

Hemorrhagic Cystitis due to Intravesical Instillation of Gentian Violet Completely Recovered with Conservative Therapy

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Chemical cystitis due to intravesical instillation of gentian violet or crystal violet is rare and all of the reported cases have been in adults using undiluted solution, which resulted in long-term sequelae. This is a case report on a 16-month-old boy with hemorrhagic cystitis after the instillation of diluted gentian violet into the bladder to rule out bladder injury during inguinal herniorrhaphy. Although he was completely recovered with conservative therapy, gentian violet, even when diluted, should not be used on the urinary tract.

Key Words: Cystitis, hemorrhage, gentian violet

INTRODUCTION

Gentian violet has been used for the treatment of oral and vaginal candidiasis or the preparation of the vagina or skin during gynecologic operation. Previously, diluted gentian violet had also been commonly used during gynecologic operations to determine the patency of the fallopian tubes or to demonstrate vesicovaginal fistula.¹ Because gentian violet is potentially toxic to mucosal membranes,¹⁻³ it has largely been replaced by indigo carmine or methylene blue when used in the urinary tract. There have been 3 case reports of chemical cystitis due to intravesical instillation of undiluted gentian violet or crystal violet, which occurred in adults and resulted in long-term sequelae.^{1,4} This is the first case report

in a child featuring the instillation of diluted gentian violet into the bladder with complete recovery through conservative therapy.

CASE REPORT

A 16-month-old boy presented with a 2-day history of painful gross hematuria. He had undergone herniorrhaphy due to left indirect inguinal hernia 2 days previously at another hospital. During the operation, gentian violet solution diluted to a 0.1% concentration had been instilled into the bladder to rule out bladder injury and hematuria developed several hours later. Urinalysis showed hematuria without pyuria. Ultrasonography revealed multiseptated structures resulting from edema and hematoma in the bladder and bilateral hydronephrosis (Fig. 1 and 2).

An 8 Fr. urethral Foley catheter was inserted and intravenous hydration was done. After 12 days, the hematuria became milder and the urethral Foley catheter was removed. At seven days after removal of the Foley catheter, the hematuria had subsided and follow-up ultrasonography showed bladder wall thickening with resolution of multiseptated structures in the bladder and improvement of hydronephrosis.

The patient has voided well without symptoms of hematuria, dysuria, straining or frequency, and with a voided volume of 100-130 ml for 6 months after discharge. Follow-up urinalysis and ultrasonography of the kidney and bladder at 3 and 6 months produced normal results.

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Fig. 1. Ultrasonogram showing multiseptated structures resulting from edema and hematoma in the bladder.



Fig. 2. Ultrasonogram showing hydronephrosis.

DISCUSSION

Gentian violet (crystal violet; methylrosaniline chloride) has been used for the treatment of oral and vaginal candidiasis or the preparation of the vagina or skin during gynecologic operation.¹ Bonney's blue dye, which was developed by Victor Bonney, consists of a 1:1 mixture of brilliant green and crystal violet dissolved in ethanol.⁵ It has been used not only for the preparation of the vagina or skin during gynecological operative procedures but also to determine the patency of the fallopian tubes and to demonstrate vesico-vaginal fistula.¹ Because this solution is potentially toxic to mucosal membranes and there have been reports of mucosal ulceration after topical application to oral mucosa,¹⁻³ it should be diluted

with water to a 0.5% concentration before instillation into the bladder or contact with any other mucosal surface.¹

In the literature, there have been 3 cases of chemical cystitis due to intravesical instillation of undiluted Bonney's blue or gentian violet.^{1,4} All of these cases occurred in adult females. In one case, the chemical cystitis occurred following the accidental injection of a small amount of gentian violet into the urethra during self-vaginal lavage for the treatment of severe pruritus.⁴ In the other 2 cases, the doctor instilled undiluted Bonney's blue into the bladder by mistake.¹ Severe pain, urgency, frequency and hematuria developed after its instillation. Only 2 of the cases mentioned sequelae. In one case, intractable suprapubic discomfort, frequency, urge incontinence, enuresis and reduced bladder capacity still remained after 2 years, although hydraulic overdistention, augmentation ileocystoplasty, and supratrigonal denervation were performed.¹ In the other case, in spite of systemic steroids, hydraulic overdistention, and intravesical treatment with dimethyl sulfoxide (DMSO), suprapubic pain persisted for 2 years but relief was finally achieved using a transcutaneous nerve stimulator.¹

Dupont et al.⁶ reported that the experimentally induced inflammation, either chemical, immune or mechanical, in rats resulted in an increase in nerve growth factor content of the bladder and morphological changes in sensory and motor neurons innervating the bladder. They suggested that such neuroplasticity may be a possible explanation for the association of bladder inflammation with long-term symptoms and pain after subsidence of inflammation. An increase in the level of nerve growth factor mRNA or protein was also found in a rat model of chemical bladder inflammation using turpentine oil.^{7,8} Kato et al.⁹ reported that the chemical cystitis experimentally induced by intravesical instillation of 50% acetone solution resulted in a severe decrease in the bladder function initially but was reversible within a 2 month period of study in rabbits.

This is the first case report of chemical cystitis induced by intravesical instillation of diluted gentian violet in a child who fortunately completely recovered with conservative therapy. It is not certain whether there is a difference in re-

covery potential between child and adult. Christmas et al.¹ suggested that the degree of resultant damage depends upon the duration of exposure to gentian violet. However, it seems more plausible that because diluted gentian violet was used in this case, the damage in the bladder may be less than that resulting from undiluted solution and that full recovery could be achieved.

Gentian violet or crystal violet has been shown to interact with cellular DNA and also appears to be a carcinogen in mice and rats.¹⁰⁻¹² Therefore, gentian violet should not be used on the urinary tract, even when diluted.

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