

Dismembered Laparoscopic Pyeloplasty: An Analysis of 24 cases

Pieloplastia Laparoscópica Desmembrada: Uma Análise de 24 casos

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ABSTRACT

Introduction: The first open pyeloplasty was performed by Kuster in 1891. For many decades open pyeloplasty was considered the treatment of choice for stenosis of the PUJ. Anterograde or retrograde endoscopic incisions emerged as alternative treatments with success rates ranging from 70% to 89%. In 1993 Shussler and Gune performed the first laparoscopic dismembered pyeloplasty, and since then success rates have been comparable to those of the open technique, but with less morbidity. **Objectives:** A review of patients undergoing laparoscopic pyeloplasty by the Anderson-Hynes technique at the federal Lagoa Hospital, Rio de Janeiro, Brazil. **Materials and Methods:** Between June 2008 and July 2011, twenty-four patients with PUJ stenosis underwent laparoscopic dismembered pyeloplasty at our institution. The diagnosis of PUJ stenosis was determined by history, clinical examination and imaging studies (CT, IVP or renal scintigraphy). Laparoscopic dismembered pyeloplasty was performed by the transperitoneal Anderson Hynes technique using the three trocars. Sometimes a fourth trocar in the posterior axillary line was needed to retract the colon. **Results:** A total of 24 patients underwent laparoscopic pyeloplasty in the three year timeframe. Of these, 8 (33%) were men and 16 (67%) were women. The patients' ages ranged from 13 to 67 years with an average of 35 years. Stenosis presented to the right side in 15 (60%) patients, left in 8 (32%) and bilateral in one (8%) patients (thus 25 procedures). An anomalous vessel was identified in 10 patients, and two others had kidney stones. The mean operative time was 245 minutes and the mean hospital stay was five days. Postoperatively three patients had double-J catheter migration into the ureter and two patients had urine leakage into the perirenal bed with urinoma formation, and in one of these it was necessary to perform a small lumbotomy to drain the collection. Two (8%) patients had recurrence of ureteropelvic junction obstruction. The mean follow-up was 4.5 months, ranging from 3 to 6 months. The clinical success rate – confirmed radiographically – was 92%, with only two patients showing unsatisfactory results during follow-up. **Conclusions:** Our approach for transperitoneal laparoscopic Anderson-Hynes technique showed results similar to those in literature, with low complication rates. We had technical difficulties during the antegrade placement of double-J catheter and malposition (migration of catheters into the ureter), which led us to change our approach, positioning them by cystoscopy. After this change, we had no more cases of poorly positioned double J catheters in the postoperative period.

Key words: Pyeloplasty. Laparoscopic pyeloplasty. Ureteropelvic junction obstruction.

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INTRODUCTION

The pyeloureteral junction (PUJ) is an anatomical and functional region that regulates the flow of urine from the renal pelvis into the ureter. Stenosis of the PUJ can impair renal function. Most PUJ lesions are congenital defects, but clinical manifestations may not arise before adulthood.

The first open dismembered pyeloplasty – a procedure in which the renal pelvis is completely sectioned to remove redundancy and an anastomosis then constructed – was performed by Kuster in 1891. In 1949, Anderson and Hynes modified Kuster's technique, establishing the standard for dismembered pyeloplasty. For many decades, open pyeloplasty has been considered the principal treatment for stenosis

Study carried out at the Urology Service of the Federal Hospital da Lagoa. Rio de Janeiro, RJ, Brazil.

of the PUJ in children and adults, with success rates of 90% to 100% (1).

Technological advances and the modernization of urological surgery instruments have fostered the emergence of endourologic procedures and, more recently, laparoscopic procedures for the treatment of PUJ stenosis.

Endourologic incisions – antegrade by percutaneous access or retrograde through the urinary tract – have emerged as alternative treatments, although they have success rates ranging between 70% and 89%, even in selected patients (2).

In 1993 Schussler and Gune performed the first laparoscopic pyeloplasty using the Anderson-Hynes dismembered technique. Besides being a minimally invasive procedure, success rates have been comparable to the open technique, with less morbidity and shorter hospital stays.(3,4)

OBJECTIVE

The objective of this study is the retrospective analysis of patients who underwent laparoscopic pyeloplasty with regard to patient characteristics; laterality of the obstruction; type of stenosis; presence of lithiasis or vessel anomaly; operative time; length of hospital stay; duration of drainage and of bladder and double-J catheters; intraoperative complications; conversion rate; and postoperative results.

MATERIALS AND METHODS

Between June 2008 and July 2011, twenty-four patients with primary or secondary stenosis of the ureteropelvic junction (PUJ) underwent laparoscopic pyeloplasty using the Anderson-Hynes technique at the Urology Service of the federal Hospital da Lagoa in Rio de Janeiro.

The diagnosis of stenosis of the PUJ was determined by history, physical examination and imaging studies, such as urinary tract ultrasonography (Figure 1), intravenous urography and renal scintigraphy. Computed tomography of the abdomen and pelvis with contrast was restricted to patients suspected of having an anomalous vessel.

The patients underwent routine preoperative tests and were hospitalized the day of the procedure. They received intravenous hydration, were started on a residue-free liquid diet, and were asked to fast for eight hours prior to the procedure.

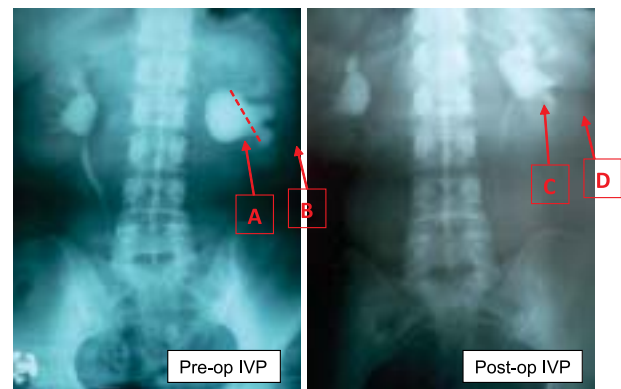


Figure 1 - Preoperative excretory urography (Pre-op IVP) showing bulging of the renal pelvis and the contrast not progressing satisfactorily 15 minutes after injection of intravenous contrast medium (arrow A) and bulging/concavity of the renal calices (arrow B). In the postoperative excretory urography (Post-op IVP) of the same patient, there is a flattened renal pelvis (reflecting surgical removal of the excess) and contrast passing into the ureter without difficulty 15 minutes after injection of intravenous contrast medium (arrow C) and regression of bulging, returning the calices to their usual shapes (arrow D).

All patients received prophylactic antibiotics with 1 gram of intravenous cephalothin upon induction of anesthesia. Patients received general anesthesia via endotracheal intubation.

The Anderson-Hynes laparoscopic transperitoneal dismembered pyeloplasty was the technique used by our service.

Although the double-J catheter was passed antegrade during surgery in most patients, we now consider that retrograde implantation of the catheter guided by fluoroscopy as safer and easier to position.

After positioning the patient (Figure 2), antisepsis and placement of sterile drapes, the surgical procedure was started.



Figure 2 – Positioning the patient on the operative table in left lateral decubitus.

● 10 mm Trocar. ■ 5 mm Trocar.

First a skin incision is made above the umbilicus or lateral to it, para-rectal external, depending on the biotype of the patient, followed by the opening of the aponeurosis, dissection of the muscle, opening of the peritoneum, and introduction of the first 10 mm trocar, under direct vision. Next the pneumoperitoneum is established with insufflation with carbon dioxide at a pressure of 12 to 15 mmHg. Once the abdomen was distended, the cavity is explored and two more trocars are introduced by puncture and guided under endoscopic vision along the line of the para-rectus externa, a 10 mm trocar below the costal margin and a 5 mm trocar near the iliac crest. Sometimes on the right side a fourth trocar at the height of xiphoid process is needed so the liver can be retracted.

After the actual surgery a suction drain is placed in the perirenal bed until the 24 hour output is less than 50 ml. The diet was introduced the morning after surgery.

RESULTS

Between June 2008 and July 2011, twenty-four patients underwent laparoscopic transperitoneal pyeloplasty using the Anderson-Hynes technique for pyeloureteral obstruction of various etiologies.

Eight patients were men and 16 were women. The patients' ages ranged from 13 to 67 years with a mean of 35 years. The stenosis was on the right in 15 patients, on the left in eight, and bilateral in one case, thus requiring a total of 25 procedures.

In ten patients an anomalous vessel was identified anteriorly crossing the uteropelvic junction. Two patients had concomitant lithiasis; the calculi were extracted at the time of pyeloplasty.

The average time in the operating room was 245 minutes and the mean hospital stay was five days.

There was no significant bleeding during the procedures and there was no injury of adjacent organs. Surgical conversion was necessary in one patient due to the presence of an intense inflammatory process,

which made it impossible to suture the renal pelvis laparoscopically.

The bladder catheter was removed 24 hours after surgery and the double J catheter was removed, on average, nine weeks later. After its removal, all patients underwent ultrasonography of the kidneys and urinary tract or excretory urography at least 90 days after the surgery.

Postoperatively three patients experienced migration of the double-J catheter, requiring ureteroscopic intervention, and two patients had leakage of urine with the formation of a perinephric urinoma (Table 1). In one case the process resolved spontaneously; the other required a small lumbar incision to drain the collection. Two patients (8%) had recurrence of the ureteropelvic junction obstruction after surgery.

Results were evaluated after 90 days of postoperative follow-up in our outpatient clinic. Results were considered positive if the patients experienced had improvement in their symptoms, imaging studies demonstrating rapid emptying of the collecting system in question, or improvement of renal function.

The mean follow-up was 4.5 months. The clinical-radiological success rate was 92% with only two patients not demonstrating improvement during follow-up.

DISCUSSION

For years open pyeloplasty was considered the standard treatment for PUJ stenosis, with success rates of 90% to 100%. The morbidity associated with open procedures stimulated the development of minimally invasive techniques that sought to shorten time needed for recuperation, while reproducing the success rates of the prior technique (1).

Endoscopic treatment – using a retrograde or anterograde incision of the PUJ stenosis – is a therapeutic alternative. The success rate can be 10% to 30% lower compared to standard treatment, especially in those cases already involving hydronephrosis, renal insufficiency, a stenosis

Table 1 – *Complications.*

Complication	Frequency	%
Migration of the duplo J catheter	3	12
Urinoma	2	8

exceeding 2 cm, or an anomalous vessel.(5-6) The main complication of these techniques is the risk of vascular injury. The rate of anomalous vessels crossing the PUJ anteriorly ou posteriorly can reach 72.2%. These anomalous vessels can be injured during the procedure resulting in bleeding (7,8). Meretyk et al reported bleeding requiring transfusion in 9% and 16% of cases of antegrade and retrograde endopyelotomy respectively, and the formation of arteriovenous fistulas in 4% of patients who underwent antegrade surgery(9).

Laparoscopic pyeloplasty has quickly become a popular therapeutic option for the correction of PUJ stenosis due to its low morbidity and mortality, allowing the surgeon to reproduce open surgery with success rates ranging from 88% to 98%.(2) In 1993 Schussler and Gune performed the first laparoscopic pyeloplasty using the Anderson-Hynes dismembered technique.

Open pyeloplasty has been considered the standard treatment for PUJ stenosis for many years, with success rates of 90% to 100%. The morbidity associated with open procedures contributed to the development of minimally invasive techniques that were designed to hasten the patient's recovery, while maintaining the success rates of the prior technique.(1)

Two approaches – retroperitoneal and transperitoneal – can be used; the approach chosen usually reflects the surgeon's experience. Some urologists, however, favor the transperitoneal technique arguing that it more closely simulates anatomically the open procedure (10).

Soulie et al. reported the results of a multi-institutional study involving 55 laparoscopic pyeloplasties using the retroperitoneal approach. The conversion rate was 5.4%, the mean operative time was 185 minutes, and the complication rate was 12.7% (11).

The transperitoneal approach has been used in most cases. Recently, Jarrett et al published the

results of first 100 pyeloplasty cases performed by his group using the transperitoneal approach. The mean operative time was 4.2 hours and the average blood loss was 181 ml. The mean hospital length of stay was 3.3 days. Complications occurred in 13 patients and two patients required blood transfusions. The success rate was 96% (12).

Our laparoscopic approach is transperitoneal using the Anderson-Hynes technique; it reproduces aspects of the standard open technique, with results similar to those in the literature.

According to some authors, the incidence of anomalous vessels can reach 72.5%. In our cohort, we found anomalous vessels crossing the anterior surface of the PUJ in nine (37.5%) patients.

The greatest difficulties associated with laparoscopic pyeloplasty were the long operative time and the necessity of having mastered the skill of intracavity suturing.

CONCLUSIONS

Laparoscopic pyeloplasty is a technically difficult procedure that has a learning curve of about 50 cases.

Our laparoscopic approach is initially transperitoneal, using the Anderson-Hynes technique, with results similar to those in the literature, even with a lower curve than recommended

We experienced greater technical difficulty with antegrade progression of the double-J catheter and with malposition (migration of the bladder end of the catheter into the ureter in three cases), which led us to change our approach, instead placing it cystoscopically (retrograde). Once we made this change, there were no further instances of postoperative double J catheter malposition.

RESUMO

Introdução: A primeira pieloplastia aberta desmembrada foi realizada por Kuster em 1891. Durante muitas décadas, a pieloplastia aberta foi considerada o tratamento de escolha para estenose da JUP. Incisões endoscópicas, anterógradas ou retrógradas surgiram como tratamentos alternativos, com taxas de sucesso entre 70-89%. Em 1993 Shussler e Gune realizaram a primeira pieloplastia laparoscópica pela técnica desmembrada e desde então, esta tem demonstrado taxas de êxito semelhantes aos da técnica aberta, porém com menor morbidade. **Objetivo:** Revisão dos pacientes submetidos à pieloplastia laparoscópica pela técnica de Anderson-Hynes, no Hospital Federal da Lagoa – Rio de Janeiro. **Materiais e Métodos:** Entre junho de 2008 e julho de 2011, vinte e quatro pacientes com diagnóstico de estenose de JUP, foram submetidos a pieloplastia laparoscópica desmembrada em nossa instituição. O diagnóstico de estenose de JUP foi determinado por anamnese, exame clínico e exames de imagem (TC, UGE ou cintilografia renal). A pieloplastia laparoscópica desmembrada transperitoneal pela técnica de Anderson Hynes com colocação de

três trocartes foi a utilizada em nosso serviço. Às vezes era necessário outro trocarce na linha axilar posterior para afastamento do cólon. **Resultados:** Um total de 24 pacientes foi submetido à pieloplastia laparoscópica no período em questão. Desses, 8 (33%) eram homens e 16 (67%) mulheres. A idade dos pacientes variou de 13 a 67 anos com média de 35 anos. A estenose apresentava-se à direita em 15 (60%) pacientes, à esquerda em 8 (32%) e bilateralmente em apenas 01 (8%) paciente, totalizando 25 casos. Vaso anômalo anteriormente a JUP foi identificado em 10 pacientes e 02 outros apresentavam doença litíásica concomitante. O tempo médio de cirurgia foi de 245 minutos e o período médio de internação hospitalar foi de 05 dias. No pós-operatório, três pacientes apresentaram migração da extremidade do cateter duplo J para dentro do ureter, e dois pacientes apresentaram extravasamento de urina com formação de urinoma perirenal sendo que em um delse foi necessário a realização de uma pequena lombotomia para drenagem da coleção. Dois (8%) pacientes apresentaram recorrência da obstrução da junção ureteropélvica após a cirurgia. O tempo de seguimento médio foi de 4,5 meses, variando de 3 a 6 meses. A taxa de sucesso clínico radiológico foi de 92%, com apenas 2 pacientes não apresentando bons resultados durante o seguimento. **Conclusão:** Nossa abordagem laparoscópica transperitoneal pela técnica de Anderson-Hynes apresentou resultados semelhantes aos da literatura, com baixas taxas de complicações. Detectamos uma maior dificuldade técnica de colocação do cateter duplo J de forma anterógrada e com posicionamento inadequado (migração da extremidade vesical do cateter para dentro do ureter), o que nos levou a mudar nossa abordagem, passando a aplicar este por via cistoscópica. Após esta mudança, não tivemos mais casos de mal posicionamento do cateter duplo J no pós-operatório.

Palavras Chave: Pieloplastia. Laparoscopia. Obstrução ureteral. Obstrução da junção ureteropélvica.

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