Healing of torpid ulcers treated with atmospheric cold air plasma jet: preliminary results

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Torpid Ulcers with especial emphasis in Venous Ulcers are very common in clinical practice mainly due to chronicity and recurrence with an important negative impact in life quality of patients and also in the systems of health around the world. The use of Cold Atmospheric Plasma treatment is gaining more visibility in medical community in last decade with significant results [1], [2].

We present preliminary clinical results obtained by using a Cold Atmospheric Air Plasma Jet device in the frame of a clinical trial of torpid ulcers in legs that is running at the Clínica Universidad de Navarra in Pamplona, Spain. The results show some typical cases of recovery and examples that have been selected among the most critical patients with large ulcerated areas and previous pathologies that determined exhausted tissues. In addition, two cases of interest are also presented in which previously an attempt was made to close the ulcers by means of grafts and which failed. In these cases, the innovation consisted in the use of the air plasma jet to improve vascularisation of the ulcerous tissues before performing a new graft with the intention of increasing the probability of its acceptance. The results of this new technique are very promising.

Fig.1. Evolution of a 94-year-old female patient with an ulcer on the instep of the right foot due to surgical dehiscence with exposure of tendons and bone without periosteum after four weeks of treatment with Cold Atmospheric Air Plasma Jet Device.

[1] B. Stratmann *et al.*, "Effect of Cold Atmospheric Plasma Therapy vs Standard Therapy Placebo on Wound Healing in Patients With Diabetic Foot Ulcers: A Randomized Clinical Trial," *JAMA Netw. open*, vol. 3, no. 7, p. e2010411, 2020, doi: 10.1001/jamanetworkopen.2020.10411.

[2] S. Mirpour *et al.*, "Cold atmospheric plasma as an effective method to treat diabetic foot ulcers: A randomized clinical trial," *Sci. Rep.*, vol. 10, no. 1, pp. 1–9, 2020, doi: 10.1038/s41598-020-67232-x.