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Original Research Article

Role of Mean Platelet Volume (MPV) In Diagnosis of Acute Appendicitis

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Abstract

The diagnosis of acute appendicitis still remains an enigma for the surgeon. The Mean Platelet volume is known to be a marker determined from megakaryocytes during platelet production, which is associated with platelet function and activation. The mean platelet volume (MPV) decreases in acute inflammatory conditions like acute appendicitis due to increased consumption and sequestration of platelets in the vascular segments of inflamed bowel. In our study of 213 patients, the MPV was determined and was found to be low (< 7.6fL) in 176 patients (82.6%) out of which 175 patients were having features of acute appendicitis on histopathology. Therefore in a patient with a provisional diagnosis of acute appendicitis, a low MPV (<7.6fL) can be taken into consideration along with total leucocyte count with suspected acute appendicitis.

Keywords: Acute appendicitis, Mean Platelet Volume, Platelet sequestration

1.Introduction

Acute appendicitis is the most common surgical cause of emergency laparotomy. The surgical principle about acute appendicitis "when in doubt, take it out", is not correct as the procedure often comes with a package of few complications. Though acute appendicitis is a common problem its diagnosis still remains a challenge. The accuracy of the clinical examination has been reported to range from 71% to 97% and varies greatly depending on the experience of the examiner [2]. However, because missed ruptured appendixes have direct consequences, surgeons have traditionally accepted a 20% rate of negative findings at appendectomy and the removal of a normal appendix [3]. The rate of negative appendectomy (Removal of a normal appendix in patients with other causes of abdominal pain) is reported to be between 20% and 30% [3,4]. The delay in diagnosis may increase the morbidity and costs. The goal of surgical treatment is removal of an inflamed appendix before perforation with a minimal number of negative appendectomies. Mean platelet volume (MPV) is a measure of platelet size, generated by full blood count analyzers as part of the routine complete blood count test cycle. This entity is often missed by treating physicians [5]. MPV decreases in acute inflammatory conditions of gastrointestinal tract; the reason given is consumption and sequestration of platelets in vascular segments of inflamed bowel [26]. The introduction of MPV in the battery of investigations for the diagnosis of acute appendicitis can aid in increasing the accuracy.

2. Materials and Methods

Total 213 cases were studied, out of which 153 were male and 60 were female. Our inclusion criteria were all patients attending hospital with clinical diagnosis of acute appendicitis and undergoing appendectomy. Pregnant females, patients on steroids, immunocompromised patients, patients on chemotherapy for malignancy and appendicular lump were excluded from study. Clinical diagnosis of acute appendicitis was, based on symptoms of pain in right iliac fossa, migration of pain to right iliac fossa, nausea/vomiting, anorexia, fever and signs of peritoneal inflammation like right iliac fossa tenderness, rebound tenderness and guarding. Mean platelet volume (MPV), was estimated in all patients of suspected acute appendicitis. The cut-off point kept for MPV for

acute appendicitis in our study was 7.6 fL. Patients with strong suspicion of acute appendicitis were advised appendectomy. After obtaining consent, patient was operated, and the appendectomy specimen was sent for histopathological examination. The histopathology report was considered as the final diagnosis.

3. Results

Total 213 patients were studied, out of which, 153 (71.8%) were male and 60 (28.2%) were female. Maximum percentage of patients belonged to age group 21-30 years (46%), followed by 31-40 years (27.2%) age group. The Male: Female ratio in the present study was 2.5:1. Out of 213 cases, 209 (98.1%) specimens revealed histopathologically inflamed appendix and 4 (1.9%) specimens did not reveal histopathologically inflamed appendix. So the negative appendicectomy rate in our study is 1.9%.Out of the four negative appendectomy, two patients were males and two were females. In one female patient, there was twisted right ovarian cyst; in rest of the three patients the diagnosis could not be made. MPV was done in all 213 patients. In our study Mean platelet volume (MPV<7.6 fl) was positive in 176 patients (82.6%) out of which 175(82.6%) patients had histopathologically confirmed features of inflamed appendix and 1 had histopathological normal appendix.(Table 1) In our study, sensitivity, specificity and accuracy of Mean platelet volume (MPV) in acute appendicitis was 83.73%, 75% and 83.56% respectively.

Table 1: Distribution of patients according to mean platelet volume (MPV)

MPV (<7.6 fl)	Number	%	Histopathologically Inflamed appendix	Histopathologically Not inflamed appendix	P-value
Positive	176	82.6	175	1	0.002 (Highly Significant)
Negative	37	17.4	34	3	

Table 2: The sensitivity, specificity, and accuracy of Mean platelet volume (MPV) in acute appendicitis in present study are weighed against other studies as below

Study Group	Sample size	Sensitivity	Specificity	Accuracy
Albayrak *et al*[13]	226	73%	84%	-
Present study	213	83.73%	75%	83.56%

4. Discussion

Acute appendicitis is the most common abdominal emergency presenting to a clinician. Despite the advances in the diagnostic field, the diagnosis of acute appendicitis remains an enigma for the surgeon [7]. The Mean Platelet volume (MPV) implies the total volume of megakaryocytes in circulation. [8-12] MPV is detected during routine blood count which is usually missed by treating clinician. There are many studies performed on adults that indicate that MPV values may be a valuable method in the diagnosis of acute appendicitis [13]. It is proposed that in acute inflammatory conditions activated leucocytes secrete interleukin-6 that causes a decrease in MPV value by reducing platelet production [12, 20-22, 24]. In the literature, MPV has been reported to decrease in some inflammatory bowel diseases such as ulcerative colitis, especially in the active period, and that it could be used for determination of the disease activity[12,15,23-25] The pathogenesis of this decrease in MPV has not been fully explained, it seems reasonable to explain this with the consumption and sequestration of large active platelets in the vascular segments of the inflamed bowel as Danese *et al*. claimed [26].

In our study Mean platelet volume (MPV<7.6 fl) was positive in 176 patients (82.6%) out of which 175(82.6%) patients had histopathologically confirmed features of inflamed appendix and 1 had histopathological normal appendix. Mean platelet volume value was found to be significantly lower in acute appendicitis patients in our study. This finding is similar to the result of the study carried out by Albayrak *et al* [13]. In our study, sensitivity, specificity and accuracy of Mean platelet volume (MPV) in acute appendicitis was 83.73%, 75% and 83.56% respectively. (Table 2)

The above mentioned results show that the sensitivity of MPV in acute appendicitis in our study is higher than the results mentioned by Albayrak *et al*, but specificity of MPV in our study is low as compared results by Albayrak *et al*. Out of 213 cases, 209 (98.1%) specimens revealed histopathologically inflamed appendix and 4 (1.9%) specimens did not reveal histopathologically inflamed appendix. So the negative appendicectomy rate in our study was just 1.9%.

5. Conclusion

It is concluded from our study that the patients with right iliac fossa pain with provisional diagnosis of acute appendicitis, low MPV (<7.6fl) help in the diagnosis of acute appendicitis and the negative appendectomy rate can be decreased if

appendectomies are avoided in cases where MPV>7.6fl. As MPV value is included in the complete blood count analysis, the MPV value may be taken into consideration along with the total leukocyte count (TLC) in patients with suspected acute appendicitis. Diagnostic laparoscopy may detect other abnormality especially in females with suspected acute appendicitis.

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