Brief Communication

Can a faulty injection technique lead to a localized insulin allergy?

Trinanjan Sanyal, Sujoy Ghosh, Subhankar Chowdhury, Satinath Mukherjee

Department of Endocrinology and Metabolism, Institute of Post Graduate Medical Education and Research, Kolkata, West Bengal, India

ABSTRACT

Insulin allergy is a rare occurrence which can present diagnostic and management dilemmas for the clinician. Three types of reaction have been reported: Localized, generalized (systemic), and insulin resistance. All need to be considered in cases of suspected insulin allergy. Adverse reactions to insulin have significantly decreased since the introduction of recombinant human insulin preparations. However, cases with insulin allergy continues to present in the clinic. Symptoms range from local injection site reactions to severe generalized anaphylactic reactions. The case study presented here describes an event of suspected insulin allergy arising out of faulty insulin injection technique.

Key words: Antigen presenting cells, insulin allergy, insulin injection technique, insulin

Introduction

Subcutaneous injection of insulin is an effective means of controlling blood glucose levels in patients with type 1 diabetes and many with type 2 diabetes. There are sporadic reports of insulin allergy in the literature, particularly to the 'older' insulins of animal origin, such as neutral protein Hagedorn (NPH), protamine zinc insulin (PZI), and biphasic insulins. Localized allergic reactions are the most frequently reported and are thought to occur as a result of the impurities contained in the older insulins; particularly proinsulin, C-peptide, and other peptides.[1-3] More recently, allergies to the insulin components protamine, metacresol, and phenol have been reported in a series of five patients.[4] Localized reactions to insulin still occur in 5% of patients receiving insulin, despite it now being available in a highly purified state and having the same molecular structure as human insulin.[5] We suggest that the localized urticarial lesions developed at insulin injection sites in our studied case is most likely due to insulin allergy arising out of faulty injection technique.

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Case Report

Patient is a 38-year-old female diagnosed as a case of diabetes mellitus (DM) presented with neuropathic symptoms in a clinic outside our hospital with an initial fasting plasma glucose (FPG): 256 mg/dl, postprandial plasma glucose (PPG): 426 mg/dl. She was put onto inj. premixed insulin (30/70) 12 IU before breakfast and 6 IU before dinner along with metformin 500 mg twice daily after meals (BDPC). A standard 1,200 kCal/day, diabetic diet, and exercise were also advised. She presented to our outpatient department (OPD) 2 months later with a complain of redness and itching at the injection site after administration of insulin (noticed for last 3-4 month after she changed her insulin brand), and burning sensation in both feet specially during the night. She had no family history of DM, no significant past illness (including bronchial asthma), no history of any drug/food allergy. Insulin was administered by her 20-year-old daughter, and she never practiced self-monitoring of blood glucose (SMBG). On examination, her body mass index (BMI) was 22.37 kg/m^2, she had no acanthosis nigricans/skin tag. Other general and systemic examinations revealed no abnormality. She had no sensory loss on 10-g monofilament test and normal ankle brachial index (ABI) values. But her insulin injection sites (over abdomen and thighs) showed multiple pigmented areas with

Corresponding Author: Dr. Triranjan Sanyal, Department of Endocrinology and Metabolism, IPGME&R, Kolkata. E-mail: drtsanyal@gmail.com

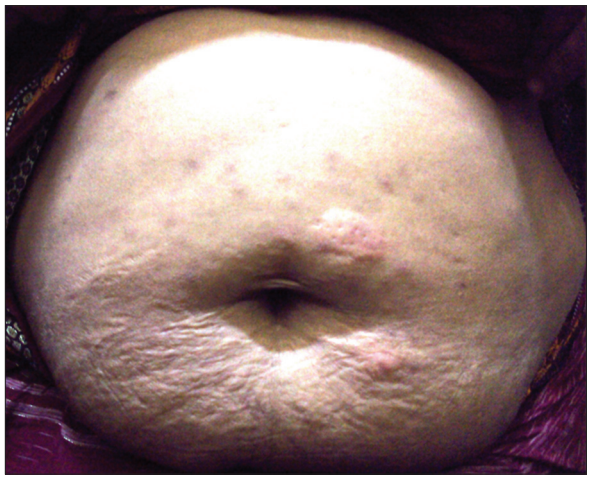

Figure 1: Abdomen site of injection showing hypertrophy and scars

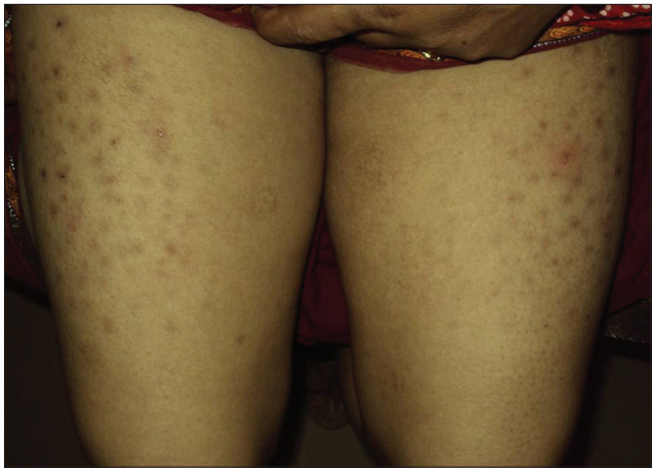

Figure 2: Injection site of thigh showing scars

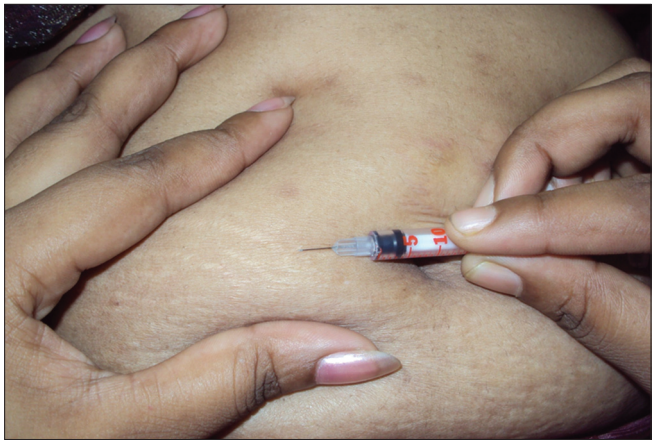

Figure 3: Faulty method of injection

small scars and few urticarial patches [Figures 1 and 2]. She had no lipoatrophy or lipohypertrophy at the injection site.

Her investigations revealed complete blood count (CBC) within normal limit, serum (Sr.) creatinine 0.9 mg/dl, Sr. lipid parameters within normal limit, ultrasonography (USG) abdomen was normal, and present glycemic status: FPG = 201 mg/dl and PPG = 310 mg/dl. When her daughter was enquired about the insulin injection technique, she demonstrated a faulty technique. She used to insert the needle horizontally (not vertically) with the plane of skinfold making an intradermal injection instead of a subcutaneous one [Figure 3].

Discussion

Repeated intradermal insulin injection led to multiple small scarring with pigmentation of the insulin injection site due to local inflammation. Poor glycemic control was due to poor insulin absorption from dermis, and probably a localized insulin allergy manifested as urticarial lesions. The insulin allergy may be explained by presence of plenty of antigen presenting Langerhans cells in the epidermis which may augment presentation of antigenic components of the human insulin such as metacresol and phenol, which acting as haptens can mediate a localized immune response.[6] However, a local skin biopsy and more sophisticated immunological parameters are required to establish this hypothesis.

Our patient was then educated regarding the correct subcutaneous insulin injection technique and after 1 month, on her next visit, her insulin injection sites were found to be absolutely normal and healthy and good glycemic control was achieved.

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