Laparoscopic heminephrectomy in nonfunctioning right moiety of a horseshoe kidney: Technical challenges and method to deal with

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Case Reports
Abstract

Laparoscopic heminephrectomy in patients with horseshoe kidney is technically challenging procedure and only few cases have been reported in the literature. Various approaches have been described for handling the isthmus. We report the management of a case of symptomatic nonfunctioning right moiety of a horseshoe kidney secondary to ureteropelvic junction (UPJ) obstruction using Ligasure™ for vessel sealing and division of isthmus. We discuss here the various challenges during laparoscopic heminephrectomy and ways and tricks to deal with.

Key words: Horseshoe kidney, laparoscopy, nephrectomy

INTRODUCTION

Horseshoe kidney is the most common congenital anomaly of the kidney. It occurs in 0.25% of the population, or about 1 in 400 persons.[1] Most of the time; it is asymptomatic and is detected incidentally in routine sonography. Symptoms are typically related to hydronephrosis, infection or calculus formation, which may occur in up to two-third of the patients. Impaired urinary drainage due to anomalous ureteropelvic junction (UPJ) and high ureteral insertion is the chief cause of hydronephrosis, infection, or urolithiasis.[1]

Laparoscopy has revolutionized all branches of surgery and urology is no exception. It has changed the way we look at the any surgical disease. More and more procedures are increasingly being reported by laparoscopy. First case of laparoscopic heminephrectomy in horseshoe kidney was reported 18 years back in 1995 by Riedl et al.[2] Since then only 24 case reports (28 patients) have been published in English literature.[3] We review and discuss here the laparoscopic heminephrectomy in horseshoe kidney, technical difficulties in the procedure, and ways to prepare oneself for this challenging surgery.

CASE REPORT

A 20-year-old unmarried lady presented with pain on right side of abdomen for last 3 months. General physical examination was unremarkable. Per abdominal examination revealed lump in right lumber area. Initial ultrasonography (USG) done outside revealed grossly hydronephrotic right kidney with thinned out parenchyma. Diethylene triamine pentaacetic acid (DTPA) scan confirmed nonvisualized right kidney and normally functioning left kidney. We ordered computed tomography (CT) scan which confirmed the horseshoe kidney with hydronephrotic right moiety with papery thin parenchyma and normal left kidney joined by isthmus [Figure 1]. Patient underwent laparoscopic right heminephrectomy using three ports. Patient was placed in a 70° right lateral position. The camera port (10 mm) was placed at umbilicus followed by one 5 mm port below right costal margin in midclavicular line and other 10 mm port in right iliac fossa. Entire right colon was mobilized and duodenum was kocherized and reflected medially. Upper pole of the kidney was dissected first, which revealed atretic small caliber renal artery and vein entering into upper pole. These vessels were dealt with 10 mm Ligasure™ [Figure 2]. The upper pole was freed laterally and posteriorly. Gonadal vessels were identified and traced upwards and were left as such toward inferior vena cava (IVC). Ureter was identified inferior to lower pole and divided with Ligasure™. Hydronephrotic sac was evacuated with the help of Veress needle to ease the handling of the sac. The upper and lower poles of the kidney were dissected all around and lifted to visualize the isthmus. After emptying the sac clear demarcation could be appreciated between hydronephrotic sac and fleshy parenchymatous isthmus. The isthmus was isolated and cut with 10 mm Ligasure™ keeping the line of division toward the hydronephrotic sac [Figure 3]. There was no major blood supply entering the hydronephrotic part of isthmus and lower pole, therefore all the dissection could be carried out with Ligasure™. The kidney was freed, bagged, and removed through the umbilical port without any need for extending the incision. A drain was placed and was removed after 24 h. The total operating time was 180 min and estimated blood loss was 50 ml. She subsequently recovered well and was discharged home on postoperative day 4.

DISCUSSION

Laparoscopic heminephrectomy is challenging procedure technically. Challenges are due to variable vascular supply and need to divide fleshy isthmus. In 30% of cases, arterial supply consists of one renal artery to each kidney.[4] Two or even three renal arteries may supply one or both kidneys. The isthmus and adjacent parenchymal masses may receive a branch from each main renal artery, or they may have their own arterial supply from the aorta, inferior mesenteric, common or external iliac, or sacral arteries.[5]

Most of the authors have used CT scan for preoperative planning.[3] Although Donovan et al.,[6] suggested that
routine preoperative arteriography is essential to identify all vessels, in our opinion modern 3-dimensional computerized tomographic (3D CT) scan with angiography and urography images provides all the details for preoperative planning in details. It helps in planning the dissection and dealing with blood vessels. CT urography may also be helpful in delineating isthmus containing calyx, which may extend toward midline. CT can provide useful information for division of isthmus preventing the caliceal injury and urinary leak.

Different energy sources and devices have been used for division of isthmus by various authors.[3] Harmonic/ultrasonic scalpel and the bipolar electrocautery are the most common used energy sources.[3] Stapler/Endo GIA is the most common device used.[3] In the four case reports of laparoscopic heminephrectomy for renal tumor in horseshoe kidney, different techniques have been used in all cases; harmonic scalpel with argon beam coagulation, parenchymal suturing with argon beam coagulation, electrocautery with digital compression, and Endo GIA stapler.[3]

In hydronephrotic nonfunctioning kidney, usually there is clear demarcation between normal isthmus and hydronephrotic part. This makes the division of isthmus easier and any of the available energy sources can be used safely. An important maneuver in these cases is to keep line of division little toward the hydronephrotic side avoiding the parenchyma. This prevents the injury to vascular fleshy parenchyma of the other side. Remaining mucosa can be cauterized with electrocautery. The real difficulty occurs in dealing isthmus in cases of heminephrectomy of renal tumor where clear demarcation cannot be appreciated easily. Here the problems are two-fold: Bleeding and chance of caliceal entry. Preoperative 3D CT angiography and urography is of extreme help to tackle both of these problems. Preoperative ureteric catheterization should be done on the normal side and methylene blue can be instilled intraoperatively to detect the caliceal entry during division of isthmus. We recommend dissecting the upper pole followed by lower pole and isthmus being the last. Blood supply to isthmus should be looked carefully. Interrupting the blood supply of isthmus delineates the demarcation between the two sides and isthmus can be divided safely.

Khan et al.[3] have excellently reviewed all the cases of laparoscopic heminephrectomy done till 2010. In most of the case reports, indication for heminephrectomy is nonfunctioning hydronephrotic/infected moiety. Only in four cases, heminephrectomy has been done for renal tumor. A transperitoneal approach was used in the majority (16) of cases, while a retroperitoneal route was used in five cases, and six patients were treated with a hand-assisted approach.

**CONCLUSION**

Laparoscopic heminephrectomy is safe and reliable approach in horseshoe kidney. A particular approach and method of division of isthmus cannot be recommended...
at this moment, but transperitoneal approach seems to be most preferred. Careful planning with the 3D CT may be the key to success.

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