· Monographic report ·

Retroperitoneal laparoscopic nephropexy: a report of 28 cases

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[**ABSTRACT**] **Objective**: To discuss the procedure and clinical effect of retroperitoneal laparoscopic nephropexy (RLN). **Methods**: From August 2001 to June 2006, RLN was performed on 28 female patients aged 26-45 years old (mean, 34±2.5) with symptomatic nephroptosis, including 15 with the right kidney, 12 with the left, and 1 with both. The preoperative complaint of patients included subjective symptoms (constant and recurring pain in 28 patients) and objective symptoms (upper urinary infections in 16, hematuria in 12, and upper tract obstruction in 12). One patient underwent nephropexy *via* the transperitoneal approach and the others underwent nephropexy *via* the retroperitoneal approach. A retroperitoneoscopic procedure was performed after positioning the patients in the flank position. Digital preparation of the retroperitoneal space was made and standardized trocar was placed. The key step of the surgery was complete exposure of the kidney within Gerota' fascia, which was aimed to separate the potential adhesions between the colon and kidney or between the inferior blood vessels of the kidney. Nephropexy was performed between the fibrous capsule at the lower pole of the kidney and the dissected psoas muscle, using three sutures placed by intracorporeal technique or the percutaneous needle both for introduction and removal of the suture; the sutures were separately tied over the sacrospinalis fascia. **Results**: The mean operative time was (125±9) min (ranging 115-240 min); the mean postoperative hospital stay was (9±1.2) days, largely owing to the required 5-12 days' bed rest. During a mean follow-up of (24±4.2) months(ranging 3 to 70 months), 3 patients had paresthesia, 5 had constant and recurrent ache, 20 were completely free of pain, and 4 had micro-hematuria. One patient had further episodes of pyelonephritis and upper tract obstruction after operation. Intravenous pyelogram(IVP) revealed that the ptosis incorporated into more than one vertebral body in 2 patients. Postoperative renal function test showed an improvement in renal function. **Conclusion**: RLN is mini-invasive and has less complication. The procedure should be considered as one of the optimal therapy for nephroptosis.

[**KEY WORDS**] nephroptosis; nephropexy; laparoscopic surgical procedures

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Nephroptosis is first described by de Pedemontanus early in the fourteenth century [1]. Nephroptosis was recognized as a clinical entity in the middle of the nineteenth century. Martin proposed in 1878 that nephrectomy was the therapy of choice for symptomatic nephroptosis[2]. Hahn performed the first nephropexy as an organ-preserving therapy in 1881[3]. During the past 100 years, numerous procedures for symptomatic nephroptosis were introduced clinically, including various pexy procedures, decapsulation of the kidney, and fixation of the kidney to the 12th rib[4]. New therapeutic alternatives, such as minimally invasive approach and nephropexy, were first published in 1993 by Urban *et al*[5]. Although scattered reports about retroperitoneal laparoscopic nephropexy (RLN) could be found during the past decade, but to date there are only few long-term follow-up studies after RLN.

From August 2001 to June 2006, we performed RLN on 28 female patients with symptomatic nephroptosis in our hospital. This article presents our experience on RLN, detailing in the indication, technique and efficacy.

1 MATERIALS AND METHODS

1.1 Patients From August 2001 to June 2006, 28 women aged 26 to 45 years old (mean, 34±2.5) with symptomatic nephroptosis underwent RLN. Sixteen patients were from Changzheng Hospital and 12 from the 10th People's Hospital of Shanghai. The mean body weight was (50±3) kg, ranging 44-58 kg; the average height of patients was 162±4 cm, ranging 156-170 cm. Preoperational examination included a thorough medical checkup

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with verification of symptoms, an intravenous pyelogram (IVP, see Tab 1) when the position was changed from supine to erect, and an isotopic renogram in a sitting position. Fifteen patients had their right kidney involved, 12 had the left kidney involved and 1 with both involved.

Tab 1　Preoperative, postoperative and follow-up intravenous pyelogram in standing position

(*n*)

Degree of renal descent	Pre-operative	Post-operative	24±4.2 months follow-up
None	0	22	18
Maximum 1 vertebral body	10	6	8
Maximum 1.5 vertebral bodies	14	0	2
>2 vertebral bodies	4	0	0

To understand the preoperational complaints of patients, a differentiation was made between subjective (pain) and objective (pyelonephritis, upper tract obstruction, hematuria and reduced renal function) complaints as following:

(1)Subjective symptoms-pain (Tab 2): A differentiation was made between constant and recurring pain and occasional complaints (feeling of pressure), whereby all patients showed symptoms of pain.

Tab 2　Subjective preoperative, postoperative and follow-up complaints

(*n*)

Pain	Preoperative	Postoperative	(24±4.2) months follow-up
Constant	27	3	4
Recurring	1	0	1
Paresthesia	0	2	3
None	0	24	20

(2)Objective symptoms-upper urinary tract infections, upper tract obstruction, hematuria (Tab 3): There were 57.14% of the patients reported past episodes of pyelonephritis, 25% showed upper tract obstruction, and 42.86% had hematuria.

(3)Objective symptoms-decreased renal function: Twenty-eight patients underwent preoperative isotopic examination of the kidney and showed an average decrease of 50% in renal function when performed in a sitting position.

Tab 3　Objective preoperative, postoperative and follow-up complaints

(*n*)

Symptom	Preoperative	Postoperative	24±4.2 months follow-up
Pyelonephritis	16	0	1
Upper tract obstruction	12	0	1
Hematuria	12	2	4

1.2　Surgical technique　One patient underwent nephropexy *via* the transperitoneal approach and the others underwent nephropexy *via* the retroperitoneal approach. This article focuses on the retroperitoneoscopic procedure.

A retroperitoneoscopic procedure was performed in the flank position. Digital preparation of the retroperitoneal space was made and standardized trocar was placed. The key step of the surgery was the complete exposure of the kidney within Gerota' fascia, with the goal of separating potential adhesions between the colon and kidney or between the inferior blood vessels of the kidney. To encourage postoperative adhesions, capsule on the posterior surface of the kidney was fulgurated with a ball electrode over a 2 cm width in the polar region. Electric fulguration should be done to keep the ball electrode away from the renal capsule to avoid damage of the underlying renal cortex.

We used the percutaneous needle for both introduction and removal of the suture in 2 patients, and tied the sutures separately over the sacrospinalis fascia. The steps of the procedure were as follows:

(1)Percutaneous insertion of the suture: A 1-0 atraumatic catgut with a round body needle were straightened to form a ski curve and was passed through the eye of a percutaneous introduction needle, and were pulled through till about 10 cm of the needle end was left. A stab incision about two centimeters was made from medial to the outer border of the sacrospinalis muscle below the pleural reflection. The loaded percutaneous needle was pushed into the retroperitoneal space through the stab incision, piercing the sacrospinalis fascia a

centimeter laterally by moving the overlying skin. The atraumatic needle was managed with a needle holder through the anterior iliac port and, thereafter, the percutaneous needle was pulled out.

(2)The first renal capsular stitch: A spiral suture was placed through the renal capsule on the posterior surface of the middle of the kidney. The catgut should be controlled within a length just enough to go through the kidney to avoid entangling in the loop of the spiral suture. Once the bites had been taken, the suture was controlled within a length enough to remove it through the posterior abdominal wall.

(3)Percutanueous removal of the needle: The percutaneous needle loaded with a suture, preferably of a different color, was pushed into the retroperitoneal space through the same skin puncture site, but piercing the sacrospinalis fascia a centimeter medially by moving the skin in the other direction; the atraumatic needle was pulled out by withdrawing the latter. The needle end of the suture passed through the same stab incision, but it went through different routes in the muscle and the overlying fascia.

(4)The second renal capsular stitch: It was placed in a similar way through the capsule on the posterior surface of the lower pole of the kidney. The suture was passed and taken out through another stab incision in the skin about 4 cm inferiorly. To avoid criss-crossing of the sutures, the first sutures was loosened and placed above the superior pole of the kidney while the second spiral suture was taken.

(5)Fixation of the kidney: The retroperitoneal space was finally inspected for bleeding and tissue debris. The sutures were now gently pulled up to make sure that the kidney was lifted up approximate to the back muscle. The gas was stopped and the retroperitoneal space was slowly decompressed as the surgeon pulled up the sutures; the ports were removed. The assistant held the kidney by a steady manual pressure over the abdomen, as the surgeon tied the two suspension sutures over the sacrospinalis fascia to fix the kidney to the muscle of the posterior abdominal wall.

In the other 26 patients, nephropexy was performed between the fibrous capsule of the lower pole of the kidney; and the psoas muscle was dissected using two or three sutures placed by intracorporeal technique.

2 RESULTS

RLN was successful in all patients. The mean operative time was (125±9) min, ranging 115-240 min; the mean postoperative hospital stay was (9±1.2) days, largely owing to the required 5 to 12 days' bed rest.

During a mean follow-up of (24 ± 4.2) months, ranging 3 to 70 months, 3 patients had paresthesia, 5 had constant and recurrent ache, 20 were completely free of pain, and 4 had micro-hematuria. One patient had further episodes of pyelonephritis and upper tract obstruction after operation. IVP revealed that the ptosis incorporated into more than one vertebral body in 2 patients.

3 DISCUSSION

More than two hundred nephropexies have been reported over the past years using various minimally invasive techniques. However, most of them were performed by the percutaneous technique, where a nephrostomy tube is left for about two weeks to prevent adhesion between the kidney and the abdominal wall. Compared to the retroperitoneal endoscopic technique, percutaneous technique is simple but slightly more invasive. The lateral borders of the kidneys were sutured to the fascia of the posterior abdominal wall laparoscopically. Hübner *et al*[6] used a polyglactin net to fix the kidney to the fascia of the posterior abdominal wall in 10 women by the transperitoneal laparoscopic technique and obtained satisfactory long-term outcomes. Rassweiler *et al*[7] and Ichikawa *et al*[8] also successfully performed retroperitoneal laparoscopic nephropexy in a patient and obtained good results.

We found RLN is more suitable for nephroptosis than transperitoneal laparoscopic technique. The most important step in our surgical procedure is the complete exposure of the kidney within Gerota' fascia, with the goal of separating potential ad-

hesions between the colon and kidney or between the inferior blood vessels of the kidney. Nephropexy was performed between the fibrous capsule at the lower kidney pole and the dissected psoas muscle, using three sutures placed by intracorporeal technique or the percutaneous needle for both introduction and removal of the suture; the sutures were separately tied over the sacrospinalis fascia. The former technique is simple and effective. Chekulaev *et al*[9] reported that they used three-trocar technique for bilateral laparoscopic nephropexy *via* the transperitoneal approach, which we also thought possible.

After surgery, 85.71% of the patients (24/28) were completely free of pain. None of the patients complained of postoperative recurring retention disorders or recurring pyelonephritic episodes.

Nephropexy, as a therapy for symptomatic nephroptosis, is one of the oldest surgeries performed on the kidney. Nevertheless, debate continues over the indications, justifiability and necessity of this procedure. An absolute prerequisite for selecting patients is the combination of nephroptosis with sustained subjective pain and objective signs, such as reduced renal function, upper urinary tract infections, or retention disorders of the kidney. Urinalysis, IVP and isotopic renogram are imperative for a reliable assessment of the indications for surgery. The indication for a laparoscopic nephropexy in our study was a renal descent of at least two vertebral bodies and the presence of two objective symptoms or one objective plus one subjective symptom. We should strictly abide by the indications of the technique. Laparoscopic nephropexy is indicated in a patient with symptomatic nephroptosis and meets all the following condition: (1) The patient has pain in a standing posture but gets relief when lying down. (2) The renal scan shows a significant decrease in the renal perfusion in the standing posture. (3) The patient has been examined by an orthopaedic surgeon, a neurophysician and a psychiatrist to rule out any other factors responsible for the lumbar pain. (4) With severe hematuria, such as anaemia.

What are the contraindications? We suggest that RLN is nonsuitable for patients with former operation failures, no matter receiving the open surgery, or laparoscopic surgery. Recurrence due to non-operative factors happened in a very few patients, and we define this situation as habitual or refractory nephroptosis. Recently, Hubner[10] reported their experience on laparoscopic nephropexy using tension-free vaginal tape for symptomatic nephroptosis and obtained a good result; the disadvantages of the method was high costs. But we think that Hubner's method is a great improvement in nephropexy, especially for the recurrence patients.

Another issue concerning laparoscopic or open technique is the lack of long-term follow up study of both techniques. Plas[11] published their long-term outcomes after laparoscopic fixation of the kidney with an alloplastic mesh graft in 2001. A total of 17 patients with a minimum follow up of 5 years participated in the long-term outcome study. No complications were noted except for 1 symptomatic recurrence 3 months after the initial operation that required open surgical fixation. Eleven patients were completely satisfied with their long-term outcomes and 2 were moderately satisfied. Twelve patients needed to undergo the procedure again, including 2 with persistent slight flank pain. One patient was inconsistent in regard to whether she would undergo the procedure again. Short-term and long-term results proved that the efficacy of alloplastic mesh graft as minimally invasive therapy had high successful rate. McDouqall[12] reported their long-term follow-up result of patients undergoing laparoscopic nephropexy. The average follow-up time for the 14 patients was 3.3 years, with an average improvement rate of the pain being 80%, ranging 56%-100%.

In our inchoate research[13], we obtained a good clinical outcome. There was recurrence of the clinical symptoms during a mean postoperative follow-up of (24 ± 4.2) months, ranging 3 to 70 months: 3 patients had paresthesia, 5 had constant and recurrent ache, 20 was completely free of pain, and 4 had micro-hematuria. One patient had further episodes of pyelonephritis and upper tract ob-

struction after operation. IVP revealed that ptosis incorporated into more than one vertebral body in 2 patients. Although there were recurrence of the clinical symptoms, the general therapeutic effects are satisfactory.

Other issue is the required time of bed rest. Guar[14] reported that their patients were discharged from the hospital 1-4 days after operation and resumed non-strenuous activity after two weeks; and there was no recurrence within a follow up of 12 months. We suggested an average bed rest of 7 days for patients after operation.

4 SUMMARY

RLN is a minimally invasive therapy with less postoperative complications; and it should be considered as the optimal therapy for nephroptosis.

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后腹腔镜下肾固定术(附 28 例报告)

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[摘要] **目的**:探讨后腹腔镜下肾固定术的手术方法和疗效。**方法**:采用后腹腔镜下手术治疗肾下垂 28 例。28 例患者均为女性。年龄 26~45 岁,平均(34±2.5)岁。右侧 15 例,左侧 12 例,双侧 1 例。术前症状:腰区酸胀 27 例,腰区明显疼痛 1 例,频发尿路感染 16 例,血尿 12 例,其中肉眼血尿 8 例,镜下血尿 4 例。肾图显示患侧呈梗阻性表现 12 例。静脉肾盂造影提示肾下垂Ⅱ度 10 例,Ⅲ度 14 例,Ⅳ度 4 例。患侧轻度肾积水 7 例。1 例双侧肾下垂采用经腹途径,其余 27 例均采用后腹腔途径。经后腹腔镜完整游离患侧肾脏,其中 8 例钳夹牵拉的肾下极血管。26 例将下垂游离肾脏用腔镜内缝合技术固定于腰大肌,2 例用外打结方法固定于患侧腰区皮下。**结果**:28 例手术均获得成功。平均手术时间(125±9) min,平均住院时间(8±1.2) d,平均卧床时间(7±1.3) d。术后复查静脉肾盂造影提示患侧肾脏位于正常位置。27 例腰区酸胀患者中 24 例症状消失,3 例改善;1 例腰区疼痛患者症状消失;16 例频发尿路感染患者症状均消失;12 例血尿患者中有 10 例症状消失。平均随访(24±4.2)个月,有一定的复发症状,包括血尿复发 2 例,1 例复发尿路感染,4 例复发患侧腰区酸胀。**结论**:后腹腔镜手术具有创伤小、疼痛轻、康复快等优点,有望成为理想的肾下垂手术方法之一。

[关键词] 肾下垂;肾固定术;腹腔镜外科手术
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