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Original Article

Validation of Abdominal Wound Dehiscence's Risk Model☆

Carlos Javier Gómez Díaz, Pere Rebasa Cladera, Salvador Navarro Soto, José Manuel Hidalgo Rosas, Alexis Luna Aufroy, Sandra Montmany Vioque, Constanza Corredera Cantarín*

Servicio de Cirugía General y del Aparato Digestivo, Corporación Sanitaria y Universitaria Parc Taulí, Sabadell, Barcelona, Spain

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ABSTRACT

Introduction: The aim of this study is to determine the usefulness of the risk model developed by van Ramshorst et al., and a modification of the same, to predict the abdominal wound dehiscence's risk in patients who underwent midline laparotomy incisions.

Materials and methods: Observational longitudinal retrospective study. Sample: Patients who underwent midline laparotomy incisions in the General and Digestive Surgery Department of the Sabadell's Hospital – Parc Taulí's Health and University Corporation, Barcelona, between January 1, 2010 and June 30, 2010. Dependent variable: Abdominal wound dehiscence. Independent variables: Global risk score, preoperative risk score (postoperative variables were excluded), global and preoperative probabilities of developing abdominal wound dehiscence.

Results: Sample: 176 patients. Patients with abdominal wound dehiscence: 15 (8.5%). The global risk score of abdominal wound dehiscence group (mean: 4.97; CI 95%: 4.15–5.79) was better than the global risk score of No abdominal wound dehiscence group (mean: 3.41; CI 95%: 3.20–3.62). This difference is statistically significant ($P<.001$). The preoperative risk score of abdominal wound dehiscence group (mean: 3.27; CI 95%: 2.69–3.84) was better than the preoperative risk score of No abdominal wound dehiscence group (mean: 2.77; CI 95%: 2.64–2.89), also a statistically significant difference ($P<.05$). The global risk score (area under the ROC curve: 0.79) has better accuracy than the preoperative risk score (area under the ROC curve: 0.64).

Conclusion: The risk model developed by van Ramshorst et al. to predict the abdominal wound dehiscence's risk in the preoperative phase has a limited usefulness. Additional refinements in the preoperative risk score are needed to improve its accuracy.

Validación de un modelo de riesgo de evisceración

Palabras clave:
Evisceración
Factores de riesgo
Modelo de riesgo
Complicación quirúrgica

RESUMEN

Introducción: Nuestro trabajo pretende valorar la utilidad del modelo de riesgo de evisceración desarrollado por van Ramshorst et al., y una modificación del mismo, para predecir el riesgo de evisceración entre pacientes operados por laparotomía media.

Material y métodos: Estudio observacional, longitudinal y retrospectivo. Muestra: pacientes operados por laparotomía media en la Corporación Sanitaria y Universitaria Parc Taulí

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* *Corresponding author.*
E-mail address: cgomezd@tauli.cat (C.J. Gómez Díaz).

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(Barcelona), entre el 1 de enero y el 30 de junio del 2010. Variable dependiente: evisceración. Variables independientes principales: los scores de riesgo global y preoperatorio (excluye variables postoperatorias), y las probabilidades de evisceración global y preoperatoria.
Resultados: Muestra: 176 pacientes. Eviscerados: 15 (8,5%). La media del score global de riesgo del grupo Evisceración: 4,97 (IC95%: 4,15-5,79) es mayor que la del grupo No evisceración: 3,41 (IC95%: 3,20-3,62), siendo esta diferencia estadísticamente significativa ($p < 0,001$). La media del score preoperatorio de riesgo del grupo Evisceración: 3,27 (IC95%: 2,69-3,84) es mayor que la del grupo No evisceración: 2,77 (IC95%: 2,64-2,89), siendo esta diferencia estadísticamente significativa ($p < 0,05$). El score global de riesgo (área bajo la curva ROC: 0,79) tiene mayor capacidad predictiva que el score preoperatorio de riesgo (área bajo la curva ROC: 0,64).
Discusión: La utilidad del modelo de riesgo desarrollado por van Ramshorst et al. para predecir el riesgo de evisceración, durante el preopeatorio, entre pacientes operados por laparotomía media es limitada. La utilización del score preoperatorio requiere ajustes para mejorar su rendimiento pronóstico.

Introduction

Abdominal wound dehiscence is a serious postoperative complication with a high morbimortality; it also entails increased patient treatment costs, due to reoperations, postoperative complications and prolonged hospital stay.[1–8]

van Ramshorst et al.[1] developed and validated a risk model to help predict wound dehiscence risk for patients undergoing abdominal surgery.

An effective risk model would be useful for deciding which patients require modification of laparotomy closure techniques (e.g. use of mesh) to reduce the risk of abdominal wound dehiscence.

The aim of this study is to determine the usefulness of the risk model developed by van Ramshorst et al.[1] to predict abdominal wound dehiscence risk and define risk groups among patients scheduled for surgery using midline laparotomy. We will also evaluate the usefulness of modifying the previous model (modified van Ramshorst).

Material and Methods

We developed an observational, longitudinal, analytical and retrospective study where the sample studied were patients with a midline laparotomy performed in the General and Digestive Surgery Department Sabadell's Parc Tauli Hospital–Health and University Corporation, Barcelona, between 1st January and 30th June 2010. Patients operated for ventral hernias, incisional hernias, or other types of laparotomy were excluded, as were those who underwent surgery in other hospital departments.

The study's dependent variable was presentation of abdominal wound dehiscence. Main independent variables were: (1) global risk score (van Ramshorst et al.[1]) which is the total score of each independent variable score; (2) preoperative risk score (modified van Ramshorst) which is the total score of each preoperative variable score (postoperative variables of cough and wound infection were excluded); (3) the probability of overall dehiscence (van Ramshorst et al.[1]) calculated with the following logistic equation[1]: $P=e^x/(1+e^x)\times 100\%$, where $x=-8.37+(1.085\times$calculated overall risk score$)$; and (4) the probability of preoperative dehiscence (modified van Ramshorst), which is calculated using the same equation, replacing the calculated overall risk score by the calculated preoperative risk score. Secondary independent variables with their respective risk scores were: age (40–50: 0.4; 50–70: 0.9; over 70: 1.1), gender (male: 0.7), history of chronic pulmonary disease (0.7), ascites (described in the surgical report or in imaging tests as: 1.5), jaundice (bilirubinanaemia >2.9 mg/dL within 48 preoperative hours: 0.5), anaemia (haemoglobin <7.5 g/dL in women and <8 g/dL in men, within 48 preoperative hours: 0.7), emergency surgery (0.6), type of surgery (hepato-biliary: 0.7; oesophagus: 1.5; gastroduodenal: 1.4; small intestine: 0.9; colon: 1.4; vascular: 1.3), cough (registered in clinical reports: 1.4), wound infection (1.9).

Data were collected from: (1) the hospital computerized clinical work station; (2) our adverse events database, which includes all adverse events suffered by our patients since 2005[2,3] collected prospectively and (3) archived clinical histories. Patient data confidentiality was always maintained. An MS-Access database was constructed into which independent variable values and automatic calculations of risk scores, and the probability of abdominal wound dehiscence and global and preoperative scores of each patient could be recorded.

The statistics programme IBM SPSS Statistics version 19 for Windows was used for data analysis. The sample was divided into 2 subgroups for analysis: abdominal wound dehiscence and no abdominal wound dehiscence. We used percentages to describe the categorical variables and means with 95% confidence intervals and standard deviation to describe the continuous variables. In the analytical study, the categorical variables were analyzed with the χ^2 test and the quantitative variables with the Students *t*-test for independent samples. Statistical significance was considered if $P<.05$. The predictive value of the risk model in our population was evaluated using ROC curves.