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Using Hydrogen Peroxide as a Bladder Irrigation Solution for Clot Evacuation

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ABSTRACT

Gross hematuria or macroscopic hematuria is a high risk urologic condition that might occur in different settings. In the case of continued gross hematuria, blood clot size may grow and lead to complete obstruction of urinary outflow. Placement of three-way catheter, continuous bladder irrigation with normal saline, and cystoscopy are conventional treatments. Here we introduce a case with urinary obstruction who did not respond to conventional therapies. A subject of Hodgkin lymphoma with urinary obstruction caused by heavy gross hematuria was presented to the emergency department. Three-way catheter was inserted to facilitate urination. However, there was no urinary drainage and bladder was distended. Consequently, 100 ml solution of hydrogen peroxide 0.15% were prepared and administered into the bladder to irrigate and evacuate the clots. A single intravesical infusion of hydrogen peroxide rapidly resolved urinary obstruction and improved patient distress. After administration of hydrogen peroxide solution, blood clots and bloody urine were evacuated successfully. These findings suggest that an intravesical injection of hydrogen peroxide can induce dissolution of blood clots and may be a simple and efficient therapy for urinary obstruction due to gross hematuria.
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Introduction

Gross hematuria has been defined as the observation of blood in urine by naked eyes. A number of conditions can cause gross hematuria including bladder or kidney stones, glomerulonephritis, cancer, inherited disorders, severe urinary tract infection and also medications (1-3). Lymphoma is also another underlying disease in which gross hematuria might occur. Formation of blood clots in the bladder is one of the sequels of gross hematuria. If this gross hematuria continues, the blood clot size may expand and cause complete obstruction of urinary outflow. In this situation, the patient's bladder can distend which has been considered as a urologic emergency (3).

Conventional treatment strategies include insertion of three-way catheter and continuous bladder irrigation with normal saline (1, 4), bladder washout (the risk of urinary tract infection exists), cystoscopy and clot evacuation that is generally used in case of resistance to conventional treatments (5). Some therapeutic strategies which are specially used to control bleeding involve Alum solution (aluminum ammonium sulfate 1%) which has shown positive effects and few side effects (3, 6, 7) and formalin solution with a good efficacy, but some side effects such as contracted bladder, vesico ureteric reflux, incontinence of urination, and bladder rupture (3, 8, 9, 10). Other strategies to reduce bleeding include hyperbaric oxygen

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therapy (3, 11), irrigation with silver nitrate (7, 12), therapeutic embolization (3, 13), and bladder tamponade (5). In this report we are going to introduce a treatment strategy for the solution and evacuation of blood clots from bladder using Hydrogen Peroxide solution.

Case presentation

A case of forty nine year-old man with a history of Hodgkin lymphoma for five years and last chemotherapy in eight months ago, presented to the emergency department with chief complaint of weakness, anorexia, nausea and vomiting. The patient was bicytopenic (Platelets: 17000, RBC: 1.86×10^6, WBC: 4900) and severely anemic (Hb: 6 g/dL). So he received 2 units of packed cells and 5 units of platelet.

Since the patient had not urinated for 24 hours, three-way catheter was inserted to irrigate and facilitate urination. After the catheterization, some bloody urine was evacuated. However, in the following days there was no urine from three-way catheter and bladder was distended. The patient was suspected to have large blood clots in the bladder that totally obstructed the bladder outflow. Also, he was quite agitated. Eventually, intravesical infusion of 100 ml hydrogen peroxide 0.15% was considered for him. Hydrogen peroxide solution facilitated dissolution of organized blood clots and helped to remove urinary obstruction. After administration of hydrogen peroxide solution, blood clots and bloody urine were evacuated, bladder obstruction improved, and patient's distress was resolved.

Discussion

Clot retention may result from gross hematuria and lead to urinary outflow obstruction. Sometimes, these blood clots are too large and stiff that cannot be removed by conventional methods, therefore unusual treatments or surgical interventions may be required. In a literature review, only one study noted hydrogen peroxide as an irrigation solution for bladder clot evacuation and resolution of bladder blockage (14). In different studies, hydrogen peroxide was used as an irrigation solution during acute upper GI bleeding and endoscopy (15-17), Adenoidectomy (18), tonsillectomy (19) and arthroplasty (20). According to these studies, we decided to utilize hydrogen peroxide solution for evacuation of bladder organized clots. The beneficial effects of hydrogen peroxide in acute upper GI bleeding had been proved previously by Kallo et al., (1999) and Wu et al., (1999). Moreover, Al-abbasi and Saeed (2008) demonstrated the advantageous role of hydrogen peroxide as a hemostatic agent in decreasing the blood loss after tonsillectomy. All of these studies (14, 15, 16, 19) indicated no significant adverse effect after hydrogen peroxide use and referred it as a safe irrigating solution. However, several studies reported of complications such as oxygen embolism and cardiovascular collapse following hydrogen peroxide irrigation (21, 22). The hydrogen peroxide mechanism in clot removal is poorly specified, but some theories have been proposed, including inhibition of adenosine diphosphate-induced platelet aggregation (23) and hemolysis through the oxidizing effect of hydrogen peroxide (16). The hemostatic effect may arise from its vasoconstrictive properties and formation of thrombus due to platelet aggregation. Also the free diffusion of hydrogen peroxide through the vessel walls and its conversion to water and oxygen may lead to the creation of intra-luminal bubbles, micro-embolisms and vessel obstruction (24). Our experience suggests that the hydrogen peroxide irrigation solution can be an efficient therapy for persistent gross hematuria in resistance to conventional treatments.

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