

Desensitisation to subcutaneous insulin using CSII followed by i-Port Advance™

ROBERT GREGORY,¹ DAWN ACKROYD,¹ HAMIDREZA MANI,¹ ALEXANDRA CROOM²

Introduction

A patient with type 1 diabetes and severe localised insulin allergy was able to use CSII after desensitisation. When she insisted on stopping CSII, she was able to inject insulin via i-Port Advance™ with no relapse of her symptoms.

Key words: insulin allergy, desensitisation, CSII, i-Port Advance™

Case report

A 70-year-old Philippines woman with a history of adult-onset asthma and hypertension was referred with suspected localised insulin allergy. She had been diagnosed with type 2 diabetes in 2010 and treated initially with oral antidiabetic agents. She was started on biphasic insulin aspart (NovoMix 30®) in February 2015 as the HbA_{1c} concentration had risen to 75 mmol/mol. After 3 months she developed red itchy blotches at her injection sites. The redness and itching occurred immediately after subcutaneous injection, and within 30 minutes a hard lump appeared which took several days to disappear. She had no generalised rash or other features of anaphylaxis. Her injection technique had been checked to exclude intradermal injection. The insulin had been changed to biphasic porcine isophane (Hypurin Porcine 30/70®) and then to insulin glargine (Lantus®) with no change in the symptoms. Her GP had prescribed an oral antihistamine and topical 1% hydrocortisone cream which had not helped. The insulin was discontinued in July 2015 and her diabetes was treated with gliclazide MR, metformin MR and saxagliptin in maximum doses.

She was seen by a consultant allergist who ascertained that she had been diagnosed with asthma at the age of 40 when she moved to England, and also suffered from occasional hay fever symptoms. A local reaction to her insulin injections was diagnosed. Specific IgE levels to human insulin (ImmunoCAP c71) and bovine insulin (ImmunocAP c73) were elevated at 1.92 kUA/L and 3.31 kUA/L, respectively, indicating that the reactions were due to insulin rather than an excipient in the preparations.

¹ Department of Diabetes and Endocrinology, University Hospitals of Leicester NHS Trust, Leicester, UK

² Department of Respiratory Medicine, University Hospitals of Leicester NHS Trust, Leicester, UK

Address for correspondence: Dr Robert Gregory

Diabetes Outpatient Department, University Hospitals of Leicester NHS Trust, Leicester General Hospital, Gwendolen Road, Leicester, LE5 4PW, UK. E-mail: rob.gregory@uhl-tr.nhs.uk

Br J Diabetes 2017;17:34-35
<http://dx.doi.org/10.15277/bjd.2017.116>

Figure 1. Photograph of the subcutaneous infusion site on the right side of the abdomen taken immediately after removal of the cannula one month after starting CSII. Erythema and oedema are visible, consistent with a low grade local reaction despite desensitisation



Skin prick testing with the insulin preparations was not performed. Skin prick testing to common aeroallergens was negative. An obstructive pattern on spirometry (FEV₁/FVC 69%) was noted and she was prescribed both Symbicort and salbutamol inhalers.

Off insulin her diabetic control deteriorated rapidly and she became symptomatically hyperglycaemic (HbA_{1c} 92 mmol/mol) and lost weight. Her anti-GAD antibody was positive, 39 IU/mL (reference range 0–9 IU/mL), and her diagnosis was changed to type 1 diabetes. It was explained that treatment with insulin was the only treatment likely to bring the diabetes under adequate control, so she agreed to attempted desensitisation. This was done using a modification of the rapid desensitisation protocol¹ using serial subcutaneous injections of insulin aspart (Novo-Rapid®) at an initial concentration of 0.0001 units/mL 0.9% saline. This was undertaken as an inpatient, as she was felt to be at higher risk of anaphylaxis because of her asthma. Oral cetirizine was continued during and afterwards. Only when undiluted insulin (100 units/mL) was injected did a localised reaction with redness and oedema appear at the injection site. There were no features of a systemic reaction and her asthma remained stable throughout. She was then started on continuous subcutaneous

Figure 2. Photograph showing the i-Port Advance™ *in situ*. There is little evidence of a localised reaction



insulin infusion (CSII) with NovoRapid® 100 units/mL at an initial rate of 0.5 units/hour. On review after a month there was mild erythema at the infusion sites which did not itch, and a palpable lump which disappeared after a few days and was significantly less than before (Figure 1). The improvement was such that the residual reaction was no longer a barrier to insulin administration.

The patient did not wish to carry on with insulin pump treatment. It became clear that, despite intensive educational and psychological support, using the insulin pump was causing her distress and she was not willing to take on the practical aspects of bolus administration. In order to achieve the desired improvement in blood glucose control it was necessary to find a way to cover both basal and prandial insulin requirements without causing a flare-up of her allergic symptoms. The decision was made to try using i-Port Advance™ to establish whether it would be possible to use insulin detemir (Levemir®) as a basal insulin that would enable her to stop CSII. This was successful (Figure 2). There was no worsening of the injection site reactions and the patient much preferred this method of giving her insulin. At the last review in December 2016 the patient was self-administering

Levemir 8 units in the morning and 6 units at night, and NovoRapid 6 units before each meal. The injections were all given via the i-Port Advance™ and separated by at least an hour to reduce the extent of mixing in the subcutaneous depot. The HbA_{1c} was 62 mmol/mol, a marked improvement in glycaemic control.

Discussion

This is not the first description of the use of CSII to treat localised insulin allergy in patients with either type 1 or type 2 diabetes,²⁻⁶ and our patient's symptoms were significantly and sufficiently improved rather than cured. However, we are not aware of other examples where i-Port Advance™, a device that has been developed to make it possible for people with needle phobia to be able to inject insulin themselves, has been used for this indication.

Conflict of interest None

Funding sources None.

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