

# Is mannitol a good alternative agent for evaluating ureteral patency after gynecologic surgery?

**Maybe**, but we need more data. There was a significant difference in surgeon satisfaction with the use of mannitol as a bladder distention medium during intraoperative cystoscopy compared with normal saline infusion, oral phenazopyridine, or intravenous sodium fluorescein in an unblinded randomized trial of 130 women who underwent gynecologic surgery at a single institution.

## FAST TRACK

Physician satisfaction was statistically significant with the use of mannitol as a bladder distention medium over oral phenazopyridine, and satisfaction was better compared with use of IV sodium fluorescein or normal saline distention

Grimes CL, Patankar S, Ryntz R, et al. Evaluating ureteral patency in the post-indigo carmine era: a randomized controlled trial. *Am J Obstet Gynecol*. 2017;217(5):601.e1-e10.

## EXPERT COMMENTARY

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Although the incidence of lower urinary tract and ureteral injury following gynecologic surgery is low, intraoperative identification of ureteral patency can prevent serious long-term sequelae. Since the indigo carmine shortage in 2014, US surgeons have searched for multiple alternative agents. Intravenous methylene blue is suboptimal due to its systemic adverse effects and the length of time for dye excretion in the urine.

Grimes and colleagues conducted a study to determine if there was any significant difference in surgeon satisfaction among

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4 different alternatives to indigo carmine for intraoperative ureteral patency evaluation.

## Details of the study

The investigators conducted a randomized clinical trial of 130 women undergoing benign gynecologic or pelvic reconstructive surgery. Four different regimens were used for intraoperative ureteral evaluation: 1) oral phenazopyridine 200 mg, 2) intravenous sodium fluorescein 25 mg, 3) mannitol bladder distention, and 4) normal saline bladder distention.

**Study outcomes.** The primary outcome was surgeon satisfaction based on a 0 to 100 point visual analog scale rating (with 0 indicating strong agreement, 100 indicating disagreement). Secondary outcomes included ease of ureteral jet visualization, time to surgeon confidence of ureteral patency, and occurrence of adverse events over 6 weeks.

**Surgeon satisfaction rating.** The investigators found statistically significant physician satisfaction with the use of mannitol as a bladder distention medium over oral phenazopyridine, and slightly better satisfaction compared with the use of intravenous

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### WHAT THIS EVIDENCE MEANS FOR PRACTICE

This study showed that surgeon satisfaction was greatest with the use of mannitol as a distending medium for intraoperative evaluation of ureteral patency compared with oral phenazopyridine, intravenous sodium fluorescein, and normal saline distention. However, time to surgeon confidence of ureteral patency was similar with all 4 methods. More data are needed related to UTIs and the cost of mannitol compared with the other 3 methods.

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sodium fluorescein or normal saline distention. The median (range) visual analog scores for ureteral patency were phenazopyridine, 48 (0–83); sodium fluorescein 20 (0–82); mannitol, 0 (0–44); and normal saline, 23 (3–96) ( $P < .001$ ).

There was no difference across the 4 groups in the timing to surgeon confidence of ureteral patency, length of cystoscopy (on average, 3 minutes), and development of postoperative urinary tract infections (UTIs).

Most dissatisfaction related to phenazopyridine is the fact that the resulting orange-stained urine can obscure the bladder mucosa.

One significant adverse event was a protocol deviation in which 1 patient received an incorrect dose of IV sodium

fluorescein (500 mg) instead of the recommended 25-mg dose.

### Study strengths and weaknesses

The strength of this study is in its randomized design and power. Its major weakness is surgeon bias, since the surgeons could not possibly be blinded to the method used.

The study confirms the problem that phenazopyridine makes the urine so orange that bladder mucosal lesions and de novo hematuria could be difficult to detect. Recommending mannitol as a hypertonic distending medium (as it is used in hysteroscopy procedures), however, may be premature. Prior studies have shown increased postoperative UTIs when 50% and 10% dextrose was used versus normal saline for cystoscopy.<sup>1,2</sup> Since the Grimes study protocol did not include postoperative urine collection for cultures, more research on UTIs after mannitol use would be needed before surgeons confidently could use it routinely.

In our practice, surgeons prefer that intravenous sodium fluorescein be administered just prior to cystoscopy and oral phenazopyridine en route to the operating room. I agree that a major disadvantage to phenazopyridine is the heavy orange staining that obscures visualization.

Finally, this study did not account for cost of the various methods; standard normal saline would be cheapest, followed by phenazopyridine. ●

### FAST TRACK

*There was no difference across the 4 groups in the timing to surgeon confidence of ureteral patency, length of cystoscopy, and development of postoperative UTIs*

### References

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