cold. Although a single case is not sufficient to make a firm conclusion, prolonged duration of PEH treatment plays a major role in developing urinary retention.

Acute urinary retention is very rare in childhood and is generally detected after surgical interventions. Gatti et al.[9] reported 53 acute urinary retention cases in children with the etiologic factors including neurological processes (17%), severe voiding dysfunction (15%), urinary tract infection (13%), constipation (13%), local inflammatory causes (7%), locally invading neoplasm (6%), benign obstructing lesions (6%) and incarcerated inguinal hernia (2%). Adverse drug events accounted for 13% of all cases and were three times more common in males[9]. Acute urinary retention requiring emergency care due to PEH was not reported previously. Diagnosis of acute urinary retention cannot be delineated based on history and physical findings[9]. These patients should undergo prompt neurological evaluation and appropriate imaging studies[9].

When a PEH-administered patient is admitted to an emergency department with a history of difficulty in voiding and globe vesical, urinary retention due to PEH should be kept in mind.

PEH should be discontinued and urethral catheterization must be performed. This is a reversible effect that resolves spontaneously and almost never necessitates alpha blockers. After emergency care is completed, further urologic evaluations must be performed to exclude neurogenic bladder, urinary obstruction, infection and other causes of distended bladder.

In conclusion, acute urinary retention due to PEH is a rare but considerable emergency event in childhood. In children, it can occur in excessive doses of PEH without any other adverse effects. Before prescribing, patients should be advised of the adverse effects of PEH. Temporary but immediate relief can be provided by urethral catheterization in the emergency department. All patients should be carefully evaluated for other causes of urinary retention in order to make accurate diagnosis.

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