



A PROSPECTIVE OBSERVATIONAL STUDY OF SERUM AMYLASE IN PATIENTS OF GASTROINTESTINAL PERFORATION

General Surgery

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ABSTRACT

Serum amylase elevations can occur in patients with small intestinal obstruction, mesenteric ischemia, tuboovarian disease, renal insufficiency, or macroamylasemia. Rarely, elevations may reflect parotitis. An upper quadrant abdominal pain with elevated amylase serum concentration could be associated with gastro-intestinal (GI) perforation. A prospective observational study study on 100 cases admitted with a probable diagnosis of gastrointestinal perforation either traumatic or non traumatic at Department of General Surgery, JLN Medical College & Hospitals, Ajmer. Males 60 (60%) were more as compared to females 40 (40%) and mean age is 38+13 years. Serum amylase level was between 160-200 in majority of cases while in 10 cases it was >300. Serum lipase level ranging from 5.6 - 51.3 but in the higher serum amylase cases (3 or more than 3 times) serum lipase also increases (suggestive of pancreatitis). Serum amylase level depends on factors like site of perforation, size of perforation. Significant elevation of serum amylase level is found in patients with gastroduodenal perforation and with larger size perforation.

KEYWORDS

Serum amylase, gastrointestinal perforation, enteric perforation.

INTRODUCTION :

Amylase is found throughout the digestive tract and may be elevated from numerous medical conditions, certain drugs or surgical procedures, or can remain normal in alcohol-induced pancreatitis or in cases caused by hyper-triglyceridemia¹. Normal range of serum amylase is 28-100 U/L units based on amount of glucose liberated from starch during incubation with the serum.

When inappropriately activated, trypsin causes pancreatic inflammation and auto-digestion, which can cause a release of amylase and lipase into the serum². Amylase may be released into circulation due to tissues damage containing high levels of enzyme and escaping from the gastrointestinal tract³.

Serum amylase is one of the biochemical investigations used most frequently by physicians when acute pancreatitis is suspected because of its availability, rapidity, and being inexpensive, although it may be elevated in several extra-pancreatic pathologies but at different magnitude. Serum amylase elevations can occur in patients with small intestinal obstruction, mesenteric ischemia, tuboovarian disease, renal insufficiency, or macroamylasemia⁴. Rarely, elevations may reflect parotitis. An upper quadrant abdominal pain with elevated amylase serum concentration could be associated with gastro-intestinal (GI) perforation. The serum half-life of amylase is short, and elevations generally return to the reference ranges within a few days.

Pancreatic digestive enzymes, especially amylase and lipase, are leaking into the circulation in small quantities under normal circumstances but in acute pancreatitis there will be major leakage and high serum amylase and lipase can be of diagnostic value⁵.

Causes of Elevated Serum Amylase :

- Primary Pancreatic :** Acute and chronic pancreatitis, Pseudocyst of pancreas, Penetrating peptic ulcer
- Condition which probably produce their effect at the ampullary level :** Carcinoma ampulla of vater Carcinoma, head of pancreas, common bile duct exploration, Acute cholecystitis Common bile duct stone
- Abnormal renal excretion of enzyme :** Chronic renal insufficiency, Acute reversible renal failure, Shock
- Diseases which produce a gastro-intestinal leak or exudates :** Perforated peptic ulcer, Mesenteric vascular occlusion, Small bowel obstruction

Serum amylase exists in two isoenzyme sub-types⁶

1. Pancreatic amylase (P-amylase) : synthesized by pancreatic acinar cells and secreted via pancreatic duct to the lumen of duodenum in its active form. Represents 35-50% of normal serum amylase.

2. Salivary amylase (S-amylase) : produced by the salivary glands, which initiates its action in the oral cavity and terminates by acid in stomach, and found in smaller amounts in ovaries, fallopian tubes, lungs, and adipose tissue.

Aims And Objectives

- To determine serum amylase level in patients of gastrointestinal perforation.
- To predict the site and size of gastrointestinal perforation with the help of serum amylase.
- Using serum amylase as a prognostic tool in patients with gastrointestinal perforation.

MATERIAL AND METHODS

A prospective observational study study on 100 cases admitted with a probable diagnosis of gastrointestinal perforation either traumatic or non traumatic at Department of General Surgery, JLN Medical College & Hospitals, Ajmer.

Patients with acute epigastric or diffuse abdominal pain (without previous history of acute / chronic pancreatitis and without systemic signs and symptoms of acute / chronic pancreatitis), presenting to the hospital within 6-12 hours of the onset of symptoms.

Inclusion Criteria

- All patients admitted with signs suggestive of GI perforation assessed clinically / USG / CT.
- Age group (12-60 years) both male and female.
- X-ray abdomen erect with free gas under diaphragm.

Exclusion Criteria:

- Drop outs and patients not willing for study.
- Chronic Alcoholics
- Patients with acute / chronic Pancreatitis
- Patients with Pancreatic tumours
- Patients with cholecystitis
- Shock and unconscious patients

Written informed consent was obtained from all study subjects before enrolment in the study. Data on patient's duration of symptoms, clinical findings, serum amylase, serum lipase were recorded. All the above details were recorded on pre-defined Proforma. All routine investigations were done.

The normal values are :- Serum amylase : 28-100 U/L

Statistical Analysis

To describe about the data descriptive statistics mean+S.D were used. In all the above statistical tools the probability value 0.05 is considered

as significant level.

RESULTS:

During the study period, a total of 100 patients were assessed with probable diagnosis of gastrointestinal perforation either traumatic or non traumatic.

Males 61 (61%) were more as compared to females 39 (39%). Maximum patients 49 (49%) were in the age group of 21-40 years and mean age is 38+13 years. There were 61 (61%) smokers in the study.

	Number (n=100)	Percent
Age Distribution (years)		
0-20	12	12
21-40	49	49
41-60	39	39
Sex Distribution		
Male	61	61
Female	39	39
Habit		
Smoker	61	61
Non Smoker	39	39
Serum Amylase		
Normal (Upto 200)	86	86
High (More than 200)	14	14
Serum Lipase		
Normal	90	90
High	10	10
Serum Calcium		
Normal	89	89
Low	11	11
Serum Calcium		
Normal	89	89
Low	11	11

Serum amylase level was between 160-200 in majority of cases while in 10 cases it was >300. Serum lipase level ranging from 5.6 - 51.3 but in the higher serum amylase cases (3 or more than 3 times) serum lipase also increases (suggestive of pancreatitis).

DISCUSSION:

Overall, 100 patients included with mean (SD) age of 38+13 years, minimum and maximum ages were .respectively, Males 61 (61%) were more as compared to females 39 (39%). Fifty-five of them were under 60 years of age and the reminders thirteen were above that age. Normal serum amylase values was observed in thirty seven patients (14 males and 23 females), while ten men and twenty-one women had high amylase titers, totaling thirty one cases, and resultant p-value of 0.7 indicating that gender does not have an important impact when serum amylase test is undertaken.

Regarding patients age, twenty-five out of fifty-five patients had raised serum amylase were younger than 60 years, meanwhile those of 60 years or older were 13 cases with only 6 having elevated amylase, also pointing to that age of patients is insignificant (p-value 0.9). An important influence on the frequency of amylase increment is time of presentation of the patients to hospital, as amylase rises quick, within (3-6 hours) of symptomatic commencement, and stays elevated for 3 to 7 days. In our study serum amylase level was high during the first six hours of symptoms in seventeen, in the next six hours in thirteen, and the following 12 hours in just a patient, which determines a great effect of time with elevation of serum amylase level (p-value 0.03), such finding is consistent with a study done by Basnayake et al. (2015) which also supports a rapid increase within the first 3-6 hours of symptoms, but can return to normal after twenty-four hours due to the fact of a relative short half-life (10-12 hours). This finding is consistent with another study by Ghimire and colleagues⁸ in Katmandu Medical College, in which highest values of serum amylase was noted in the first twenty-four hours.

CONCLUSION:

Serum amylase level depends on factors like site of perforation, size of perforation. Significant elevation of serum amylase level is found in patients with gastroduodenal perforation and with larger size perforation.

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