Impact of Integrated, Real-Time Digital Measurement on Surgeon Decision Making in Ureteroscopic Stone Surgery

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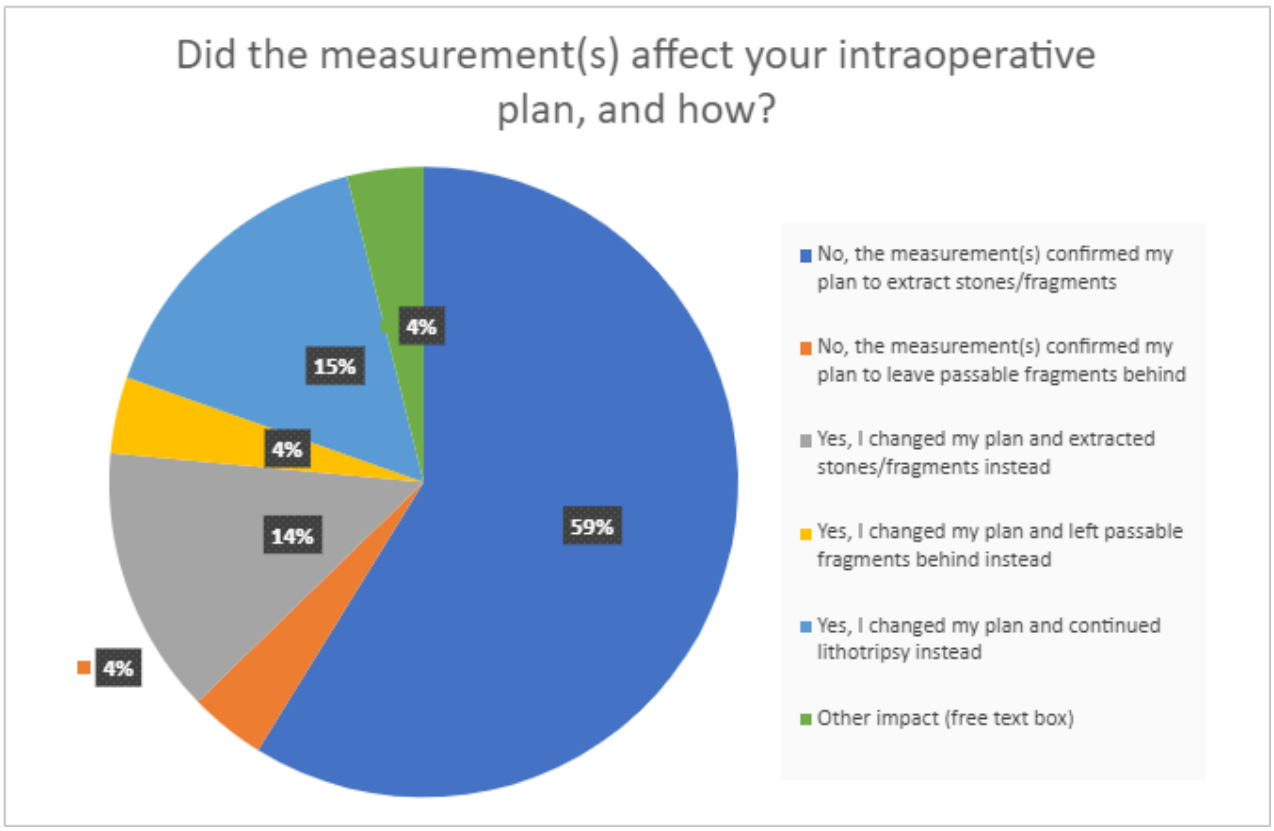
Introduction: Accurate estimation of stone fragment size during ureteroscopic lithotripsy facilitates decisions to extract fragments or leave them behind for spontaneous passage. A novel software capable of accurately measuring these fragments in real-time during ureteroscopy has been developed, but the impact on surgeons' decision-making is not known. The aim of this study is to assess the clinical use of this software and its impact on intraoperative decision-making.

Methods: Adult patients undergoing elective flexible ureteroscopy and laser lithotripsy for renal stones were prospectively enrolled. Surgeons could request digital measurement of stones or fragments at any time during the procedure. All measurements were reported to the surgeon in real-time. Surgeons were surveyed after each case about the reasons for taking measurements and how the measurements impacted their intraoperative decisions. 30-day clinical complications were recorded.

Results: Among a total of 51 patients undergoing ureteroscopy, surgeons took an average of 2.1 (range 1-6) intraoperative measurements per case. The software was deployed successfully in all cases. Surgeons reported that the primary purpose of taking intraoperative measurements was to determine whether post-lithotripsy fragments were extractable (26, 51.0%) or sufficiently small to leave behind (5, 9.8%). However, surgeons also took measurements prior to lithotripsy to confirm extractability (23, 45.1%), or to assess overall stone size (4, 9%). Following stone measurements, surgeons changed intraoperative plans in 17 (33%) cases and instead continued lithotripsy (8, 15.7%), extracted fragments (7,13%), or left fragments behind for passage (2, 3.9%) (figure). Surgeons rated the ability to take intraoperative measurements as "very helpful" (66%) or "somewhat helpful" (34%). In no cases (0%) were measurements "not helpful." The time burden of taking affected procedural efficiency in only 4% of cases. There was 1 sepsis complication among the cases (2%).

Conclusion: The ability to take real-time stone measurements during flexible ureteroscopy changed surgeons' intraoperative decisions in 33% of cases. This may improve procedural efficiency and reduce fragment extraction failures and ureteral injury.


Did the measurement(s) affect your intraoperative plan, and how?
59%
4%
14%
4%
15%
4%
No, the measurement(s) confirmed my plan to extract stones/fragments
No, the measurement(s) confirmed my plan to leave passable fragments behind
Yes, I changed my plan and extracted stones/fragments instead
Yes, I changed my plan and left passable fragments behind instead
Yes, I changed my plan and continued lithotripsy instead
Other impact (free text box)