An unusual presentation of generalised oedema in a child with type 1 diabetes mellitus and ketoacidosis – A case Report

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Abstract
Insulin oedema is a rare complication seen after initiation or intensification of insulin therapy in children. Oedema may be due to other causes also. Hence, it is important to differentiate insulin oedema from that of cardiac, hepatic or renal cause, as it could be a complication of diabetes per se. In this article we report a 9-year-old girl with insulin oedema and DKA. Very few case reports are available till date worldwide regarding insulin oedema in children with DKA. Through this case report, we aim to raise awareness among doctors, to watch out for insulin oedema during insulin therapy.

Key words: Type 1 Diabetes Mellitus, Insulin oedema, Child

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Introduction:
Insulin oedema is a rare complication seen after initiation or intensification of insulin therapy and only few cases have been reported in the paediatric age group¹. It rarely presents with generalised oedema. Less than 5 cases with generalised oedema have been reported so far in the literature,²

Case report
A 9-year-old girl presented with one week history of polyuria, polydipsia and four days history of progressive oedema of lower limbs with mild abdominal distension. She developed abdominal pain for past two days and
difficulty in breathing since last six hours. She was diagnosed with Type 1 Diabetes Mellitus 6 months ago and started on Insulin Actrapid 2U-4U-2U and Insulin Glargine 0-0-8U. Her compliance to therapy was poor. She had stopped talking insulin for 1 week. Later on while reinitiating insulin therapy, she developed pedal oedema and progressive abdominal distension.

On admission to PICU, her vital parameters were Temperature=36.8°C, pulse rate = 78/min, Respiratory rate = 30/ min and blood pressure = 108/60 mmHg. Her weight =26 kg (0.56 SDS), height = 129cm (-0.61 SDS) and BMI = 15.62kg/m² (-0.29 SDS). She had a GCS of 15/15 with Kussmaul breathing. Bilateral non tender pitting oedema without skin changes was noted along with abdominal distension, mild hepatomegaly and shifting dullness.

Her capillary blood glucose was high and Random Blood Glucose was 456 mg/dl. Metabolic acidosis was noted in ABG with a pH of 7.248 and bicarbonate of 7mEq/L with ketonuria and glycosuria. With a diagnosis of mild DKA, she was treated with continuous insulin infusion and normal saline as per standard DKA protocol. After correction of acidosis, subcutaneous insulin was started at 1U/kg/day to determine daily requirement and then switched to basal bolus regimen; short acting Insulin Actrapid before meals and Insulin Glargine at bed time with total insulin requirement of 1.6U/kg/day following which the oedema increased in severity involving face and abdomen. Ultrasound abdomen was suggestive of mild hepatomegaly with normal liver echo texture, moderate ascites and a normal renal parenchyma. Chest X ray revealed bilateral mild pleural effusion. Her HbA1c was 11.8% suggesting uncontrolled diabetes. Lipid profile was deranged with triglycerides-750mg/dl, total cholesterol-348mg/dl and high-density lipoprotein-46mg/dl. In order to rule out other possible causes, further investigations like renal function tests, liver function tests, serum electrolytes, echocardiography and thyroid function were done and all these tests were normal.

The oedema gradually resolved over the next 7 days after salt and fluid restrictions. At discharge her weight was 20 kgs after losing 6 kgs. The parents were counselled regarding importance of Insulin therapy and discharged after 10 days of hospital stay with the advice to continue Insulin Glargine and Insulin Actrapid @ 0.65U/kg/day.

Figure 1 and 2: Pedal oedema and abdominal distension after initiating Insulin therapy
Discussion

Insulin oedema is defined as an oedema syndrome occurring in patients with either type I or type II diabetes after introduction or intensification of insulin therapy\(^1\). Female preponderance is noted in paediatric age group\(^3\). The extent of oedema varied from pedal oedema, ankle oedema, pretibial oedema, sacral oedema, periorbital oedema or generalised oedema to cardiac failure, ascites, pleural effusion and was not related to the severity of ketosis. Most often only mild ketosis is seen. Usually there is no recurrence of oedema\(^2\).

Incidence of insulin oedema in children with type I diabetes is rare and likely under diagnosed complication of a common treatment in pediatrics. A review of literature was done and only 16 cases of insulin oedema have been reported in children with type 1 diabetes mellitus.\(^2\) The current reported case is the 17\(^{th}\) case worldwide. Most of the reported cases were in the mean age of 13.5 with female preponderance and mostly pedal oedema.

Mechanism of fluid retention may be due to sodium retention and increased vascular permeability by activation of Na\(^+\)-K\(^+\) ATPase and Na\(^+\)/H\(^+\) exchanger in renal tubules and increased Vascular endothelial growth factor (VEGF) expression\(^4, 5\). Temporary inappropriate hyperaldosteronism may contribute to fluid retention\(^6\). Loss of albumin due to increased transcapillary leakage, malnourishment, thiamine deficiency, over hydration, increased glucagon by inhibiting aldosterone have also been attributed\(^7\).

There are no specific guidelines for the treatment of insulin oedema. It usually resolves spontaneously. Fluid and salt restrictions have been found to be useful. For severe oedema, loop diuretics, ephedrine have been tried in some cases\(^2\).

Learning Objectives

Insulin oedema is a possibility in a clinically stable and improving child, during the initial days of insulin therapy or while increasing insulin doses during the management of hyperglycemia.

Hence, parents should be counselled to maintain strict dietary control and treatment compliance in children with type 1 diabetes and regarding the possibility of insulin edema and early presentation for medical attention.

References


