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Guest Editorial

Trend of C Reactive Protein in Patients Admitted to the Emergency Department with Acute Diverticulitis

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Abbreviations

ED: Emergency Department; CRP: C-Reactive Protein; WBC: White Blood Cell Count; AD: Acute Diverticulitis; AUD: Acute Uncomplicated Diverticulitis; ACD: Acute Complicated Diverticulitis; CT: Computed Tomography

Acute diverticulitis both complicated and uncomplicated is an ever-increasing disease. The clinical management of acute uncomplicated diverticulitis has changed in the recent years, been considered as a self-limiting condition; so, the majority of patients can be followed in an output setting without antibiotics. The prescription of antibiotics is reserved for elderly immunocompromised patients with many comorbidities and presenting clinical and laboratory signs of systemic involvement. The most used serological markers of inflammation in ED are CRP and WBC.

This retrospective and observational study examined the trend of CRP and WBC in patients who access to the ED of Fondazione Policlinico Universitario A. Gemelli, IRCCS, a large tertiary hospital in Rome, for abdominal pain with a diagnosis of AD including both AUD and ACD cases [1-4]. We analysed from January 2016 to December 2019 a total of 1099 AD patients (579 females and 520 males), with a mean age of 68.11 ± 23.05 years.

All patients underwent an abdomen computed tomography scan with contrast that confirm the diagnosis of AD; the severity was assessed using the modified Hinchey classification [1-4] (Table 1). We know that CT scan is the gold standard for the correct diagnosis of AD, grade of inflammation and this could guide the physicians to different approach. Conversely, there is little information regarding the variation of the values of the laboratory inflammation markers in particular CPR and WBC during the observation of patient with AD in ED and the evolution of the disease in relation to initial values. We investigate the modifications of the values of the serum inflammation markers during the observation in ED of patients with AD and to evaluate the role of their initial trend in the early phase within the first 48 - 72 hours following the presentation of the patient at the ED.

Knowledge concerning the trends of these laboratory parameters and their correlation with the clinical status may assist the physician in the on-going evaluation of the severity of the disease.

Blood tests to measure inflammatory markers [5] such as CRP and WBC were performed at enrollment (T0), 24 hours later (T1), and 48 - 72 hours later (T2).

Clinical, laboratory and demographic data were collected from the computerized clinical record (GIPSE®).

According to the policy of our hospital all patients at the admission to the ED gave their written informed consent to assess their medical records.

We excluded patients with colonic cancer, inflammatory bowel disease, with previous colonic surgery, pregnant and those in which a single blood sample was taken.

Our study showed that, 659 out of 1099 (60%) patients obtained a diagnosis of AUD (Hinchey 0-Ia) and in particular 302 patients were classified as Hinchey 0 and 357 patients were classified as Hinchey Ia. Meanwhile, 440 out of 1099 (40%) patients were diagnosed with ACD (Hinchey Ib-IV) with 211 Hinchey Ib, 195 Hinchey II, 22 Hinchey III, and 12 Hinchey IV. We observed a slight gender prevalence in the different stage of the Hinchey classifications, patients with Hinchey III and IV having a higher percentage of males on the opposite Hinchey 0 and II having a higher percentage of females. In a previous paper published by our group, we analysed the characteristics of patients who were admitted to the ED of Fondazione Policlinico Universitario A. Gemelli with a diagnosis of acute diverticulitis from 2002 to 2017. We observed a progressive increase in the number of accesses for both AUD and ACD, a reversal in the prevalence of the male sex, particularly in complicated forms of diverticulitis, and a reduction in the average age of presentation [6].

The mean values of CRP were summarized in table 1 and figure 1 and represented the trend of CRP according to Hinchey classification. We observed that patients with AD-Hinchey 0 had a mean value of CRP of 30.7 ± 21 mg/dl at T0, which curiously doubled to 60.78 ± 42 ± mg/dl at T1 and decreased to 31.5 ± 18.9 at T2. Patients with Hinchey Ia had a higher level of CRP mean value of 71.2 ± 48 mg/dl at T0, which remained stable at T1 and decreased to 50.6 ± 30.74 at T2. Patients with Hinchey Ib had a mean CRP value higher compared to the previous Hinchey stage with of 85.1 ± 57.2 mg/dl at T0, which remained stable at T1 and decreased to 60.2 ±38 at T2. Patients with Hinchey II showed a more increase of CRP mean value of 91 + 62 mg/dl at T0, which remained stable at T1 and decreased to 75.6 ± 39.5 mg/dl at T2. Patients with Hinchey III had a mean value of CRP of 120.2 + 76.3 mg/dl at T0, which remained stable at T1. Finally, patients with Hinchey IV had a mean value of CRP of 177.0 ± 80.6 mg/dl at T0, which slightly increased to 183.5 ± 91.4 mg/dl at T1 Surgery was required for both these patients after 48 hours.

In our cohort of patients, CRP level at enrollment correlates very well with the Hinchey stage, we observed a linear increase in CRP levels as the degree of colic inflammation.

Hinchey 0	Mild diverticulitis
Hinchey Ia	Confined pericolic inflammation or phlegmon
Hinchey Ib	Confined pericolic abscess
Hinchey II	Pelvic, distant intra-abdominal or retroperitoneal abscess
Hinchey III	Generalized purulent peritonitis
Hinchey IV	Generalized fecal peritonitis

Table 1: *Modified Hinchey classification of AD.*

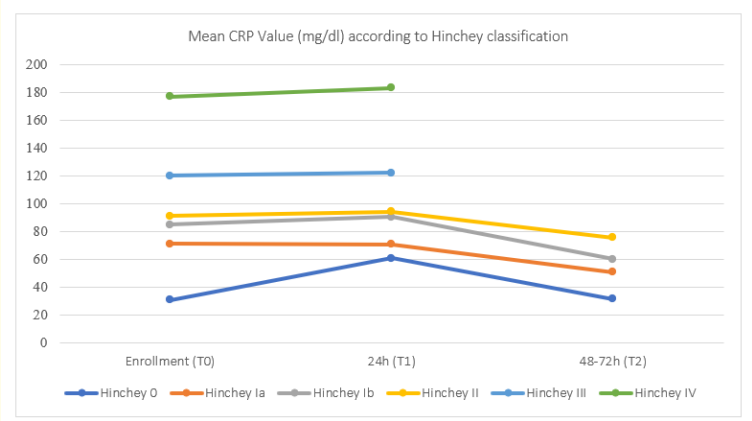

Figure 1: *Mean CRP Value (mg/dl) according to Hinchey classification.*

Regarding WBC levels, we found that they were directly proportional to the severity of AD according to Hinchey classes. The values are reported in table 2. Interestingly, we observed a decrease in total WBC after 24 hours in all groups. We also observed that the mean level of CRP was elevated in all patients at enrollment and remained elevated in patients with ACD with a progressive increasing linear trend. In contrast, patients with AUD had a lower mean value of CRP at T0 compared to ACD but its value doubles after 24 hours, with a "peak point" and then decrease. This "peak point" did not correlate with a worsening of the clinical conditions of patients with AUD.

	Enrollment (T0)	**24 hours (T1)**	**48-72 hours (T2)**
CRP value of Hinchey 0	30.7 ± 21 mg/dl	60.78 ± 42 mg/dl	31.5 ± 18.9 mg/dl
CRP value of Hinchey Ia	71.2 ± 48 mg/dl	70.65 ± 38,04 mg/dl	50.6 ± 30.74 mg/dl
CRP value of Hinchey Ib	85.1 ± 57.2 mg/dl	90.3 ± 62.3 mg/dl	60.2 ± 38 mg/dl
CRP value of Hinchey II	91.0 ± 62 mg/dl	94.1 ± 60.3 mg/dl	75.6 ± 39.5 mg/dl
CRP value of Hinchey III	120.2 ± 76.3 mg/dl	122.3 ± 77.1 mg/dl	Surgery
CRP value of Hinchey IV	177.0 ± 80.6 mg/dl	183.5 ± 91.4 mg/dl	Surgery
WBC value of Hinchey 0	9800/mm^3	6300/mm^3	4600/mm^3
WBC value of Hinchey Ia	11600/mm^3	10800/mm^3	6400/mm^3
WBC value of Hinchey Ib	13200/mm^3	12100/mm^3	9400/mm^3
WBC value of Hinchey II	12400/mm^3	11900/mm^3	8200/mm^3
WBC value of Hinchey III	13700/mm^3	12600/mm^3	9700/mm^3
WBC value of Hinchey IV	14100/mm^3	13800/mm^3	10800/mm^3

Table 2: *Mean CRP values and mean WBC values of patients with AD.*

The management of AD at our hospital followed the current guidelines. Treatment for patients with Hinchey 0 consisted of fasting, intravenous fluids and antispastic. Patients with ACD instead received antibiotics, and those with Hinchey III-IV were hospitalized and underwent surgery or radiological drainage.

None of these patients with AUD developed complications, and they were all discharged after three to four days of observation.

The serum inflammation markers have a substantial role in the clinical-laboratory diagnosis of AD and can be used together with imaging finding.

Our research validates previous literature on the correlation between CRP levels and the severity of Hinchey degree in AD patients. Those with higher CRP values have a greater probability to undergo surgical treatment or at least a percutaneous intervention.

Interestingly, we observed a distinct CRP pattern between ACD and AUD. Specifically, CRP levels in ACD patients remained stable during the first two to three days, while AUD patients experienced a paradoxical increase in CRP levels after 24 hours with a concurrent decline of the WBC count during the first 24 hours of observation. However, this increase did not signify any complications or deterioration of their condition. Interestingly, none of the patients who experienced a peak in CRP levels after 48-72 hours required further testing or changes to their treatment, nor did they develop surgical issues or require antibiotics.

Another paper by Aristotelis Kechagias., *et al*. [7] showed that the early C-reactive protein trend does not have a role in monitoring acute diverticulitis progression. In their retrospective analysis they conclude that the 24-hour trends of the CRP value should not be used as a determinant of the failure of the responsiveness of acute diverticulitis to the conservative therapy [7]. Therefore, in an ED setting, an initial rise in CRP levels in AUD patients should not prompt physicians to add antibiotics as it does not correspond to a negative outcome. These findings can assist emergency doctors in the management of AUD, avoiding unnecessary interventions and encouraging personalized treatment decisions. Nonetheless, additional studies are necessary to confirm these results.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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