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CASE REPORT

Surgical Technique for Retroperitoneoscopic Nephrectomy

A case report

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التقنية الجراحية لاستئصال الكلية بالمنظار عن طريق الحَيِّزُ خَلْفَ الصِّفاق

تقرير حالة

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الملخص: تقرير عن حالة كلية يمنى لا تعمل بسبب التهابات مزمنة في الحُوَيضَةِ والكُلَيَة تم استئصالها بنجاح بالمنظار عن طريق الحَيِّزُ خَلْفَ الصِّفاق. ندرج هنا وصف العملية التي تعتبر غازية بحد أدنى .

مفتاح الكلمات: عملية الجراحة بالمنظار، استئصال الكلية، خطوات عملية غازية بحد أدنى . التهاب الحويضة والكلية، الحَيِّزُ خَلْفَ الصِّفاق . تقرير حالة، عُمان.

ABSTRACT: A case of right non-functioning kidney secondary to chronic pyelonephritis is presented. The successful management through retroperitoneoscopic nephrectomy is described, emphasising the technique of this minimally invasive therapeutic option.

Keywords: Laparoscopic surgery; Nephrectomy; Reteroperitoneal space; Surgical procedures; Pyelonephritis; Minimally invasive surgical procedures, Case report; Oman

Nephrectomy is one of the most common ablative surgeries performed by urologists. Apart from the psychological trauma of losing a kidney, the patient usually undergoes significant discomfort and disfigurement due to the long surgical incision, as the traditional approaches require a large muscle-cutting skin incision in order to reach the organ. Until the last decade, this open surgical technique was the only available option for this procedure.

In the last decade, minimally invasive surgery has been at the frontier of surgical development. From its initial diagnostic use in gynaecology to the current use in advanced oncological and reconstructive surgery, laparoscopy has become firmly established in the armamentarium of surgeons in every field. The advantages of lower post-operative pain, minimal scars, rapid recovery and early return to work have offset the marginal increase in the instrumentation costs and the longer training period for the surgeon. With the introduction of re-usable equipment these limitations can be minimised.

Retroperitoneoscopy was initially described by Bartel[1] in 1969, but was considered to be technically cumbersome because of limited working space, lack of clear-cut anatomic landmarks, and abundant fat in the retroperitoneum. However, the retroperitoneal anatomy is more familiar to the urologist because of commonly performed open retroperitoneal surgery. In addition, the advantages of not entering the peritoneal cavity, such as the early return of bowel activity, the avoidance of contamination of the peritoneal cavity with urine, have made urologists consider this option once again.[2] Wickham[3] reported the initial retroperitoneoscopic ureterolithotomy in 1979. In 1982, Bay-Nielson and Schultz[4] performed endoscopy of the retroperitoneum to remove upper ureteral calculi. The first attempts at retroperitoneal

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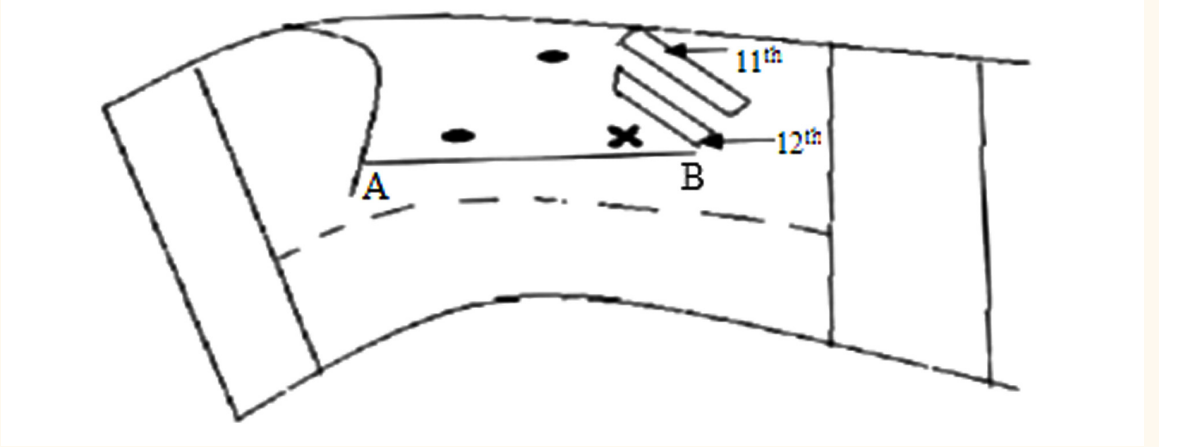

Figure 1: Patient in the lateral (flank) position. Dashed line represents vertebral spinous processes. Solid line A-B denotes edge of para-spinalous muscles, 11th and 12th rib as marked. X marks primary port site and balloon insertion site. Solid circles represents secondary port sites. Patient is strapped to keep the kidney in position

endoscopic nephrectomy were made by Coptcoat,[5] Wickham and Miller,[6] and Weinberg and Smith[7] in the early 1980s, and were based on the technique of percutaneous renal stone surgery. The first transperitoneal laparoscopic nephrectomy was performed by Clayman[8] *et al.* in 1991.

Case Report

A 48 year-old female presented at Sultan Qaboos University Hospital, Oman, with right flank pain and dysuria of several months duration. Abdominal ultrasonography revealed a right small kidney, but the contralateral kidney was normal. Routine haematological and biochemical examinations were normal. The urine culture was sterile. An isotope diethylene triamine penta-acetic acid (DTPA) scan showed differential functions of 5% in the right kidney and 95% in the left kidney. She was diagnosed to have a right non-functioning atrophic kidney and it was suggested that she undergo nephrectomy through a retroperitoneal approach.

The surgery was performed through the retroperitoneal route; hence surgical details of this procedure are described. The procedure was performed under general anaesthesia with end tidal CO_2 monitoring under cover of prophylactic antibiotics. After bladder catheterisation, the patient was placed in the standard right lateral kidney position. The surgeon and the camera person stood on the right side of the patient while the scrub nurse was on the left side of the patient. We used the open (Hasson)[9] technique for obtaining initial access. A 10-12 mm incision was made in the lumbar (Petit's) triangle below the 12th rib at the lateral border of paraspinalis muscles. The muscle fibres were carefully separated and entry was gained into the retroperitoneum by gently piercing the thoracolumbar fascia with the tip of an artery forceps. A balloon dilator was constructed as described by Gaur.[10] This consists of a glove finger stall tied by silk over the end of a suction catheter. The balloon dilator was then inserted into the opening. Distension of the balloon with air rapidly and atraumatically displaces the adjacent fat and peritoneum, there by creating an adequate working space for retroperitoneoscopic surgery within that area. A 10mm port was then placed in this opening and used as the camera port. All work was visualised via a monitor at the head of the table using a high quality charge-couple device (CCD) camera connected to the laparoscope. The 2nd and 3rd ports were inserted under direct vision as shown in Figure 1. An automatic insufflator was used to maintain the CO_2 pressure at 14mm Hg. The psoas muscle acts as a landmark and was sought immediately on entry with the laparoscope. The posterior aspect of the kidney was reached first and the pulsating renal artery was identified at the hilum. The renal hilum was dissected, the renal vein and renal artery cleared of fat and clipped using Liga Clips 400 series™ (Ethicon). Endo GIA clips, if available, can also be used. Three clips were applied on the proximal part of the vessel and two on the distal end.[11] The vessels were divided and then further dissection of the kidney was performed

separating it from the surrounding fat. The ureter was clipped and divided and once the kidney was fully mobilised it was removed from the body by incising one of the port sites and increasing it to 2.5-3 cm. A drain was left in the retroperitoneum and CO_2 evacuated before the end of the procedure. An Endo catch bag, if available, can also be used. The duration of the procedure was 145 minutes. On first post-operative day, the Foley catheter was removed and oral feeding started after confirming return of bowel sounds. The patient was fully mobilised within 24 hours after which the drain was removed. The puncture site remained dry and the patient was discharged on the third postoperative day. On follow-up, the histopathology revealed chronic pyelonephritis, but the patient was well and without complaints.

Discussion

In the past few years, laparoscopy has been the subject of great interest in the field of urology. It has evolved from simple diagnostic manoeuvres to complex operative procedures. In general, from an anatomic point of view, retroperitoneoscopy seems to be more suitable than the transperitoneal laparoscopic approach to reach the upper urinary tract. It also is less invasive and complies with the criteria for open renal surgery. The first attempts at retroperitoneal endoscopic nephrectomy were made by Wickham and Miller [6] in early 1980s and were based on the technique of percutaneous renal stone surgery. The real breakthrough was a transperitoneal laparoscopic nephrectomy performed by Clayman *et al.* in 1991.[8] Initially, endoscopic access to the upper and lower retroperitoneum did not find wide acceptance. The main reason was the suboptimal view due to the inability to establish a pneumoperitoneum. On the other hand, establishment of a pneumoperitoneum using CO_2 insufflation alone proved to be a problem. The balloon dissection technique described by Gaur[10] allowed the safe and reproducible creation of a retroperitoneal operating field. Using single digit dissection, Rassweiler[12] has shown it to be sufficient for adequate exposure of the retroperitoneal space and reduces the operating time by 10-15 minutes. The basic surgical technique of laparoscopic nephrectomy has been described in detail by both Clayman[8] and Gill.[13] The technique described here has some modifications as compared to the original descriptions. A pre-operative angiogram or renal artery immobilisation was not performed as it adds to cost and morbidity and makes little difference to the outcome. Some technical points should be detailed for the avoidance of complications: 1) strict attention to basic surgical principles; 2) placement of trocars under direct vision; 3) meticulous attention to avoid even minor haemorrhage as blood in the field obscures vision dramatically; 4) approaching the renal hilum before perirenal or ureteric dissection, if at all possible; 5) later dissection of the anterior-medial aspect of the kidney to prevent it from falling on the posteriorlateral pedicle area; 6) adequate exposure and retraction; 7) early conversion to open surgery if there is failure to progress.

The complications encountered in reteroperitonescopy include inadvertent entry into the peritoneal cavity; difficulty in identifying small atrophic kidneys; inadvertent bowel injury; excessive bleeding from slippage of the renal pedicle or from the trocar site; surgical emphysema and septicaemia from handling of an infected hydronephrotic kidney. Conversion to open surgery may be required to manage these complications.[14] Apart from standard contraindications of laparoscopy like bleeding diathesis and cardiac failure, or severe chronic obstructive pulmonary disease, previous retroperitoneal surgery is a relative contraindication for this procedure.

The relatively long operative duration reported by some investigators[15] for laparoscopic nephrectomy and nephroureterectomy has been used by critics to argue against the widespread adoption of this technique. The present duration of 145 minutes compares favourably with 153 minutes[16] and 154 minutes[17] reported in other series and in a contemporary open surgical series.[18] By maintaining the operative duration in line with that for open surgery, we support reports rating laparoscopic nephrectomy overall as less expensive than open nephrectomy. [19, 20]

Conclusion

We conclude that retroperitoneoscopic nephrectomy is a feasible, safe and minimally invasive technique. The length of hospital stay and convalescence is short and return to normal activity is rapid.

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