ACTA MEDICA SALINIANA

ORIGINAL PAPERS

INNOVATIVE DIABETES MANAGEMENT: NAVIGATING TREATMENT, FINANCIAL CONSTRAINTS, AND PATIENT-CENTERED CARE

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ISSN 0350-364X

DOI: 10.5457/821

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DISCLOSURE SUMMARY: The author declare that he has no relevant or material financial interests that relate to the research described in this paper.

ABSTRACT:

Diabetes mellitus, a chronic and progressive disease, often leads to severe complications that compromise patients' quality of life and reduce life expectancy. This case study presents a 54-year-old female patient with type 2 diabetes mellitus, diagnosed 13 years ago, who experienced frequent hypoglycemia despite achieving satisfactory glycemic control. The patient's treatment regimen included basal-bolus insulin therapy, oral metformin, and rigorous self-monitoring of blood glucose, yet she expressed dissatisfaction with her weight and overall well-being. To address these concerns, liraglutide, a GLP-1 receptor agonist, was introduced into her treatment plan. Liraglutide was selected for its ability to maintain glycemic control, reduce hypoglycemic episodes, facilitate weight loss, and offer cardiovascular protection. Despite initial out-of-pocket costs due to lack of insurance coverage, the patient experienced a marked improvement in glycemic variability, reduced insulin dependence, decreased frequency of glucose monitoring, and weight reduction after just two months of therapy. This case underscores the importance of individualized, holistic diabetes management that addresses glycemic control and prioritizes patient satisfaction and quality of life. It also highlights the impact of medication costs and insurance coverage on treatment accessibility and long-term outcomes.
Key words: diabetes, inertia, insulin, GLP-1 ra, obesity

INTRODUCTION

Diabetes is a chronic and progressive disease that can cause serious complications. The prevalence of end-stage kidney disease is ten times higher in people with diabetes [1, 2]. Diabetic retinopathy is the leading cause of vision loss in working-age adults [3]. People with diabetes are two to three times more likely to have cardiovascular disease than people without diabetes [4]. These complications deprive patients of their desired quality of life and shorten life expectancy. Here, we present a case of a patient with satisfactory glycemic control but low quality of life with current treatment, emphasizing the problems with diabetes therapy and prices of novel medications.

CASE PRESENTATION

The patient, a 54-year-old woman, was diagnosed with type 2 diabetes mellitus 13 years ago. Over the years, she has undergone numerous treatment changes, as depicted in Figure 1. Despite maintaining reasonable glycemic control (HbA1C at 6.3%), she was plagued by ten to fourteen daytime and up to four nighttime hypoglycemic episodes per month. Furthermore, the patient was not content with her body weight and was not satisfied. Her current treatment regimen included basal-bolus insulin therapy, oral metformin taken three times daily, and self-monitoring of blood glucose levels at least four times daily.

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26.11.2024.

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Funding: none

Competing interests: none

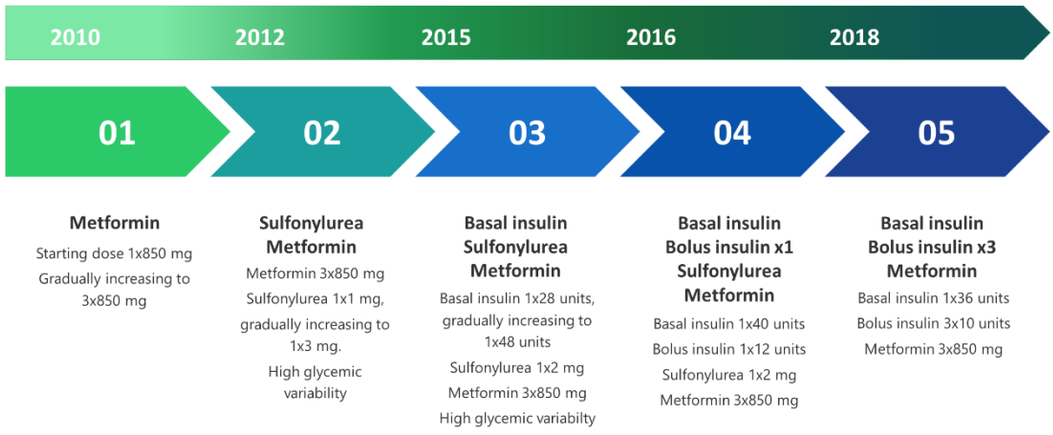

Figure 1. Patient's therapy changes over time until the first visit to our office

DIAGNOSTIC ASSESSMENT

Treatment reevaluation was necessary due to its complexity and several unaddressed aspects of diabetes management. Firstly, we conducted a GAD antibody test on the patient considering her age, the duration of diabetes, and intensive insulin therapy. The test result was negative.

TREATMENT

It is decided to start liraglutide, which we hypothesized would sustain glycemic control, simplify therapy administration and self-glucose monitoring, decrease body weight, and provide cardiovascular protection. We recommended starting with liraglutide 0.6 mg daily and stopping fast-acting insulin before meals.

OUTCOME AND FOLLOW-UP

Two months after initiating liraglutide, the patient's glycemic control remained satisfactory. Glycemic variability, body weight, and the frequency of glucose monitoring decreased, resulting in a positive patient experience (Tables 1 and 2). During the first week of liraglutide administration (0.6 mg once daily), we recommended the cessation of insulin before meals. Postprandial glucose levels were comparable to those achieved with insulin boluses. Following initiation, due to health insurance constraints, the liraglutide dosage was not increased to 1.2 mg once daily after the first week (as recommended by the dosing instructions). Nevertheless, satisfactory glycemic control was attained with the lowest liraglutide dose (0.6 mg once daily). After six months, the patient's liraglutide dosage was increased to 1.2 mg once daily to reduce body weight and basal insulin dosage. A year ago, once-weekly GLP-1 RA became available through the patient's health insurance at no additional cost, prompting a switch from daily liraglutide to weekly dulaglutide (1.5 mg).

Table 1. Review of body weight, BMI, HbA1C and insulin doses before and after the introduction of liraglutide dose of 0.6 mg once daily

	Body weight (kg)	BMI (kg/m2)	HbA1C (%)	Basal/ bolus (units)
Before introduction of liraglutide	94	33.7	6.3	36/30
14 days after introduction of liraglutide	91	32.6	-	30/0
2,5 months after introduction of liraglutide	86	31.7	5.9	30/0
Target level	Below 80	Below 30.0	Below 7.0	-

Abbreviations: BMI, Body Mass Index; HbA1C, glycosylated hemoglobin;

The patient's diabetes management objectives have been maintained since the introduction of GLP-1 RA therapy over four years ago. Comparing the patient's glycemic control parameters at the initial visit and four years later is insufficient to comprehensively demonstrate the advantages we provided to our patient by introducing a novel therapeutic agent to address their concerns and long-term diabetes management objectives (Table 3).

Table 2. Review of pre- and post-prandial blood glucose levels before and after the introduction of liraglutide dose of 0.6 mg once daily

Blood glucose level (mmol/L)		Before the introduction of liraglutide	14 days after the introduction of liraglutide	2.5 months after the introduction of liraglutide	Target level
Breakfast	Before meal	6.0-7.8	5.2-5.9	4.6-6.8	4.0-7.0
	After meal	6.8-8.5	5.2-7.4	5.7-6.9	Below 8.5
Lunch	Before meal	6.4-10.1	4.2-6.9	5.0-7.7	4.0-7.0
	After meal	5.2-7.8	5.4-6.0	5.5-7.3	Below 8.5
Dinner	Before meal	6.1-7.9	4.6-5.8	5.3-8.3	4.0-7.0
	After meal	4.2-9.7	5.2-6.5	5.7-8.7	Below 8.5

Table 3. Comparison of our patient's parameters of metabolic control and daily diabetes management burden before and four years after the change of therapy

Parameters	Before the change of therapy	After a shift in therapy
HbA1C (%)	6.3%	6.6%
Number of daytime hypoglycemia monthly	10 to 14	1 to 2
BMI (kg/m2)	33.7	29.1
Basal insulin total daily dose (units)	36	28
Bolus insulin total daily dose (units)	30	none
GLP-1RA with proven cardiovascular benefit	none	1.5 mg weekly
Number of therapeutic pricks monthly	120	34
Number of SMBG pricks monthly	120	30 to 40

Abbreviations: HbA1C, glycosylated hemoglobin; BMI, Body Mass Index; GLP-1RA, Glucagon-Like-Peptide-1 Receptor Agonist; SMBG, Self-Monitoring Blood Glucose

DISCUSSION

While our patient initially presented with satisfactory glycemic control, effective diabetes management extends far beyond achieving favorable HbA1c levels. The ultimate goals of diabetes care are to prevent complications and enhance the patient's quality of life, which requires a holistic approach that includes weight management, cardiovascular risk reduction, and individualized treatment plans [5].

The evidence from large-scale trials supports the broader application of GLP-1 RA in reducing cardiovascular events in high-risk patients with type 2 diabetes [6, 7]. Also, use of GLP-1 RA resulted in weight loss in overweight patients with type 2 diabetes [8].

For patients on basal-bolus insulin therapy, hypoglycemia, and weight gain are often significant issues, contributing to a reduced quality of life and frustration with treatment.

In our patient's case, the decision to introduce liraglutide was driven by its potential to simplify the patient's regimen, reduce glycemic variability, facilitate weight loss, and provide cardiovascular protection. Despite the financial burden, the patient started liraglutide, which proved highly beneficial. Within three months, the patient experienced fewer hypoglycemic episodes, a simplified insulin regimen, and weight loss, with these improvements sustained over several years.

The improvements observed in our patient—sustained glycemic control, reduced hypoglycemia, and weight loss—are well supported by the latest ADA guidelines [9] and echoed in other studies and cases. Yet, these outcomes often depend on the patient's ability to afford the necessary medications.

This case reminds us that while clinical decision-making should be based on optimizing patient outcomes, it must also consider patients' financial realities.

CONCLUSION

The primary goals of diabetes management extend beyond glycemic control to include weight management, cardiovascular risk reduction, and improving overall quality of life. GLP-1 RA, such as liraglutide and dulaglutide, can simplify diabetes treatment regimens, reduce glycemic variability, promote weight loss, and provide cardiovascular benefits. Insurance coverage and medication costs remain significant barriers to accessing innovative diabetes treatments, impacting patient outcomes and quality of care. Healthcare providers should advocate for improved access to novel therapies and tailor treatment plans to meet clinical and financial needs, ensuring equitable patient care.

Acknowledgments:

None.

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Contributors

All authors made individual contributions to authorship. Đ.H was involved in the diagnosis and management of the patient and manuscript submission. I.K. was involved in overseeing treatment and preparation of the manuscript. All authors reviewed and approved the final draft.

Funding

No public or commercial funding.

Disclosures

None declared.

Informed Patient Consent for Publication

Signed informed consent was obtained directly from the patient.

Data Availability Statement

Some or all datasets generated during and/or analyzed during the current study are not publicly available but are available from the corresponding author on reasonable request.

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