Laparoscopic Nephroureterectomy in Wilms' tumor

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Abstract. Open surgery has remained the standard surgical technique for Wilms' tumor. But laparoscopic nephrectomy in Wilms' tumor is a feasible and a safe option in selected subset of patients. It reproduces all steps similar to an open surgical approach with the advantage of less postoperative pain, shorter hospital stay, a more acceptable cosmetic scar and early initiation of adjuvant chemotherapy. Here we describe a 13-month-old patient of Wilms' tumor successfully treated using a minimally invasive approach.

Keywords: Indications of laparoscopy, Laparoscopic nephroureterectomy, Wilms' tumor

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Introduction

Wilms' tumor is the most common malignant renal tumor of childhood affecting approximately one child per 10,000 younger than fifteen years. Surgical staging and tumor resection remain the central components of tumor therapy. Treatment protocols recommend nephroureterectomy with neoadjuvant/adjuvant chemotherapy. The surgeon must remove the tumor, determine the intra abdominal stage by lymph node sampling and carefully examine the liver and the contralateral kidney. The surgical guidelines for the management of Wilms' tumor have been clearly outlined. A large trans-abdominal, trans-peritoneal incision is recommended for adequate exposure. Recently, the advancement in laparoscopic techniques and increased laparoscopic nephroureterectomies for benign renal lesions has encouraged surgeons to apply this potentially beneficial approach to treat malignant renal lesion such as Wilms' tumor. But standard selection criteria for patients undergoing laparoscopic nephroureterectomy in Wilms' tumor is lacking and the question of safety of laparoscopic nephroureterectomy in children with Wilms' tumor still lingers in the mind of most paediatric surgeons. Herein is described a case of Wilms' tumor successfully treated using a minimally invasive approach. Also recommendations for selection criteria for laparoscopic nephroureterectomy are discussed.

Case Report

A 13-month-old boy presented to us with fever and anorexia for 2 months and lump in the right flank for the last 20 days. The child had no complaints of hematuria, pyuria, graveluria, bowel irregularities, lethargy, loss of appetite and weight loss. Clinically the child had pallor and a firm, ballottable lump, measuring 5 x 4cm palpable in the right lumbar and hypochondrium region.

The contrast enhanced computed tomogram (CECT) of the chest and abdomen revealed a large heterogenous enhancing mass lesion 7.1 x 7.1 x 6.6cm arising from the anterior surface of the right kidney with multiple necrotic areas with no calcification. Renal vein, inferior vena cava and the liver were normal. There was no lung metastasis. Fine needle aspiration cytology (FNAC) was suggestive of biphasic Wilms' tumor with predominant blastemal components. A diagnosis of stage two right Wilms' tumor was made and the child received six weeks of DD4A neoadjuvant chemotherapy consisting of vincristine, actinomycin-D and doxorubicin. Post chemotherapy CECT (Fig. 1) showed a partial response and an exophytic tumor of 4 x 4 x 3cm localized to the mid-polar region of the right kidney.

Thereafter, a three port laparoscopic nephrectomy with lymph node sampling was planned for this patient. After induction of general anaesthesia, an orogastric tube and a urinary catheter were inserted. The patient was placed supine and was secured to the table with straps. The operating surgeon, first assistant and the scrub nurse were positioned on the left
of the patient facing the primary video monitor and the second assistant on the right. The first 12mm port was placed in the umbilicus for the camera. Then two 5mm ports were placed under vision in the epigastrium and the right hypochondrium in the mid clavicular line (Fig. 2). The head end was raised to about 45 degrees and right side was raised. The dissection was started along the line of Toldt, releasing the ascending colon, the hepatic flexure and the transverse colon. The mobilized colon was reflected medially and the retroperitoneal fat was dissected to identify the gonadal vein and the right ureter. The ureter was traced proximally to reach the renal hilum (Fig. 3a). The lower pole of the right kidney was mobilized using harmonic scalpel. Thereafter the upper pole was mobilized by releasing it from undersurface of the liver and the diaphragm, after retracting the liver. The hilar dissection was carried out meticulously. The renal artery and the renal vein were clipped and cut (Fig. 3b). The posterior adhesions of the kidney with the psoas muscle were released using sharp and blunt dissection. After complete mobilization of right kidney (Fig. 4a), ureter was traced caudally, clipped and cut just proximal to the bladder. Thereafter the supra-hilar, infra-hilar and the para-caval lymph nodes were sampled using electrocautery. Titanium clips were applied to mark the limits of the tumor extension. The specimen was delivered from the right inguinal skin crease incision (Fig. 4b) and the specimens were sent for histo-pathological examination. The child was extubated and the total duration of the surgery was one hour and thirty minutes.

He was started on enteral feeds on day two and discharged on postoperative day three. The duration of hospital stay was six days. The child received week seven chemotherapy on postoperative day seven. The histo-pathological report showed a 4 x 3 x 3cm homogenous tumor in the mid-portion of
the right kidney with tri-phasic histo-morphologic features, large areas of necrosis with fibrosis and approximately five percent of viable tumor. The renal sinus, resected end of ureter and the hilar vessels were free of tumor. The tumor extended beyond the renal capsule but the resected margins were free of tumor. There was no lymph node metastasis. The child is receiving adjuvant chemotherapy and is under regular follow up for the last three months.

Discussion

Open surgery has remained the standard surgical technique for Wilms’ tumor with excellent survival for localized disease with favourable histology. Surgical procedure includes a liberal trans-peritoneal incision, complete inspection of the abdominal cavity, lymph node sampling, tumor resection and retrieval with no spill. Neoadjuvant chemotherapy can reduce the tumor size and can minimize the incidence of spill or rupture making resection easier and minimizing the recurrence rates. However, open conventional surgery carries the disadvantage of unsightly scars, greater postoperative pain and ileus, longer hospital stay and recovery period. Potential benefits of laparoscopic techniques include a more cosmetically acceptable scar, less postoperative discomfort and ileus, less pain, decreased bowel adhesions and shorter length of hospital stay.

There has been a legitimate interest regarding the use of laparoscopic techniques for nephroureterectomy in Wilms’ tumor. Increasing number of case reports and case series are available depicting the safety and feasibility of laparoscopy in Wilms’ tumor. Initial reports described by Duarte et al in 2004 and 2006 have been encouraging. They successfully treated two cases of unilateral non-metastatic Wilms’ tumor in 2004 who received preoperative chemotherapy and then underwent laparoscopic nephrectomy. Later in 2006, they published a case series in which eight children with unilateral Wilms’ tumor underwent laparoscopic nephrectomy after chemotherapy. They found it a safe procedure which provided a complete surgical approach required to treat this tumor. Similar results were published by Varlet F et al in 2009 who performed laparoscopic radical nephrectomy in five children with unilateral renal malignant tumor. Four cases were of suspected Wilms’ tumor who were treated with chemotherapy according to the International Society of Paediatric Oncology protocol and the fifth case was a juvenile renal cell carcinoma. Another case report by Patric J Javid in 2011 reconfirmed the feasibility of laparoscopic techniques for resection of Wilms’ tumor provided oncological principles are carefully followed.

They performed laparoscopic resection of tumor with right radical nephroureterectomy, retroperitoneal lymph node dissection and resection of peritoneal metastases in a 2-year-old girl with a large right renal mass with peritoneal seeding and pulmonary metastasis.

In our case too, the oncologic principles followed were the same as that of open surgery. After neoadjuvant chemotherapy, the tumor shrunk in size and became amenable to resection. This case represents the subset of patients with Wilms’ tumor who can be successfully treated with laparoscopy, especially when performed by beginners. We were able to reproduce all steps of open surgical approach including complete excision and lymph node dissection. The proper visualization and magnification provided by laparoscopy aided in tumor mobilization with minimal tissue trauma. Easy release of tumor adhesions and minimal bleeding was ensured during surgery with the use of new energy sources like the harmonic scalpel and ligasure. Finally the tumor was removed intact through an inguinal skin crease incision which was still smaller and less visible incision than the conventional laparotomy incision. We avoided morcellation and removal, as it would prevent proper histological staging and may have caused tumor spill. Post operatively, the child had decreased analgesic need, started early enteral feeding and was discharged on the third day. He received adjuvant chemotherapy as early as one week postoperatively.

While laparoscopy has been successful in the treatment of this case, the limitations pertaining to patient selection and
Laparoscopic nephrectomy per se do prevail. Most cases selected were small, unilateral tumors, not crossing the midline, with absence of thrombus in the renal vein or inferior vena cava and had received neo-adjuvant chemotherapy, hence making the tumor less friable and decreasing the chances of tumor rupture. Patients with very large tumor with impending rupture or those with previous surgeries and extensive postoperative adhesions are not the ideal candidates for laparoscopy. The absence of tactile feedback during surgery and the fear of tumor spillage during morcellation, inadequate retroperitoneal lymph node dissection, postoperative complications like atelectasis, port site recurrence, trocar site herniation and the effect of insufflation on biology of tumor cells have limited the use of laparoscopy till date.

**Conclusion**

Laparoscopic nephrectomy in Wilms' tumor is a feasible and a safe option in selected subset of patients with Wilms' tumor provided the principles of oncology are strictly followed. It reproduces all steps similar to an open surgical approach with the advantage of less postoperative pain, shorter hospital stay, a more acceptable cosmetic scar and early initiation of adjuvant chemotherapy. Proper patient selection, port placement and laparoscopic surgical experience contribute to the above. Careful controlled randomized studies are needed to help determine the benefits and drawbacks of this new evolving technique.

**References**


