Evaluation of plasma serotonin concentration in acute appendicitis

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Background: Due to lack of reliable biochemical/radiological markers, the diagnosis of acute appendicitis is based only on clinical features. Methods: We estimated plasma serotonin levels in 48 patients with acute appendicitis (histologically proven), 27 patients with abdominal pain of other etiologies, and 20 healthy controls. Results: The plasma serotonin levels were (mean ± SD) 36.6 ± 12.5 nmol/L, 12.5 ± 3.6 nmol/L, and 10.4 ± 3.5 nmol/L in the three groups, respectively. The levels in patients with acute appendicitis were significantly higher (p <0.001) than in the other groups, giving 93.8% sensitivity and 95.7% specificity to the test. Conclusion: Plasma serotonin level is a reliable marker of acute appendicitis, especially in the first 48 hours. [Indian J Gastroenterol 1997; 16: 18-19]

Key words: Acute abdomen, appendix

Acute appendicitis is a frequent cause of acute abdomen, affecting about 7% of the population at some time during life. Despite significant progress in surgical treatment, the diagnosis is based primarily on clinical grounds because of lack of reliable and specific biochemical or radiological diagnostic tools.

The incidence of negative laparotomy in acute abdomen is high (20% - 25%) and may be still higher (40%) in women of child-bearing age. Attempts to reduce this have succeeded only at the cost of increased chances of burst appendix (59% in extremes of age), which is the principal cause of mortality and morbidity.

The appendix contains numerous serotonin-secreting (enterochromaffin) cells. Damage to tissues in acute appendicitis leads to increased serotonin concentration in the plasma, and a positive correlation has been shown. We assessed the efficacy of plasma serotonin estimation in diagnosing acute appendicitis.

Methods

Prior consent was taken from all the patients and the proposed study was approved by the Ethics Committee. In this prospective, controlled study, plasma serotonin levels were estimated in 95 subjects. They included 48 patients with acute appendicitis established on histology (Group I), 27 patients with abdominal pain of other etiologies (Group II) including seven patients suspected preoperatively to have acute appendicitis, but proved not to have it at surgery, and 20 healthy subjects (Group III).

Patients with history of diseases recognized to cause serotonin elevation or having taken foodstuffs containing serotonin were excluded from the study.

Serotonin estimation

Ten milliliters of blood were collected in a prechilled polypropylene tube containing 1 mL of trisodium citrate solution (0.12 mol/L) as anticoagulant. Plasma was separated by centrifugation at 2000 rpm for 10 min in a refrigerated centrifuge. This plasma was again centrifuged at 5000-6000 rpm for 30 min and serotonin estimation was done by spectrophotofluorometric method in supernatant platelet-poor plasma.

The values were compared by the Student’s t test for unpaired data.

Results

The patients with acute appendicitis included 37 with or without perappendicitis and 11 with perforated/gangrenous appendicitis.

The plasma serotonin levels were significantly higher (mean ± SD 36.6 ± 12.5 nmol/L vs 12.5 ± 3.6 nmol/L; p < 0.001) in patients with acute appendicitis as compared to those with abdominal pain of other etiologies (Fig). The latter group had values similar to those in healthy subjects (10.4 ± 3.5 nmol/L). There was no difference in levels between patients with acute appendicitis with perforation/gangrene and those without.

Forty five of the 48 patients with acute appendicitis had raised serotonin levels (>20.5 nmol/L), giving a sensitivity of 93.8%. Levels were also increased in two patients with abdominal pain of other etiologies, giving a specificity of 95.7%.

Patients who presented within 24 h (n=11) of onset of symptoms had higher levels (50.6 ± 11.5 nmol/L; p < 0.001) of plasma serotonin as compared to those who presented between 24 h and 48 h (n=22) and those who presented after 48 h (n=4) (36.6 ± 12.6 nmol/L and 18.7 ± 7.6 nmol/L, respectively). Levels were higher (p < 0.001) in patients coming to hospital within 48 h; in patients who came after 48 h, levels were similar to those in healthy subjects.

Discussion

Efforts to find imaging techniques for the diagnosis of acute appendicitis have been largely unrewarding. Plasma serotonin concentration assay has been suggested as a sensitive and specific diagnostic indicator of acute appendicitis, with a
cells with progression of the disease or lower serotonin contents in the appendix due to previous attacks of subclinical appendicitis resulting in fibrosis.

We conclude that plasma serotonin level is higher in cases with acute appendicitis, more so in the early phase of the disease, making this a reliable diagnostic test for the condition.

References

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Received May, 1996. Received in final revised form August 14, 1996. Accepted August 24, 1996