



Inflammation and infection

Laparoscopic heminephrectomy in a horseshoe kidney affected by xanthogranulomatous pyelonephritis: A modified approach

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ABSTRACT

Horseshoe kidney (HSK) is a common congenital kidney anomaly that is encountered frequently by urologists. It is rare for HSK to be affected by xanthogranulomatous pyelonephritis (XGP), a potentially life-threatening condition. The standard of care for XGP is open nephrectomy, but recently a few case reports have been published showing the feasibility of minimally invasive surgery to deal with XGP. We present a case of HSK affected by XGP treated successfully with modified laparoscopic transperitoneal heminephrectomy. The rarity of such a combination, the modified approach, and the successful outcome encouraged us to report it.

Introduction

Horseshoe kidney (HSK) is a congenital kidney anomaly that urologists frequently encounter for different reasons such as obstruction, stones, and malignancy.¹ Xanthogranulomatous pyelonephritis (XGP) is a rare and potentially harmful diagnosis as it may lead to serious complications such as sepsis, renal failure, and potentially life-threatening conditions.² A combination of HSK and XGP is rarely encountered and creates a challenge to urologists in the prospect of diagnosis and management. Few articles were published showing the feasibility of laparoscopic heminephrectomy in such a situation.³ Therefore, we present a case of XGP and HSK treated with modified transperitoneal laparoscopic heminephrectomy.

Case presentation

A thirty-year-old female known to have HSK and recurrent attacks of stones referred to our clinic for consideration of heminephrectomy. She had been struggling with recurrent episodes of urinary tract infections and stone formation. She had several ureteroscopies, but her last ureteroscopy was complicated with ureteric injury treated by prolonged

stent insertion followed by the established diagnosis of ureteric stricture. Before our clinic visit, she was pregnant, and her pregnancy was threatened by recurrent urosepsis attacks. She had a diuretic renogram which showed 18% split function and poor drainage. The CT scan showed horseshoe kidney with features of chronic inflammatory process is seen involving the right side suggestive of XGP (Fig. 1). After prolonged discussion and counseling, a decision was made to proceed with laparoscopic heminephrectomy. The patient was informed about the high probability of conversion to open surgery.

We modified the operative steps to achieve a safe laparoscopic transperitoneal heminephrectomy. The position is standard laparoscopic nephrectomy, and the patient was placed in a 45-degree semi-lateral decubitus position. The camera port (12 mm) was inserted using the open (Hasson) technique just above and lateral to the umbilicus through the rectus muscle. A triangulation was made around the lower pole rather than the hilum of the kidney. Standard reflection of the colon was done. The kidney, ureter, gonadal vein appeared as a matted mass with dilated renal pelvis Figure (2-a). The gonadal vein was dissected carefully and bluntly off the kidney and used as a landmark as a dense inflammatory process obscured IVC. Kidney handling was not possible significantly since the renal pelvis was dilated; thus, a veress

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Fig. 1. (a) CT scan with IV contrast - portovenous phase at the level of the isthmus shows fibrosis and fat stranding; and (b) CT with delayed images shows a horseshoe kidney with features of the chronic inflammatory process is seen involving the right side, including significant right-sided ureteric wall thickening at the level of the right PUJ with surrounding fat stranding. There is a mass-like structure at the level of PUJ, isthmus, and adjacent IVC, which is highly suggestive of right-sided Xanthogranulomatous pyelonephritis.

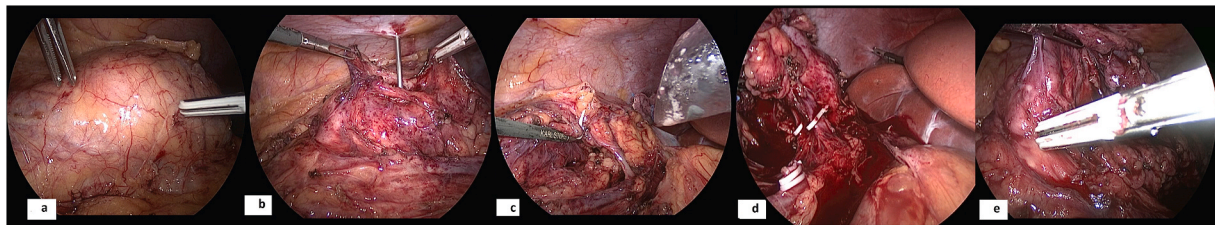


Fig. 2. (a–e) Operative steps (a) The kidney, ureter, gonadal vein appeared as a matted mass with dilated renal pelvis Figure (b) A veress needle was inserted through the abdominal wall to deflate the renal pelvis. (c) A triangle which is bounded by the gonadal vein medially and upper pole laterally is ready to approach the hilum. (d) Blunt dissection through this triangle using ligasure allows us to identify the renal pedicles, which are controlled by hem-lock clips. (e) The isthmus, lower pole, and ureter are stacked together as one mass. Blunt dissection was done carefully until we identified the isthmus.



Fig. 3. (a) The gross appearance shows a shrunken-dusky coloured heminephrectomy specimen. The cortex is thin with multifocal yellowish exudate. The isthmus is identified (b) H&E stain shows atrophic cortex, tubulointerstitial fibrosis with marked mixed inflammatory cell infiltrate and tubular atrophy. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

needle was inserted through the abdominal wall to deflate the renal pelvis (Fig. 2-b). The renal pelvis was used as a handle to manipulate the kidney.

A triangle now is ready to approach the renal pedicles. It is bounded

by the gonadal vein medially and upper pole laterally (Fig. 2-c) (Duodenum was pushed down gently). Blunt dissection through this triangle using ligasure allowed us to identify the renal pedicle, which was secured by hem-lock clips (2-d). Then, the upper pole and lateral

attachment were carefully dissected. The kidney was devascularized and detached from the upper pole and lateral attachment. Ligasure was used to dissect, cut, and coagulate all tissue above the psoas muscle until reaching the isthmus. The isthmus, lower pole, and ureter were stacked together as one mass. Blunt dissection was done meticulously until we identified the isthmus, Fig. 2-e). The kidney was pulled upward toward the abdominal wall, so an abdominal wall incision was made. The incision was created by extending the low 5 mm port site 5 cm laterally and directed to the laparoscopic view. The kidney was delivered through the incision. IVC dissected bluntly downward. The ureter was identified and secured. A heavy clamp was used to clamp the isthmus followed by a sharp cut through the isthmus fibrotic band. 5-0 prolene was used to secure the residual part of the isthmus. The operative time was 300 minutes, and blood loss was 350 ml. Closure of layers was done and a drain was inserted. Postoperatively, the patient was doing well and discharged after two nights stay. The final histopathology showed atrophic cortex, tubulointerstitial fibrosis, and tubular atrophy (Fig. 3-A and 3-B).

Discussion

Minimally invasive surgery is currently considered the standard of care in renal surgery. Recently, several international guidelines recommend either robotic or laparoscopic surgery to deal with renal malignancies. Therefore, robotic and laparoscopic surgery has become more popular and minimally invasive radical or partial nephrectomies are now well-established treatment modalities for renal malignancies.⁴ Nevertheless, the surgical approach to benign nephrectomy is still controversial, especially when infection is a concern. For instance, XGP nephrectomies were previously described as complex even with an open approach and associated with high perioperative morbidity. However, a few published articles have shown the feasibility of this approach, especially in the current era of widespread usage of robotic and laparoscopic surgery (3). In this case, we describe a modified transperitoneal laparoscopic approach dealing with XGP and HSK as both conditions create a significant challenge to laparoscopic surgery. Our modified approach slightly deviates from the standard transperitoneal minimally invasive nephrectomy or partial nephrectomy in the prospect of operative steps and the specimen extraction.⁵ The modified approach prioritizes dissection, within the upper pole, and early control of renal pedicles, so surgeons encounter less bleeding while dissecting through the inflammatory planes and avoid early encounter of the isthmus and the anteriorly displaced ureter. Deflation of the dilated renal pelvis, if present, will help the surgeon to manipulate the kidney easier and use

the renal pelvis as a handle during kidney manipulation. Lastly, hanging the kidney toward the abdominal wall after dissection of the isthmus allowed us to identify the site of our abdominal wall small incision, which is an extension of the lower port but directly on top of the kidney. The isthmus was disconnected and sutured manually under direct vision to prevent any inadvertent injury to the IVC or aorta through this incision. In our opinion, the modified operative steps allowed us to perform a safe heminephrectomy in XGP and HSK.

Conclusion

Laparoscopy is a feasible option to deal with HSK and XGP. However, this minimally invasive approach should be considered carefully, and patients should be counseled about the high possibility of conversion to open surgery.

Ethical statement

Written informed consent was taken from the patient to publish this case report and the associated images.

Declaration of competing interest

The authors have no conflicts of interest.

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