

## Superior Mesenteric Artery Syndrome Causing Normal pH Diabetic Ketoacidosis in Type 1 Diabetes

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### Abstract

Diabetic ketoacidosis may be presenting feature of Type 1 Diabetes Mellitus. Occasionally normal pH DKA is seen with significant electrolyte loss following vomiting. A case of 20-year-old boy presenting with osmotic symptoms and recurrent vomiting for 1 month with postprandial upper abdominal pain is reported here. Investigation suggested Superior mesenteric artery (SMA) syndrome as underlying cause of vomiting in this case. This case report merits publication to highlight rare occurrence of one of the related causes of persistent vomiting complicating DKA in Type 1DM.

### Case Report

A 20-year-old male patient attended emergency room with complaint of pain abdomen and recurrent vomiting. He was diagnosed to have type 1 diabetes mellitus with diabetic ketoacidosis. The abnormal biochemical findings included ABG, PH 7.4, HCO<sub>3</sub> 19, CO<sub>2</sub> 32 mmHg, K: 3.3 meq/L. Ketones were positive in urine. Serum amylase and lipase were normal. Patient was started on insulin and discharged. Within 3 days' patient was again admitted with same complaint of abdominal pain, distension and recurrent vomiting. Serum amylase and lipase was repeatedly normal. Ultrasound abdomen revealed duodenal obstruction. The upper GI endoscopy showed a distended stomach full of gastric residue. Barium meal follow through was done which revealed marked delay in passage of the contrast from the duodenum into the more distal small bowel. Passage of contrast halted abruptly at the third portion of the duodenum. The proximal duodenum and stomach were dilated with prolonged retention of barium (Figure 1).

Diagnosis of SMA syndrome was made. Patient was managed conservatively with fluid and electrolyte repletion. Patient was advised small frequent meals and lying in prone or left lateral decubitus position. Subsequently pain abdomen resolved. On follow up patient gained weight with significant improvement in symptoms.

### Discussion

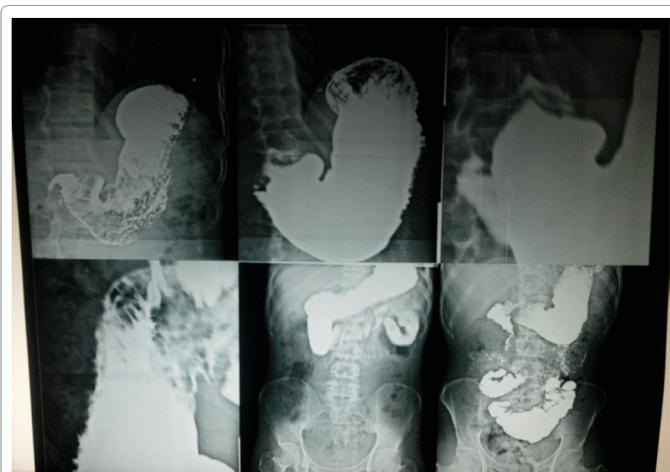
Diabetic ketoacidosis may be presenting feature of type 1 diabetes and at times recurrent vomiting associated with DKA may lead to

normal pH or metabolic alkalosis in a patient with diabetic ketoacidosis. Causes of recurrent vomiting in diabetic ketoacidosis are gastritis and gastric dilatation [1].

Superior mesenteric artery compressing duodenum might occur in patient with significant weight loss due to medical disease [2,3]. This entity is recognized as superior mesenteric artery syndrome which is a rare disorder in which clinical signs and symptoms are caused by compression of the third portion of the duodenum between the angle made by the aorta and the superior mesenteric artery (SMA) [4-7]. Typical symptoms of the SMA syndrome are postprandial upper abdominal pain and distress, early fullness, nausea, and vomiting. The compression can be demonstrated by barium meal study showing obstruction at the gastric outlet [8]. The primary treatment is conservative with fluid resuscitation and proper positioning of the patient during feeding, which includes the modified knee-chest, prone or left side down positioning, which increases the aorto-mesenteric angle. Surgical bypass is reserved when conservative measures have failed. If necessary, the passage of a tube past the point of obstruction, jejunostomy placement or Strong's operation (mobilization of the ligament of Treitz) may be needed.

In the present case, superior mesenteric artery syndrome as a result of significant weight loss due diabetes was the cause of recurrent vomiting and normal pH diabetic ketoacidosis complicating DKA. This led to normal pH with ketonuria and hyperglycaemia. This case report suggested that a possibility of SMA should be considered in type 1 diabetes mellitus with normal pH DKA and persistent vomiting with upper abdominal pain.

This is unique case report which was not published in literature on diabetes. failure of identification of this disorder might be cause of paucity of reporting this syndrome.



**Figure 1:** Upper gastrointestinal series showing partial gastric outlet obstruction due to compression from outside the stomach wall on 3<sup>rd</sup> part of duodenum.

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## Conclusion

Type 1 diabetes causing rapid weight loss may be one of the causes of SMA Syndrome. This syndrome may complicate development of DKA by causing metabolic alkalosis and masking the picture of acidosis. Presence of normal pH with ketonuria and hyperglycemia in type 1 diabetes mellitus with persistence of upper gastrointestinal obstructive features led to SMA syndrome in this case report which was managed successfully. The diagnosis of SMA in type 1 diabetes mellitus will help reassuring the patient and avoiding invasive tests.

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