Laparoscopic radical nephrectomy for the management of chromophobe renal cell carcinoma in a 13-year-old girl

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Article info
Article history:
Received 14 May 2014
Received in revised form 18 June 2014
Accepted 23 June 2014

Key words:
Laparoscopic radical nephrectomy
Chromophobe renal cell carcinoma
Child

Open surgery is the standard therapeutic approach for renal malignant tumor in children; while in adults, laparoscopic radical nephrectomy (LRN) is used. Only few reports on LRN in children have been published because the most common form of pediatric renal malignancy, Wilms tumor, is well known for presenting with large palpable masses. Here, we report the case of a 13-year-old girl with small chromophobe renal cell carcinoma (RCC) who was managed by LRN. RCC is a rare condition, with an incidence rate of only 2–6% of all renal tumors in children. We found LRN for small RCC to be feasible and safe.

Laparoscopic radical nephrectomy (LRN) is a standard procedure for the treatment of renal cell carcinoma (RCC) in adult patients. There is conclusive evidence showing that the long-term cancer control afforded by this procedure is similar to that of open surgical procedures [1,2]. On the other hand, the standard therapeutic approach for renal malignant tumor in children is open surgery. The outcome of laparoscopic surgery in children remains unclear [3]. In recent years, tumor removal using endosurgical procedures has been commonly performed at our institution [4]. Here, we present a pediatric case of chromophobe RCC that was managed by planned LRN.

1. Case report

A 13-year-old girl presented with right flank pain and hematuria. Abdominal computed tomography revealed a tumor measuring 40 mm × 40 mm in her right kidney and three metastatic lesions in the liver (Fig. 1A, B). She underwent right LRN and subsequent radiofrequency ablation to the liver lesion, followed by post-operative chemotherapy.

1.1. Surgical procedure

The patient was placed in a 45-degree left lateral position. The pressure points were minimized, with the upper arm positioned cranially and secured on an arm support. A 12-mm port for a camera was inserted through the umbilicus using the open Hassan method. Carbon dioxide insufflation was performed to maintain an intraperitoneal pressure of 10–12 mm Hg, and a 5-mm 30-degree telescope was used to visualize the operative field. Then, two other 5-mm ports were placed in the epigastric site and the right iliac fossa. An additional 12-mm port was inserted at a suprapubic position (Fig. 2A). We used an ultrasonically activated device (USAD; Harmonic scalpel™; Ethicon) to dissect out the kidney. In order to obtain a wide right retroperitoneal view, the first to second portion of the duodenum was mobilized from the retroperitoneum and the ascending colon was mobilized from the cecum to the hepatic flexure, which allowed identification of the inferior vena cava (IVC) and aorta. The anterior surface of the IVC and the aorta was dissected to the level of the renal vein. The ureter and gonadal vein were identified and...
dissected between the common iliac artery bifurcation and the renal hilum level (Fig. 2B). The ureter was divided using an USAD and the distal end of the ureter was ligated. The gonadal vein was divided with an USAD. Lymph nodes located around the renal vessels and between the IVC and the abdominal aorta were dissected and removed. First, the right renal vein was divided with a 45-mm vascular stapler. Next, blood flow in the right renal artery was controlled with three 5-mm titanium clips, of which two were placed medially toward the aorta and one toward the renal artery; then, the artery was divided with scissors. After achieving control of the renal vessels, the lower pole was dissected from its attachment by using an USAD. Mobilization of the upper pole was performed before lateral dissection. Once the upper pole of the kidney was free, lateral dissection was possible. The right adrenal gland was preserved. The specimen was packed in an end surgical bag and retrieved through a suprapubic 12-mm port that was widened by a 5-cm skin incision without morcellation. The ascending colon was fixed to the right abdominal wall. The operation time was approximately 4.5 h. The estimated blood loss was 250 mL, with no blood transfusion required.

1.2. Postoperative course

The postoperative period was uneventful. Oral feeding was initiated on postoperative day 1, and the drain was removed on postoperative day 3. The tumor was diagnosed as a chromophobe RCC. Immediately after the operation, radiofrequency ablation was performed for the metastatic liver lesions. Since then, the patient has been receiving treatment with sunitinib. No long-term complications were observed at the follow-up examination conducted one year after LRN.

2. Discussion

Potential advantages of minimally invasive surgery (MIS) include greater cosmetic benefit, less bowel adhesions, less postoperative discomfort and pain, less analgesics requirement, less postoperative ileus, and relatively short length of hospital stay [3]. LRN has become the standard procedure for adults since its initial description by Clayman et al., in 1991 [5]. Furthermore, single-incision LRN, first reported by Raybourn et al., in 2010 [6], is gradually replacing the classic laparoscopic procedure.

While the value of MIS in pediatric urology is well established [7], its advantages and usefulness in pediatric surgical oncology remains a challenge and needs to be defined [8]. In children, Wilms tumor is the most common renal malignancy, and it is too large to be excised using laparoscopy. Several small case series have been published since the first report of LRN for Wilms tumor in children by Duarte et al. [9,10]. The more recent reports demonstrated that LRN following preoperative chemotherapy for Wilms tumor was feasible and safe [11,12]. They were a new strategy of therapy preliminary and need more cases to obtain the feasibility and safety of the LRN. However, in our case, the RCC was small. Hence, LRN was decided as the treatment option. The decision to perform LRN in...
children usually depends on the experience of the surgical team. In recent years, tumor removal using endosurgical procedures has been commonly performed at our institution [4].

Surgery is the mainstay of therapy for RCC, and complete tumor resection without any spillage is the most important prognostic factor in order to avoid a regional relapse. The indications for LRN in children are not unlike those in adults. Duarte et al. insisted that LRN was not recommended for the case of a large tumor whose dimension/height ratio was over than 10% [13]. Depending on the size and age of a pediatric patient, the size of the tumor can sometimes be a contraindication. If a large tumor can be extracted through an incision without causing rupture, the size does not pose as a challenge; provided that the incision is large enough to avoid complication. Varlet et al. [3] proposed that contraindications of LRN include bilateral renal tumor, tumors extending beyond the midline, and tumors complicated with thrombus of the renal and caval veins. LRN can be performed for a renal tumor that is not locally advanced or metastatic; however, in 2011 Javid et al. [14] reported otherwise. They suggested that the laparoscopic approach hasten recovery and thereby reduce the time required to begin or reinstitute postoperative chemo- or radiotherapy. Nonetheless, they emphasized that the indication for LRN should be assessed on a case-by-case basis and should not be universally introduced without further comprehensive study.

Our review of the literature showed that the majority of intraoperative complications in laparoscopic nephrectomy are related to adjacent organ injury (4% incidence) and vascular injury (2%) [15]. The incidence of bowel, spleen, pancreas, and diaphragm injuries was reported to be 0.8%, 1.4%, 2.1%, and 0.6%, respectively. Vascular complications are associated with malfunction of stapler devices in 1.7%–10% of the cases [15]. Laparoscopic nephrectomy has been reported to have low intraoperative complication rates. However, in the case of pediatric patients, we have to consider the limited working space for performing an LRN.

While postoperative LRN complications such as port-site metastases have been reported [15], they are very rare (6 cases). Such complications can be prevented by avoiding morcellation by using an endoscopic retrieval bag [16]. Further, postoperative chemotherapy may prevent port-site recurrence after MIS in cancer patients who have a chemotherapy-sensitive tumor [17,18].

3. Conclusion

In pediatric RCC cases whereby the tumor is usually not too large with laparoscopy giving good surgical views of the main tumor and large vessels, LRN appears feasible and safe. When compared to open radical nephrectomy, the laparoscopic approach may have allowed early planning of postoperative treatment for metastatic liver lesions. In order to evaluate the safety and efficacy of LRN procedure for pediatric renal malignant tumors, further studies conducted with more cases and long-term follow-up are needed.

Acknowledgment

We would like to thank Dr. Julian Tang of the Department of Education for Clinical Research, National Center for Child Health and Development, for proofreading and editing this manuscript.

References