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Original article

C Reactive Protein as a Predictor of Anastomotic Leakage in Colorectal Surgery. Comparison Between Open and Laparoscopic Surgery☆

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ABSTRACT

Introduction: Anastomotic leak (AL) is a serious complication in colorectal surgery due to its increase in morbidity and mortality. The aim of this prospective non-randomised study is to determine whether C-reactive Protein (CRP) is useful as a predictor of AL in patients undergoing open versus laparoscopic surgery.

Methods: A total of 168 patients undergoing elective colorectal surgery were included. CRP was measured daily during the first 5 postoperative days. Complications, specially AL, were analyzed.

Results: Following an open approach 32 patients (45.7%) presented complications, 15 (18.7%) in the laparoscopic group and 12 (29.4%) in the converted group ($P = 0.153$). Following open surgery 9 patients experienced AL, 5 were detected in the laparoscopic group and none in those converted ($P = 0.153$). There were significant differences in CRP values between the 3 groups ($P = 0.03$). ROC Curves showed AUC for the open and laparoscopic approach of 0.731 and 0.760 respectively. On day 4 the AUC was 0.867 for the open group and 0.914 for the laparoscopic group.

Cut-off points on day 4 were: Open: 159.2 mg/L; sensitivity 75%, specificity 89% and NPP 96% ($P < 0.001$). Following laparoscopic surgery the cut-off point was 67.3%; sensitivity 100%, specificity 89.5% and NPP 100% ($P = 0.016$).

Conclusion: CRP on day 4 is useful to diagnose AL. Different cut-off values should be taken into account depending on the approach used.

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Proteína C reactiva como predictor de fuga anastomótica en cirugía colorrectal. Comparación entre cirugía abierta y laparoscópica

Palabras clave:
Fuga anatomótica
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Proteína C reactiva
Test diagnóstico

RESUMEN

Introducción: La fuga anastomótica (FA) es una complicación seria en cirugía colorrectal, dado que conlleva un aumento de la morbimortalidad. El objetivo de este estudio prospectivo no aleatorizado es determinar si la proteína C reactiva (PCR) es útil como predictor de FA en pacientes intervenidos por vía laparoscópica versus cirugía abierta.

Métodos: Se incluyeron 168 pacientes intervenidos de manera electiva por enfermedad colorrectal. La PCR fue medida diariamente en los 5 primeros días del postoperatorio. Se analizaron las complicaciones y, especialmente, la FA.

Resultados: Presentaron complicaciones 32 (45,7%) pacientes del abordaje abierto, 15 (18,7%) del laparoscópico y 12 (29,4%) en el grupo de convertidos a cirugía abierta (p = 0,002). Desarrollaron FA 9 pacientes del abordaje abierto, 5 de los del laparoscópico y ninguno del grupo que hubo que convertir (p = 0,15). Hubo diferencias estadísticamente significativas de los valores de PCR entre los 3 grupos (p = 0,03).

Las curvas ROC mostraron un área bajo la curva (ABC) en el día 3 para el abordaje abierto y laparoscópico de 0,731 y 0,760, respectivamente. En el día 4 obtuvimos un ABC de 0,867 en el abierto y de 0,914 en el laparoscópico.

Los puntos de corte en el día 4 fueron: en abierto 159,2 mg/L; sensibilidad 75%, especificidad 89% y valor predictivo negativo (VPN) de 96% (p < 0,001). En el laparoscópico fue de 67,3 mg/L; sensibilidad 100%, especificidad 89,5% y VPN de 100% (p = 0,016).

Conclusiones: La PCR en el cuarto día postoperatorio es útil para diagnosticar FA; se deben tener en cuenta los diferentes puntos de corte en función del abordaje quirúrgico utilizado.

Introduction

The incidence of anastomotic leakage (AL) in colorectal surgery is very variable: different studies have described rates between 1% and 28%.[1,2] Undoubtedly, it is a very severe complication that involves important mortality and morbidity, increased hospital stay and frequently requires a stoma with relevant functional consquences.[3,4] In addition, there are important implications in oncologic patients, as there has been an observed increase in local recurrence in these patients.[5]

Early diagnosis is very important to be able to initiate early treatment. It has been observed that delayed start of treatment greatly increases septic complications.[6]

In certain instances, symptoms and complementary tests either do not adequately guide us toward the diagnosis, or can delay it. Although computed tomography is still the most extensively used diagnostic test when AL is suspected, a recent systematic review has concluded that, when analyzing its utility in colon and rectal surgery, its sensitivity is just 68%.[7] C-reactive protein (CRP) is an acute-phase protein synthesized in the liver and released into the blood as a response to the stimulation of inflammatory cytokines. When the stimulus for its production ceases, CRP levels decrease rapidly, and its half-life is 19 h.[8] CRP has been studied as a biological marker for the early diagnosis of AL in colorectal surgery and is useful for ruling it out.[9–12] This fact seems to be clear in patients with open surgery; however, in patients treated with a laparoscopic approach and, a priori, a lower immune response,[13] it would be possible to expect CRP values to be lower than in open surgery. Nevertheless, there is controversy in this regard among different published articles.[14]

For these reasons, we proposed a study aimed at determining whether CRP predicts AL similarly in open and laparoscopic surgery.

Material and Methods

Ours is a single-center, prospective, nonrandomized study including 168 patients who underwent elective surgery for colorectal disease with primary anastomosis, using open or laparoscopic approaches. The study was approved by the Ethics Committee of the hospital, and all patients gave their written informed consent.

The exclusion criteria were: age under 18, urgent surgery, active infection at the time of surgery, creation of a protective stoma, or no signed informed consent. Patients with stomas were excluded to avoid selection bias, because, although protective stomas do not prevent AL, they do reduce symptoms.

Patients were divided into 3 groups: open surgery, laparoscopic surgery and laparoscopy converted to open surgery. Conversions were not included in the open surgery group to avoid possible selection bias.