Routine Measurement of Serum Amylase in Acute Abdomen

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ABSTRACT

Background: Acute abdominal pain is a common condition presenting to both the emergency department (ED) and surgical admission unit. Increase in serum amylase levels are found in much gastrointestinal pathology. Serum amylase level is consistently high in acute pancreatitis though high values are not pathognomonic of pancreatitis .The aim of this study to assess the level of serum amylase in various diseases presenting with acute abdominal pain and to evaluate the role of routine measurement of serum amylase in the screening of patient with acute abdominal pain for the diagnosis of acute pancreatitis in a prospective series.

Methods: A prospective observational study was performed from 15th May 2014 – 15th Nov 2014 (6 months) at Department of Surgery of Kathmandu medical College Teaching Hospital; Kathmandu. All consecutive patients presented at emergency department and required admissions in surgical ward were included. A multivariate analysis was performed to assess the level of serum amylase in various diseases presenting with acute abdominal pain including acute pancreatitis.

Results: Overall, 318 patients were included during a period of 6 months among them 48 patients were excluded. 34 cases (12.6 %) were diagnosed of acute pancreatitis. three cases (1.1%) of non pancreatic pathology with raised serum amylase level (> 1000 U\L).

Conclusions: Routine assessment of serum amylase is helpful in excluding differential diagnosis of patient presenting with acute abdomen and this study identified serum amylase as a good screening tool if done in cases with clinical suspicion.

Keywords: *acute abdominal pain; acute pancreatitis; serum amylase.*

INTRODUCTION

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Acute abdominal pain is a common condition presenting in both the emergency department (ED) and surgical admissions unit. The presentation of a patient with acute abdominal pain often is both a diagnostic and therapeutic challenge. A number of diagnostic tests are routinely performed in the ED so that results are available when clinicians arrive to assess patients.

Acute abdomen accounts for approximately 7% of ED visits.¹ Incidence of Acute pancreatitis in UK is between

100-250 per 1,000,000 populations per year.² Serum amylase level is consistently high in acute pancreatitis. Very high values are found in the first 24 hours. Unfortunately, high values are not pathognomonic of pancreatitis.³

Correspondence: Dr. Roshan Ghimire, Department of Surgery, Kathmandu Medical College and Teaching Hospital, Kathmadu, Nepal. Email: roshanghimire@mail.com, Phone: +977-9841280037. Increase amylase levels are found in much other gastrointestinal pathology as well⁴. In some cases of pancreatitis, enzyme concentration may be normal.⁵ Amylase may be released into circulation due to tissues damage containing high levels of enzyme and escaping from the gastrointestinal tract.⁶

Most of the cases of acute pancreatitis are of mild types which are self limiting though better outcome can be generated if identified and managed early.⁷

Amylase is good tool of screening pancreatitis because level of serum amylase is much higher in these cases than in other gastrointestinal pathology.⁸

This study was conducted to assess level of serum amylase in acute pain abdomen and its usefulness to screen acute pancreatitis.

METHODS

A hospital-based prospective observational study was performed including all consecutive patients with acute abdomen from 15^{th} May 2014 – 15^{th} Nov 2014 presented to ED and then admitted in department of surgery KMCTH. Exclusion criteria consisted of age group < 16 years and patient transferred from other hospital diagnosed as acute pancreatitis and managed primarily in other center. Acute abdomen with history of abdominal trauma was also excluded.

Informed consent was taken

Among these cases selected elements from the history, physical examination, laboratory values, diagnosis and treatment were recorded.

Historical Variables included: a) History of alcohol abuse, Gall stones disease (previously detected), History of previous pancreatitis, b) Location, Character, radiation of pain (c) Aggravating and relieving factors (d) history of anorexia, nausea and vomiting.

Physical findings evaluated were: (a) Abdominal tenderness, (b) Muscle guarding and (c) Rebound tenderness

Emergency medical staff sent serum amylase routinely in all cases of acute abdomen. The laboratory values of Serum amylase levels were recorded. Serum amylase level > 1000 U\L was used as a diagnostic tool for rapid diagnosis of acute pancreatitis.⁹

Diagnosis of acute pancreatitis was based according to revised Atlanta criteria.¹⁰

- B) level of biochemical marker; amylase
- C) Evidence of pancreatic inflammation by imaging studies.

According to our protocol, serum amylase and ultrasound of abdomen was done in all cases but computerized tomography scan was performed only to establish diagnosis if required.

Cases of acute pain abdomen were classified into two groups

a) Group of acute pancreatitis

b) Acute abdomen with other etiology

Level of serum amylase was assessed in both the groups.

All the collected data were evaluated and analyzed. Using the cut off value of serum amylase as more than 1,000 IU/L, sensitivity and specificity, positive predictive value and negative predictive value were calculated in establishing the diagnosis of acute pancreatitis in acute abdomen.

The final diagnosis with the aid of further assessment of each case was recorded. The correlation between associated symptom with acute abdominal pain, level of serum amylase level and final diagnosis was made.

RESULTS

Total of 318 patients were studied. 48 patients were excluded on the grounds of eligibility. Of the 48 patients, 20 patient were of pediatric age group (<16 years) and 28 patient transferred from other hospital.

Total of 270 patients were analyzed with mean (SD) age was 44 years.

Out of 270 patients, 34 patients were finally diagnosed to have acute pancreatitis and 236 patients were found to have other pathology.

Etiologies of acute pancreatitis in this group were and 18 patients diagnosed with Gall stone disease, alcohol in 12 patients, one patient with Steroid induced and 3 were kept as idiopathic cause.

202 patients of acute abdominal pain had routinely requested enzyme measurement, 68 patients had undergone serum amylase assessment on clinical suspicion of acute pancreatitis.

Diagnosis of pancreatitis was not strongly related to level of serum amylase alone, diagnosis was confirmed as guided by revised Atlanta criteria (Table 1).

A) typical pain abdomen

Table 1. Serum amylase level in various conditions presenting with acute abdominal pain.							
Diagnosis	Number of cases	Serum Amylase					
		< 400 U	400 U - 1000 U	>1000 U			
Acute pancreatitis	34	1	4	29			
Perforated DU	6	0	5	1			
Acute Appendicitis	115	112	3	0			
Intestinal obstruction	36	27	9	0			
Urinary Tract disease	22	22	0	0			
Gall bladder disease	30	21	8	1			
Mesenteric ischemia	2	0	1	1			
Acid peptic disease	1	0	1	0			
Others	24	24	0	0			
Total	270	207	31	32			

Of the 32 patients with elevated serum amylase (>1000 IU/L), 29 patients ultimately given a diagnosis of acute pancreatitis where as four patients with acute pancreatitis had serum amylase value ranging from 400 IU/L to 1000 IU/L and one patient had serum amylase value of <400 IU/I. Three patients with a truly dramatic elevation of serum amylase (>1000U) out of which one had perforated duodenal ulcer, one had gall bladder perforation and next one had mesenteric ischemia.

The large majority of patient with normal serum amylase were considered not to have acute pancreatitis although one patient out of 207 were diagnosis of acute pancreatitis with serum amylase <400U with the aid of CT scan. Four out of 31 patients had serum amylase between 400 IU/L to 1000 IU/L.

Serum Amylase	Pancreatitis	Non Pancreatitis
Amylase >1000U\L	29	3
Amylase 400- 1000 U\ L	4	26
Amylase <400 U\L	1	206

Test(U\L)	Sensitivity	Specificity	Positive Predictive value (PPV)	Negative Predictive value (NPV)
Amylase > 1000	85.2%	98.72%	90.06%	97.89%
Amylase > 400	95.83 %	86.39%	36.50%	99.60%

DISCUSSION

In this study we attempted to evaluate the use of one laboratory test, total serum amylase level which is frequently used in our hospital at emergency department and surgery ward in the evaluation of patient with a chief complaint of abdominal pain.

We identified 34 cases (12.6 %) of acute pancreatitis out of 270 patients of acute abdominal pain. 29 cases (10.7 %) of acute pancreatitis had significant rise in serum amylase levels (> 1000 U\L) and three cases (1.1%) of non pancreatic pathology had serum amylase > 1000 U\L .

At a diagnostic threshold of 1000 U\L of serum amylase, Sensitivity 79.17% Specificity 98.30%, PPV 79.17% and NPV 98.30%. They concluded that there was no additional benefit in performing both tests Assay of single enzyme (Lipase) based on clinical suspicion results in cost savings.11

Serum lipase is believed to be superior in sensitivity and specificity for the diagnosis of acute pancreatitis.12 Serum amylase levels are determined often in the absence of historical or physical findings suggestive of acute pancreatitis only to facilitate clinical examination. .Laboratory and radiographic tests comprise upto 25% of hospital costs.¹³ Emergency house staffs in particular tend to over utilize the clinical laboratory.14

Acute pancreatitis 34 (50 %) were detected with the help of serum amylase done with clinical suspicion in 68 cases however 202 patients out of 270 (74.8%) was done routinely. This study identified serum amylase good diagnostic marker of acute pancreatitis if done in a case of clinical suspicion.

In summary, patient presented with acute abdominal pain with suspicion of acute pancreatitis clinically, evaluation of serum amylase level was a reliable

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diagnostic marker. And it is equally important to differentiate other possible diagnosis as well. Though we have not studied detail about the cost effectiveness of this test, it seems not to be used as a routine blood test.

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