Video

"Polar flip" technique for transperitoneal laparoscopic partial nephrectomy – Evolution of a novel technique for posterior hilar tumors

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ABSTRACT

Posterior hilar renal tumor extirpation by partial nephrectomy is a unique challenge for transperitoneal laparoscopy. We describe our novel technique of "polar flip" for these tumors. Kidney is rotated by around 45 -60 degrees after mobilisation so that lower pole faces anteriorly and upper pole faces posteriorly, thereby exposing the posterior surface for maneuverability. Technical highlights are hilar control, complete kidney mobilisation, initial flipping with dissection in Gil Vernet's plane to clip posterior segmental renal artery, en mass hilar clamping in normal lie, polar flipping, dissection in Gil Vernet's plane till renal sinus fat, completion of tumor excision, selective vascular ligation, renorhaphy and nephropexy.

INTRODUCTION

The field of laparoscopic partial nephrectomy has progressed from the initial reports in 1992 of transperitoneal approach and 1994 of retroperitoneal approach to the current era of selective clamping and early unclamping to preserve maximal renal parenchyma.[1-4] With the advent of three-dimensional reconstruction and imaging, more complex partial nephrectomies are feasible without any conversions.[3,5] Various approaches have been described for hilar tumors; however, posterior hilar tumors are always a technical challenge even in the hands of skilled surgeons. We demonstrate our novel technique of "polar flip" for transperitoneal laparoscopic partial nephrectomy (TPLPN) for posterior hilar tumor in a patient with 3.6 cm × 3.8 cm × 3.2 cm mass [Figure 1 for Video] with RENAL score of 10ph.[6]

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	DOI: 10.4103/iju.IJU_235_18

TECHNIQUE

Initial mobilization

Standard positioning is done for TPLPN without prior ureteric catheterization. Ports are placed slightly caudal and lateral than standard position, so as to maneuver the dissection on posterior pole easily. Lower polar dissection is completed to identify the ureter. The ureter is separated from the lower pole to enable flipping the lower pole. Hilar dissection is completed by blunt and sharp dissection by creating windows above and below the hilum so as to control it en-mass with a Satinsky clamp.

Posterior dissection and dissection in Gil–Vernet's plane

After completion of anterior part of the dissection, the kidney is mobilized all around so that the only intact attachment which remains is the hilum. After this, the kidney is rotated by around 45º–60º so that lower pole faces anteriorly and the upper pole faces posteriorly. This leads to complete exposure of the entire posterior surface for the dissection. Gil–Vernet's potential avascular plane

Received: 06.11.2018, **Accepted:** 04.05.2019

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest.

is then entered just posterior to renal pelvis.[7] A posterior segmental renal artery, which is the terminal extension of the posterior division of renal artery or a direct branch from a common trunk, is a consistent vessel encountered in Gil–Vernet's plane coming from anterior side of the intrarenal pelvis to posterior side.[8] This vessel is clipped for the deeper dissection in the same plane.

Vascular clamping and polar flip

Kidney is aligned again in normal axis for actual vascular clamping. Lateral traction on kidney just before the clamping permits clamp to be placed flush to the great vessels. After en-mass clamping, the kidney is flipped again in the previous position to have good exposure of the posterior surface of the kidney. The parenchymal lips on both sides of hilum are cut at medial side. The dissection proceeds in Gil–Vernet's plane, just flush to the posterior wall of the intrarenal pelvis. Normal anatomical structures encountered in this plane are the infundibulum of mid-posterior calyx and draining veins coming perpendicular with the intrarenal pelvis at the base. All these structures are clipped with 5-mm Hem-O-Lok® Clip as and when encountered. The deepest plane here is the renal sinus fat which guides us about the change of plane for further dissection on the opposite side of parenchyma to complete the tumor excision.

Renorrhaphy and hilar declamping

Vessels at the tumor bed are selectively ligated with Vicryl No. 2-0 in figure-of-eight fashion. Outer renorrhaphy is done using the sliding clip technique with barbed suture. After complete approximation of the parenchymal lips, the kidney is flipped back to normal axis and Satinsky clamp is removed. Reperfusion of the renal tissue is ascertained.

Nephropexy

The kidney is fixed to the parietal wall [Figure 1], drain is placed and the specimen is entrapped in a bag and retrieved through extension of one the ports and port sites are closed.

Description

Two cases have been operated with similar tumors. Warm ischemia time was 20 and 18 min, respectively in two cases. Total operative time in both the cases was 110 and 95 min, respectively. Histopathology in both cases was clear cell carcinoma with negative resected margins.

CONCLUSIONS

The polar-flip approach requires expertise in basic laparoscopy but can be safely performed. To the best of our knowledge, this is the first description of this unique "polar flip" technique.

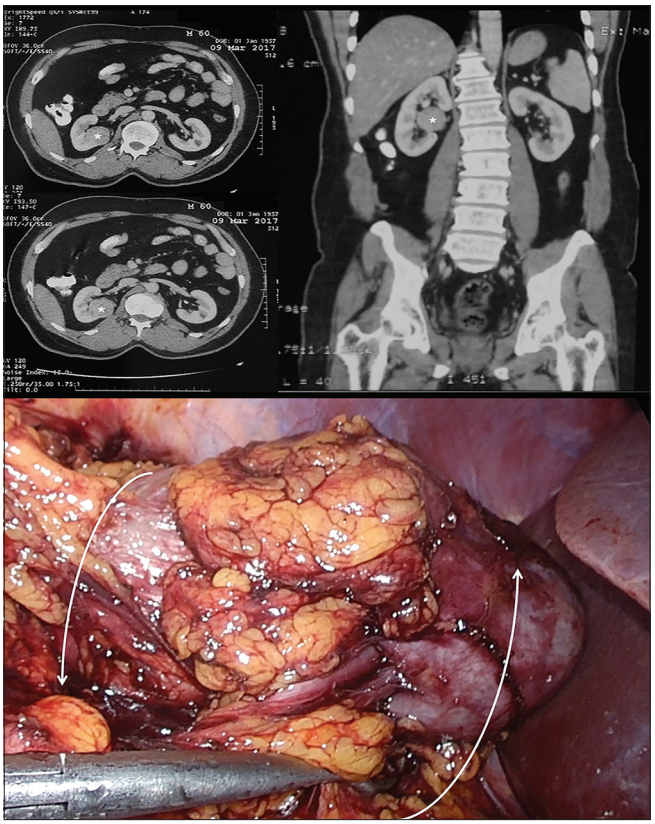

Figure 1: Contrast enhanced CT scan of the tumor

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How to cite this article: Chiruvella M, Ghouse SM, Tamhankar AS. "Polar flip" technique for transperitoneal laparoscopic partial nephrectomy – Evolution of a novel technique for posterior hilar tumors. Indian J Urol 2019;35:230-1.