Perioperative patient radiation exposure in the endoscopic removal of upper urinary tract calculi

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J Endourol. 2011; 25: 1747-51

Abstract Background and Purpose: The efficacy of computed tomography (CT) in detailing upper urinary tract calculi is well established. There is no established acceptable annual recommended limit for medical exposure, yet the global accepted upper limit for occupational radiation exposure is < 50 millisieverts (mSv) in any one year. We sought to appreciate the CT and fluoroscopic radiation exposure to our patients undergoing endoscopic removal of upper tract calculi during the periprocedure period.
Patients and Methods: All patients undergoing upper urinary endoscopic stone removal between 2005 and 2009 were identified. To calculate the cumulative radiation exposure, we included all ionizing radiation imaging performed during a periprocedure period, which we defined as ≤ 90 days pre- and post-therapeutic procedure.
Results: A total of 233 upper urinary tract therapeutic patient stone procedures were identified; 127 patients underwent ureteroscopy (URS) and 106 patients underwent percutaneous nephrolithotomy (PCNL). A mean 1.58 CTs were performed per patient. Ninety (38.6%) patients underwent ≥ 2 CTs in the periprocedure period, with an average number in this group of 2.49 CT/patient, resulting in approximately 49.8mSv of CT radiation exposure. Patients who were undergoing URS were significantly more likely to have multiple CTs (P = 0.003) than those undergoing PCNL. Median fluoroscopic procedure exposures were 43.3mGy for patients who were undergoing PCNL and 27.6mGy for those patients undergoing URS.
Conclusions: CT radiation exposure in the periprocedure period for patients who were undergoing endoscopic upper tract stone removal is considerable. Added to this is the procedure-related fluoroscopic radiation exposure. Urologic surgeons should be aware of the cumulative amount of ionizing radiation received by their patients from multiple sources.

Editorial Comment

It is interesting that the authors excluded patients with a prior indwelling ureteral stenting - indeed these present a decision-making challenge as conventional imaging may have difficulty identifying residual ureteral calculi, leaving the patient and physician faced with the dilemma of stent removal or ureteroscopy. New modalities such as dual-energy CT scan imaging may prove helpful in this subset of patients, as one would anticipate that the risk of negative ureteroscopy would be higher in this group.

The average time from CT scan to ureteroscopy was 55 days in this study. It is unclear from the study what follow-up occurred during this time period. Did patients strain their urines to identify stone passage? Was any re-imaging performed on any of these patients in the interval between diagnosis and surgery? What drove the decision to proceed with ureteroscopy - did the patients have persistent colic? These questions would help delineate the significance of the findings of this study.

Only 1/3rd of patients received medical expulsive therapy - suggesting that the risk of a negative URS would be even higher than the 10% reported in this study in areas where medical expulsive therapy has become standard practice. This study highlights the need to emphasize to patients the importance of straining their urine to monitor for stone passage. Not only does this minimize the risk for repeat imaging, but also

would likely decrease the risk of unnecessary anesthesia. For patients who cannot reliably strain their urine, reimaging with a low-dose CT pelvis should be seriously considered for those patients with distal ureteral calculi ≤ 5mm in size.

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ENDOUROLOGY & LAPAROSCOPY

Natural orifice transluminal endoscopic radical prostatectomy: initial perioperative and pathologic results

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Urology. 2011; 78: 1211-7

Objective: To describe the first clinical experience, pathologic, and perioperative outcomes of natural orifice transluminal endoscopic surgery (NOTES) radical prostatectomy. NOTES represents the evolution of minimally invasive surgery. The conceptual feasibility has been shown in careful laboratory and animal studies, but a scarcity of information regarding clinical applications exists.
Methods: After institutional review board approval, 2 patients agreed to undergo NOTES radical prostatectomy for localized prostate cancer. The prostate was radically resected using a 26F resectoscope, 550-µm laser fiber, and holmium laser. The prostate was delivered into the bladder and removed at the conclusion of the procedure through a suprapubic cystotomy for histopathologic analysis. The vesicourethral anastomosis was completed using a cannula scope, urethral-vesical suturing device, and titanium knot applier. Cystograms were taken immediately postoperatively and at catheter removal.
Results: Both patients tolerated the procedure without operative complications. All intraoperative cystograms showed watertight anastomoses. The pathologic examination revealed Gleason score 3 + 3 and Stage pT2aNxMx for 1 patient and Gleason score 3 + 4 and Stage pT2cNxMx for 1 patient, with negative margins for both. No blood transfusions were required. Patient 2 experienced some left-sided gluteal and suprapubic pain postoperatively.
Conclusion: NOTES radical prostatectomy appears to be a safe and feasible option for the management of carefully selected, organ-confined prostate cancer. The perioperative and pathologic outcomes show promise with this new technique; however, the high standards of oncologic and functional outcomes demand close and longer follow-up before adoption into the surgical armamentarium can be recommended.

Editorial Comment

The authors must be congratulated for their pioneer work. The advancement of minimally invasive urological surgery has pushed the technology and surgical instruments industry to collaborate with surgeons allowing better care of our patients.