

The latin american Saint Elian wound score system (sewss) for the triage of the diabetic foot attack

El sistema latinoamericano de San Elían para el triaje del ataque del pie diabético

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Abstract

To review the global and regional contributions of the Saint Elían Wound Score System (SEWSS) for the diabetic foot syndrome are the aim of this report. The update includes definitions, classification, diagnosis, treatment, prognosis, and prevention to reduce amputations and mortality. From its local use in Mexico to their global spread as part of the Clinical Practice Recommendations of the Diabetic Foot - International Diabetes Federation-2017, the SEWSS has achieved a significant acceptance for the diabetic foot problem care in Latin America. The concept includes the triage of severity grades system for the five types of Diabetic Foot Attack (DFA) due to ischemia, infection, edema, neuropathy (Charcot), or a mixed combination. Persons with Diabetes Mellitus may progress from the low-risk stage to foot attack that may remite to a high risk stage or conversely, evolve to a major amputation or death. The DFA progressive stages (I-III) are described in this review. The clinical details provided by the assessment of the 10 Saint Elían factors permit a rationale therapeutic approach with relevance in prevention and medical treatment and not focused only on wound care avoiding bias originated by specialty-related preferences.

Key words: Classification. Diabetic foot. Amputations. Prevention. Triage. Foot attack.

Resumen

El propósito de este informe es revisar las contribuciones regionales y mundiales del Sistema de San Elían para el Síndrome del Pie Diabético. Esta actualización incluye definiciones, clasificación, diagnóstico, pronóstico, tratamiento y prevención para reducir las amputaciones y su mortalidad. Desde su aplicación local en Mexico hasta su difusión mundial como parte fundamental de las Recomendaciones de Práctica Clínica del Pie Diabético- Federación Internacional de Diabetes 2017, el sistema ha alcanzado una aceptación significativa para la atención del Pie Diabético en Latinoamérica. El concepto incluye el triaje urgente por la diferenciación de la gravedad que proporciona el sistema para los cinco tipos de Ataque Del Pie Diabético (APD): isquémico, infeccioso, edema grave, neuropatía (Charcot) y el mixto. Los pacientes con DM-2 pueden evolucionar desde un pie con bajo riesgo hasta un APD que logre remitir a una etapa de riesgo alto o que finalmente evolucione a amputación mayor y/o muerte. Se describen las etapas evolutivas (I-III). La detallada evaluación que proporciona los 10 factores

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de San Elian permiten un abordaje terapéutico racional con relevancia en la prevención y el tratamiento médico sin centrarse erróneamente en el cuidado de heridas.

Palabras clave: Clasificación. Pie diabético. Amputaciones. Prevención. Triage. Ataque del pie.

Although the knowledge and number of several consensus meetings show an increasing trend in the last decades¹⁻⁸, the need to review some controversial topics to update the common language that we are currently using for the diabetic foot syndrome still remain.

To review the global and regional contributions of the Saint Elian Wound Score System (SEWSS) for the diabetic foot syndrome are the aim of this report.

Definition of the diabetic foot

Since 1998, once the Diabetic Foot definition⁹ was published by the World Health Organization, scarce efforts to define this complex condition were made. A relevant task was performed by the consensus of the International Working Group on the Diabetic Foot (IWGDF)¹⁰. Definitions were consensuated on the knowledge that prevails during those meetings. Although in the first definition the IWGDF agreed to differentiate the severity grades for ischemia, they were not applied the same criteria for the rest of variables, describing "leg" involvement instead the foot. Unfortunately, in the following consensus the terms grading, wound and foot were omitted until the 2015 meeting when the word foot was included again¹¹. The relevance to differentiate the severity grade using an score system (absence = 0, mild = 1, moderate = 2, and severe = 3) for single or multiple wound variables was addressed and validated by Lavery¹² for infection, DEPA¹³ for depth and the San Elian System¹⁴ for location (site), anatomic aspects and foot zones, ischemia, infection, edema, neuropathy, area, depth, and wound healing phase. The diabetic foot definition like many published classifications shows bias because it does not include all the relevant wound variables. For instance, one paper¹⁵ exclude ischemia and infection as a wound factor, mixing area, depth, gangrene, and ulcer size in one variable when each one was previously validated as a single significant independent factor^{14,15}. The resultant controversies from the author preferences to select variables according to their personal view could influence the decisions to define the diabetic foot inside the task groups. The last 2015, IWGDF definition of diabetic foot¹¹ omitted the term

wound and, the severity grades that were not considered as part of the destruction of tissues caused by PAD, infection, or advanced neuropathy (Charcot). The 2016, Saint Elian definition include severity grades and the description of wound variables that cause and aggravate the risk of lower extremity amputations and death. Therefore, considering the evolving concept of the "Diabetic Foot Attack (DFA)" that will be posteriorly described within this paper the authors reasoned the Diabetic Foot definition as follow: Is a syndrome clinically manifested by an acute or chronic attack, featured by one or more foot wounds with differences in etiology and severity grades of extent, depth, anatomic zones and aspects, infection, ischemia, edema, and neuropathy increasing amputations and death risk in persons with diabetes. This definition clearly differentiates diabetic foot wounds from soft tissue infections and venous or arterial ulcers of the lower extremities in people with Diabetes Mellitus. Also clarify that ulcer is a term that not define the diabetic foot and means only a kind of wound.

Classification and score

While many classification systems have been validated in study populations, little is known about their interobserver reliability. Two concordance studies between observers in different popular classifications were recently published. Santema et al.¹⁶ founded in an interobserver analyses a moderate agreement comparing the Meggitt-Wagner and the University of Texas classifications for diabetic foot ulcers, that demonstrates that both systems appear not to be useful as single instrument and should always be used in combination with additional clinical information to avoid erroneous interpretations. Recently, Forsythe et al.¹⁷ evaluate the interobserver reliability of three scoring systems for diabetic foot ulceration (Perfusion, Extent, Depth, Infection, Sensation, Site, Ischemia, Neuropathy, Bacterial Infection, and Depth and UTC). These classification systems may be reliably used by multiple observers, for example, when conducting research and audit. However, they demonstrate only slight to moderate reliability when used by a single observer on an individual subject and may

therefore be less helpful in the clinical setting, when documenting ulcer characteristics or communicating between colleagues. The absence of internal and external validation for many popular classifications system is a current problem because their use in centers where the amputations rate is high. Some classifications were validated for other groups (external) without the mandatory initial internal validation¹⁸. The progress to validate a score system must include all identified wound variables, avoiding bias of variables selection. Unfortunately, current classifications show bias because they are excluding important wound variables and their differentiation by severity grades. The Saint Elian score is a system submitted to scrutiny under the rigorous scientific process of internal¹⁴ and external validation¹⁹⁻²⁵ that provide a comprehensive model to approach the above-mentioned purposes.

Relevance of the San Elian System in diabetic foot wounds^{14,25-36}.

Diagnosis

After clinical assessment and non-invasive studies data collections are recorded on the clinical chart including the levels of severity to the ten different categories as follows: (a) primary location, (b) topographic aspects, (c) number of affected zones, (d) ischemia, (e) infection, (f) edema, (g) neuropathy, (h) depth, (i) area, and (j) wound healing phase (Table 1). All are subcategorized with an ascending severity score from mild (1 point) to severe (3 points).

Prognosis

The maximum score achievable is 30 points. When a score sum of 10 points or fewer (if zero value was scored for aggravating factors) was obtained, it was graded as I (mild, likely successful wound healing). A moderate score of 11-20 points was graded as II (partial foot threatening; outcome related to “state-of-the-art” therapies used and associated with a good patient biological response), and 21-30 points was graded as III (limb- and life-threatening; outcome unrelated to “state-of-the-art” therapies because of poor biological patient response).

Treatment

Focused on medical and surgical treatment of aggravating factors (Ischemia, infection, edema, and



Figure 1. The picture shows a combined mixed devastating Diabetic Foot Attack (DFA) including, infection, edema, Charcot foot and their remission (Saint Elian Grade III scoring 23 points). The arrow point out the DFA remission after the treatment under the Saint Elian System. Then, the Stage III start with a very high risk for a new DFA, amputations, or death.

neuropathy) according to the severity score (0-3) and wound healing phases acceleration. Recently a paper³⁷ reported the term “DFA” to describe the wounded Diabetic Foot Syndrome. The DFA report, describes three types including ischemia, infection, and Neuropathy (Charcot). According to the San Elian System the DFA include the addition of edema and the mixed attack considering five types of foot attack. The DFA is a devastating presentation with an acutely inflamed foot with rapidly progressive skin and tissue necrosis, associated at times with significant systemic symptoms (Fig. 1). It could rapidly escalate over hours from an apparently simple injury, to limb-threatening proportions. This may be an entirely new presentation or a sudden deterioration on the background of a known neuropathic diabetic foot ulcer, limb ischemia, or both, wherein delays in recognition or intervention pose a significant risk of major amputation.

The San Elian Triage for the DFA in the Emergency room.

The SEWSS severity Grades and score provide a guideline to prioritize the immediate medical treatment of diabetic foot persons according to their chance of benefiting from such care to survive or limit the damage and extremity function (Table 2).

Follow-up of healing progress²⁶

The score of ten severity factors and grade for prognosis within the checklist format is recorded from daily to every week, as necessary. Score changes in progress of wound healing permit to implement proactive therapeutics actions (Table 3).

Table 1. Saint elian score system. Clinical practice recommendations of the diabetic foot -IDF 2017

Factors	Score (Severity)			Score
	1 (Mild)	2 (Moderate)	3 (Severe)	
(1) Primary zone (location)	Phalanges	Metatarsal	Tarsal	
(2) Topographic aspects (location)	Dorsal or plantar	Lateral or medial	Two or more	
(3) Zone number	One	Two	Three	
(4) Ischemia	Palpable pulses slightly diminished ABI (0.89-0.7) TBI (0.74-0.60)	Scarcely palpable pulses ABI (0.69-0.5) TBI (0.59-0.30)	Non palpable pulses ABI < 0.5 TBI < 0.30	
(5) Infection	Erythema < 2 cm. Purulent discharge, warmth, tenderness	Erythema > 2 cm Muscles, tendons or bone or joint infection.	Systemic inflammatory Response Syndrome. Secondary hyper or hypoglycemia	
(6) Edema	Periwound	One Foot or leg	Bilateral secondary to comorbidities	
(7) Neuropathy	Protective Sensation diminished (128 HZ tuning fork, SWM, Vibratip, Ipswich)	Protective Sensation absent (128 HZ tuning fork, SWM, Vibratip, Ipswich)	Diabetic neuroosteoarthropathy (DNOA)-Charcot	
(8) Area	Small < 10 cm ²	Medium 11-40 cm ²	Big > 40 cm ²	
(9) Depth	Superficial (skin)	Tendons, fascia, muscles	Deep joint and bones	
(10) Wound healing phase	Inflammatory	Granulating	Epithelialization	
Score sum				
Final score	Grade (Severity)	Prognosis		
< 10	I (Mild)	Likely successful wound healing. No LEA		
11-20	II (Moderate)	Partial foot-threatening; outcome related to "state-of-the-art" therapies used and associated with a good patient biological response. < 30% LEA		
21-30	III (Severe)	Limb- and life-threatening; outcome unrelated to "state-of-the-art" therapies because of poor biological patient response. > 70% LEA		

Check the severity column and annotate the score (1-3) at the right column. Score 0, for absence of the aggravating factor (ischemia, infection, edema or neuropathy. WFA: waveform analysis SWM: Semmes Weinstein Monofilament. LEA: Lower extremity amputations.

Table 2. The Saint Elian severity triage for survival and function of the diabetic foot

Priority 1	Priority 2	Priority 3	Priority 4
Saint Elian Grades III and II (> 17 score) Severe Diabetic Foot Attack secondary to ischemia, infection, edema and Charcot or a mixed combination.	Saint Elian Grades III and II (> 17 score) moderate Diabetic Foot Attack secondary to ischemia, infection, edema and Charcot or a mixed combination.	Saint Elian Grade II (< 17 score) mild Diabetic Foot Attack secondary to any type of attack.	Gangrene of the entire foot limb- but not life threatening problem

Prevention

The system provides a platform for primary, secondary, and tertiary prevention according to the Leavel and Clark model and the foot risk classification of the IDF (Table 4). The referral and counter referral process

for three levels of care is included. The potential value of this system is that the influence of population-dependent parameters may be important to be included within a detailed and unified score to inform the work of colleagues developments else-where toward reducing amputations in the diabetic patient³¹.

Table 3. Follow up table for healing progress of diabetic foot wounds*

Patient name
Date
Date
Medical and surgical Treatment**
FACTORS (score 1-3)
Location (1-3)
Aspects (1-3)
Number of Zones (1-3)
Ischemia (0-3)
Infection (0-3)
Edema (0-3)
Neuropathy (0-3)
Area (1-3)
Depth (1-3)
Wound healing phase (1-3)
Score
Difference
Grade
Physician name and signature

*Saint Elian System scores the wound severity as many times as necessary, at least 1 time/week.

**Surgical operations (debridement, minor and major amputations, bypass, angioplasty, etc.) and/or adjuvant therapies (Negative Pressure Therapy, bioengineered skin, growth factors, stem cells, antimicrobial therapy, etc.).

Table 4. Foot risk classification – international diabetes federation 2017

Risk Category	Characteristics	Follow-up	Treatment Plan
0 Low risk	Normal plantar sensation	Re-check in 12 months	Patient education, daily inspection, proper footwear. Routine foot care as needed. Yearly follow-up, tight glycemic control necessary to maintain this risk category
1 moderate	Loss of protective sensation (LOPS)	Re-check in 6 months	Patient education, proper footwear, soft molded insoles. Routine foot care as needed. Daily self-inspection. Six month follow-up.
2 high risk	LOPS with either high pressure or poor circulation (PAD) or structural foot deformities or onychomycosis	Re-check in 3 months	Patient education, proper footwear with possible modifications custom molded insoles fitted into footwear with possible modifications to relieve areas of pressure. Scheduled routine foot care. Daily self-inspection.
3 Very High Risk	History of ulceration amputation or neurophatic fractures	Immediate referral if active ulcer or Charcot foot. Re-check in 1 month if history of ulcer or Charcot foot	Patient education. Extra depth footwear with custom modification custom molded insoles with modifications to relieve pressure, offload with cast as necessary, scheduled routine foot care. Daily self- inspection.

Stages of risk progress for Foot Attack, amputations, and death.

Persons with Diabetes Mellitus may progress from low risk stage to foot attack remitting to a posterior high risk stage or conversely to a major amputation or death. The progress stages are described as follow: (a) Stage I Low Risk Foot. Persons with diabetes mellitus and foot at risk without wound history and no wound at patient presentation; (b) Stage II The Foot Attack that could progress to heal with or without minor amputations or conversely, lead to major limb amputation or death; and (c) Stage III High Risk Foot. After the Foot Attack. History of a wound healed with minor amputations with their feet at a higher risk for limb lose or to develop a new wound.

The global and the latinamerican impact of the San Elian System

The San Elian Latin American System is widely referred as part of peer-review papers^{14,19-23,25,26,28,29,30,33-36}, books chapters^{27,30,32}, awards keynote lectures³⁸, and guidelines^{1-8,24}, including the global milestone contribution to the IDF -Clinical Practice Recommendations of the Diabetic Foot-2017¹. The relevant keynote lectures included: (1) the Multidisciplinary International Limb and Amputations prevention Conference. Clas-sificazioni del piede diabetico: la classificazione di San Elian e migliori di altre? Milán, . 2013;(2) the San Elian comprehensive surgical approach for diabetic foot wounds. Diabetic Foot International Summer School of Surgery, Bergamo Italia, 2017; (3) Certification for Physicians to prevent the Diabetic Foot Syndrome: The Saint Elian System. International Diabetes Federation Congress. Abu Dhabi-2017; and (4) The Saint Elian score for the diabetic foot syndrome: A dynamic and detailed system to reduce lower-extremity amputation: the foot attack in LATAM. IDF- Global Congress, Busan, Korea-2019. The Regional Contribution for the Americas is published as part of several diabetic foot guidelines of different medical societies and the Minister of Health in Chile³⁹ and Mexico^{40,41}. Included as one of the main classification system in several clinical practices guidelines of different multidisciplinary medical associations, the San Elian model presented by latinamerican delegates integrated a final and current document: The Declaratory of the Diabetic Foot Summit of the Americas, that was held in Mexico City⁴².

In conclusion, the Latinamerican SEWSS provides a validated tool with global relevance. The

key message is to be able to treat diabetes and to prevent any possible complication. Once the DFA develops the system provide a comprehensive checklist to score wound severity at patient presentation and during the follow-up of healing progress to achieve better outcomes. The devastating five types of DFA according to San Elian aggravating factors include the ischemic attack as the first cause of legs amputations. This report reviewed the regional and global contribution of the SEWSS for definition, classification, diagnosis, treatment, prevention including a new triage system and the progress of DFA stages as an useful tool to prevent mortality and major amputations.

Conflict of interest

The authors declare there is no conflict of interest.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that no patient data appear in this article.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

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