

Persistent chronic calcific pancreatitis with intraductal calculi associated with secondary diabetes mellitus type 3 and diabetic ketoacidosis – A case report

Gurusha BAHL¹, Dinesh K. UPADHYAY¹, Madhumati VARMA², Rajveer SINGH¹, Subhankar DAS¹, Sadique HUSSAIN¹

¹School of Pharmaceutical Sciences, Jaipur National University, Jaipur, Rajasthan, India; ²Department of Medicine, Jaipur National University, Institute for Medical Sciences and Research Center, Jaipur, Rajasthan, India
E-mail: sadiquehussain007@gmail.com

Diabetes mellitus type 3 refers to diabetes secondary to an existing disease or condition of the exocrine pancreas and is an uncommon cause of diabetes occurring due to pancreatogenic pathology. It accounts for 15–20% of diabetic patients in Indian and Southeast Asian continents. This is case report of a rare case of type 3 diabetes mellitus (T3DM) presenting with diabetic ketoacidosis (DKA). The patient was admitted for DKA along with complaint of hyperglycemia, blood glucose of 405 mg/dl with HbA1c level of 13.7%. Computed tomography evidence revealed chronic calcific pancreatitis with intraductal calculi and dilated pancreatic duct.

Key words: pancreatogenic diabetes mellitus, type 3 diabetes mellitus, diabetic ketoacidosis, chronic pancreatitis

Diabetes mellitus (DM) is a group of metabolic disorders mainly characterized by hyperglycemia (high blood glucose levels), polyphagia, polydipsia, and polyuria resulting from defects in insulin secretion, insulin action or both (Alam et al. 2021; Hussain & Shamra 2022). Symptoms of diabetes include increased thirst, blurred vision, frequent urination, slow-healing sores or cuts, frequent unexplained infections, dry mouth, numbness or tingling in the hands or feet (Kumari et al. 2020). Pancreatogenic DM is classified as a form of (type 3c) of secondary or type 3 DM (T3DM, T3cDM) by the American diabetes association and refers to DM secondary to an existing disease or condition of the exocrine pancreas (Egan and Dinneen 2019; Hart et al. 2021). According to Ewald et al. (2012), about 78.5% patients of T3cDM suffer from the chronic pancreatitis (CP).

Pancreatogenic diabetes accounts for 15–20% of diabetic patients in Indian as well as Southeast Asian continents where fibrocalcific pancreatitis is endemic

(Sanyal and Bhattacharjee 2022). As per Cui and Andersen (2011), T3cDM affects approximately 5–10% of Western diabetic populations and fibrocalcific pancreatitis is estimated to be the etiology of diabetes for as many as half of all young patients suffering from diabetes in India (Kulkarni et al. 2020). Universally, there are no accepted diagnostic criteria for T3cDM, but the commonly known criteria were proposed by Ewald and Bretzel (2013). Diagnosis can be made in patients who meet the following three basic criteria: 1) fulfilling the diagnostic criteria for diabetes, 2) having a disease of exocrine pancreas and 3) having diabetes secondary to their exocrine pancreatic disease (Hart et al. 2016). This patient was diagnosed with pancreatic T3cDM with diabetic ketoacidosis (DKA).

Case report

Male 36-year-old patient with worsening glycemc control and with complaints of polyuria, polydipsia



Figure 1. Contrast-enhancing computed tomography scan of abdomen showing diffuse parenchymal calcifications and dilated pancreatic duct.



Figure 2. Contrast-enhancing computed tomography scan of abdomen showing chronic calcific pancreatitis with intra ductal calculi.

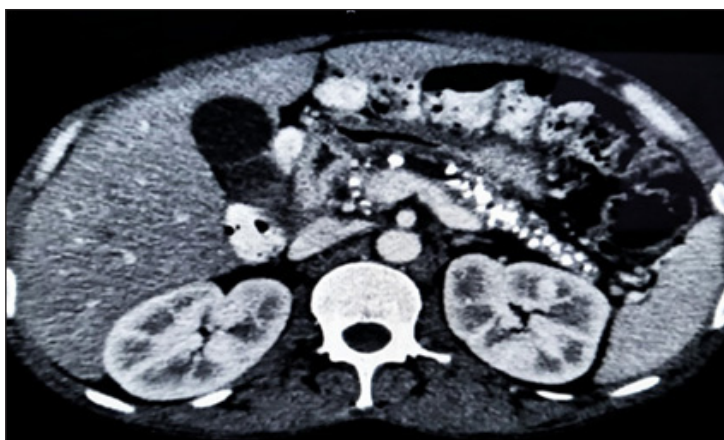


Figure 3. Contrast-enhancing computed tomography scan of abdomen showing multiple calcifications involving the head, body, and tail of the pancreatic parenchyma.

along with progressive and gradual abdominal pain was presented to the male medicine ward in November 2022. Vital signs on presentation were blood pressure 137/96 mmHg, respiratory rate of 18 breaths/min, heart rate of 90 bpm, and temperature 36.94°C. Patient's HbA1c value at the time of admission was 13.7% and plasma glucose random was found to be 405 mg/dl.

Other laboratory investigations showed normal hemoglobin levels but slightly decreased total leukocyte count along with sodium and mild elevation in globulin was observed. A computed tomography (CT) of the abdomen revealed chronic calcific pancreatitis with intraductal calculi and dilated pancreatic duct as shown in Figure 1.

CECT (contrast-enhancing computed tomography) scan of abdomen showed atrophic pancreas with diffuse parenchymal calcification with intra-ductal calculi Figure 2. Patient was given intravenous fluid normal saline 1000 ml in 2 h followed by 120 ml per h and insulin 12 units was started initially followed by 15 units and 20 units before breakfast and 14, 20, 24 units before lunch, and 12, 20, and 24 units before dinner and lantus 10 units was started initially followed by 20 units. Also, tablet metformin 500 mg twice daily was given after meal. Patient was discharged with insulin regular 20 units before breakfast, 24 units before lunch, and 24 units before dinner and 30 min before meal and lantus (insulin glargine) was given 20 units subcutaneously at night. Patient was placed on diabetic diet and diabetic teaching was provided to the patient during the hospital admission. Patient was told to follow up with the primary care physician. The patient was further advised for MRCP (magnetic resonance cholangiopancreatography).

CECT scan of abdomen showed multiple calcifications involving the head, body, and tail of pancreatic parenchyma Figure 3. Calculus of size 8 mm was seen in duct region of body of the pancreas and another calculus of 11 mm was seen in the duct region of head of the pancreas. As shown in ultrasonography, the abdomen was suggestive of mild hepatomegaly with the enlarged size of 16.3 cm.

Discussion

Globally, around 10% of the total diabetic population has been diagnosed with CP, which is characterized by progressive fibrosis, early onset of endocrine dysfunction of pancreas, and irreversible exocrine pancreas. Recurrent and intractable abdominal pain is the dominant clinical feature (Sasikala et al. 2016). Development of diabetes in CP occurs mainly due to destruction of the islet cells by pancreatic inflammation. Nutrient maldigestion also leads to an impaired incretin secretion resulting in reduced insulin release of the remaining beta-cells (Ebert and Creutzfeldt 1980).

Patients suffering from CP must be screened for diabetes with HbA1c. After diabetes confirmation, an autoimmune workup for type 1 diabetes mellitus (T1DM) must be sent to rule out the possibility of late onset T1DM (Melki et al. 2019). Chronic calcific pancreatitis is one of the most common causes of T3cDM, which is commonly underdiagnosed or misdiagnosed (Bahl et al. 2023; Hardt et al. 2008). CT and magnetic resonance imaging (MRI) are the preferred tests to detect CP at the earliest (Kamat et al. 2019). Nutritional management of T3cDM includes regular dietary assessment and monitoring to reduce hyperglycemia, prevent hypoglycemia, prevent malnutrition, and decrease risk of diabetes-related complications

(Duggan et al. 2017). In patients with T3cDM treating exocrine pancreatic insufficiency and preventing lack of fat-soluble vitamins (mainly vitamin D) along with restoring impaired fat hydrolysis as well as incretin secretion are the main features of medical therapy (Ewald and Hardt 2013).

Conclusion

T3cDM is a rare type of pancreatogenic diabetes resulting due to pancreatic pathology. It is often overlooked, underdiagnosed or mistaken consider for T1DM or T2DM. Thus, in patients suffering from CP presenting with diabetic ketoacidosis, it is important to consider about T3cDM for planning effective long-term management. Computed tomography scan and magnetic resonance play an important role in the diagnosis of the small subset of the population affected with T3cDM, which should be considered.

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