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Original article

# Outcomes of an Enhanced Recovery After Surgery Programme for Pancreaticoduodenectomy☆

*Rafael Morales Soriano,[a,*] Neus Esteve Pérez,[a] Silvia Tejada Gavela,[b] Ángel Cuadrado García,[c] José Carlos Rodríguez Pino,[a] José Miguel Morón Canis,[a] Xavier Molina Romero,[a] José Muñoz Pérez,[d] Xavier González Argente[a]*

[a] *Unidad de Cirugía HBP, Servicio de Cirugía General y Digestivo, Hospital Son Espases, Palma de Mallorca, Baleares, Spain*
[b] *Departamento de Biología y Ciencias de la Salud, Universidad de las Islas Baleares, Palma de Mallorca, Baleares, Spain*
[c] *Servicio de Cirugía General y Digestiva, Hospital Juan Carlos I, Madrid, Spain*
[d] *Servicio de Cirugía General y Digestivo, Hospital Son Llátzer, Palma de Mallorca, Baleares, Spain*

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ABSTRACT

*Background:* Enhanced recovery after surgery (ERAS) has demonstrated in colorectal surgery a reduction in morbidity and length of stay without compromising security. Experience with ERAS programmes in pancreatoduodenectomy (PD) is still limited. The aims of this study were first to evaluate the applicability of an ERAS programme for PD patients in our hospital, and second to analyse the postoperative results.

*Methods:* A retrospective study using a prospectively maintained database identified 41 consecutive PD included in an ERAS programme. Key elements studied were early removal of tubes and drainages, early oral feeding and early mobilisation. Variables studied were mortality, morbidity, perioperative data, length of stay, re-interventions and inpatient readmission. This group of patients was compared with an historic control group of 44 PD patients with a standard postoperative management.

*Results:* A total of 85 pancreatoduodenectomies were analysed (41 patients in the ERAS group, and 44 patients in the control group. General mortality was 2.4% (2 patients) belonging to the control group. There were no statistical differences in mortality, length of stay in intensive care, reoperations, and readmissions. ERAS group had a lower morbidity rate than the control group (32% vs. 48%; P=.072), as well as a lower length of stay (14.2 vs. 18.7 days). All the key ERAS proposed elements were achieved.

*Conclusions:* ERAS programmes may be implemented safely in pancreaticoduodenectomy. They may reduce the length of stay, unifying perioperative care and diminishing clinical variability and hospital costs.



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* *Corresponding author.*
E-mail address: rafa.morales@telefonica.net, rafaelmoralessoriano2@ssib.es (R. Morales Soriano).

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## Resultados de la rehabilitación multimodal en la duodenopancreatectomía cefálica

*Palabras clave:*
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Resultados

RESUMEN

*Introducción:* La rehabilitación multimodal precoz (RMP) ha demostrado en la cirugía colorrectal una reducción de la morbilidad y de la hospitalización sin comprometer la seguridad de los pacientes. La experiencia de la RMP en la duodenopancreatectomía cefálica (DPC) es más limitada. Los objetivos de este estudio fueron analizar la aplicabilidad de un programa RMP en los pacientes intervenidos mediante una DPC en nuestro medio y evaluar los resultados postoperatorios.

*Métodos:* Estudio retrospectivo utilizando una base de datos prospectiva de 41 pacientes a los que se realizó DPC y fueron incluidos en un programa de RMP. Se evaluaron 3 elementos clave: retirada precoz de sondas y drenajes, ingesta oral y movilización precoz. Las variables analizadas fueron la mortalidad, morbilidad, datos perioperatorios, estancia hospitalaria, reintervenciones y reingresos. Este grupo de pacientes fue comparado con un grupo control de 44 pacientes consecutivos, en los que se realizó una DPC con manejo postoperatorio estándar.

*Resultados:* Se estudió a 85 pacientes intervenidos con DPC (41 pacientes en el grupo RMP y 44 pacientes en el grupo control). La mortalidad global fue del 2,4%: 2 pacientes pertenecientes al grupo control. No encontramos diferencias significativas en la mortalidad, ingreso en Reanimación, reintervenciones ni reingresos. El grupo RMP presentó una morbilidad menor que el grupo control (32 vs. 48%; p = 0,072), y una estancia hospitalaria menor (14,2 vs. 18,7 días; p = 0,014). Todos los elementos clave propuestos fueron conseguidos.

*Conclusiones:* La RMP en la DPC puede implantarse con seguridad en nuestro medio. Permite unificar los cuidados perioperatorios, disminuir la variabilidad clínica y la estancia media y como consecuencia, el coste hospitalario.



## Introduction

As a result of the application of multimodal rehabilitation protocols in the area of colorectal surgery, morbidity has been reduced along with hospital stay duration and hospital expenses. Furthermore, patient satisfaction has improved.[1–3] Implementation of these protocols in pancreaticoduodenectomy (PDT) is challenging due to its complexity and high morbidity rate.[4] In recent years, mortality due to PDT has decreased to levels below 5% due to the evolution of surgical techniques, improvements in perioperative care and the treatment of patients in high volume centres.[3,5,6] Because of the inflammatory and catabolic reaction produced following PDT, the application of a structured and multimodal protocol for the reduction of perioperative stress may be a useful tool to achieve objectives similar to those obtained in colorectal surgery. The objectives of this study are: 1) To determine if an early multimodal rehabilitation programme (EMR) for PDT is applicable in our setting. 2) To assess the possibility of improving results in terms of morbidity, mortality and length of hospital stay.

## Methods

In January 2011 we developed the EMR protocol for PDT (Table 1). Between January 2011 and January 2014, 41 consecutive PDTs were included in the EMR programme. The following key elements have been evaluated: (1) early removal of tubes and drains; (2) early oral intake and (3) early mobilisation. The results of this group of patients were compared with a historical control group consisting of 44 patients who had undergone surgery between January 2005 and December 2010. These were patients where a PDT was performed with standard postoperative management. All data were collected from a prospective database including pancreatic resections which have been performed consecutively in our centre.

The variables analysed were the American Society of Anaesthesiology (ASA), probe and drain removal, intestinal transit, oral intake, seated position/ambulation, stay at the postoperative intensive care unit, length of hospital stay, percentage of surgical reoperations and percentage of readmissions. Mortality and complications were followed up until hospital discharge or death of the patient. Readmissions were registered up to 30 days after admission. Postoperative complications were recorded according to Clavien-Dindo classification.[7]

### *Surgical Technique*

All the interventions were performed by the same two surgeons. Resection included an antrectomy, lymphadenectomy of the hepatoduodenal ligament, celiac artery and the right side face of the superior mesenteric artery. The reconstruction in both groups was a double loop Roux-en-Y and end to side pancreaticojejunal anastomosis in 2 layers with a silicone tutor and end-to-side hepaticojejunostomy. Latero-lateral gastrojejunal anastomosis was retrocolic in the control group and antecolic in the EMR group, as described by Hartel.[8] All venous