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Citation	The 17th Annual Scientific Meeting of the Hong Kong Urological Association, Hong Kong, 6 November 2011. In Program Book, 2011, p. 54
Issued Date	2011
URL	http://hdl.handle.net/10722/153138
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PCNL Trajectory: A Novel Concept to Predict Success in Supine PCNL

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Objective:

Supine PCNL confers certain advantages over its prone counterpart but access parameters change with supine positioning. Supine position limits maneuverability of instruments, limiting access to upper and mid-pole stones. We aim to determine predictive factors for success of supine PCNL through road-mapping of PCNL trajectory.

Patients & Methods:

Patients undergoing PCNL from July 2010 to August 2011 were recruited. Choice of position was made by surgeon. Tracts were performed under USG & fluoroscopy. Distances and angles were measured intra-operatively with rigid and flexible nephroscopes, and correlated with pre-operative imaging. Patients with unconventional anatomy were excluded (duplex system / caliceal stones with narrow infundibulum)

Results:

21 patients underwent PCNL (11 supine, 10 prone). Stone load was greater in the prone group. Overall stone clearance after single PCNL was 71%, with mean size of residual stone fragment 12 mm. Regardless of abdominal thickness and approach, all lower pole and renal pelvic stones were reached with mean excursion of 138 mm in supine & 88 mm in prone position; mean-entry angle was 60° for supine, and 44° for prone for PUJ access. In supine PCNL, the upper pole was reached in 3 of 11 tracts, with mean-excursion of 168 mm & entry angle of 35°. Similarly, 2 of 11 supine PCNL reached middle pole. Conversely, all prone PCNL tracts reached upper & middle pole with decreased excursion & angle.

Conclusion:

PCNL in prone position can reach renal pelvis and 3 poles via lower pole puncture. PCNL trajectory may be a tool to predict success in supine PCNL by estimating chance of reaching mid & upper pole. Skin to upper pole distance larger than 185mm and entry angle more than 48° decrease chance of upper pole access for supine PCNL.