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Professional paper

ACANTHOSIS NIGRICANS AND DIABETES MELLITUS: A CASE REPORT

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Abstract

Acanthosis nigricans (AN) is a dermatological disorder that manifests as hyperpigmented and thickened skin. It usually affects areas where there is skin-on-skin contact and can be a manifestation of insulin resistance, obesity, and type 2 diabetes mellitus. We present the case of a 39-year-old male who had progressive darkening and thickening of the neck region for approximately one year. He did not have any chronic illnesses or medication at the time. On physical examination, the patient had symmetrically dark, velvety, and thickened brownish patches over the posterior and lateral aspect of the neck suggestive of acanthosis nigricans. Laboratory studies revealed a fasting blood glucose level of 14 mmol/L and glycated hemoglobin (HbA1c) of 10%, indicating previously undiagnosed diabetes mellitus. After evaluation by the endocrinologist, he was put on insulin treatment, and the skin lesions were treated with topical retinoids. This case demonstrates the significance of understanding acanthosis nigricans as a clinical sign of metabolic disorders. In addition, it shows the importance of performing metabolic assessment in patients with skin lesions.

Keywords: Acanthosis nigricans; Diabetes mellitus; Insulin resistance; Hyperinsulinemia; Hyperpigmentation; Case report.

Introduction

Diabetes mellitus is a lifelong metabolic disorder in which there is always high glucose levels due to insufficient insulin production or its activity, or both. Type 2 diabetes mellitus, the most prevalent type of this condition, is very closely linked to insulin resistance and usually develops along with such conditions as obesity and metabolic syndrome components [1,2]. Apart from systemic complications, diabetes mellitus might also have certain cutaneous manifestations, which sometimes appear before the disease itself is diagnosed. These manifestations include such skin changes as acanthosis nigricans, which is closely related to insulin resistance and hyperinsulinemia [3,6].

Acanthosis nigricans is a condition characterized by clinical presentation in the form of bilateral hyperpigmentation, thickening, and velvety change in the skin predominantly affecting the folds like the neck, axillae, and groin regions [4,5]. It is usually seen in individuals who are obese, have insulin resistance, hyperinsulinemia, and type 2 diabetes mellitus. For such patients, the appearance of acanthosis nigricans is an important clinical marker for metabolic abnormalities [3,9]. Though most cases are usually due to metabolic disorders, rapidly progressive or widespread changes, especially when involving mucosa, are indicative of malignant acanthosis nigricans [4,8].

In histopathology, acanthosis nigricans is marked mainly by hyperkeratosis and papillomatosis, along with varying epidermal acanthosis [5,8]. The pathogenesis of metabolically-related acanthosis nigricans is very close to insulin resistance and subsequent hyperinsulinemia. At elevated levels in the blood, the hormone insulin may stimulate the insulin-like growth factor-1 (IGF-1) receptors present on keratinocytes and dermal fibroblasts leading to cell proliferation

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[6,8]. Treatment mainly aims at addressing the metabolic disorder that causes the condition, such as improving glycemic status and weight loss when necessary, with topical treatments for skin-related complaints [7,8]. In this case report, acanthosis nigricans is highlighted as the presenting sign through which diabetes mellitus was discovered in a 39-year-old male.

Case report

The patient is a 39 year old male who comes to the dermatology department with complaints of progressive hyperpigmentation and thickening of his neck. There were occasional odours emanating from the area but he did not have any pruritus or pain. He did not suffer from any chronic illnesses and did not take any medications.

On physical examination, symmetrical, hyper-pigmented, velvety, thick brown plaques were found to be present over the posterior and lateral aspects of the neck. With regard to the clinical presentation of the lesions, a clinical diagnosis of acanthosis nigricans was made.

Laboratory findings revealed significantly high fasting blood glucose at 14 mmol/L and glycated hemoglobin (HbA1C) of 10%. This finding suggested previously unrecognized diabetes mellitus which was poorly managed. Other hematological and biochemical markers were within normal limits.

The patient underwent endocrinological evaluation, and insulin therapy was initiated. The cutaneous lesions were treated with topical retinoids. The patient was also advised to implement lifestyle modifications, including dietary changes, weight reduction, and increased physical activity.

At the one-month follow-up, improvement in the cutaneous lesions was observed. The patient remained under clinical follow-up for continued management of the dermatological and metabolic conditions.

Discussion

The skin changes seen in acanthosis nigricans (AN) are usually manifested by hyperpigmented, velvety plaques that occur in a symmetric distribution. The lesions usually involve the posterior neck, armpits, groins, and other body folds [4,5]. While acanthosis nigricans is essentially a harmless skin problem, it is generally associated with certain metabolic disorders such as obesity, insulin resistance, hyperinsulinism, metabolic syndrome, and type 2 diabetes mellitus [3,6]. Occasionally, acanthosis nigricans that manifests abruptly, has a rapid course, involves extensive areas, or affects mucosal surfaces is considered a paraneoplastic phenomenon indicating an underlying cancer [4,8].

However, in this particular case, the patient showed classical signs of AN including symmetrical darkening and thickening of the posterior and lateral neck. The patient had not been diagnosed with diabetes mellitus in the past. Laboratory work up showed that his fasting blood sugar was 14 mmol/L and HbA1c 10%, thus showing that there was significant hyperglycemia. The skin findings were hence very useful clinically in diagnosing this undiagnosed diabetes mellitus.

The pathogenesis of acanthosis nigricans associated with metabolic disorders is strongly linked to insulin resistance and compensatory hyperinsulinemia. At high circulating concentrations, insulin may activate insulin-like growth factor-1 (IGF-1) receptors expressed on keratinocytes and dermal fibroblasts, thereby promoting cellular proliferation and contributing to the characteristic epidermal changes observed in acanthosis nigricans [6,8].

Although insulin resistance and hyperinsulinemia are considered central to metabolically associated acanthosis nigricans, additional growth-factor and inflammatory pathways may also contribute to epidermal proliferation and the development of the characteristic skin changes [5,8]. These mechanisms further support the clinical interpretation of acanthosis nigricans as a

cutaneous marker of underlying metabolic dysregulation rather than an isolated dermatological finding [3,8].

However, a clear link has been established between acanthosis nigricans and metabolic diseases. Patients with acanthosis nigricans are at higher risk for developing insulin resistance, poor glucose metabolism, metabolic syndrome, and type 2 diabetes mellitus [9,10]. In light of this, the occurrence of acanthosis nigricans, especially among patients with other metabolic risk factors, indicates the need for more comprehensive metabolic assessment [8,9]. However, the condition must be viewed as a sign of underlying metabolic problems and not a diagnostic tool for diabetes mellitus [3,8].

Diagnosis of acanthosis nigricans requires investigation for associated metabolic abnormalities especially in those with other risk factors for developing insulin resistance. These investigations include fasting plasma glucose and HbA1c levels, along with BMI, blood pressure, and lipid status in the presence of clinical indications [8,9]. Investigation helps to detect undiagnosed abnormalities of glucose metabolism and other features of metabolic syndrome [3,9].

Differential diagnosis for acanthosis nigricans is confluent and reticulated papillomatosis, post-inflammatory hyperpigmentation, frictional hyperpigmentation, Addison's disease, hemochromatosis, and some genetic causes of hyperpigmentation [5,8]. In this case, the symmetric appearance of dark, velvety, and thickened patches in the posterior and lateral aspects of the neck, along with hyperglycemia, led to the clinical diagnosis of acanthosis nigricans in a patient with metabolic problems. A skin biopsy may be performed when the diagnosis is not certain [4,8]. Also, any sudden development, rapid course, extensive lesions, or involvement of mucous membranes should suggest malignant acanthosis nigricans, which needs further investigation for malignancy [4,8].

The management of acanthosis nigricans should concentrate on the underlying cause of the condition. In metabolic causes, correction of the state of insulin resistance and glucose control, as well as weight loss, diet modification, and exercise, can help improve the skin lesions [6,7]. The dermatologic management aims at improving the skin quality. Retinoids and keratolytic agents such as ammonium lactate have been employed with mixed results [7,8].

For the current case, improvement in the skin lesions has been noted after about a month of insulin use, topical retinoids, and lifestyle changes. This is an indication of short-term clinical improvement, which is likely due to the correction of the metabolic problem and the use of the cutaneous treatment regimen. Nonetheless, since a combination of various treatments has been used, it is difficult to pinpoint the effect of each individual modality based on this one case.

This particular case emphasizes the significance of diagnosing acanthosis nigricans as a possible skin marker of internal metabolic dysfunctions. The detection of skin lesions might give the possibility to explore the hidden conditions of insulin resistance, hyperglycemia, or diabetes mellitus type 2, especially in patients who have other metabolic risk factors [3,9]. In this case, the skin manifestations helped the clinicians to perform further diagnostics and found diabetes mellitus in a patient who had no symptoms of it before.

Conclusion

This particular case highlights the significance of acanthosis nigricans as a potential marker of metabolic derangements on the skin. This case highlights the clinical importance of acanthosis nigricans as a potential cutaneous marker of underlying metabolic dysfunction. In this patient, the characteristic skin changes prompted further metabolic evaluation, leading to the identification of previously unrecognized diabetes mellitus.

Acanthosis nigricans often coexist with insulin resistance, and the patient should be assessed for problems in glucose metabolism along with other metabolic risks, especially if the patient has other risk factors. Early detection will be helpful in making the diagnosis.

The main issue is the metabolic disorder, but the dermatological therapy can also be applied in order to alleviate the skin symptoms. In this way, we see the importance of carrying out an appropriate dermatological examination, since this condition can be considered a complication of metabolic disorder.

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