

# First experience with a new form of orthotopic ileal neobladder (Leuven N-Pouch) following radical cystectomy

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## ABSTRACT

Bladder cancer is the most common malignancy of the urinary tract. Radical cystectomy with pelvic lymph node dissection and a urinary diversion (UD) is the gold standard treatment of non-metastatic muscle-invasive bladder cancer (MIBC). Although ileal conduit is the standard and most commonly performed type of UD, more number of centers have recently started to perform orthotopic ileal neobladder (OIN). A novel OIN has been described in 2005 as the so-called “Leuven N-pouch”, which combines the features of the commonly used Hautmann and Studer neobladders. Herein, we report our first experience with a case of Leuven N-pouch in our department, which was performed for a male patient with MIBC.

**Keywords:** Bladder cancer; continent; ileal orthotopic neobladder; radical cystectomy; urinary diversion.

## Introduction

Bladder cancer is the most common malignancy of the urinary tract and the ninth most commonly diagnosed cancer worldwide.<sup>[1]</sup> Radical cystectomy (RC) with pelvic lymph node dissection (PLND) and urinary diversion (UD) is the standard therapy for non-metastatic muscle-invasive bladder cancer (MIBC) and high-risk non-muscle-invasive bladder cancer (NMIBC).<sup>[2]</sup> Although ileal conduit (IC) remains the standard method of UD, orthotopic ileal neobladder (OIN) has gained popularity over the last two decades.<sup>[3,4]</sup> Compared to IC with respect to avoidance of a urinary stoma, it offers a higher quality of life to patients by preserving continence and near-normal voiding function, and without compromising the treatment outcomes of cancer.<sup>[5,6]</sup> Despite the fact that different parts of the gastrointestinal tract have been historically used for neobladder creation, a detubularized segment of ileum is recommended for use at present, and the Hautmann and Studer pouches are also being commonly used.<sup>[3,4,6]</sup> In 2005, Joniau et al.<sup>[7]</sup> published the early results of their novel OIN, also known as “Leuven N-pouch.” Herein, we

present the first case of N-pouch in our department, which was performed on a male patient with MIBC.

## Case presentation

A 67-year-old male patient was admitted to our outpatient clinic in February 2017 with macroscopic hematuria since the past three weeks. A contrast-enhanced abdominopelvic computed tomography showed a papillary tumor of 3x2 cm on the left posterolateral bladder wall (Figure 1). The patient underwent a transurethral resection of bladder tumor (TUR-BT) under spinal anesthesia with an obturator block. The histopathological evaluation of the specimen showed a high-grade T1 NMIBC with a suspected muscle layer invasion in a focal region. The patient underwent a re-TUR-BT, which showed high-grade dysplasia in a small area and no tumor within the muscle layer. Simultaneously, an induction course of intravesical Bacillus Calmette-Guérin (BCG) treatment was started.

During the first cystoscopic examination at his follow-up, a disease recurrence was observed

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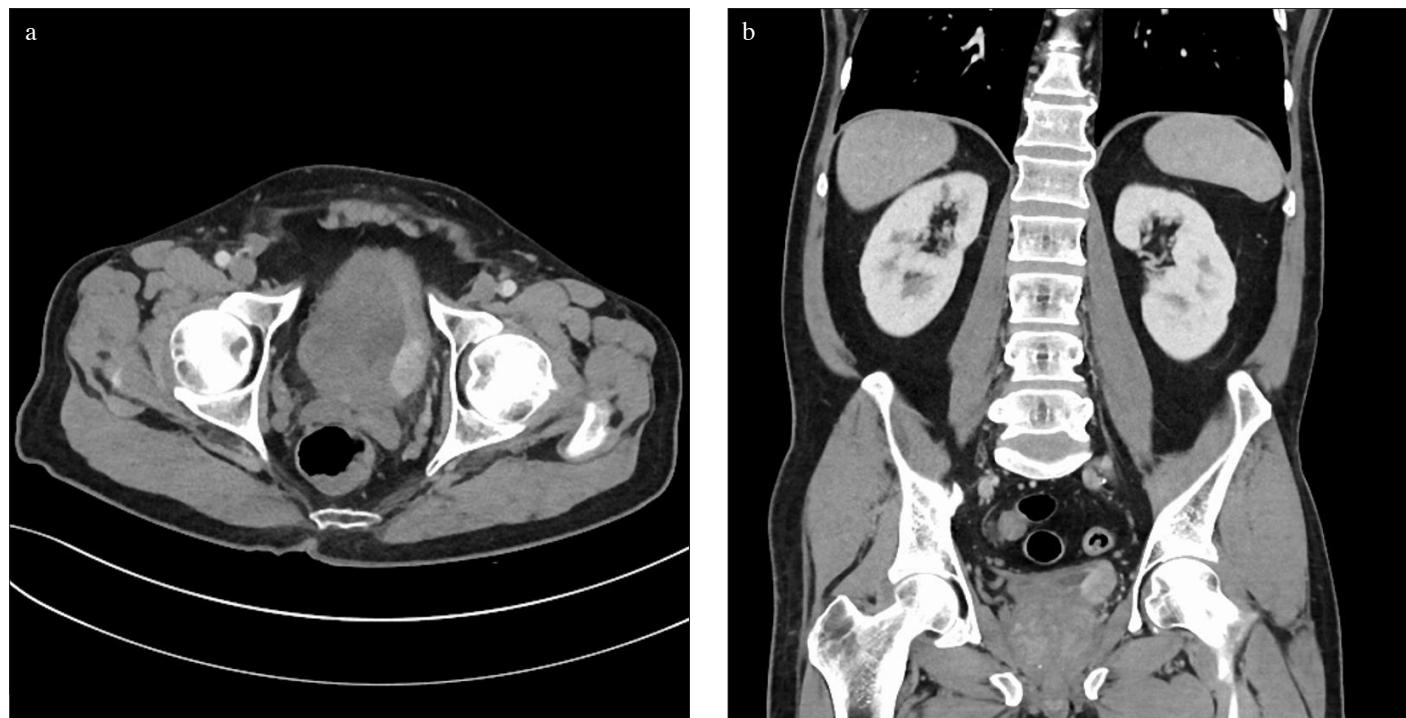


Figure 1. a, b. Computed tomography image showing the bladder tumor on the posterolateral wall. (a) Axial section. (b) Coronal section

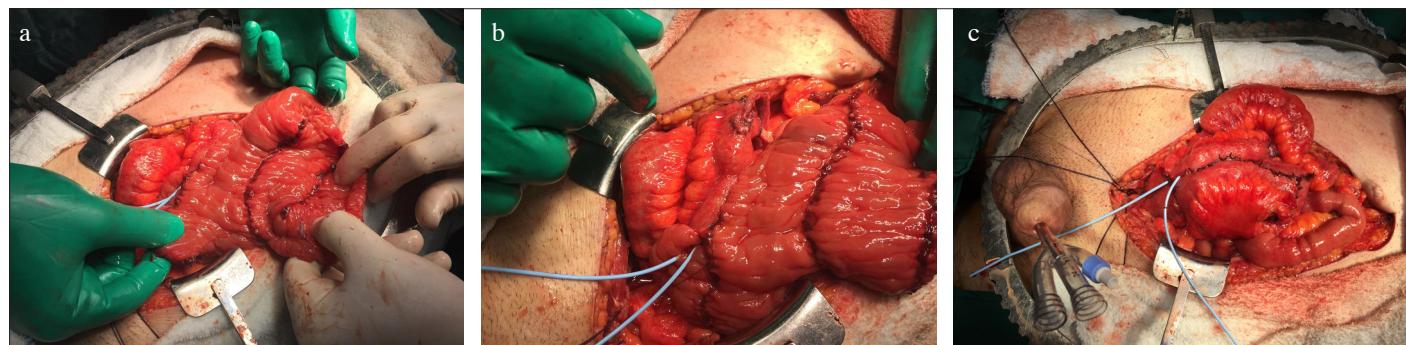


Figure 2. a-c. Intraoperative image of the Leuven N-pouch. (a) Ileal segment folded in an "N" shape and the posterior wall is formed with sutures. (b) Both ureters anastomosed onto the afferent limb in an end-to-end fashion and catheterized. (c) Completed form of the N-pouch before urethronеobladder anastomosis

with three papillary tumors on the right lateral, posterior, and left lateral bladder wall. These tumors were resected, and the histopathological examination revealed a low-grade NMIBC. Three months later, another recurrence was identified on the left lateral wall, which was confirmed to be a high-grade MIBC on histopathological evaluation. Following this, he had a full evaluation for tumor staging, in which no signs of locally advanced or metastatic disease were identified. With the diagnosis of an organ-confined MIBC, he was offered the treatment option of an RC along with an OIN. He was informed about the advantages, disadvantages, and complications of an OIN, and he agreed to

undergo the operation. In January 2018, the patient underwent an RC with an extended PLND, while a Leuven N-pouch was performed for UD according to the technique previously described (Figure 2).<sup>[7]</sup>

The total operative time was 330 minutes and the estimated blood loss was 700 mL, which was replaced with 2 units of erythrocyte suspension intraoperatively (grade 2, according to the modified Clavien-Dindo classification [CDC]). Oral intake was started on the 5<sup>th</sup> postoperative day. A wound eversion was observed on the 11<sup>th</sup> postoperative day, which was treated

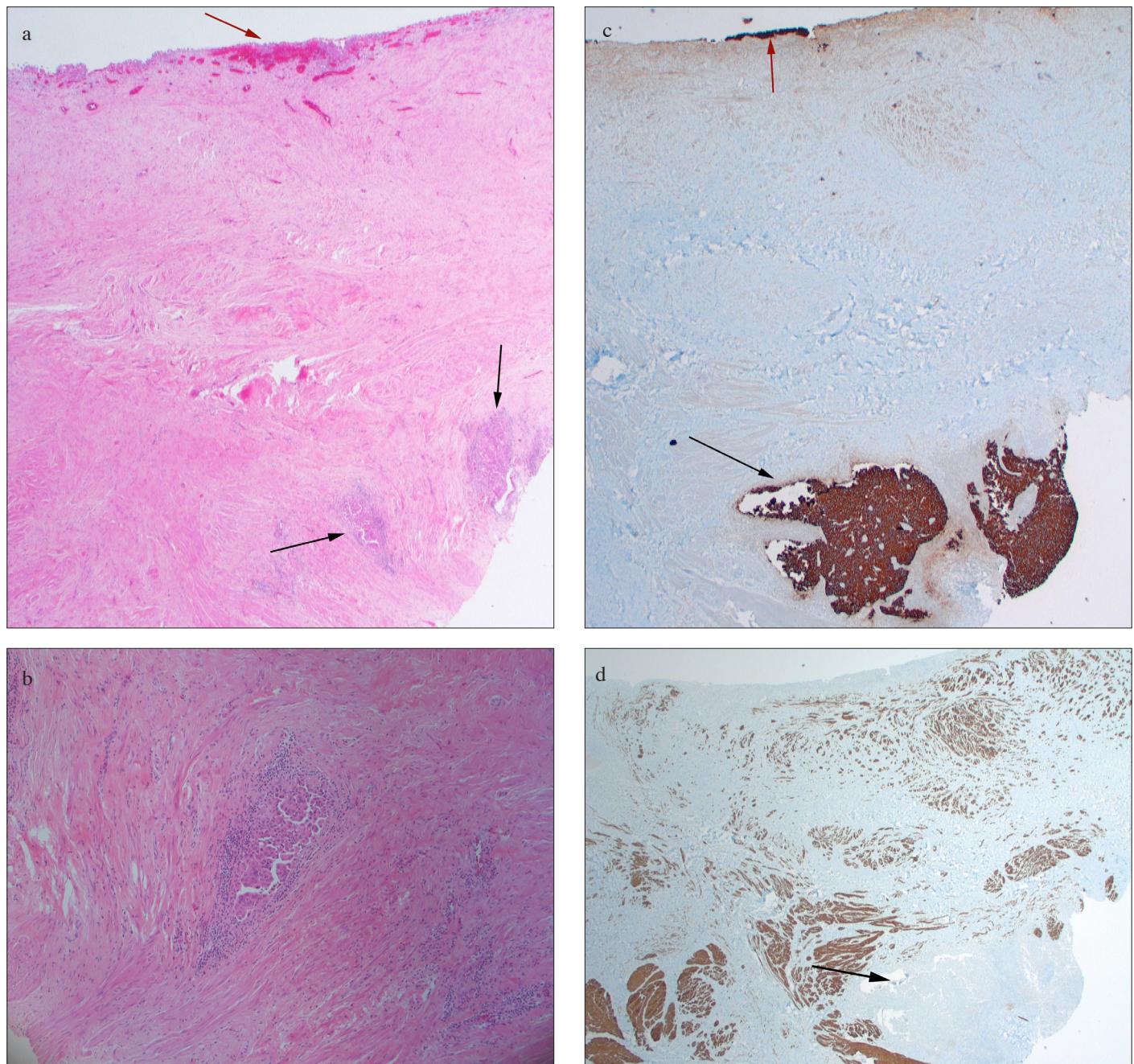


Figure 3. a-d. Pathologic evaluation of the radical cystectomy specimen. (a) Surface epithelium (red arrow) and tumor cell groups (black arrows) in between deep muscle fibers (Hematoxylin & Eosin, 25X). (b) Tumor cell groups in between deep muscle fibers (Hematoxylin & Eosin, 100X). (c) Immunohistochemical staining of surface epithelium (red arrow) and tumor cell groups (black arrow) in between deep muscle fibers (Pancytokeratin, 25X). (d) Tumor cell groups (black arrow) in between deep muscle fibers (Desmin, 25X)

with incisional wound revision (CDC grade 3b). Three days later, he was discharged with no complications in his wound.

Four weeks later, he was re-admitted to our department with loss of appetite, vague abdominal pain, fatigue, and discharge

from the wound. *Escherichia coli* and *Klebsiella pneumoniae* were identified from the discharge culture, which raised the suspicion of intestinal leakage. Therefore, the patient underwent a diagnostic laparotomy, where a tiny leakage point was found at the corner of the ileoileal anastomosis, with no complications



Figure 4. Pouchography at postoperative sixth month follow-up (bladder capacity: 430 mL)

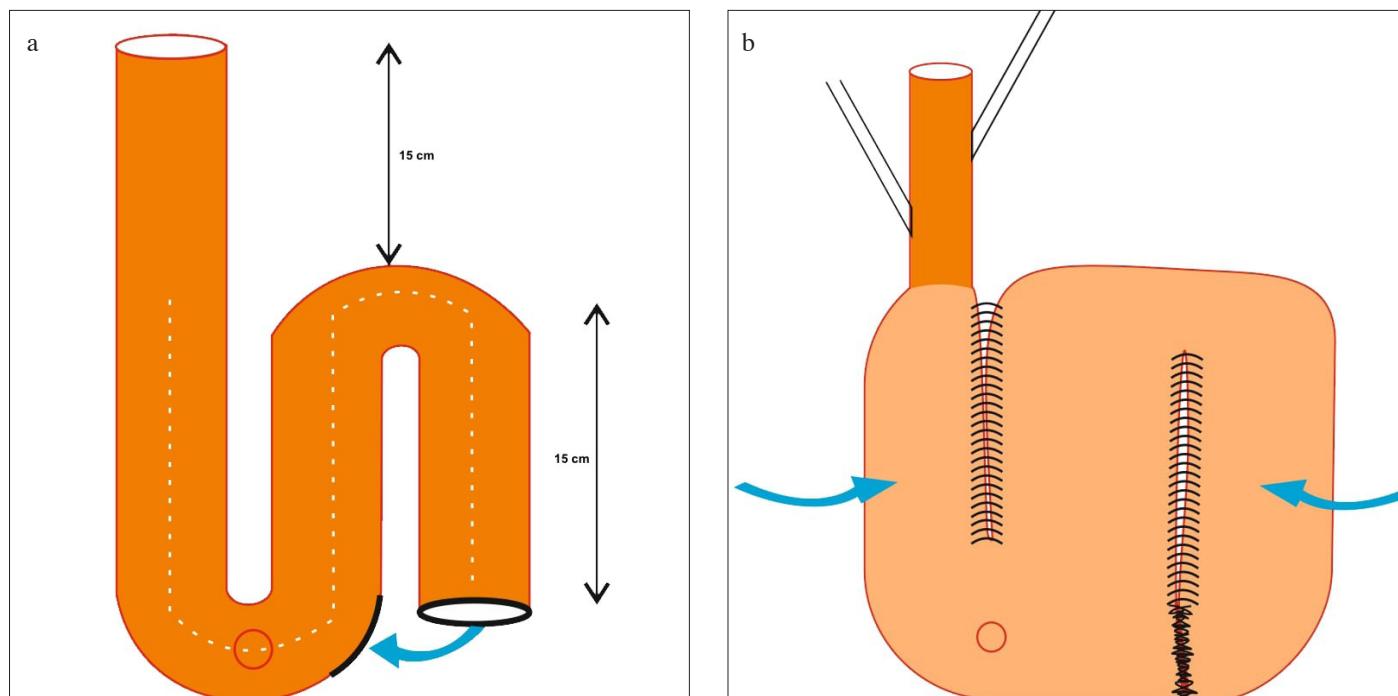


Figure 5. a, b. Schematic explanation of the Leuven N-pouch. (a) An ileal segment of 60 cm is folded in an N-shape, where the proximal part (15 cm) constitutes the isoperistaltic afferent limb and the remaining part (45 cm) is opened from the antimesenteric side (dashed white line). After opening this segment, the distal end (black color contoured) is anastomosed to the right corner of the "U"-shaped ileal segment (black color contoured). (b) The posterior wall of the pouch is formed by suturing the free edges of the N-shaped ileal segment (small black curves), and the remaining two edges are sutured to form the anterior wall (blue arrows). The red circle shows where the urethroneovesical anastomosis is performed. The ureters are anastomosed onto the afferent limb

in the N-pouch. An ileal resection with a re-anastomosis was performed (CDC grade 3b), and he was discharged uneventfully on the 8<sup>th</sup> postoperative day.

The pathological evaluation of the operation specimen did not reveal a pronounced tumor in the bladder, however, two small groups of malignant cells with large, vesicular nuclei were observed between the muscle fibers in one region (Figure 3). No tumor was observed in the dissected pelvic lymph nodes and the surgical margins. The final pathological stage was T2bNOM0 according to the Tumor-Node-Metastasis staging. During his 6<sup>th</sup> month follow-up visit, he was continent during the day, however, he reported that he used a safety pad during the night. He had no problem in emptying his neobladder, and his kidney function tests, endoscopic examination of the N-pouch, and pouchography (with a bladder capacity of 430 mL) were normal (Figure 4).

## Discussion

Numerous techniques with different intestinal segments and configurations have been described for OIN. The European Association of Urology guidelines for MIBC recommend performing an OIN for both male and female patients who do not have any contraindication or tumor in the urethra (grade B

recommendation).<sup>[2]</sup> RC with OIN is a complex surgery with common complications, therefore, OIN is frequently reserved for highly motivated and cognitively capable patients. Early complication rates ranging between 12.6%-33.6% and late complication rates between 23.8%-32% have been reported at long-term follow-ups by various groups.<sup>[6,8-11]</sup> The risk of nighttime incontinence is another disadvantage of OIN. Nighttime incontinence is generally more common than daytime incontinence. Hypercontinence constitutes a significant risk, especially in women.<sup>[8]</sup> Due to these complications, patients should be informed about pelvic floor reeducation and self-catheterization.

In 2005, Joniau et al<sup>[7]</sup> presented the Leuven N-pouch technique (Figure 5), which combines the features of the commonly used Hautmann et al.<sup>[12]</sup> and Studer et al.<sup>[13]</sup> neobladders and creates a good-capacity ileal pouch with an isoperistaltic afferent limb. The ureteroneovesical anastomosis is created by a simple, refluxing end-to-side anastomosis on the afferent limb, which has the lowest stenosis rates<sup>[14]</sup> and does not require an anti-reflux anastomosis, since the active reflux cannot be provoked in an OIN that has low pressure inside and an existing active anti-reflux mechanism of the afferent ileal limb. In 2016, the same group published their long-term experience in terms of complication and continence rates in 119 patients.<sup>[15]</sup> The early complication rate was 39.5%, while the late complication rate was 53.1%. Urinary infection and outlet obstruction were reported to be the most frequent early and late pouch-related complications, whereas infectious and gastrointestinal complications and wound herniation were the most common early and late non-pouch-related complications, respectively. At the 1-year follow-up, 96% and 60% of the male patients, and 84.6% and 66.7% of the female patients achieved daytime and nighttime continence, respectively. Their complication rates were relatively high as compared to other series, which was attributed to their strict and meticulous recording and follow-up scheme. They concluded that despite the high complication and nighttime incontinence rates, the N-shaped OIN could be a reasonable option for UD in carefully selected patients who could receive RC.

To the best of our knowledge, this is the first report describing the Leuven N-pouch in our institution, in our region, and in our country. Our initial experience demonstrates that despite the possibility of major non-pouch-related complications, this complex surgery can be performed safely and efficiently in well-informed patients who are candidates for OIN.

**Informed Consent:** Written informed consent was obtained from the patient who participated in this case.

**Peer-review:** Externally peer-reviewed.

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**Conflict of Interest:** The authors have no conflicts of interest to declare.

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