



The T-Tilt Position: A Novel Modified Patient Position to Improve Stone-Free Rates in Retrograde Intrarenal Surgery

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Purpose: Residual fragments following retrograde intrarenal surgery can lead to future stone episodes. The lower pole of the kidney presents a unique challenge as it is the most difficult location for retrograde intrarenal surgery. We investigated a modified patient position to increase stone-free rate by analyzing presence of residual fragments. We randomized patients into standard position and the T-Tilt position (15° Trendelenburg and 15° airplane away from the surgical side kidney).

Materials and Methods: In this prospective, randomized study, patients were randomized into the standard or T-Tilt position. Demographics, comorbidities, and operative parameters were collected. Stone-free rate was determined with renal ultrasound and x-ray at 1-month followup. Postoperative complications were recorded up to 1 month. Variables were compared using Kruskal-Wallis test for continuous variables and chi-square test for categorical variables.

Results: A total of 138 patients were analyzed: 75 standard patients and 63 T-Tilt patients. The groups had similar patient and stone factors. The most common stone position was the lower pole (68.0% standard, 74.6% T-Tilt). Stone-free rates were significantly different: standard position was 76.7% and T-Tilt position was 92.1% ($p=0.015$). Stone-free rates for isolated lower pole stones were significantly different as well: standard position was 68.2% and T-Tilt position was 95.6% ($p < 0.001$). Clavien-Dindo scores did not differ significantly ($p=0.262$).

Conclusions: The T-Tilt patient position was associated with higher stone-free rates. It is an atraumatic, cost-effective technique. These results suggest that modifying patient positioning during retrograde intrarenal surgery improves stone-free rates.

COMMENTARY

In this Journal Club issue, the article published in the Journal of urology in November 2021 by Dr. Christine W. Liaw will be reviewed. A prospective and randomized study comparatively evaluates patients undergoing retrograde intrarenal surgery (RIRS) in the traditional position (full dorsal decubitus) versus the so-called T-Tilt, in which the

patient is placed on 15-degree Trendelenburg position and 15-degree airplane away from the surgical side kidney.

It is important to point out the reasoning underlying this position, whereby the gravity would facilitate the migration of calculi and fragments to the more cranial and medial portions of the renal unit. Thus, reducing the difficulties of extracting and treating calculi in inferior calyces as well as reducing the risk of small fragments from migration into these calyces during lithotripsy.

While the primary endpoint of this study was the achievement of stone-free (SF) status in one month after the procedure, a first critical point could arise regarding the control exams applied to determine the presence of any residual calculi. At the end of the first month, patients underwent ultrasound and abdominal X-ray (KUB), as opposed to most of the published papers in the literature that make use of CT scanning for this evaluation. Difficulties with the release of CT scans by health insurance companies made this more detailed analysis difficult, as all patients were subjected to the same control, the risk of bias in the comparative analysis is reduced.

By comparing the group of patients operated on in the traditional position (73 patients) and the T-Tilt position (68 patients), there were no differences found in either surgical, clinical, or anatomical characteristics that could favor any specific group. It is worth noting that the patients in the study were without a ureteral stent before surgery and the ureteral sheath usage rates were similar, 25% and 29% respectively.

Upon direct observation of the primary endpoint, the SF rate was 76.7% in the traditional position group versus 92.1% in the T-Tilt position group, a difference of 17% with statistical significance. On evaluating only lower calyx calculi patients, the difference was even more dramatic, with SF scores of 68.2% in the traditional position group and 95.6% in the T-Tilt position group ($p < 0.001$), in the multivariate evaluation, the position was the only factor to influence the SF rates.

The high SF rates in this study are certainly, due to the complementary exam selected for the evaluation of residual calculi according to the study referenced in the article, *York NE et al.* reported rates of 73% but using CT as the control method and regarding any size of calculus as residual, including those smaller than 4mm with the low capability of detection by ultrasonography. Undoubtedly, the highlight of the article is the comparative increase in SF rates through the use of a simple and costless maneuver, which reduces the risk of re-interventions, future complications, and health care costs.

To confirm the position's safety, there was a similar rate of complications between the groups, with no position-related events such as cerebral edema, loss of vision, rhabdomyolysis, or changes in blood pressure control. The author argues in this paper that the experience with robotic surgery, in which the patient is left for a longer time in an even more tilted trendelenburg position (45°), allows us to assume the safety of the T-Tilt position.

Another interesting point of debate raised by the article is based on an article previously published by Berkowsky E *et al.* In which the study of the lower infundibulopelvic angle proved to be variable based on the patient's position as it was less acute in the 20° Trendelenburg position and with the patient in the prone position, suggesting that the T-tilt position seeks not only to benefit from the action of gravity but also to favorably alter the infundibulopelvic angle.

An additional fact, which comes from the author's experience with the position cited, is that during fragmentation in the lower calyx, the fragments migrate out of it, allowing a better local visualization and less risk of small fragments being retained in

inaccessible regions of the lower calyx. A question still to be answered in the future, what if we just did the Trendelenburg, would we have the same results?

To conclude, notwithstanding the limitations assumed by the author in the discussion of the paper, in a growing scenario of expansion in the indication of RIRS, the pursuit to raise SF rates is the holy grail. The possibility of no-cost and easily adjustable increments such as the T-Tilt position is welcomed. Paraphrasing Dr. Peter Steinberg in the editorial of this very paper, often the simplest ideas are the best ones and makes us wonder: "why did I not think of this before?". Let's look forward to more articles that prove these same findings.



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