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Prospective Randomized Comparison of Standard Hand Pump Infuser Irrigation vs an Automated Irrigation Pump During Percutaneous Nephrolithotomy and Ureteroscopy: Assessment of Operating Room Efficiency and Surgeon Satisfaction

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Introduction

The objective of this study was to determine if use of an automated irrigation pump (AIP) during ureteroscopy (URS) and percutaneous nephrolithotomy (PCNL) affects circulating nurse labor, irrigation-related issues, and surgeon and nurse satisfaction when compared to manual hand pump (HP) irrigation.

Methods

Eighty consecutive adult patients undergoing unilateral URS or PCNL were prospectively randomized to irrigation with the HP or AIP. Preoperative pump setup time, intraoperative pump maintenance time, total pump time (setup+maintenance), and the number of irrigation-related concerns verbalized by the surgeon intraoperatively were recorded; postoperatively, surgeons and nurses rated their satisfaction with the irrigation system (1 = highly dissatisfied to 10 = highly satisfied).

Results

Eighty patients were enrolled (39 AIP and 41 HP); 51 patients underwent URS and 29 patients underwent PCNL. On univariate analysis, the AIP resulted in a significantly reduced total pump time for URS (2.9 vs 5.9 minutes) and PCNL (4.6 vs 33.9 minutes; $p < 0.001$). The number of irrigation-related concerns was significantly lower in the AIP group during URS (1.2 vs 2.8, $p < 0.001$), but not during PCNL (1.9 vs 4.0, $p = 0.07$). The AIP was associated with significantly higher nurse satisfaction during URS (9.2/10 vs 6.5/10, $p < 0.001$) and PCNL (9.4/10 vs 4.4/10, $p = 0.001$). There was no significant association between pump type and surgeon satisfaction. On multivariate analysis of URS cases controlling for body mass index and number of stones, use of the AIP was a predictor of total pump time <5 minutes (odds ratio 25.8, 95% confidence interval [CI] 4.0-165.4; $p < 0.001$) and favorable (8-10/10) nurse satisfaction rating (odds ratio 25.4, 95% CI 4.1-164.0; $p < 0.001$). Operative time, stone-free rate, and liters of irrigant used with the HP and AIP were similar.

Conclusion

During URS and PCNL, the AIP was associated with a significant reduction in irrigation pump time and higher nurse satisfaction.

Link to abstract