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Clinic case

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# Effective communication leading to better adherence to treatment and wound closure in diabetic patients. Presentation of a case

# Comunicación efectiva que condiciona un mejor apego al tratamiento y cierre de heridas en el paciente diabético. Presentación de caso

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**Abstract:**

**Introduction:** Diabetes mellitus is a chronic degenerative disease of multifactorial etiology that causes a metabolic disorder, resulting in chronic hyperglycemia, leading to microvascular and macrovascular complications in different organs. Currently, about 422 million people worldwide are living with diabetes and it is estimated that by 2045 it will affect 693 million adults.

**Clinical case:** In this article, we report the case of a 54-year-old man with type 2 diabetes mellitus with poor adherence to treatment and with risk factors that perpetuate poor control and the incidence of complications.

**Conclusion:** Several studies demonstrate that the higher the patient's level of understanding of the disease, the greater the adherence to the treatment strategies and the better the glycemic control, resulting in a decrease in complications. Therefore, emphasizing effective communication is always one of the best strategies to guide the diabetic patient.

**Keywords:** Diabetes mellitus, diabetic foot ulcers, wund infection, psychoeducation, vascular surgery.

**Resumen**

**Introducción:** La diabetes *mellitus* es una enfermedad degenerativa crónica de etiología multifactorial que causa un trastorno metabólico, dando lugar a hiperglucemia crónica, lo que conlleva a complicaciones microvasculares y macrovasculares en diferentes órganos. Actualmente, alrededor de 422 millones de personas en todo el mundo viven con diabetes y se estima que en 2045 afectará a 693 millones de adultos.

**Caso clínico:** En este artículo presentamos el caso de un varón de 54 años con diabetes *mellitus* tipo 2 con mala adherencia al tratamiento y con factores de riesgo que perpetúan el mal control y la incidencia de complicaciones.

**Conclusión:** Diversos estudios demuestran que cuanto mayor es el nivel de comprensión de la enfermedad por parte del paciente, mayor es la adherencia a las estrategias de tratamiento y mejor es el control glucémico, lo que se traduce en una disminución de las complicaciones. Por lo tanto, hacer hincapié en una comunicación efectiva es siempre una de las mejores estrategias para orientar al paciente diabético.

**Palabras clave:** Diabetes *mellitus*, úlceras del pie diabético, infección de herida, psicoeducación, cirugía vascular

## Introduction

Diabetes is a devastating chronic degenerative endocrine disease, results from the progressive loss of β-cell mass and/or function, leading to inadequate insulin secretion and manifesting clinically as hyperglycemia.[1] It affects 422 million people worldwide and causes 1.5 million deaths worldwide,[2] these numbers are increasing and are projected to affect 693 million adults by 2045.[3] Diabetes involves a wide range of macrovascular and microvascular complications, among which cardiovascular disease, nephropathy, retinopathy and neuropathy are the main causes of morbidity and mortality in diabetic

patients. However, diabetic foot ulcers are a fairly frequent complication in people with inadequate control of the diseas.[4] An estimated 18.6 million people worldwide are affected by diabetic foot ulcers each year, and 80 % of these cases lead to lower extremity amputations, increasing the risk of mortality.[5]

Diabetic foot ulcers or chronic diabetic foot wounds, as we will also call them in this paper, have a significant impact on the quality of life of patients, affecting physical, economic and psychological aspects. Therefore, the importance of a multidisciplinary therapeutic approach to effectively address this complex medical condition is recognized.

As a consequence of their increasing incidence, chronic diabetic foot wounds constitute a public health problem with economic and social repercussions. Therefore, it is essential to provide more aggressive management in the young population living with diabetes, while in elderly population we must be more cautious.[6] Intensive therapy has now been shown to delay the onset and slow the progression of complications,[7] however, adherence to basic disease care strategies includes a diet tailored to each patient, as a cornerstone, since reaching the glycemic targets achieves adequate metabolic control, with a significant decrease in complications, as well as daily physical activity, weight loss (up to 15 %), pressure relief of the affected limb proper sleep hygiene,[8,9] control of other comorbidities and elimination of risk factors, among others.[10] Nevertheless, it has been observed that most patients do not adhere to these measures in a relevant manner.

In this paper we will present a patient reluctant to pharmacological treatment and with risk factors that predisposed him to the development of foot ulcers as a complication, which greatly affect the quality of life and cause a deterioration of functional, physical and psychological well-being.

## Clinical case description

A 54-year-old man, history of smoking for 7 years and Type 2 Diabetes Mellitus since he was 22 years old, poor adherence to treatment with NPH Insulin, 20 units in the mornings and 10 units in the afternoon and Metformin 850 mg every 12 hours, he works in construction, for this reason, he wears tight-fitting, synthetic industrial footwear.

Weight: 63kg, Height: 1.57m, BMI: 25.6, Blood Pressure: 110/70 mmHg.

August 31, 2020, he came to the primary care office complaining of burning pain in the sole of the right foot with ulcers on two fingers of the same foot of one week's evolution. Fasting capillary glucose 200 mg/dL. HbA1C test 9 %. Physical examination revealed edema on the dorsum of the right foot, euthermia, no crepitation or color changes, posterior tibial and pedal pulses present. In the first finger, a phlyctena located in the distal phalanx of the plantar aspect was observed, second finger with a superficial ulcer of 1.5 centimeters in diameter on the distal phalanx of the plantar aspect, thick edges, granular base, no bleeding, not exudative or foul-smelling, mildly painful (Figure 1). It is initially classified according to the Diabetic Ulcer Severity Score (DUSS) (Table 1) obtaining a score of 1 and is classified as 1A according to The University of Texas Wound Classification System (Table 2).

**Figure 1. Right foot**

In the first toe there is a phlyctena in the distal phalanx of the plantar aspect and in the second toe there is a superficial ulcer of 1.5 centimeters in diameter, located in the distal phalanx of the plantar aspect. Onychomycosis of all nails and predominant onychodystrophy in the nail of the first finger.

**Table 1. Diabetic Ulcer Severity Score (DUSS)**

| *Variables* | *Score 0* | *Score 1* |
|---|---|---|
| Palpable pedal pulses | Presence | Absence |
| Probing to bone | No | Yes |
| Ulcer site | Toes | Foot |
| Ulcer numer | Single | Multiple |

**Table 2. The University of Texas wound classification system**

| *Stage* | *Grade 0* | *Grade I* | *Grade II* | *Grade III* |
|---|---|---|---|---|
| **A** | Pre-ulcerative lesions<br>No skin break | Superficial wound<br>No penetration | Wound penetrating tendon or capsule | Wound penetrating bone or joint |
| **B** | With infection | With Infección | With Infección | With Infección |
| **C** | With ischemia | With ischemia | With ischemia | With ischemia |
| **D** | With infection and ischemia | With infection an ischemia | With infection an ischemia | With infection an ischemia |

A multidisciplinary management is established, referring him to the nutrition and psychology services, accompanied by strict ulcer care. Debridement of phlyctena was performed, finding a superficial ulcer, 2 centimeters in diameter, thick edges, base sharing tissue between granular and clean, not exudative, bleeding or foul-smelling, painful to mid palpation. Ulcer cleansing is scheduled every two days. The established wound care plan, which promotes adequate healing, was based on the DOMINATE acronym (Figure 2).

**Figure 2. DOMINATE acronym; components to stimulate the correct healing of diabetic foot wounds**

| | | |
|---|---|---|
| D | ebridement | Remove non-viable tissue to stimulate the wound to shift from the inflammatory to the proliferative phase. |
| O | ffloading | Eliminate stress and trauma that interfere with wound healing. |
| M | oisture, medication, mental health | Control of chronic exudates. Monitoring of adherence to treatment. Patient education, bilateral cooperation and stress management. |
| I | nfection and Inflammation | Identify signs of infection, wound culture and antimicrobial therapy. |
| N | utrition | Identify malnutrition or obesity, correction of disorders and timely referral to endocrinological nutrition. |
| A | rterial | Arterial insufficiency, peripheral arterial disease and atherosclerosis are impediments to wound healing. Refer to vascular surgeon. |
| T | echnical advances | Hyperbaric oxygen therapy, negative pressure therapy, cell therapy and bioengineered skin substitutes. |
| E | dema | Treatment of venous and lymphatic insufficiency. Use of compression therapy. |

The patient came to the clinic three days later, he has not taken insulin, fasting capillary glucose 165 mg/dL. Right foot with edema in the dorsal region without fovea, first finger with a superficial ulcer, 2.5 centimeters in diameter, thick-edged, base sharing tissue between granular and clean and now painful with slightly foul-smelling purulent material, second finger with a superficial ulcer, 1.5 centimeters in diameter, thick edges, granular base and presence of purulent material, scarcely foul-smelling, non-bleeding and painful (Figure 3). Ulcers were debrided, now with clean bases and edges; antibiotic is instituted and the next cleaning is scheduled in three days.

**Figure 3. Three days after debriding the phlyctena**

Three days after debriding the phlyctena, a 2.5-centimeter diameter ulcer with thick borders and slightly foul-smelling purulent material was observed on the first finger.

September 5, the patient came to the office concerned about the presence of moderate stabbing pain in the first, second and third digits of his right toe at work. Blood glucose 2 hours after meal 205 mg/dL; right foot with non-pitting edema reaching the malleolar region (Figure 4), no significant changes in ulcers, however, we proceed to place adhesive felt over the head of the first to fourth metatarsal.

**Figure 4. A) Photograph prior to wound debridement. B) Pretibial edema is seen in comparison with the other limb**


Until September 14, 2020 a significant decrease in glycemia was achieved, 110 mg/dL and HbA1C of 6%. Right foot edema improved, being practically imperceptible, first finger with superficial ulcer, 2 centimeters in diameter, thick borders, base with granulation tissue in most of the area, second finger with a superficial ulcer, 1.5 centimeters in diameter, thick edges, clean base and no pain (Figure 5).

**Figure 5. A) Ulcer with granulation tissue in most of its extension. B) Decreased edema compared to the contralateral limb**


September 30, 2020, patient's improvement was practically complete in both ulcers (Figure 6), now there is no evidence of edema and both thumbs are covered with healthy skin.

**Figure 6. A) Almost complete closure of both ulcers is observed. B) The right limb is observed without edema**

Finally, 0 according to the DUSS and Grade 0 of the Texas scale. The complete evolution of the patient's lesion can be seen in Figure 7.

**Figure 7. Photographic sequence of patient's evolution**

## Discussion

Chronic diabetic foot wounds develop as a result of diabetic sensory, motor, and autonomic neuropathy. Chronic hyperglycemia predisposes to neuropathy and occlusive arterial disease, which are risk factors for the development of complications such as diabetic foot, even more so with the constant trauma to the limb that conditions the appearance of a wound or ulcers, in addition, poor control can be complicated by infection, causing in most cases, in the loss of the limb. Diabetic neuropathy is mainly caused by endothelial cell dysfunction, however, other causes are recognized, such as the formation of extracellular end products of advanced glycation, inflammatory cytokines, among others. This causes degeneration and hyperplasia of pericytes in the endoneural microvessels, resulting in neuronal ischemia.[11] Another known mechanism by which a diabetic foot ulcer develops is due to constant pressure, such as that caused by tight footwear, or high pressure, such as that generated by sharp objects impacting directly on the foot.[5]

Diabetic foot ulcers affect 18.6 million people worldwide and, if not properly treated, progress by infecting the soft tissue, causing gangrene and, later, loss of the limb. Epidemiological studies show that the risk of developing a diabetic foot ulcer is 2.2 % per year.[12] A meta-analysis showed that deaths in patients with diabetic foot ulcers were 231 per 1000 persons per year, compared to 182 deaths per 1000 persons per year in those with chronic wounds.[5]

Up to 85 % of diabetic ulcers are neuropathic and 15 % may have an ischemic component. Plantar ulcers are the most frequent and have the highest recurrence.[13] The risk is 2 to 4 times more frequent in male patients with type 2 diabetes and smokers compared to the healthy population,[14] the most common manifestation is intermittent claudication, caused by decreased blood flow secondary to endothelial alterations of atherosclerotic origin [15].The lifetime risk of foot ulcers ranges from 19 % to 34 %; this rate increases with aging and lack of control in people with diabetes. Recurrence rates are 65 % at 3-5 years, lifetime incidence of lower extremity amputation 20 %, and 5-year mortality 50-70 %.[16]

One of the most valuable strategies for preventing complications is to reduce glucose through the use of medications, maintaining glycosylated hemoglobin levels between 6.5 % and 7.5 % can slow and even prevent the progression of neuropathy as well as controlling blood pressure and renal pathology,[17] but other measures that delay progression are lifestyle changes, patient empowerment and psychological well-being, as it allows the patient to be aware and improve his or her decision making. Self-care should include foot hygiene with water at moderate temperature and keeping them dry, wearing appropriate footwear, and daily self-evaluation of skin color and texture, lesions and sensitivity of the feet.[18]

According to the American Diabetes Association, there are four critical times to assess the need for diabetes education and self-management: at the time of diagnosis; annually and when therapeutic goals are not met; in the presence of medical, physical and psychosocial complications; and when life and care transitions occur.[19] In this case we identified two critical moments to provide support, information and answer questions: when blood glucose levels were out of target range and when foot wounds were present. Likewise, educational barriers that could limit the patient's understanding of the diagnosis were identified, and an explanation of "what is diabetes", its treatment, prognosis, lifestyle modifications, diet, physical activity and the complications it produces were provided in a clear and understandable way, facilitating decision making, promoting self-care, psychological health and bilateral collaboration.

Approximately 50 % of patients with diabetes do not adhere to treatment,[20] due to difficulties in understanding the information provided by healthcare personnel.

Communication is an inherent characteristic of human beings that goes beyond the mere exchange of information. It focuses on understanding the emotions and intentions behind the information. Therefore, effective communication is not only a matter of transmitting a message so that someone understands it as he or she wants, but also of listening carefully so that it makes sense and the other person knows that he or she is being understood. In other words, effective communication is a two-way street, where even without uttering a single word, communication persists through posture, facial expressions and even breathing pattern. This allows the receiving person to interpret a message.[21]

A systematic review showed that proper communication can mean better outcomes for patients with diabetes, because by taking into account the experiences, comments and exchange of ideas with patients, a higher level of understanding is achieved, which translates into truly effective communication.[22] Another approach to effective communication is motivational interviewing, a session in which the clinician can explore the patient's motivations. This technique has been reported to improve both glycemic control and overall quality of life.[23] Effect sizes for interventions such as effective communication range from 58 % to 98 %.[13]

The patient complained for the presence of two ulcers, one located on the distal phalanx of the plantar aspect of the first toe and the other located on the distal phalanx of the second toe, secondary to the use of inappropriate footwear, inadequate glycemic control and the patient's reluctance to follow the recommendations. Likewise, he also argued that he did not understand why proper nutrition, insulin administration and tobacco deprivation could contribute to a significant improvement of his clinical condition and prevent the onset of complications. However, thanks to effective communication, empathy, multidisciplinary intervention, antibiotic treatment, as studies show that in case of infection it is as effective as surgery,[5] training and self-care strategies provided during treatment, she was able to achieve metabolic control. Appropriate language was used, avoiding the use of judgmental words

that could make the patient feel guilty about his current condition and opting for positive phrases that would provide confidence at all times.

During follow-up consultations and 5 chronic wound cleansing sessions (approximately 30 days), disease awareness was achieved; in addition, counseling on the future benefits of good metabolic control encouraged immediate adherence to all interventions that improved the condition of the foot wounds.

In every medical and nutrition consultation, but especially in every session with psychology, the empathic bond was reinforced, asking the patient to express his feelings and thoughts about diabetes and about his expectations with the comprehensive treatment. We also decided to make adjustments and training in their diet, sleep hygiene, daily glucose self-monitoring, correct medication intake, daily physical activity and attendance at medical appointments. Based on the principle of autonomy, we made him aware that a large part of the improvement would be thanks to his effort. We also told him that each case is different, never scaring him, but giving him real information about the complications and the benefits he would obtain from an adequate metabolic control. By providing confidence, coping measures, self-management, resilience and resolution of doubts, better results are obtained compared to those that could be obtained by scaring the patient.[24]

In addition to the above, a factor that favored the improvement of the wounds was that the health personnel, not only doctors, but also nurses, psychologists and nutritionists were fully committed to him, which allowed an unhurried, personalized and close follow-up.[25]

Another extremely important factor was the patient's decision to follow the established treatment.

Despite not being able to ensure a different result than the one we obtained with all the measures applied with this patient, national statistics report that the rate of amputations secondary to foot injuries in diabetic patients was 9.2 per 100,000 population in 2011 and a UK study showed that foot ulcers are associated with a 5 % mortality in the first 12 months and 42 % at 5 years, along with a 2.5-fold increased risk of death compared to diabetic patients without foot ulcer,[26] therefore, by avoiding the risk of progression to amputation, we undoubtedly improve the prognosis.

As previously mentioned, hyperglycemia predisposes to microvascular and macrovascular complications, affecting wound healing, hindering the wound repair process and inducing oxidative stress that perpetuates damage in the regeneration of the affected skin; it is worth mentioning that there are several altered repair processes and substances that perpetuate cell damage and subsequent tissue repair in patients living with diabetes, however, it is not the purpose of this work to delve into these processes. But it is important to mention that, due to the chronic lack of control of the patient, some of these mechanisms could have been undoubtedly compromised during intensive treatment.

The natural history of diabetic foot ulcers is usually variable in each patient and their improvement will depend on many factors; in the case of our patient, one of the main factors that may have contributed to his improvement was that the multidisciplinary team chose to make use of Effective Communication, getting the patient to make the decision to adhere to the established medical treatment, attend follow-up visits, use appropriate footwear, attend wound cleaning sessions and psychology services, and this, together, helped to restore normal blood glucose levels and wound repair.

The International Working Group on the Diabetic Foot (IWGDF) states in its latest update that most diabetic foot wounds heal if the physician takes into account the above measures for treatment, with the patient being the center of attention.[27]

We suggest that if this strategy had not been adopted with the patient, he would not have adhered adequately to treatment and most likely the wounds would not have shown progressive improvement due to his chronic glycemic decontrol, resulting in more severe complications of diabetes.

The task of healthcare provider is to train and guide patients to understand the disease so that they can carry out conscious and optimal self-care, using well-accepted strategies. The model proposed by Peyrot and Rubin focuses on two main interventions:[28] 1) Self-care interventions, which include issues such as regimen acceptance and compliance, 2) Emotional interventions, addressing the relationship between diabetes and stress; diabetes and depression. To place the patient at the center of the process of behavioral change, focusing on his or her autonomy, promoting the will to achieve the proposed changes.

## Conclusion

Providing confidence, empathy, security, self-care strategies, empowerment, bilateral collaboration, but above all providing effective communication with patients, avoiding the use of technical terms and replacing them with colloquial and understandable language, is a very important strategy on the part of the physician that has demonstrated an increase in adherence to treatment, with the consequent improvement in metabolic control, a greater use of the first level of care and preventive medicine, and a reduction in the use of emergency rooms and hospitalization.

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