

Kidney stone surgery: When does ‘getting it all’ put older patients at risk?

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Kidney stones remain a common and painful affliction, with surgical intervention often required for larger or symptomatic calculi. While advancements in endoscopic techniques have made these procedures less invasive, the duration of surgery itself may carry distinct risks, particularly for an aging patient population with comorbidities. Understanding the threshold at which operative time becomes detrimental is important for patient safety and optimal outcomes.

KEY TAKEAWAYS

- **The Pivot:** Surgical duration for kidney stone removal in older patients is a modifiable risk factor for postoperative complications.
- **The Data:** No specific numeric data was provided, but the principle is that longer procedures correlate with higher adverse event rates.
- **The Action:** Clinicians should prioritize shorter, less complex procedures or staged approaches for older adults with kidney stones, balancing stone clearance with patient safety.

Kidney stone disease, or nephrolithiasis, affects a significant portion of the population, with prevalence increasing globally. The formation of these calculi within the urinary tract can lead to severe pain, infection, and kidney damage if left untreated. While smaller stones may pass spontaneously, larger or obstructing stones often require active removal through various surgical modalities, including ureteroscopy, percutaneous nephrolithotomy (PCNL), or extracorporeal shockwave lithotripsy (ESWL). The choice of procedure depends on stone size, location, composition, and patient anatomy, as well as the patient's overall health status.

Older patients present a unique challenge in the management of kidney stones. They often have a higher burden of comorbidities, such as cardiovascular disease, diabetes, and chronic kidney disease, which can complicate surgical planning and increase the risk of perioperative and postoperative adverse events. Their physiological reserve is typically diminished, making them more susceptible to the stresses of anesthesia and prolonged surgical procedures. This demographic also experiences a higher incidence of complex stone disease, including staghorn calculi, which inherently demand longer and more intricate surgical approaches.

The Impact of Operative Time on Outcomes

The duration of kidney stone surgery is a critical factor influencing patient outcomes, especially in the elderly. Longer operative times expose patients to extended periods of anesthesia, increased blood loss, greater fluid shifts, and prolonged immobility, all of which contribute to a higher risk of complications. These complications can range from minor issues

like nausea and urinary tract infections to more severe events such as sepsis, acute kidney injury, and cardiovascular incidents. The cumulative stress on an older patient's system during an extended procedure can overwhelm their compensatory mechanisms, leading to a cascade of adverse effects.

For instance, prolonged anesthesia exposure in older adults has been associated with an increased risk of postoperative cognitive dysfunction, a concern that clinicians must weigh carefully when planning interventions. This is particularly relevant given that surgery has been linked to slight cognitive decline in older adults. The risk of infection also rises with longer procedures, as the surgical field is exposed for a greater duration, and instrumentation within the urinary tract can introduce bacteria. This is especially pertinent for patients with pre-existing urinary tract infections or those undergoing complex procedures like PCNL, where the risk of systemic inflammatory response syndrome (SIRS) and sepsis is already elevated.

Extended surgical times can lead to increased radiation exposure for both the patient and the surgical team, particularly in fluoroscopy-guided procedures. While efforts are made to minimize radiation, cumulative exposure can be a concern, especially for patients who may require multiple procedures over time. The physical strain on the surgical team during lengthy cases can also contribute to fatigue, potentially impacting surgical precision and patient safety. Therefore, optimizing operative efficiency without compromising stone clearance is a constant balancing act for urologists.

Balancing Stone Clearance and Patient Safety

The primary goal of kidney stone surgery is complete stone clearance, but this must be balanced against the imperative of patient safety, particularly in vulnerable populations. For older patients, a strategy that prioritizes minimizing operative time and complexity may be more beneficial, even if it means accepting a slightly lower rate of complete stone-free status in a single sitting. Staged procedures, where a large or complex stone is removed over two or more shorter operations, can be a viable approach to reduce the risks associated with prolonged single-session surgery.

Preoperative assessment plays an important role in identifying older patients at higher risk for complications from extended surgery. A thorough evaluation of cardiac, pulmonary, and renal function, along with a comprehensive medication review, can help optimize patient health before intervention. For instance, patients with underlying chronic kidney disease may be more susceptible to contrast-induced nephropathy or fluid overload during surgery, making careful fluid management and choice of imaging modalities essential. The link between oral and kidney health also highlights the importance of addressing systemic factors that can impact surgical outcomes.

The choice of surgical technique also influences operative time and risk. While PCNL is highly effective for large stones, it is generally more invasive and associated with longer operative times and higher complication rates than ureteroscopy. For smaller stones, ureteroscopy offers a less invasive option with shorter operative times and quicker recovery. ESWL, though less effective for very large or hard stones, is non-invasive and can be performed on an outpatient basis, making it an attractive option for frail older patients who might not tolerate general anesthesia well. Clinicians often consult resources like the Oxford Handbook of Clinical Medicine for quick reference on managing complex patient presentations.

But the decision to pursue a less aggressive approach must be weighed against the potential for residual stone fragments, which can lead to recurrent symptoms, infection, or the need for further procedures. The goal is not merely to remove the stone, but to achieve a durable, symptom-free outcome with minimal morbidity. This requires a detailed discussion with the patient and their family, outlining the risks and benefits of various treatment options, including the possibility

of staged procedures or active surveillance for asymptomatic, non-obstructing stones. The management of kidney stones in older adults is a complex relationship of surgical expertise, patient-specific factors, and careful risk-benefit analysis.

Refining Surgical Strategies for the Elderly

To mitigate the risks associated with longer kidney stone surgeries in older patients, urologists are continually refining their surgical strategies and embracing technological advancements. The development of smaller caliber endoscopes and improved lithotripsy devices allows for more efficient stone fragmentation and removal, potentially reducing operative time. Enhanced imaging techniques, such as low-dose fluoroscopy and ultrasound guidance, can also minimize radiation exposure and improve intraoperative visualization, contributing to safer and quicker procedures.

The use of regional anesthesia or monitored anesthesia care (MAC) instead of general anesthesia for select cases, particularly ureteroscopy, can reduce the physiological burden on older patients. This approach can lead to faster recovery times and a lower incidence of postoperative complications, including cognitive dysfunction. But the feasibility of regional anesthesia depends on the patient's tolerance, the complexity of the procedure, and the expertise of the anesthesia team. Close collaboration between urologists and anesthesiologists is paramount in optimizing perioperative care for this vulnerable population.

Postoperative care is equally important. Early mobilization, aggressive pain management, and vigilant monitoring for signs of infection or other complications are essential for older patients. Nutritional support and careful management of comorbidities in the postoperative period can also accelerate recovery and prevent readmissions. The overall goal is to provide comprehensive, patient-centered care that addresses not only the stone disease but also the unique physiological and social needs of older adults. The ongoing challenge is to define clear thresholds for operative duration beyond which the risks for older patients become unacceptably high, guiding clinical decision-making with more precision.

CLINICAL IMPLICATIONS

The data, while not quantified here, reinforces a fundamental principle: surgical duration is not benign, especially in the elderly. Clinicians must move beyond simply achieving stone clearance and actively consider the cumulative physiological toll of prolonged procedures on older patients. This means a more aggressive embrace of staged procedures or less invasive options, even if it requires a slight compromise on immediate stone-free rates.

The focus needs to shift towards a holistic assessment of patient frailty and comorbidity burden, rather than just stone characteristics. A 75-year-old with multiple cardiovascular risk factors and chronic kidney disease is not the same as a healthy 50-year-old, regardless of stone size. Preoperative optimization, including careful medication review and comorbidity management, becomes non-negotiable.

Urologists should engage in frank discussions with older patients and their families about the trade-offs between complete stone clearance in one go and the increased risk of complications from extended surgery. Sometimes, a slightly less aggressive, but safer, approach is the better clinical decision. The aim is to improve quality of life and prevent serious adverse events, not just to clear a stone at any cost.

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REFERENCES

1. Khan SR, Pearle MS, Robertson WG, et al. Kidney stones. Nat Rev Dis Primers. 2016;2:16008. doi:10.1038/nrdp.2016.8
2. Fontenelle LF, Sarti TD. Kidney Stones: Treatment and Prevention. Am Fam Physician. 2019;99(8):490-496. PMID:30990297
3. Wang Z, Zhang Y, Zhang J, Deng Q, Liang H. Recent advances on the mechanisms of kidney stone formation (Review). Int J Mol Med. 2021;48(2). doi:10.3892/ijmm.2021.4982
4. Moe OW. Kidney stones: pathophysiology and medical management. Lancet. 2006;367(9507):333-44. doi:10.1016/S0140-6736(06)68071-9
5. Borghol AH, Azooz M, Bou Antoun MT, et al. Kidney stones and autosomal dominant polycystic kidney disease: a state-of-the-art review. Ren Fail. 2025;47(1):2570071. doi:10.1080/0886022X.2025.2570071
6. Shastri S, Patel J, Sambandam KK, Lederer ED. Kidney Stone Pathophysiology, Evaluation and Management: Core Curriculum 2023. Am J Kidney Dis. 2023;82(5):617-634. doi:10.1053/j.ajkd.2023.03.017

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