

# First Case Report: Breakage of an Insulin Pen Needle in Subcutaneous Tissue

Najya A Attia<sup>1\*</sup>, Yousef I Marzouk<sup>2</sup> and Nada I Marzouk<sup>3</sup><sup>1</sup>Pediatric Department, King Saud bin Abdulaziz University for Health Sciences, Jeddah, Saudi Arabia<sup>2</sup>King Saud bin Abdulaziz University for Health Sciences, Jeddah, Saudi Arabia<sup>3</sup>Ibn Sina National College for Medical Studies, Saudi Arabia

## Abstract

The majority of patients with type 1 diabetes (T1D) uses an insulin pen for convenience, accessibility, accuracy and reduced injection pain. We report the first case of an insulin pen needle breaking off at the base and becoming embedded in the soft tissue of the abdominal wall. The mother of a 4-year-old boy with T1D injected the boy with long acting insulin using an insulin pen while he was sleeping. He kicked his mother dislodging the needle from the pen and embedding it in the soft tissue of the abdominal wall.

**Keywords:** Insulin pen; diabetes; glucose; Carbohydrate

## Introduction

T1D is a global health problem, affecting mainly children [1]. The Diabetes control and complication trial demonstrated that intensive insulin therapy achieved better blood glucose control than conventional therapy and reduced the severity and frequency of micro- and macro vascular complications [2,3]. One of the insulin regimens, the basal/bolus regimen consists of multiple daily injections (MDI). Basal insulin is long-acting insulin provided once or twice daily as a subcutaneous injection and the bolus is fast acting insulin, injected before each meal in proportion to the size of the meal. Insulin pen devices deliver insulin through variable needle sizes and offer an alternative to the traditional insulin syringe and vial method. Studies have shown that adherence is improved when using an insulin pen [4,5], the administration is less painful than the syringe and vial method [6] and dosage accuracy is improved when used with children and adolescents [7]. Local cutaneous complications of insulin injection include lipohypertrophy, the most frequent complication, lipoatrophy, hypersensitivity to insulin therapy, scarring of tissue under the skin and abscess formation. Most of these cutaneous complications are significantly reduced with the use of recombinant human insulin analogs [8,9]. Breakage of the needle infusion set of an insulin pump or Insulin syringe needle in children with T1D has been previously reported [10,11]. To our knowledge, this is the first case reporting the breakage of an insulin pen needle and subsequently being embedded in abdominal soft tissue.

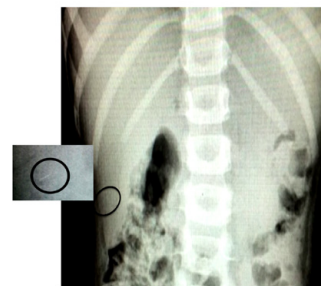
## Case Report

This patient is a 4 year old boy newly diagnosed with T1D who has been started on MDI of subcutaneous insulin with long-acting insulin (Glargine) once daily at 11 o'clock at night as requested by the mother and fast acting insulin (Aspart) according to a carbohydrate counting regimen, matching the amount of carbohydrate eaten with the appropriate dose of insulin. The parents received several educational sessions regarding the insulin injection technique, injection sites and rotation within injection sites. The patient's mother reported that while she was injecting basal insulin, using an abdominal site, he kicked her and the insulin pen was pushed away before completing the dose. She noticed that the needle was dislodged from the pen and she could not find it. The mother was using an insulin pen with a 4mm needle and a 31-gauge in diameter. On examination, the child was stable, not in pain or discomfort with a normal growth pattern (weight, 25th percentile; height, 50th percentile; and body mass index (BMI), 25th percentile). The patient's BMI was 18.65 kg/m<sup>2</sup>. The skin where the needle had been inserted was normal and did not show any erythema or induration and there was no tenderness on manually manipulating the injection site. An

abdominopelvic x-ray revealed small metal radiopaque foreign body seen at the right lower abdomen (Figure 1). A computed tomography of the abdomen and pelvis was done for better localization of the needle place and showed the needle in the soft tissue of the abdomen (Figure 2). The case was discussed with the pediatric surgeon and it was decided to remove the needle under general anesthesia using fluoroscopy to locate the needle.

## Discussion

An insulin pen consists of an insulin cartilage and a dial to measure the dose and is used with a pen needle. The needle is disposable and consists of a plastic hub in which a small needle (3 mm to 12 mm) is embedded and it is designed to allow both a screw-on and a click-on method to attach the needle to the injection pen. The pen needles are short, thin in diameter/gauge (G29 to G31) with a wider bore, to increase the insulin flow and decrease the pressure required to inject the insulin. It is coated with silicon lubrication to minimize local tissue [12,13]. The advantage of the delivery system is a reduction in pain and psychological fear associated with longer needles. However, thinner and shorter needles are more prone to breaking or bending [14]. In



**Figure 1:** abdominopelvic x-ray showing the needle (circle) embedded in subcutaneous tissue.

**\*Corresponding author:** Najya A Attia, Pediatric Department, King Saud bin Abdulaziz University for Health Sciences, Jeddah, Saudi Arabia, Tel: +966505693307; E-mail: [attiana@ngha.med.sa](mailto:attiana@ngha.med.sa)

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**Figure 2:** A CT scan of the abdomen and pelvis showing the needle (circle) embedded in subcutaneous tissue.

our medical center, children and adolescents diagnosed with T1D are supplied with pen needles (4 mm/G31) free of charge when prescribed and they are taught to inject insulin at a 90° angle on the usual injection sites (abdomen, arms, thighs, and buttocks) using the pinch-up skin technique. Most of the T1D patients can use a 5 mm or 6 mm needle to inject insulin subcutaneously with or without pinching-up a skin fold regardless age or BMI [15,16], as magnetic resonance imaging and ultrasound images of injection sites have shown that the average skin thickness at the injection sites range from 1.5 mm to 3 mm [16,17].

The parents of our patient attended several educational sessions regarding the technique of injecting insulin, injection sites and rotation within injection sites but were not informed to avoid injecting insulin while the child is sleeping.

## Conclusion

Insulin pen needles have been used by the majority of children diagnosed with T1D and are considered safe. We report the first case of accidental breakage of the insulin pen needle and it being embedded in the soft tissue of the abdominal wall. The accident happened while the child was sleeping and not aware of the injection. This case may raise awareness that the child should be aroused before being injected or the use a special technique to avoid such an accident is required.

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