

Successful introduction of sensor-augmented pump therapy in a patient with diabetes and needle phobia: A case report

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ABSTRACT

Needle phobia is a specific phobia classified as an anxiety disorder in the Diagnostic and Statistical Manual of Mental Disorders-5, and can be a serious problem for patients requiring insulin injections. However, there have been few reports to date on the management of adults with diabetes and needle phobia. We here report a case of a woman with pancreatic diabetes who developed needle phobia and could no longer perform self-injections. She started to use a sensor-augmented pump (SAP), and was able to perform a puncture for the insulin pump and the continuous glucose monitoring sensor by herself. The SAP treatment achieved self-management, better glycemic control, and high treatment satisfaction quantified using the Diabetes Treatment Satisfaction Questionnaire in this patient. Our case suggests the therapeutic potential of SAP in adults with needle phobia and diabetes requiring insulin therapy.

INTRODUCTION

Needle phobia is a specific phobia classified as an anxiety disorder in the Diagnostic and Statistical Manual of Mental Disorders (DSM)-5. Previous studies demonstrated that the prevalence of needle fear and phobia classified by the DSM-4 varied from 2.1% to 30% in the general population^{1,2}. Needle fear and phobia can be a serious problem for patients requiring insulin therapy. However, few studies have focused on the management of such patients. We herein present our experience of the successful initiation of sensor-augmented pump (SAP) therapy in a patient with needle phobia and pancreatic diabetes.

CASE REPORT

A 57-year-old woman with pancreatic diabetes and needle phobia was admitted to our hospital to initiate SAP in 2022. She was diagnosed with gestational diabetes at the age of 29 years, but hyperglycemia was not noted in her last medical checkup in 2014. In 2017, she was suspected of having chronic pancreatitis and a pancreatic tumor, and was referred to our hospital. In the preoperative examination, her random blood glucose level was 250 mg/dL, and glycated hemoglobin level was 11.5%. She was diagnosed with diabetes and started multiple daily

insulin therapy (MDI). She was instructed on insulin self-injection and self-monitoring of blood glucose (SMBG), and underwent distal pancreatectomy after achieving adequate glycemic control.

She continued self-injections after discharge, although she had a fear of injections. She became unable to perform self-injection owing to increased anxiety and fear of needles after watching a TV program depicting needles. Hence, her family started performing the injections on her. She was able to perform SMBG even after becoming unable to perform self-injection because the SMBG lancing device made the needle invisible. To reduce the number of injections, she started a sodium glucose cotransporter 2 inhibitor in 2019, but stopped in 2020 owing to pyelonephritis.

On admission, she was treated with 17 U insulin aspart injections t.i.d., 34 U insulin degludec q.d., and metformin 1,000 mg b.i.d. Her height was 156 cm, and weight was 63 kg. Her glycated hemoglobin had ranged from 7.6% to 8.2% in the previous year. Fasting serum and 24 h urinary C-peptide measurement suggested attenuated insulin secretion (Table 1). The MiniMed 770G system (Medtronic Inc., MN, USA) with ultra-rapid lispro was introduced on admission. She began it without Auto Mode function to optimize her basal insulin rate, and based on her wishes. She was able to perform puncture for

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Table 1 | Clinical course of the patient during hospitalization and after discharge

	During hospitalization	One month after discharge	Two months after discharge
Body weight (kg)	63.0	61.9	62.5
Body mass index (kg/m ²)	25.9	25.4	25.7
GA (%)	16.3	15.9	15.6
HbA1c (%)	7.6	7.5	7.5
Fasting plasma CPR (ng/mL)	0.41	-	-
Urinary CPR (µg/day)	27.1	-	-
Mean sensor glucose ± SD (mg/dL)	139 ± 31	153 ± 38	157 ± 36
Mean blood glucose ± SD (mg/dL)	138 ± 30	139 ± 35	157 ± 39
Time in range 70–180 mg/dL (%)	91	78	74
Time above range (%)	9	22	26
Time below range (%)	0	0	0
Coefficient of variation (%)	-	24.7	23.2
GMI (%)	-	7.0	7.1
Sensor use (%)	82	99	97
Total daily insulin dose (U)	39.2	58.0	66.1
Bolus amount (U)	24.0	39.4	48.1
Basal amount (U)	15.2	18.6	18.0
Carbs entered (g)	178 ± 75	284 ± 60	318 ± 32

CPR, C-peptide immunoreactivity; GA, glycated albumin; GMI, glucose management indicator; HbA1c, glycated hemoglobin.

both the insulin pump and the continuous glucose monitoring (CGM) sensor by herself, according to the instructions. She was discharged after she had performed a second puncture with no problem.

After discharge, she was able to wear both the insulin pump and CGM sensor by herself. Her glycemic profiles are shown in Figure 1 and Table 1. Although her total carbohydrate intake increased with an increased frequency of eating out, time in range was maintained at more than 70% (Table 1). Her treatment satisfaction score on the Diabetes Treatment Satisfaction Questionnaire (DTSQ) after initiating SAP was 36.

DISCUSSION

Needle phobia is a serious problem for patients requiring insulin therapy. The glycated hemoglobin level was positively associated with the total score of phobic symptoms³, suggesting a negative effect of needle phobia on glycemic control. Several studies investigated insulin pump use in children and youths

with needle phobia. Fear of injections was more common in those on continuous subcutaneous insulin infusion (CSII) than those on MDI³. Another study showed a similar rate of CSII discontinuation in patients with needle phobia and those without mental disorders, suggesting the potential of CSII in such patients⁴. As needle fear decreases with increasing age¹, there has been little focus on adults with diabetes and needle phobia. A study showed that 38.5% of pregnant women with diabetes had a fear of self-injection, and a multidisciplinary educational approach decreased this fear⁵. However, 12.7% of patients remained fearful even after receiving education.

In the present patient, an excessive fear of needles with anxiety and avoidance responses lasted for more than 6 months. These characteristics met the DSM-5 criteria of specific phobia. As reported previously, various factors are associated with the development of specific phobias⁶. In this patient, starting MDI triggered a fear of needles. Aggravating factors contributing to the development of needle phobia were direct conditioning by repeated insulin injections under direct observation of the needle, and negative information transmission by seeing needles on a TV program. In the field of psychiatry, exposure therapy is an effective treatment for specific phobias⁷. In this therapy, individuals are exposed to their feared stimuli gradually. As this patient did not wish to consult a mental health department, we decided to introduce SAP inspired by exposure therapy. SAP has the potential to be more favorable for patients with needle phobia than MDI in terms of the frequency of needle punctures. The initiation of SAP resulted in more favorable self-management and glycemic control. Although we did not assess her treatment satisfaction of MDI using the DTSQ, the score after introducing SAP was full marks, suggesting high satisfaction with SAP. We introduced the MiniMed 770G because she could perform SMBG even after she developed needle phobia. The selection of a CSII and/or CGM should be considered based on the individual's severity of needle phobia and the individual's situation.

In conclusion, we reported the successful introduction of SAP in an adult with needle phobia and pancreatic diabetes. Our case demonstrates that SAP is a potentially effective therapy in adults with needle phobia and diabetes requiring insulin therapy.

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DISCLOSURE

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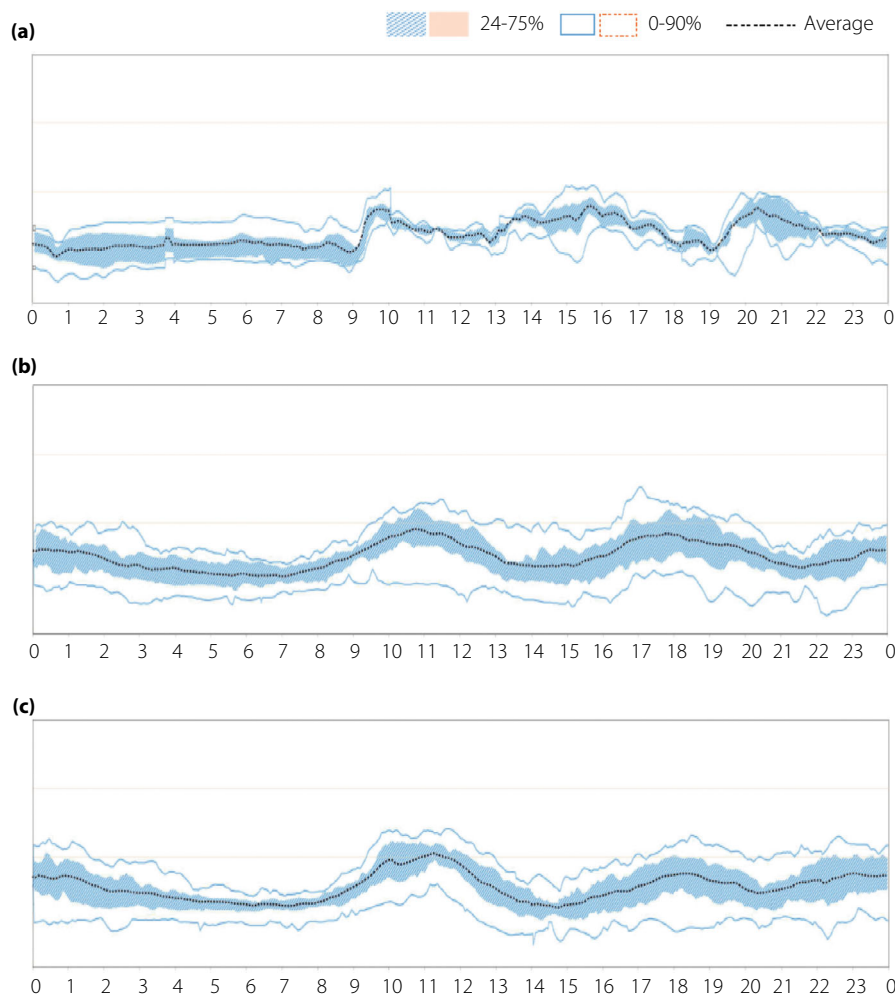


Figure 1 | Glycemic profile of the patient during hospitalization (a), 1 month after discharge (b), and 2 months after discharge (c).

Animal Studies: N/A.

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