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CASE REPORT

Case Report: Complex ureteral stenosis treated with ileal substitution [version 1; peer review: 1 approved with reservations]

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V1 First published: 05 Mar 2018, 7:273
<https://doi.org/10.12688/f1000research.13122.1>

Latest published: 05 Mar 2018, 7:273
<https://doi.org/10.12688/f1000research.13122.1>

Abstract

Ileal substitution of the ureter is a complex procedure, considered a surgery of the last resort in ureteral repair and is useful in the presence of an extensive ureteral stricture. It is indicated in cases of long or multiple ureteral stenosis.

There are few large studies in the literature reporting the outcome of this procedure. We present a case report of a patient with long ureteral stenosis surgically treated with ileal substitution of the right ureter, with an isoperistaltic ileal segment of 22 cm, with no detubularization. The patient had no perioperative complications and presented normal renal function. Currently, after 20 months of follow-up, the patient is asymptomatic, presents no urinary infections, no relapse of stenosis and has preserved renal function.

In conclusion, ileal substitution of the ureter is a surgical technique that should be considered in cases of long, proximal or multiple ureteral stenosis, when there is no other surgical option.

Keywords

Ureteral stenosis, Ileal ureteral substitution, Bowel ureteral replacement, reconstructive urology.

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Approval Status ?

1

version 1

05 Mar 2018

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Author roles: **Catarino R:** Investigation, Writing – Original Draft Preparation; **Cardoso A:** Conceptualization, Methodology, Supervision, Writing – Review & Editing; **Ferreira C:** Conceptualization, Methodology; **Correia T:** Methodology, Validation; **Cerqueira M:** Formal Analysis, Supervision; **Carmo Reis F:** Supervision, Writing – Review & Editing; **Prisco R:** Supervision, Writing – Review & Editing

Competing interests: No competing interests were disclosed.

Grant information: The author(s) declared that no grants were involved in supporting this work.

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How to cite this article: Catarino R, Cardoso A, Ferreira C *et al.* **Case Report: Complex ureteral stenosis treated with ileal substitution [version 1; peer review: 1 approved with reservations]** F1000Research 2018, 7:273
<https://doi.org/10.12688/f1000research.13122.1>

First published: 05 Mar 2018, 7:273 <https://doi.org/10.12688/f1000research.13122.1>

Introduction

Ureteral stenosis is associated with ischemia, iatrogenic lesions, periureteral fibrosis, malignancy, congenital factors, radiation, urinary lithiasis, infections (namely tuberculosis and schistosomiasis), and idiopathic conditions. After the diagnosis of a ureteral stricture, surgical treatment is indicated if the patient presents clinical symptoms and a functionally significant obstruction¹.

There are several options for the surgical treatment of ureteral stricture disease. Endourological interventions can be performed in short ureteral strictures and include ureteral stent placement, balloon dilation and endoureterotomy. Surgical repair options are more complex and need a careful evaluation of the nature, location and length of the stricture, in order to plan the appropriate surgical procedure. Surgical repair options include ureteroureterostomy, ureteroneocystostomy, Psoas Hitch procedure, Boari flap, downward nephropexy, transureteroureterostomy, bowel substitution and autotransplantation.

In case of long, proximal or multiple ureteral stenosis, the defect can be bridged with non-urothelial tissues, including bowel substitution¹⁻³. Ileal substitution of the ureter is a complex procedure, considered a surgery of the last resort in ureteral repair and is useful in the presence of an extensive ureteral stricture.

There are few large studies in the literature reporting the outcome of this procedure^{2,3}. We present a case report of a patient with long ureteral stenosis surgically treated with ileal substitution of the right ureter.

Case description

A woman of 43 years, with no relevant past medical history, presented lumbar pain, oliguria and bilateral peripheral oedema. She presented renal dysfunction, with serum creatinine of 6 mg/dl [normal range 0.5-1.2mg/dl] and renal echography demonstrated right ureterohydronephrosis and left renal atrophy.

The patient was submitted to ureteral stent placement with rapid improvement of renal function after one week. She removed the catheter for a CT scan after one month, which revealed circumferential thickening of the right ureter and caudally a complete obliteration of the lumen for 4 cm (Figure 1).

With ureterorenoscopy, we visualized multiple concentric ureteral stenosis, and a biopsy revealed no malignancy. Mycobacteriologic and parasitologic urine tests were negative.

Since the patient later presented acute obstructive renal dysfunction after 2 days without urinary diversion, a ureteral stent was placed, but in spite of the ureteral diversion, the patient presented further deterioration of renal function (assessed using serum creatinine levels) after one month, so a right nephrostomy was placed, with complete consequent restoration of renal function.

We proposed a curative surgical procedure, which the patient agreed to undergo 17 months after the initial diagnosis, and the patient was submitted to ileal substitution of the right ureter, with an isoperistaltic ileal segment of 22 cm, with no detubularization.

The procedure was done using a midline incision, followed by medial mobilization of the right colon, isolation of the right ureter and section of the pieloureteral junction. We performed an enterectomy of 22cm of ileum (15cm away of the ileocecal valve), followed by a terminoterminal enteral anastomosis. Next, we reflected the cecum and ascending colon superiorly and placed the ileal segment in the retroperitoneum. Finally, we checked the orientation of the ileal segment and performed the anastomoses of the intact, isoperistaltic ileal segment at the level of the renal pelvis and at the bladder (Figure 2 and Figure 3).

Figure 1. Three-dimensional reconstructed CT scan demonstrating the long ureteral stenosis.

Figure 2. Three-dimensional reconstructed CT scan performed after surgery demonstrating the ileal substitution of the ureter.

Figure 3. Cystoscopy image demonstrating the ileal ureter.

The patient was discharged from the hospital with no medication. Total hospital stay of the patient was 14 days. The patient removed the urethral catheter after 4 weeks and the nephrostomy catheter after 6 weeks.

There were no perioperative complications and renal function was unaltered, with serum creatinine of 1.2 mg/dl. Pathological study of the ureter demonstrated chronic inflammation and fibrosis, with no malignant cells.

After 20 months of follow-up, the patient is asymptomatic, presents no urinary tract infections, no relapse of stenosis and has preserved renal function. She is now medicated with oral sodium bicarbonate 6 mg per day in order to correct metabolic acidosis.

Discussion and conclusions

Ileal substitution of the ureter was described in 1959 by Goodwin and co-workers⁴. Historically, it has been applied in ureteral stenosis associated with tuberculosis infection. However, it has been used more frequently with the new onset of ureteral stenosis associated with endoscopic procedures, as well as post radiation stenosis.

Ileal substitution of the ureter is a complex procedure, considered a surgery of the last resort in ureteral repair and is useful in the presence of an extensive ureteral stricture. It is indicated in cases of long or multiple ureteral stenosis. The ileum is considered the best ureteral segment for ureteral substitution

because of its peristalsis, good vascular supply and absorptive properties.

The Yang Monti principle consists of the interposition of reconfigured bowel segments, where a small segment of bowel is isolated, detubularized and retubularized in the opposite axis, forming a longer tube. The procedure can be performed using two or more reconstructed bowel segments to obtain a longer graft. This technique has the advantage of using a shorter bowel length, leading to a smaller intestinal absorptive surface and decreased mucus production^{5,6}.

Known contraindications of bowel substitution include renal dysfunction (serum creatinine above 2 mg/dl), bladder outlet obstruction, inflammatory bowel disease and radiation enteritis^{2,3,7,8}. Common complications include ileal and anastomotic stenosis, mucus obstruction, urinary infection, renal dysfunction, metabolic acidosis and rare cases of malignancy. However, the risk of metabolic acidosis and renal dysfunction are rare in patients with no renal impairment pre-operatively^{2,3,7-9}.

There are few large studies in the literature reporting the outcome of ileal substitution of the ureter; however, the published series demonstrate very good results^{2,3,7,8}. The largest reported series, published by Armatys and co-workers², includes the study of 91 patients submitted to ileal ureter replacement, with a mean follow-up of 36 months. They reported anastomotic stricture in 3.3% of the patients and fistula in 6.6%. Serum creatinine remained stable or decreased in the majority of the patients (74%) and hyperchloremic acidosis was reported in 3.2% of the patients.

In conclusion, we present a case report of a patient with long and multiple ureteral stenosis successfully treated with ileal substitution. Ileal substitution of the ureter is a surgical technique that should be considered in cases of long, proximal or multiple ureteral stenosis, that present no other surgical option. This procedure is certainly a better alternative to a nephrectomy, permanent ureteral stenting or permanent nephrostomy tube.

Consent

Written informed consent for the publication of the patient's clinical details and images was obtained from the patient.

Competing interests

No competing interests were disclosed.

Grant information

The author(s) declared that no grants were involved in supporting this work.

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Version 1

Reviewer Report 12 March 2018

<https://doi.org/10.5256/f1000research.14234.r31508>

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This case report illustrates the use of a bowel segment to restore the urine flow from the kidney to the bladder. The authors appropriately consider that as the "last resort" option for long ureteral strictures. From the description of the case it looks like that the renal pelvis and the proximal ureter were salvageable (in fact, the anastomosis was performed to the pelvis), making the reader wonder whether alternatives such as a auto-transplantation to the iliac fossae could be implemented, avoiding the need for interposing bowel. Using 22cm of bowel was probably excessive, given the anticipated lengthening that always occurs (as illustrated in the post-operative reconstructed images from a CT). Also, the authors could include tapering of the ureter as an option to reduce the risks of urine reabsorption.

Finally, it would be interesting to know the final diagnosis of the pathology behind the ureteral stricture, to further support the therapy chosen.

Is the background of the case's history and progression described in sufficient detail?

Yes

Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?

Partly

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?

Partly

Is the case presented with sufficient detail to be useful for other practitioners?

Partly

Competing Interests: No competing interests were disclosed.

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