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Videolaparoscopic radical nephrectomy after chemotherapy in the treatment of Wilms' tumor: Long-term results of a pioneer group

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Summary

Introduction
A high cure rate for Wilms' tumor has been achieved using a multidisciplinary approach. The natural step forward is to offer the benefits of a minimally invasive technique for surgery, which is an obligatory part of treatment. Nevertheless, some authors resist using videolaparoscopic radical nephrectomy (VRN) because of concerns about reducing the cure index.

Methods
The present study included children with unilateral Wilms' tumor treated from December 2003 to December 2015 with neoadjuvant chemotherapy followed by VRN. Patients were selected based on the size of their tumors compared with the contralateral kidney, and on their stature.

Results
VRN was performed in 24 patients of age range 10–93 months, with an average of 38.04 ± 23.37 months. The tumoral kidney's largest diameter after chemotherapy averaged 10% of a patient's height. There was no tumor rupture or spillage and no patient presented intra or immediate postoperative complications, except for prolonged ileum in two patients. One patient required intraoperative transfusion because of preoperative anemia. Another developed a late herniation in the umbilical port that required surgical correction. After an average of 6.65 years of follow-up, two patients presented relapse: one with a stage IV disease had relapse in the lung and another with a stage III, involving the liver, had local relapse because of an unwanted delay in the adjuvant treatment.

Conclusion
VRN can be considered a feasible alternative to open surgery in selected cases of children with Wilms' tumor. The present experience shows that besides the benefits of minimally invasive procedures and better cosmetic results, there is no evidence of increased tumor rupture or spillage, peritoneal or port site metastasis, and the long-term oncological results are the same as open procedures.

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Introduction

Compared with the 30% rate of cure achieved in treatment of Wilms' tumor in the middle of the last century, the present rate of 90% represents a fantastic achievement in medical history [1,2]. Treatment of this disease has evolved from a phase of "of cure at any cost to that of cure at the least cost" [3]. Videolaparoscopic radical nephrectomy (VRN), introduced by adult urologists and applied to Wilms' tumor by our group, has been proven to show excellent oncological results with all the benefits of a minimally invasive surgical procedure. Nevertheless, there is still some concern that hinders the overall acceptance of this procedure, regarding risks of tumor rupture and spillage, local recurrence, and port site metastasis [4]. In an attempt to respond to these concerns, we present the results of our 12 years' experience.

Methods

This prospective study included children with unilateral Wilms' tumor treated from December 2003 to December 2015 with neoadjuvant chemotherapy followed by radical VRN. The protocol included all patients who presented tumor shrinkage sufficient to be considered resectable by videolaparoscopic procedure. Preoperative diagnosis as well as tumoral shrinkage were based on abdominal CT or MRI.

For all patients, the protocol included obligatory preoperative chemotherapy according to the SIOP-2001 protocol [5]. The chemotherapy scheme consisted of vincristine 1.5 mg/m^2 on treatment days 1, 8, 15, and 21 and actinomycin D 1.5 mg/m^2 on days 1 and 15. For patients with metastatic pulmonary disease, a 50 mg/m^2 dose of adriamycin was added in weeks 1 and 5. After this chemotherapy, patients with significant tumoral size reduction were selected to undergo videolaparoscopic nephrectomy, at the surgeon's discretion.

As there were no previous reports of the procedure in the pediatric literature, at the beginning of our study the evaluation of an oncologically safe VRN was based on our previous experience with laparoscopic nephrectomy for benign diseases in children, as well as the experience of laparoscopic radical nephrectomy in adult patients accumulated at our institution. The inclusion criteria were the size of the neoplastic kidney after chemotherapy, namely a unilateral mass not larger than 1.5—2 times the size of the contralateral normal kidney, as well as one that could be safely removed through the Pfannenstiel incision. The objective exclusion criteria were patients with larger tumors, vascular invasion, and extensive perirenal or lymphatic infiltration after chemotherapy, who were then treated by open procedures.

Surgical technique

All cases were operated using a transperitoneal approach. The patient was positioned in a 30° contralateral supine position with forced extension to expose the ipsilateral abdomen, under general anesthesia, with bladder and orogastric catheters. Pneumoperitoneum was achieved either with an umbilical puncture with the Veress needle or by the Hasson technique, and the abdominal cavity was insufflated to a pressure of 12—15 mmHg, according to size and age of the patient. A 5 or 10 mm trocar was placed at the umbilicus for the camera, a 3 or 5 mm one near the xyphoid appendix, and two 5 or 10 mm ones at the anterior axillary line, one in the iliac fossa and another subcostally, both sites according to tumor size and extension.

Laparoscopic evaluation of the abdominal cavity is always performed in the search for previously undiagnosed metastases or other intra-abdominal abnormalities. The tumoral kidney can be visualized easily, bulging in the retroperitoneum. According to the side, the liver or spleen were retracted upwards and stabilized with forceps inserted through the xyphoid. After mobilization of the colon, the Gerota's fascia was identified, as it includes a very well-defined fibrous tissue or pseudocapsule that involves the affected kidney, resulting from preoperative chemotherapy. The dissection was initiated medially to the mass, searching for the renal vessels. In the right side, this began with the vena cava, while in the left with the renal vein. After dissection of the renal vein, the renal artery was identified posterior to the vein, being carefully isolated and ligated with a polymer clip (Hem-o-Lok® - Weck Closure Systems, Research Triangle Park, NC, USA). Any supranumerary renal arteries must also be searched and ligated. After this maneuver, the previously dissected renal vein was also clamped and sectioned. The ligated arteries can then also be sectioned distal to the ligature. The spermatic and adrenal veins, as well as the ureter, were also identified, ligated, and sectioned, to allow mobilization of the specimen. The kidney and perirenal fat were then dissected "en bloc", and in most cases this was easily accomplished. Eventual fibrotic or tumor adherences to the lumbar muscle or diaphragm, or to the liver on the right side, must be handled with great care to avoid injuries to these structures, as well as rupture of the tumor. At this point, a harmonic scalpel is very useful. After complete mobilization of the specimen, it was entrapped in a plastic retrieval bag, which was introduced by a trocar through a Pfannenstiel incision, without opening the peritoneum. Before removal of the tumor through this incision, pericaval and periaortic lymph node samples were also obtained. The specimen was removed intact inside the bag, without morcellation. After review of the cavity, hemostasis being ensured, the incision and ports were closed without drains.

Ethical approval

The medical ethical committee of the Hospital das Clínicas of the University of São Paulo approved this work.

Results

Demographic data

VRN was performed in 24 patients, of age range 10—93 months, with an average of 38.04 ± 23.37 months. Twelve patients were male. The mean weight was 15.03 ± 4.01 kg and the mean height was 95.89 ± 13.91 cm.