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EFFECTIVENESS OF EARLY ORAL HYDRATION IN RELIEVING POSTOPERATIVE THIRST IN PATIENTS UNDERGOING UROLOGICAL ENDOSCOPIC PROCEDURES: A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Background: Postoperative thirst is one of the most prevalent and distressing sensations for individuals recovering from general anesthesia. Early oral hydration has been recommended as a way to increase patient comfort after urological endoscopic procedures; however, there is insufficient evidence supporting this strategy.

Objective: To determine the efficacy of early oral hydration in alleviating postoperative thirst in patients following urological endoscopic procedures.

Methods: The study was a randomized controlled trial conducted at Sindh Institute of Urology and Transplantation, Karachi, from 1st April, 2026 to 30th June, 2026. A total of 200 adult patients undergoing elective urological endoscopic procedures under general anesthesia were randomized equally to receive either early oral hydration after recovery of protective airway reflexes or standard delayed oral hydration. SPSS 26 was used for data analysis, and $p \leq 0.05$ was considered significant.

Results: Both groups had similar baseline demographic and clinical characteristics. Early oral hydration significantly reduced postoperative thirst scores and decreased thirst levels compared to controls ($p<0.001$). In the intervention group, patients reported higher levels of comfort and satisfaction, as well as earlier initiation of oral hydration ($p<0.001$).

Conclusion: Early oral hydration is a safe, easy, and effective technique for reducing postoperative thirst and improving patient comfort and satisfaction in patients following urological endoscopic procedures while minimizing hydration-related problems.

KEYWORDS: Postoperative Period; Thirst; Drinking; Postanesthesia Care Unit; Urologic Surgical Procedures

INTRODUCTION

Thirst is one of the most frequent and disagreeable complaints of anesthetic patients.[1] Despite being perceived as a minor complaint, it has a substantial negative impact on patient comfort, satisfaction, and overall recovery experience.[2] Several factors are responsible for the sensation of thirst during the perioperative period, including prolonged fasting, fluid loss, anesthetic and anticholinergic medications, endotracheal intubation, supplemental oxygen therapy, and decreased salivary production.[3] Oral fluids have traditionally been restricted until protective airway reflexes have recovered due to concerns about postoperative nausea and vomiting, as well as the risk of pulmonary aspiration.[4] The introduction of new anesthetic techniques, better postoperative recovery guidelines (ERAS), and post-surgical monitoring has been questioning this conservative strategy, as it seems a few well-chosen patients can recover safely from earlier oral rehydration without an increase in complications.[5]

Endoscopic procedures involving the urinary tract such as cystoscopy, ureteroscopy, transurethral resection of the prostate (TURP), transurethral resection of bladder tumors (TURBT), and placement of ureters are a group of minimally invasive surgical procedures throughout the world.[6, 7] Endoscopic urologic procedures are performed on more than 10 million patients every year, and their incidence has been growing due to an increase in the incidence of urolithiasis, benign prostatic hyperplasia, and bladder tumors.[8] These treatments are noted for having reasonably

short surgery periods and speedy recovery, although the postoperative recovery period is generally characterized by the presence of moderate to severe thirst in the post-anesthesia care unit (PACU). [9] It has been found that around 59% of surgical patients experience thirst after surgery.[10] However, although effective management of thirst is known to significantly enhance patient comfort and satisfaction, postoperative thirst is not often the clinical focus in as much detail as pain, nausea, or vomiting.[11]

There is emerging evidence that early oral hydration after confirmation of adequate consciousness and intact swallowing reflexes can effectively relieve postoperative thirst without increasing the risk of aspiration, postoperative nausea, or vomiting.[12, 13] In several randomized controlled trials, early fluid administration was shown to improve thirst intensity scores and patient satisfaction with early fluid compared with the conventional delayed hydration approach. [14, 15]

Given the increasing volume of endoscopic urological surgeries and the growing emphasis on patient-centered perioperative care, establishing evidence-based strategies for early postoperative thirst management is both clinically relevant and timely. The successful and safe administration of early oral hydration may help optimize the postoperative nursing care given, help improve patient comfort, help increase satisfaction with perioperative care, help facilitate implementation of enhanced recovery pathways, and help potentially decrease unnecessary delays in initiating oral fluids and/or hospital discharge. In addition, the data collected in this study will be useful to anesthesiologists, urologists, perioperative nurses, and hospital officials who are looking at ways to streamline recovery procedures. The present study was designed to determine the effectiveness of early oral hydration in relieving postoperative thirst in patients admitted to the PACU after undergoing urological endoscopic procedures, to assess patient satisfaction with the timing of oral hydration, and to identify the incidence of adverse effects associated with early oral hydration.

METHODS

This randomized controlled clinical trial, ClinicalTrials.gov ID: NCT07563530 that was undertaken in the Post Anesthesia Care Unit (PACU) of the Department of Anesthesia at Sindh Institute of Urology and Transplantation (SIUT), Karachi, Pakistan for three months starting from 1st April, 2026 to 30th June, 2026 after approval of study protocol by the Institutional Review Board (IRB) of SIUT, approval no: SIUT-ERC-2025/A-586, Date: 11th November, 2025.

Participants were randomly allocated in a 1:1 ratio to either the early oral hydration group or the standard care (control) group. The sample size was determined from a prior study that reported 85% and 60% of postoperative thirst relief for intervention and control groups, respectively. [16] Using OpenEpi version 3.01, with a study power of 90% and a two-sided significance level of 5%, the minimum sample size calculated was 89. The final sample size was 200 participants (100 patients per study arm), after accounting for a 25% loss to follow-up.

The non-probability consecutive sampling technique was employed to choose participants. Adult male and female patients aged 18-65 years, scheduled for elective day-care urological endoscopic operations under general anesthesia and with an American Society of Anesthesiologists (ASA) physical status classification of I-III, were considered eligible.[17] Patients with gastrointestinal disorders that contraindicated early oral hydration, previous gastrointestinal surgery, swallowing dysfunction, delayed gastric emptying, inability to communicate or to express thirst after anesthesia, requirement for nasogastric suction, and previous facial, oropharingeal, or laryngeal surgery were excluded from the study.

Eligible patients were identified during the pre-operative evaluation, and informed written consent was obtained after providing a detailed explanation in the patient's preferred language regarding the aim, procedure, potential risks, and benefits of the study. The participants were randomized at the PACU after admission using a computer-generated randomization sequence prepared by an independent statistician. Sequentially numbered opaque envelopes were used to conceal the allocation, which were only opened after the patients were enrolled. Demographic and clinical data such as age, gender, ASA score, and type of urological endoscopic procedure (UEP) were obtained on a pre-designed data collection sheet before the procedure.

Patients were monitored in the PACU using continuous electrocardiography, pulse oximetry, non-invasive blood pressure monitoring, and clinical assessment until discharge, while all received standard postoperative monitoring during their PACU stay. There was no difficulty in accessing essential emergency equipment such as the suction apparatus, oxygen supply, anesthesia equipment, and emergency medication during the study period. Standardized assessment tools were used by trained PACU nurses under the guidance of the principal investigator to gather data. The Visual Analogue Scale (VAS) was used to assess the intensity of thirst with a 10-pt scale, with 0 indicating no thirst at all and 10 indicating the worst thirst one could imagine, at PACU admission and immediately before PACU discharge.[18] Patient comfort was also measured by a VAS while overall satisfaction with postoperative care was measured by a Likert scale at PACU discharge.[19] Oral water intake in total millilitres during the PACU stay was recorded, and adverse events (nausea, vomiting, cough, gagging, regurgitation and aspiration) were recorded prospectively.

Early oral hydration was given to the participants in the intervention group once safety criteria were met. The criteria were sufficient consciousness to be able to follow simple commands, intact swallowing and protective coughs, spontaneous ventilation without any evidence of residual neuromuscular blockade, and that there was no surgical contraindication to taking oral fluids. Initially, patients were offered up to 10 mL of clear water and were observed for 10–15 minutes for any evidence of coughing, choking, vomiting, or intolerance. Other clear fluids were given if there were no other troublesome symptoms. Nurses actively promoted oral hydration as opposed to waiting for patients to ask for fluids. A total of 0.5 mL/kg body weight was administered, and the volume consumed was estimated by subtracting the volume of water that remained in the container from the total water volume supplied. Patients in the control group received regular postoperative care in accordance with institutional procedure, which included withholding oral fluids for two hours after anesthesia was completed.

Patients who experienced bucking, coughing, or choking upon intake of fluids were asked to stop drinking right away and were placed in a lateral position with supportive measures provided. All patients with suspected regurgitation or aspiration were immediately suctioned, supplemental oxygen was administered, and the attending anesthesiologist initiated further treatment as indicated. Both research groups were given intravenous ondansetron (4-8 mg) as needed for postoperative nausea and vomiting. Every occurrence of adverse events and interventions was recorded in the patient's medical record, and patients were monitored until complete clinical stabilization was achieved.

A structured data collection form was completed at the beginning of the intervention with baseline demographic and perioperative variables such as age, sex, BMI, ASA physical status, length of surgery, and urological endoscopic procedure. The anesthetic record was used to determine the length of surgery and was reported in minutes.

The data were statistically evaluated with IBM SPSS Statistics version 26.0. The normality of continuous variables was determined using the Shapiro-Wilk test. Data for regularly distributed variables were reported as mean ± SD, whereas non-normally distributed variables were provided as median and interquartile range (IQR). The independent-samples t-test was used to compare baseline characteristics and regularly distributed continuous data, and the Mann-Whitney U test was used to compare non-normally distributed data, such as thirst score and oral water intake. Categorical variables were presented and compared using frequencies and percentages. The chi-square test and Fisher's exact test were employed to determine relationships between categorical variables. Relative risks (RRs) and 95% confidence intervals (CIs) were determined for clinically significant thirst relief, high patient satisfaction, and adverse events. All statistical tests were two-tailed, with a p-value of <0.05 indicating statistical significance.

RESULTS

A total of 200 patients were enrolled and equally randomized into the early oral hydration group (n=100) and the control group (n=100). There were no statistically significant differences between the 2 groups in baseline demographic and clinical characteristics, including age, sex distribution, BMI, ASA physical status, duration of surgery, and baseline thirst intensity, suggesting successful randomization and comparability among baseline characteristics (Table 1).

Table 1. Baseline demographic and clinical characteristics of the study participants (n= 200)

Variable	Early Oral Hydration (n=100) n(%)/Mean ± SD	Control (n=100) n(%)/Mean ± SD	Test statistic	p-value
Age (years)	45.8 ± 12.1	46.9 ± 11.8	t = -0.65	0.516
Gender			$\chi^2 = 0.23$	0.632
Male	74 (74.0)	71 (71.0)		
Female	26 (26.0)	29 (29.0)		
BMI (kg/m²)	25.4 ± 3.9	25.7 ± 4.2	t = -0.53	0.598
ASA Physical Status			$\chi^2 = 0.62$	0.733
ASA I	34 (34.0)	31 (31.0)		
ASA II	50 (50.0)	53 (53.0)		
ASA III	16 (16.0)	16 (16.0)		
Duration of surgery (minutes)	51.8 ± 18.2	53.4 ± 19.1	t = -0.61	0.541
Baseline thirst score (VAS), median (IQR)	7 (6–8)	7 (6–8)	U = 4878	0.827

The distribution of urological endoscopic procedures was similar in both study groups. Ureteroscopy was the most frequently performed procedure, followed by cystoscopy, transurethral resection of bladder tumor (TURBT), and ureterolithotripsy, with no significant difference in procedure type between the intervention and control groups (Table 2).

Table 2. Distribution of urological endoscopic procedures

Procedure	Early Oral Hydration n (%)	Control n (%)	p-value
Cystoscopy	24 (24.0)	26 (26.0)	0.874
Ureteroscopy (URS)	36 (36.0)	34 (34.0)	
TURBT	22 (22.0)	21 (21.0)	
Ureterolithotripsy	18 (18.0)	19 (19.0)	

Patients in the early oral hydration group had considerably better postoperative outcomes than the standard care group patients. Early oral hydration was associated with lower postoperative thirst scores, greater decreases in thirst scores, higher comfort and satisfaction scores, earlier oral fluid intake, and higher oral water consumption during the PACU stay. The difference between all the groups was statistically significant (all $p<0.001$) (Table 3).

Table 3. Comparison of primary and secondary continuous outcomes

Outcome	Early Oral Hydration n(%)/Mean ± SD	Control n(%)/Mean ± SD	p-value
PACU discharge thirst score (VAS), median (IQR)	2 (1–3)	5 (4–6)	<0.001
Reduction in thirst score, median (IQR)	5 (4–6)	2 (1–3)	<0.001
Patient satisfaction score (0–10)	8.9 ± 1.1	6.8 ± 1.5	<0.001
Patient comfort score (VAS)	8.6 ± 1.0	6.9 ± 1.4	<0.001
Total oral water intake (mL)	30 (25-35)	0 (0-0)	<0.001
Time to first oral hydration (minutes)	16.5 ± 5.3	122.7 ± 10.8	<0.001

Adverse events after surgery were rare in both groups. Episodes of nausea, vomiting, coughing, choking, and regurgitation were noted in both the intervention group and the control group, although these were not statistically different between the two groups. Importantly, there were no patients with suspected aspiration in either group, and overall rates of adverse events were similar, suggesting that early oral hydration was safe in appropriately selected patients (Table 4).

Table 4. Comparison of postoperative adverse events

Adverse event	Early Oral Hydration n (%)	Control n (%)	RR (95% CI)	p-value
Nausea	8 (8.0)	10 (10.0)	0.80 (0.33–1.93)	0.617
Vomiting	3 (3.0)	4 (4.0)	0.75 (0.17–3.23)	0.701
Coughing	5 (5.0)	3 (3.0)	1.67 (0.41–6.75)	0.469
Choking	2 (2.0)	0 (0.0)	—	0.155*
Regurgitation	1 (1.0)	0 (0.0)	—	0.316*
Suspected aspiration	0 (0.0)	0 (0.0)	—	—
Any adverse event	16 (16.0)	17 (17.0)	0.94 (0.50–1.76)	0.853
**Fisher's exact test.*				

The number of patients with clinically meaningful relief of thirst was also higher in the early oral hydration group than in the control group, and the rate of high satisfaction with postoperative care was also higher in the early oral hydration group. The percentage of patients with no adverse events was similar between the two groups, suggesting that early oral hydration also did not adversely affect patient-centered outcomes, while maintaining safety (Table 5).

Table 5. Overall effectiveness of early oral hydration

Outcome	Early Oral Hydration n (%)	Control n (%)	Effect size	p-value
Clinically significant thirst relief (≥3-point reduction in VAS),	91 (91.0)	58 (58.0)	RR = 1.57 (95% CI: 1.34–1.84)	<0.001
Satisfaction score ≥8	87 (87.0)	49 (49.0)	RR = 1.78 (95% CI: 1.43–2.22)	<0.001
No adverse event	84 (84.0)	83 (83.0)	RR = 1.01 (95% CI: 0.90–1.14)	0.853

DISCUSSION

The present randomized controlled trial demonstrated that early oral hydration was effective in decreasing postoperative thirst among patients who underwent urological endoscopic procedures with no increase in adverse events. Demographic characteristics, baseline thirst intensity, ASA physical status, body mass index, duration of surgery, and type of endoscopic procedure were similar in both study groups, and no baseline imbalance could account for the differences in postoperative outcomes observed between the two groups; thus, the differences in postoperative

outcomes between the two groups were most likely caused by the intervention. These findings strengthen the study's internal validity and confidence in the efficacy of early oral hydration as a post-operative nursing intervention.

A notable finding of this trial was a considerable decrease in the intensity of postoperative thirst experienced by the early oral hydration group in the PACU. Those who received the intervention reported considerably reduced levels of thirst after discharge, as well as a greater drop in thirst intensity, when compared to those treated with'standard' delayed hydration. Similarly, the results are in line with Chen et al. (2026), who found that small amounts of room temperature water given in the PACU significantly reduced postoperative thirst and throat discomfort compared to postoperative care alone without increasing postoperative nausea. The authors were satisfied that early oral hydration is a simple, cost-effective, and easily implemented strategy that has a significant effect on postoperative recovery and patient comfort.[20]

The results we discovered are also aligned with a prospective randomized controlled trial (PRCT) by Qin et al. (2024), who evaluated early oral hydration on demand following laparoscopic surgery in gynecological surgery. Patients who were able to receive oral fluids immediately after meeting certain safety conditions had significantly less thirst and greater postoperative comfort compared to those managed with the more traditional delayed hydration.[14] Similarly, in the current trial, fluids were not introduced until the patient was able to move around, swallow, and protect their airway, demonstrating the safety and efficacy of careful early postoperative oral feedings.

A study by Xue et al. (2024) discovered comparable findings in thoracoscopic surgery patients. Their randomized controlled research revealed that modified ultra-early oral hydration dramatically reduced postoperative thirst and increased patient comfort without worsening aspiration or other hydration-related problems. The study did include patients undergoing thoracic surgery, but the results were consistent, and the benefits of early oral hydration would be likely to apply across other surgical groups using standardized safety measures before commencing oral intake.[21]

Similar findings have been obtained during cardiac surgery. Kim and Song (2026) conducted a randomized controlled trial to determine if early oral hydration post-extubation would reduce postoperative thirst to a greater extent than delayed hydration without changing the incidence of postoperative nausea and vomiting. Early oral hydration after extubation was associated with significantly lower postoperative thirst, but did not affect postoperative nausea and vomiting. [13] Although the surgical population in this trial was more difficult than that in the present investigation, their findings confirm the accumulating evidence that early oral hydration in patients with a higher-risk surgical population may not compromise patient safety but increase patient comfort. [13]

The findings of the current study further corroborate the randomized study by Eren et al. (2025) on postoperative thirst management with oral water and ice. In that study, it was shown that providing water to the mouth was an effective method for reducing the severity of thirst in the immediate postoperative period and achieved similar results to other methods for relieving thirst, like ice application. The results suggest that low-cost and widely available interventions can be used to successfully alleviate one of the most distressing postoperative symptoms without the need for specialized equipment or additional health care resources. [22]

The present results have been found consistent with the emerging local evidence in favor of Enhanced Recovery after Surgery (ERAS) principles, but no published study has specifically investigated early oral hydration for postoperative thirst in the PACU in Pakistan. The study by Riaz et al. (2021) showed that adopting an ERAS pathway in patients undergoing minimally invasive esophagectomy in a tertiary care hospital in Pakistan led to earlier oral feeding, shorter ICT and hospital stay, and reduced postoperative morbidity without an increase in postoperative complications.[23] Likewise, Ghani et al. (2026) noted high compliance with early feeding within the ERAS protocols after gastrointestinal surgery and that early feeding in the postoperative period was feasible and safe.[24]

Moreover, a nationwide survey conducted by Rauf et al. (2023) showed that while the knowledge of ERAS principles among Pakistani surgeons was rising, early postoperative feeding was not widely adopted, indicating a need to increase the uptake of evidence-based perioperative practices. This study builds on the local observations, as early hydration was not only found to be in line with ERAS principles, but also resulted in a significant reduction in postoperative thirst, enhanced comfort and patient satisfaction, and did not cause more adverse events in patients who underwent urological endoscopic procedures. [25]

The results of this randomized controlled trial can be used to support early oral hydration in appropriately selected patients recovering from elective urological endoscopic procedures under general anesthesia. A single dose of oral fluids significantly reduced postoperative thirst, enhanced patient comfort and satisfaction, and did not increase the rate of postoperative nausea, vomiting, regurgitation, or aspiration when given after the protective airway reflexes were restored. Early oral hydration is a simple, inexpensive, and low-tech intervention that can be easily integrated into routine PACU nursing care and Enhanced Recovery after Surgery (ERAS) pathways. Standardized criteria for starting oral fluids could enhance the quality of postoperative care, facilitate patient-centered recovery, and ensure better use of resources, without adding to the financial strain on health care systems.

There are some limitations to this study. The study was conducted at a single tertiary care center, which may limit the data's application to different contexts and demographics within the health care system. Second, only adult patients with ASA physical status I-III in elective day care urological endoscopy were included; thus, the results may not apply

to patients undergoing major surgery, emergency operations, or those with serious comorbidities. Third, postoperative evaluation was limited to during the PACU period, not allowing patient satisfaction or delayed postoperative effects to be considered. Last, validated patient-reported outcome measures and standardized data collection protocols may have introduced response bias due to their subjective nature, yet the patient-as-sentient being.

CONCLUSION

Oral hydration was an effective and safe approach to postoperative thirst in patients who underwent urological endoscopic procedures. It had a significantly better effect on the relief of thirst, patients' comfort and satisfaction, and with no higher incidence of hydration-related adverse events, compared to conventional delayed hydration. The results support the use of structured early oral hydration protocols in the routine postoperative management of appropriately selected patients, and help reinforce the accumulating evidence of the safe reduction of unnecessary postoperative fasting. These results should be confirmed in multicenter randomized controlled trials with larger and more varied surgical populations, with their long-term recovery outcomes assessed and evidence-based national and international guidelines for postoperative oral hydration developed.

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