



## Original article

# Pancreas Transplantation: Advantages of a Retroperitoneal Graft Position<sup>☆</sup>



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## A B S T R A C T

**Introduction:** In the 50 years since the first pancreas transplant performed at the University of Minnesota, the surgical techniques employed have undergone many modifications. Techniques such as retroperitoneal graft placement have further improved the ability to reproduce the physiology of the “native” pancreas. We herein present our experience of a modified technique for pancreatic transplant, with the organ placed into a fully retroperitoneal position with systemic venous and enteric drainage of the graft by duodeno-duodenostomy.

**Methods:** All pancreas transplantations performed between May 2016 and January 2017 were prospectively entered into our transplant database and retrospectively analyzed.

**Results:** A total of 10 transplants were performed using the retroperitoneal technique (6 men: median age of 41 years [IQR 36–54]). Median cold ischemia time was 10.30 h [IQR 5.30–12.10]. The preservation solution used was Celsior (n=7), IGL-1 (n=2), and UW (n=1).

No complications related to the new surgical technique were identified. In one patient, transplantectomy at 12 h was performed due to graft thrombosis, probably related to ischemic conditions from a donor with prolonged cardio-respiratory arrest. Another procedure was aborted without completing the graft implant due to an intraoperative immediate arterial thrombosis in a patient with severe iliac atheromatosis. No primary pancreas non-function occurred in the remaining 8 patients. The median hospital stay was 13.50 days [IQR 10–27].

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<sup>☆☆</sup> This study was presented in video format at the 12th Biennial E-AHPBA Congress 2017 of the European-African Hepato-Pancreato-Biliary Association, held May 23–26, 2017 in Mainz (Germany) with the title *Pancreas transplantation: A retroperitoneal graft placement*.

<sup>☆☆☆</sup> This study has also been accepted as an oral communication at the 16th International Conference of the International Pancreas and Islet Transplant Association (IPITA), held June 20–23, 2017 in Oxford (United Kingdom), under the title *Pancreas transplantation: Advantages of a retroperitoneal graft position*.

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*Conclusions:* Retroperitoneal graft placement appears feasible with easy access for dissection the vascular site; comfortable technical vascular reconstruction; and a decreased risk of intestinal obstruction by separation of the small bowel from the pancreas graft.

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## Trasplante de páncreas: ventajas de la posición retroperitoneal del injerto

### R E S U M E N

#### Palabras clave:

Trasplante de páncreas  
Posición retroperitoneal  
Duodenoduodenostomía  
Complicaciones quirúrgicas

*Introducción:* Después de transcurridos más de 50 años desde el primer trasplante de páncreas realizado en la Universidad de Minnesota, las técnicas quirúrgicas empleadas han experimentado muchas modificaciones. La colocación del injerto en posición retroperitoneal reproduce la fisiología del páncreas «nativo». El objetivo del estudio es presentar la experiencia de la aplicación de una técnica modificada, con el injerto pancreático en posición retroperitoneal, con drenaje venoso sistémico y duodenoduodenostomía para el drenaje entérico.

*Métodos:* Análisis retrospectivo de los trasplantes de páncreas realizados entre mayo de 2016 y enero de 2017 en una sola institución.

*Resultados:* Se incluyen un total de 10 trasplantes (6 hombres: mediana de edad de 41 años [IQR 36-54]). El tiempo de isquemia fría fue de 10,30 h [IQR 5,30-12,10]. La solución de preservación utilizada fue Celsior (n=7), IGL-1 (n=2) y UW (n=1).

No se han identificado complicaciones relacionadas directamente con la posición retroperitoneal y la derivación duodenoduodenal. Un paciente requirió trasplantectomía a las 12 h por trombosis del injerto proveniente de un donante con paro cardiorrespiratorio prolongado. Otro procedimiento fue abortado debido a una trombosis arterial intraoperatoria en un paciente con ateromatosis ilíaca grave. Los restantes pacientes presentaron una correcta función del injerto, sin requerimientos de insulina. La estancia hospitalaria fue de 13,50 días (IQR 10-27).

*Conclusiones:* La colocación del injerto retroperitoneal es una técnica factible, que permite un fácil acceso para la disección de los vasos y posterior reconstrucción vascular y que minimiza, a su vez, el riesgo de oclusión intestinal.

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## Introduction

Currently, pancreas transplantation is the only therapy that has demonstrated effectiveness for correcting metabolic control. It is considered the gold-standard treatment for type 1 diabetes mellitus in selected cases.

In 1966, William Kelly and Richard Lillehei performed the first pancreas transplantation in the world at the University of Minnesota.<sup>1-3</sup> This initial experience anticipated the future destiny of pancreatic transplantation: functioning grafts with diabetes correction and no need for insulin in the long term,<sup>4,5</sup> but risks included surgical<sup>6-13</sup> and immunological<sup>14</sup> complications. In this context, refinements and advances in the surgical technique have often been preceded by improvements in graft preservation,<sup>15-18</sup> immunosuppression,<sup>4,5</sup> and antimicrobial prophylaxis.<sup>4</sup> However, after more than 50 years of history, no surgical technique has become standardized among the different transplant groups.

Most likely, the position of the pancreatic graft is what determines the type of vascular anastomoses and exocrine drainage. Traditionally, the intraperitoneal position has been preferred by most medical centers. In the last decade, however, various authors have advocated the placement of

the graft in the retroperitoneal area, which is a more physiological position.

If we focus on the drainage method of exocrine secretions, the urinary diversion was most frequently used until the mid-1990s, when it was replaced by enteric drainage,<sup>19</sup> which is considered the current standard. In the most common method, the anastomosis is performed between the graft duodenum and the jejunum of the recipient, with the graft in intraperitoneal position. The enteric anastomosis can be performed to the proximal jejunum<sup>20-22</sup> or to the distal ileum,<sup>23</sup> and can be either end-to-end,<sup>24,25</sup> end-to-side<sup>26,27</sup> or side-to-side.<sup>28-32</sup> The use of direct anastomosis is currently more frequent<sup>21,33-36</sup> than Roux-en-Y anastomosis.<sup>28,29,31,32,36</sup> However, Boggi et al.<sup>28,29</sup> have shown excellent results with side-to-side Roux-en-Y duodenojejunostomy, with retroperitoneal graft placement and portal venous drainage. Techniques using exocrine drainage to the stomach have also been described.<sup>37,38</sup>

A few surgical innovations have been recently described related with graft placement, type of intestinal anastomosis, and their contribution to improved graft function. Duodenoduodenostomy (DD) is an interesting option for the drainage of gastrointestinal secretions, when the pancreas is placed behind the right colon and is oriented cranially.<sup>28,29,39-46</sup>

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