Diabetic foot – prevention and control challenges

Pie diabético: desafíos de prevención y control

Vitorino Modesto dos Santos[1], Taciana Arruda Modesto Sugai[2], Lister Arruda Modesto dos Santos[3]

doi: http://doi.org/10.61997/bjm.v13i1.371

Dear Editor

We read the article by Pérez Lozada Y, et al. describing the main characteristics and outcomes of 25 patients treated for diabetic foot (DF) during seven months.[1] The majority of them were males (68%) over 60-years-old and with 5 to 10 years since the diabetes diagnosis; 44 % were white, 48% had only the primary scholarity and only one had university level. Their low socioeconomic level and inadequate glycemic control were the major factors for development of DF with neuropathic lesions, additional factors were smoking, increased body weight and not wearing shoes. Most patients improved within the first month of treatment, despite of high rate of amputations.[1] The authors emphasized the role of multidisciplinary medical monitoring and nursing care, in addition to the use of tissue regeneration medicines to get better outcomes. Their very illustrative work focused on this common disabling consequence of diabetes mellitus, which merits the earliest accurate care. The objective of the following comments, also based on more recent literature data, is enhance the awareness of non-specialist and primary health workers about prevention and care of DF.

Canha F and Soares R[2] reviewed the literature, including 22 studies from 2018 to 2021, about targeted angiogenic resources that are used to treat ischemic DF ulcers. They focused on growth factors and their receptors, cytokines, hormones, transcription factors, matrix degradation proteases, microRNAs, besides the hyperbaric oxygen and negative pressure wound therapy as promising approaches for ischemic ulcer repair. Felgueiras HP[3] reviewed treatment innovations from 2017 to 2022 related to DF ulcer dressing systems via fiber-based scaffolds modified with bioactive compounds. The Nanospider™ technology was commented on as the current available tool that should be optimized for electrospinning the nanofibrous systems at an industrial scale, besides the seamless technology for bandage production, the 3D printing for fiber patterned constructs, or even on wet-spun systems.

The authors also cited one classification for the grades of DF ulcers: 1) partial thickness involving only dermis and epidermis; 2) full thickness and subcutaneous tissues; 3) grade 2 plus exposed tendons, ligament, and/or joint; 4) grade 3 plus abscess and/or osteomyelitis; 5) grade 3 plus necrosis in wound; and 6) grade 3 plus gangrene both in wound and in the surrounding tissue.[3] Kim J[4] reviewed the role of metabolic dysfunction, immunopathy, neuropathy, and angiopathy in DF genesis, including adenosine triphosphate deficiency, polyol pathway, oxidative stress, protein kinase C activity, suppression of the endothelial nitric oxide production, favoring atherosclerosis, inflammation, and abnormal intimal growth; interplayed factors favor the origin and progression of infections in diabetes. Lazarus J et al,[5] reviewed 81 reports about the use of Digital Health Technology (DHT) to the remote care of DF ulcers, including features, technological readiness, and scope of clinical testing. The studies involved multiple ulcers (19%), treatment methods (56%), or prevention (26%), and 10% involved treatment-autonomous interventions. They found that high levels of patient adherence and satisfaction were often reported, and DF ulcers constitute a promising resource for the application of remote DHTs.

1. MD, PhD. Department of Medicine, Armed Forces Hospital and Catholic University of Brasília-DF, Brazil. ORCID https://orcid.org/0000-0002-7033-6074 Correspondence: vitorinomodesto@gmail.com
2. MD, Specialist. American Society of Neurophysiology, and Dermatologist of Brasília-DF, Brazil. ORCID https://orcid.org/0000-0002-4397-3254 Correspondence: taciana.sugai@gmail.com
3. MD, Preceptor. Department of General Surgery of State Worker's Hospital, São Paulo-SP, Brazil. ORCID https://orcid.org/0000-0003-4647-4044 Correspondence: listersantos@hotmail.com

Matijević T, et al,[6] performed an evidence-based overview about DF complications, including risk factors for foot ulcers in diabetics as peripheral neuropathy or arterial disease, recurrent trauma, infection, foot abnormality, or Charcot osteoarthropathy. Worthy of note, poor wound healing is a main cause of long-term diabetic wounds, and the presence of polymicrobial infections may be another major concern these cases. The authors cited that the most frequent microorganisms isolated from DF infections include *Staphylococcus aureus, Escherichia coli, Pseudomonas, Proteus, Enterococcus, Klebsiella, Acinetobacter, Citrobacter, and the coagulase-negative staphylococci*. They commented on the hyperbaric oxygen or negative pressure therapies if healing wound does not occur after a minimum of 4 weeks under the standard treatment.

REFERENCES

1. Pérez Lozada Y, González E, Fuentes Álvarez C, Carbonel Téllez S. Caracterización de los pacientes atendidos por pie diabético en el área de salud San Pedro. BJM [Internet]. 2023; 12(Suppl1): 30-36. Disponible en: https://bjomed.org/index.php/bjm/article/view/311
2. Canha F, Soares R. The use of innovative targeted angiogenic therapies for ischemic diabetic foot ulcer repair: From nanomedicine and microRNAs toward hyperbaric oxygen therapy. Porto Biomed J [Internet]. 2023; 8(1):e187. doi: http://doi.org/10.1097/j.pbj.0000000000000187
3. Felgueiras HP. Emerging antimicrobial and immunomodulatory fiber-based scaffolding systems for treating diabetic foot ulcers. Pharmaceutics [Internet]. 2023; 15(1):258. doi: http://doi.org/10.3390/pharmaceutics15010258
4. Kim J. The pathophysiology of diabetic foot: a narrative review. J Yeungnam Med Sci [Internet]. 2023; 40(4):328-334. doi: http://doi.org/10.12701/jyms.2023.00731
5. Lazarus J, Cioroianu I, Ehrhardt B, Gurevich D, Kreusser L, Metcalfe B, et al. Data-driven digital health technologies in the remote clinical care of diabetic foot ulcers: a scoping review. Front Clin Diabetes Healthc [Internet]. 2023;4:1212182. doi: http://doi.org/10.3389/fcdhc.2023.1212182
6. Matijević T, Talapko J, Meštrović T, Matijević M, Erić S, Erić I, et al. Understanding the multifaceted etiopathogenesis of foot complications in individuals with diabetes. World J Clin Cases [Internet]. 2023; 11(8):1669-1683. http://doi.org/10.12998/wjcc.v11.i8.1669

Keywords: diabetic foot; foot ulcer; neuropathy; treatment

Disclosure: none to disclaim

Authorship:
Vitorino Modesto dos Santos, Taciana Arruda Modesto Sugai, and Lister Arruda Modesto dos Santos made equally substantial contributions to: 1) the conception and design of the study, acquisition of data, and analysis and interpretation of data; 2) the drafting the article and revising it critically for important intellectual content; and 3) the final approval of the version to be submitted.

Correspondence: Vitorino Modesto dos Santos. Armed Forces Hospital. Estrada do Contorno do Bosque s/n, Cruzeiro Novo, Zip Code 70.658-900, Brasília-DF, Brazil. Telephone: #55 61-39662103. Fax: #55 61-32331599. vitorinomodesto@gmail.com.

Received: *November 21, 2023*
Accepted: *December 7, 2023*