



50% dextrose versus normal saline as distension media during cystoscopy for assessment of ureteric patency



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ABSTRACT

Objective: To compare the visualization of ureteric jets when using 50% dextrose (D50) as opposed to normal saline (NS) as distension media during cystoscopy.

Study design: Cross sectional study.

Methods: Two patients each had two cystoscopy videos recorded at the time of a ureteric jet; one using NS and the other using D50 resulting in two sets of paired videos (four videos). A fifth cystoscopy video was recorded, as a control, at a time when there was no ureteric-jet. Fifty participants including attending physicians, residents and medical students were recruited at an academic-affiliated community hospital. Participants were blinded to the medium used and viewed each of the five videos. Participants assessed each video for presence of a ureteric-jet, ease of interpretation, and compared the paired D50 and NS videos for clarity of ureteric-jets.

Main outcome measures: Participant's assessment of clarity of the ureteric jets when D50 was used as compared to when NS was used in the paired videos.

Results: All 100 observations of the two D50 videos with jets identified the presence of a jet; for the NS videos, 96/100 observations identified a jet, 2/100 did not identify a jet and 2/100 were unsure. 48/50 observations of the video with no jet were correct, while 2/50 were unsure. Participants rated the ureteric-jets to be clearer in videos with D50 (86% vs 14%, $P < 0.001$); and had difficulty interpreting cystoscopy videos with NS (62% vs 2%, OR: 80, 95% CI: 10.2–627.6).

Conclusion: Participants preferred the clarity of the ureteric-jet when 50% dextrose was used as the distension medium during cystoscopy as compared to normal saline.

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Introduction

Pelvic surgery places the lower urinary tract at risk of injury, and ureteral injuries are of particular concern to practicing Obstetrician/Gynecologists. The use of intraoperative cystoscopy to assess ureteric patency allows for the identification of most ureteric injuries. Traditionally, coloring agents have been used to color the urine and facilitate visualization of the ureteric jets. Coloring agents are given systemically (intravenously or orally) and are then excreted into the urine. The most commonly used coloring agent in cystoscopy used to be indigo carmine (sodium indigotindisulfonate). In the presence of normal renal function, it is cleared rapidly by the kidney from the circulation after intravenous administration and is typically seen in the

bladder within 5–7 min. The dye has proven clinical safety with only a few case reports of adverse effects: hypertension due to an exaggeration of the known vasopressive effects of the drug mediated by alpha-adrenergic receptor activation [1,2]; hypotension [3,4]; bronchospasm with urticaria [5], and one case of severe life-threatening anaphylactoid reaction followed by cardiac arrest [6].

Recently indigo carmine has become unavailable, and attention has been directed towards using other agents such as phenazopyridine, riboflavin and sodium fluorescein to color the urine [7–9]. As an alternative to coloring agents, distension media can be used to facilitate visualization of ureteric jets [10]. We used video recordings of cystoscopy performed using highly viscous 50% dextrose (D50) solution as the distension medium based on the premise that the urine, which is of lower viscosity, will be seen clearly as a jet at the time of ureteric efflux due to their different viscosities. (Supplemental digital content: Video 1). We compared the visualization of ureteric jets on these D50 videos with those on cystoscopy videos recorded using normal saline as the distension medium.

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Methods

After approval from our institutional review board we conducted a cross sectional study to evaluate the visualization of ureteric jets when using 50% dextrose (D50) as the distension medium during cystoscopy as compared to normal saline (NS). Attending physicians (Obstetrician/Gynecologists), residents in training (Obstetrician/Gynecologists) and medical students were shown cystoscopy videos and asked to fill out a questionnaire.

Each participant viewed five short cystoscopy video clips, 20–30 s each, to assess ureteric patency. In each video, the view was focused on one ureteric orifice. The first video was an unpaired video followed by two sets of paired videos resulting in a total of five videos. Two patients each had two cystoscopy videos recorded; one with D50 and the other with NS as the distension medium at the time of a ureteric jet resulting in two sets of paired videos. Both these patients had a total laparoscopic hysterectomy and the cystoscopy was performed to assess ureteric patency at the completion of the surgery. The unpaired video using D50 as the distension medium showed no ureteric jet; it was also from one of the patients that contributed to the paired videos, but recorded at a time when there was no ureteric efflux. Participants were blinded to the medium used, and they were not aware that there was more than one video from the same patient.

After viewing each video, the participants were asked to answer two questions. The first question was on the presence of a ureteric jet (good, sluggish, absent, unsure). The participants were then asked to score each video on ease of interpretation (very/somewhat easy, neither difficult nor easy, very/somewhat difficult). The first video was unpaired, videos 2 and 3 were a pair, and videos 4 and 5 were a pair. After viewing and answering the questions for videos 1, 2 and 3; the participants were shown videos 2 and 3 simultaneously on the same screen and asked to compare them and pick the clearest video in the pair. Similarly, after viewing and answering questions for videos 4 and 5, they were asked to compare videos 4 and 5 for clarity. If the participants thought one video was clearer than the other, they were asked to quantify the extent to which that video was clearer on a scale of 1–5 (1 = slightly clearer, 3 = moderately clearer and 5 = substantially clearer). If they thought both videos were equally clear, a score of 0 was assigned to indicate no difference between the two videos. The term “clear” was explained to mean better visualization of the jets. The questionnaire also collected data on the level of training of the participants and the number of cystoscopies they performed or observed in the last year.

The primary outcome was the participant’s assessment of clarity of the ureteric jets when D50 was used as compared to when NS was used. We hypothesized that 75% of the participants would state that the ureteric jets were clearer with D50 compared to NS. In order to reject the null hypothesis the study required 29 participants to achieve 83% power. We recruited in excess of that number in order to be able to assess the influence of the level of training and experience with cystoscopy on the primary outcome. The secondary outcomes were to assess the accuracy and ease of interpretation of the cystoscopy videos when using D50 as compared to NS. Standard descriptive statistics were used and comparison between groups with different level of training and experience was done using the chi-square test.

Results

We recruited a total of 50 participants. The level of training and cystoscopy experience of the participants are depicted in Table 1. Thirty two percent of the participants were practicing Obstetrician-Gynecologists with more than 10 years of post-residency

Table 1

Level of training and cystoscopy experience of the participants.

Variable	% (n)
Level of training	
Medical student	10 (5)
PGY 1–2 resident	24 (12)
PGY 3–4 resident	18 (9)
Attending <10years post-residency experience	16 (8)
Attending >10years post-residency experience	32 (16)
No. of cystoscopies performed or observed in the last year	
Less than 5	72 (36)
5 or more	28 (14)

PGY, post graduate year of training during residency.

experience, and most of the participants (72%) had performed or observed less than five cystoscopies in the last year.

Assessment of clarity with D50 as compared to NS

When asked to compare the two videos with different media (D50 vs NS) within each pair, for the first pair of videos, 46 of 50 participants (92%) said D50 was clearer, 4 participants (8%) said that both D50 and NS were equal, and none of the participants said NS was clearer (Table 2). For the second pair of videos, 44 of 50 participants (88%) found D50 to be clearer, 6 participants (12%) said both media were equal and none of the participants said NS was clearer. Overall, when including both patients, there was a significant improvement in the clarity of visualization of ureteric jets when D50 was used (86% vs 14%, $P < 0.001$). We quantified the extent to which jets were clearer with D50 as compared to NS on a scale of 0–5. The degree of clarity with D50 was significantly above a level of “3” (moderately better) with a mean score of 4 (SD: 1.4, $P < 0.001$).

Accuracy of assessment for presence of ureteric jets with D50 as compared to NS

All 100 observations of the two D50 videos were able to identify the presence of a jet; for the two NS videos, 96/100 observations identified a jet, 2/100 did not identify a jet and 2/100 were unsure. 48/50 observations for the video with no jet were correct, while 2/50 were unsure. When a jet was identified, the participants were also asked to specify if the ureteric jet in the videos was “good” (interpreted as a patent ureter) or “sluggish” (interpreted as a ureter that may be partially obstructed or kinked). We evaluated the difference in the assessment with the two different media for a given patient by studying the data for the paired videos (Table 3). For both patients with good jets, more participants identified the jet to be sluggish when NS was used as compared to D50.

Ease of interpretation with D50 as compared to NS

More than half of the participants (62%) found it “very difficult” or “somewhat difficult” to interpret at least one of the videos when NS was used, while only one participant (2%) found it “very

Table 2

Assessment of clarity: D50 vs NS.

	First pair of videos (Patient A) % (n)	Second pair of videos (Patient B) % (n)
D50 is clearer	92 (46)	88 (44)
NS is clearer	0 (0)	0 (0)
D50 and NS are equally clear	8 (4)	12 (6)

D50, 50% dextrose; NS, normal saline.

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