

ROLE OF C-REACTIVE PROTEIN IN EARLY DETECTION OF ANASTOMOTIC LEAK IN PATIENTS UNDERGOING ELECTIVE COLORECTAL RESECTION SURGERY WITH PRIMARY ANASTOMOSIS

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ABSTRACT

INTRODUCTION: Despite improvements in surgical technique and perioperative care anastomotic leaks (AL) are still present, causing increased morbidity, mortality, length of stay and costs.

AIM: The aim of this article is to study the role of c-reactive protein in early detection of anastomotic leak in the studied group.

MATERIALS AND METHODS: Prospective study in the period January 2017 - December 2018 of all patients undergoing elective colorectal surgery for cancer with primary colonic anastomosis in the Clinic of Surgical Oncology, Dr. G. Stranski University Hospital – Pleven was conducted. All patients were treated according to the ERAS protocols for colorectal surgery. The incidence of anastomotic leaks, changes in CRP and leukocyte (WBC) levels were studied.

RESULTS: A total of 201 patients were subjected to colonic resection in the Clinic for the study period. In 123 of the interventions an intestinal anastomosis was performed and this is the group of interest. Fifty-two of all interventions were minimally invasive. Anastomotic leak was found in 7 cases (5.7%), of which 2 patients were conservatively treated, and 5 patients were reoperated.

All patients with anastomotic insufficiency had serum levels of CRP above 130 mg/L. In five patients we found CRP levels above 130 mg/L without anastomotic leak. There were no patients with anastomotic insufficiency with CRP levels below 130 mg/L. The positive predictive value for these levels of CRP was 58.33% and the negative predictive value - 100%. In 85.7% of the patients with AL leukocyte (WBC) levels were in normal range at the time of AL detection.

CONCLUSION: CRP is an early marker with excellent negative predictive value for the development of anastomotic leak after colorectal surgery.

Keywords: CRP, anastomotic leak, detection, rectal resection, primary anastomosis

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INTRODUCTION

The incidence of anastomotic leak (AL) in resection surgery for colorectal cancer in various studies ranges between 2 and 17% (1-5). Despite improvements in surgical techniques and perioperative care, AL still occurs, causing increased morbidity, mortality, length of hospital stay, and increased costs. It is also an independent factor of poor prognosis in pa-

tients undergoing curative resection for colorectal cancer (6-8). Due to the consequences for patients with AL, there are a lot of techniques used by surgeons to create better intestinal anastomoses. Even though multiple risk factors associated with anastomotic leakage are recognized, it is difficult to predict this complication in an individual patients (1, 9-12). C-reactive protein (CRP) is an acute-phase protein synthesized in the liver and has shown benefits in early detection of anastomotic leak in colorectal surgery (13-16).

Aim

The aim of this article is to study the role of c-reactive protein in early detection of anastomotic leak in patients undergoing elective colorectal resection surgery with primary anastomosis.

MATERIALS AND METHODS

Prospective study in the period January 2017 - December 2018 of all patients undergoing elective colorectal surgery for cancer with primary colonic anastomosis in the Clinic of Surgical Oncology, Dr. G. Stranski Hospital – Pleven was conducted. All patients were treated according to Enhanced Recovery After Surgery (ERAS) protocols for colorectal surgery. Mechanical bowel preparation (MBP) was performed for left-sided cancer and lack of bowel obstruction. In patients with right-sided cancer no MBP was performed. For the left-sided cancer at the end of the operation transanal drainage was placed for 5 days. Antibiotic prophylaxis was performed only perioperatively (30-60 min before skin incision) with a single dose of cephalosporin 2nd generation (cefuroxime) and metronidazole. If the surgery lasted for more than 4 hours, a second dose of the cephalosporin was administered intraoperatively. CRP levels were measured at POD 1-5.

When clinical and laboratory data suspect for AL, CT with rectal water soluble contrast was done for left-sided cancer - CT with rectal water soluble contrast was done, and for right-sided cancer – native CT was done. The incidence of anastomotic leaks, changes in CRP and leukocyte (WBC) levels were studied. The results were processed with the Microsoft SPSS statistical program.

RESULTS

A total of 201 patients were subjected to colonic resection in the Clinic for the study period. The performed procedures were as follows: right hemicolectomy - in 33 patients, left hemicolectomy - in 13 patients, resection of the transverse colon resection - 3 patients, sigmoid resection – 22 patients, total colectomy - 6 patients, abdominoperineal excision - 11 patients, anterior rectal resection - in 33 patients, Hartmann's procedure - 9 patients, palliative intestinal bypass - 8 patients, reversal of Hartmann's procedure - 3, ileostomy – 16 patients, colostomy - in 38 patients. There were 62 palliative surgical interventions and 136 radical surgical interventions. In 123 of the interventions an intestinal anastomosis was performed and this was the group of interest. Fifty-two of all interventions were minimally invasive (laparoscopic or robot-assisted). Anastomotic leak was found in 7 cases (5.7%), of which 2 patients were conservatively treated, and 5 patients were revised. In all cases AL was confirmed by CT (Fig. 1) and 3D CT reconstructions (Fig. 2).

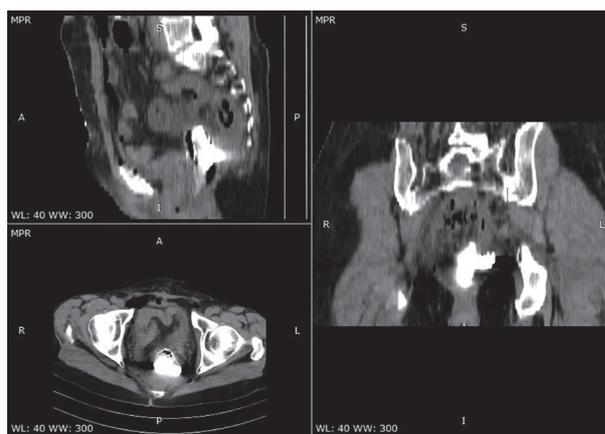


Fig. 1. CT with rectal water soluble contrast in patient with AL

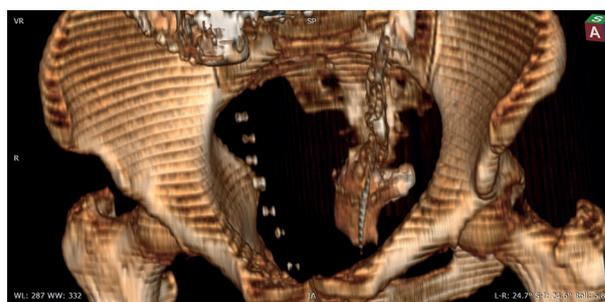


Fig. 2. 3D CT reconstruction of the same patient

All patients with anastomotic insufficiency had serum levels of CRP above 130 mg/L (Fig. 3). In five patients we found CRP levels above 130 mg/L without anastomotic leak – four were with multi-organ resections due to locally advanced cancer and one patient developed pneumonia in the postoperative period. There were no patients with anastomotic insufficiency with CRP levels below 130 mg/L. The positive predictive value of these levels of CRP was 58.33% and the negative predictive value - 100%. In 6 out of 7 patients (85.7%) with AL, leukocyte levels were in normal range at the time of AL detection. The mean time to WBC level elevation was 28.3 hours (Fig. 4).



Fig. 3. CRP levels of the same patient

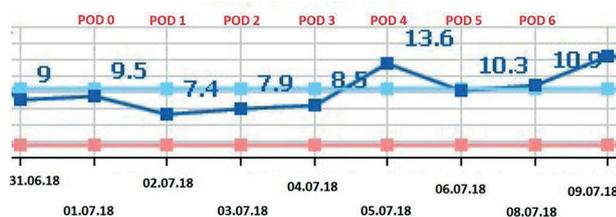


Fig. 4. WBC levels of the same patient

DISCUSSION

Identifying patients at high risk of developing anastomotic insufficiency is essential for patient pre-operative optimization (1,3,10,11). Risk factors for anastomotic leak are traditionally divided into three categories: patient-related, surgery-related and disease-related factors. Patients diagnosed with colorectal carcinoma have a proven higher risk, compared to the non-cancer population, of developing anastomotic insufficiency (17). The broad limits of resection of healthy tissue resection combined with resection respecting anatomical blood supply may reduce the risk of this complication by providing adequate vascular supply of newly constructed anastomosis. The localization of the disease is also important. In rectal cancer patients a higher incidence of AL has been established (10-12). Studies have shown that patients treated according to ERAS protocols following

colorectal surgery have a lower incidence of AL (18). In 4 of the patients with CRP levels above 130 mg/L and intact anastomosis, multi-organ resections have been performed, which is likely to cause increased serum CRP levels. In the other patient with CRP levels above 130 mg/L and intact anastomosis, pneumonia is most likely to cause increased serum CRP levels. Patients with insufficient anastomoses who have limited infection, stable laboratory results, and moderate clinical presentation are believed to be indicated for conservative treatment (19-21).

CONCLUSION

CRP is an early marker with excellent negative predictive value for the development of anastomotic leak after colorectal surgery.

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