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SURGICAL TECHNIQUE

# Laparoscopic ureteral replacement by Boari flap: Multi-institutional experience in 30 cases☆

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**KEYWORDS**
Ureter;
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**Abstract**
*Introduction:* The Boari flap is an excellent technique for replacement of distal ureteral injuries. There are few reports with the use of laparoscopic surgery, especially with long term results. Our goal is to present the results of a multi-institutional study of 30 cases.
*Materials and methods:* We analyzed 30 patients treated between December 2001 and January 2009 who underwent a laparoscopic intracorporeal Boari flap, in three Latin American centers. In all cases the same surgical technique was employed. The database was recorded prospectively and analyzed retrospectively.
*Results:* The mean age was 43.2 years (range 9–71 years). Most were women (22 of 30) with a slight predominance of left-side lesions (17 of 30). The most common cause of ureteral injury was hysterectomy in 14 patients (46.6%) and endoscopic ureterolithotomy in 9 patients (30%). The mean length of ureteral resection was 7 cm (5–20 cm). The average operative time was 161.16 min (90–280 min). The average estimated blood loss was 123 mL (0–500 mL), and hospital stay was 4.86 days (2–10 days). There were no intraoperative complications or conversion to open surgery. Postoperative complications occurred in 5 patients (16.6%), Clavien 1 in 2 patients (6.6%) and Clavien 3 in three patients (10%). The success rate was 96.6% (29 patients) with a mean follow up of 32 months (5–60 months).
*Conclusions:* Laparoscopic Boari flap in our hands had good short and long term results.


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**PALABRAS CLAVE**
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## Reemplazo ureteral con colgajo de Boari laparoscópico: experiencia multi-institucional en 30 casos

### Resumen

*Introducción:* El colgajo vesical tipo Boari es una excelente técnica para el reemplazo de lesiones del uréter distal. Existen pocas comunicaciones con el uso de la vía laparoscópica, sobre todo con resultados a largo plazo. Nuestro objetivo es presentar los resultados de un estudio multi-institucional en 30 casos.

*Material y método:* Se analizan 30 pacientes tratados entre diciembre de 2001 y enero de 2009, en quienes se realizó un colgajo de Boari laparoscópico intracorpóreo en 3 centros latinoamericanos. En todos los casos se empleó la misma técnica quirúrgica. La base de datos fue registrada de forma prospectiva y analizada retrospectivamente.

*Resultados:* La edad media fue de 43,2 años (rango de 9 a 71 años). La mayoría fueron mujeres (22 de 30) con un ligero predominio del lado izquierdo (17 de 30). Las causa más frecuente de lesión ureteral fue la histerectomía en 14 pacientes (46,6%) y la ureterolitotomía endoscópica en 9 pacientes (30%). La longitud ureteral media resecada fue de 7 cm (5 a 20 cm). El tiempo medio operatorio fue de 161,16 min (90 a 280 min). El sangrado intraoperatorio estimado promedio fue de 123 ml (0 a 500 ml) y la estancia hospitalaria de 4,86 días (2 a 10 días). No hubo complicaciones intraoperatorias ni conversión a cirugía abierta. Ocurrieron complicaciones postoperatorias en 5 pacientes (16,6%), Clavien 1 en 2 pacientes (6,6%) y Clavien 3 en 3 pacientes (10%). La tasa de éxito de la cirugía fue del 96,6% (29 pacientes), con un tiempo medio de seguimiento de 32 meses (5 a 60 meses).

*Conclusiones:* Nuestros resultados con la técnica de colgajo de Boari laparoscópico confirman los buenos resultados de esta técnica a corto y largo plazo.



## Introduction

The major basic principles of ureteral surgery that underpin the choice of the restoration technique of distal ureteral injuries are a delicate mobilization of ureter and tension-free anastomosis in order to avoid anastomosis failure and prevent ischemic complications. Since Casati and Boari, over 100 years ago, described for first time bladder flap technique to repair large ureteral defects,[1] its use continues to be a good surgical alternative. In 2001, Fergany et al. described for first time laparoscopic Boari flap technique[2] in animals. In the same year, Fugita et al. published their results with the laparoscopic Boari flap[3] in three patients. These successful outcomes were published in subsequent years.[4–6] Our goal is to present the early and long-term results of a multi-institutional study of 30 patients operated with the same technique.

## Materials and methods

The series consists of 30 patients operated between December 2001 and January 2009. Authors previously described the technique employed.[4] A prospective database was established for this study. Demographical, intra- and post-operative data were analyzed retrospectively as well as long-term results. Complications were defined according to Clavien classification.[7] Long-term follow-up was carried out with intravenous urography, computed tomography and Mag-3 renal scintigraphy.

### Surgical technique

Patients were placed in lithotomy position with 20° Trendelemburg tilt. Pneumoperitoneum was created with Veress needle (umbilical level) and maintained at 15 mm Hg. Disposition of trocars is as follows: 12 mm umbilical trocar for the 30° optical, 12 mm trocar placed in the left iliac fossa port-site and 5 mm trocar was placed in right iliac fossa port-site. Occasionally, for the surgical assistant, a pararectus paraumbilcal trocar is placed (Fig. 1). Colon is mobilized and ureter is identified at the level of the crossing of iliac vessels. The dissection proceeds distally and proximally until the normal ureter is identified. On distal position, Hem-O-Lok clip is placed and the section of the ureter is carried out in healthy tissue. Bladder is visualized by filling with 250 ml saline and its upper limit is visualized properly and the total dissection of Retzius space is performed without sectioning bladder pedicles. Anterior bladder flap is created: base is

**Figure 1** Disposition of the ports sites for right ureteral surgery.