

## Editorial

# Minimally Invasive Radical Nephrectomy with Inferior Vena Cava Thrombectomy: Is it here to Stay?

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Two recent studies published in two different journals of great impact in urological literature report their experience with minimally invasive surgery of Renal Cell Carcinoma with Inferior Vena Cava Tumor Thrombus (RCCIVCTT) arising high levels of extension such as level III and IV. The group from China [1] reports their experience with laparoscopic approach in 11 patients (5 of them were level IV); the other group from USA [2] reports 16 patients who underwent robot-assisted approach (9 of them were level III).

Minimally invasive urologic surgery has made great progress in recent decades. Due to an earlier and better recovery, and to a lower analgesia requirement, it has become the gold standard approach for several urologic conditions and pathologies such as living donor nephrectomy, radical nephrectomy, pyeloplasty or adrenalectomy. Thus, minimally invasive radical nephrectomy with tumor thrombus levels I and II was reported in previous studies, both robotic [3] and laparoscopic [4].

Surgical procedure for levels III and IV is complex, technically demanding and usually requires a multidisciplinary approach. Open surgery is the classical and standard approach; it requires maneuvers derived from liver transplantation field in order to perform a correct vascular control and to remove the entire tumor thrombus [5].

Novelty in recent reports is the minimally invasive approach to tumor thrombus levels III and IV. Shao presents results of 5 patients with level IV thrombus treated with laparoscopic radical nephrectomy and tumor thrombectomy [1]. Surgical approach includes the standard abdominal approach and an additional thoracic approach, including cardiopulmonary bypass and regional hypothermia. After incising right atrium and encircling superior vena cava, bypass was started. Cavotomy is performed in two points: a lower abdominal cavotomy through renal vein ostium and an upper thoracic cavotomy through right atrium. Tumor thrombus is transected and divided in two parts: the upper part is excised through the atrium and the lower part through abdominal cavotomy, assessing the complete evacuation with endoscopic examination of IVC and transesophageal ultrasonography.

Gill IS [2] reports the experience with first 9 patients with level III thrombus treated with robot-assisted approach. Surgical

technique reproduces quite similar the open approach; it starts with IVC dissection and control below the thrombus. Then, inter-aortocaval dissection proceeds cephalad through retrohepatic IVC (below major hepatic veins), controlling left renal vein, lumbar veins, short hepatic veins and ligating right renal artery. Once retrohepatic IVC is circumferentially dissected and the vascular control is achieved, sequential clamping is performed with Rummel tourniquets and blood flow cessation is assessed with laparoscopic ultrasound. Cavotomy is done and the entire thrombus is removed en bloc with right renal vein, previously transected with Endo GIA. Cavotomy closure is done with running suture, tourniquets are released to restore caval flow and radical nephrectomy with lymph node dissection is completed. This group routinely performs preoperative angioembolization of renal artery.

Both studies, despite of a logical low number of cases and short follow-up comparing to open surgery series, report similar intraoperative results, as well as similar oncological outcomes and acceptable rates of complications. These data highlight the excellent development of minimally invasive surgery in expertise groups, which nowadays achieves surgeries unimaginable just a few years ago. Robotic surgery of the IVC is technically demanding and requires considerable experience in robotic surgical field, as well as an excellent knowledge of retroperitoneal visceral and vascular anatomy. However, a few limitations of the studies deserve to be commented. Surgical technique from Shao [1] for level IV tumors used routinely Cardiopulmonary Bypass (CPB) and thoracic approach, which increases by itself surgical morbidities due to platelet dysfunction and coagulopathy, among others [6]. A surgical alternative to this approach would be the one described by Ciancio, who advocates for an exclusive abdominal approach to right atrium [7]. After opening the central tendon of the diaphragm, supradiaphragmatic and intrapericardial IVC is identified and dissected until it can be correctly encircled. Once here, confluence of IVC in the right atrium can be gently pulled to the abdomen, below the diaphragm. Clamps positioning, cavotomy, thrombectomy and IVC reconstruction should be done in conventional fashion. Gill IS reports their successful robotic approach [2] with patients level III, all of them with the tumor below the suprahepatic veins, that is level IIIa according to modified classification described by Miami group [8]. It means that, once the tourniquets are positioned above the thrombus but below major hepatic veins, liver flow can be open during vascular resection, so Pringle maneuver and piggy-technique are not necessary. When comparing with other series as authors do, reporting better bleeding and operative time results, this facts should be considered, because they can explain by their own at least part of results.

Nobody really knows what will happen in future and which will be the place of robotic surgery in this field. Encouraging reports of minimally invasive surgery for the treatment of RCCIVCTT levels III

and IV have to be prudently taken into consideration. However, most of us would not have believed a few years ago that this surgery could be performed. And the reality is here; they have already reached our days... Who knows if to stay?

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