Vitamin D And Inflammatory Biomarkers During Wound-healing.

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Objectives: Hypertrophic scars and keloids represent common undesirable consequences of wound-healing in which the pathogenesis continues on debate. It is known that a robust inflammatory mechanism is behind the formation of this abnormal fibrous wound-healing process. However, specific etiology, and pathophysiology remains unknown and treatment options ineffective [1]. Vitamin D is involved in proliferation, differentiation, and immunoregulation of cells and has shown to be a powerful anti-inflammatory agent [2]. Moreover, Vitamin D plays a role in terminal differentiation of epidermal cells that can affect wound healing [3, 4]. The aim of this study is to evaluate vitamin D and inflammatory biomarkers plasma levels during wound-healing.

Materials and Methods: A prospective study was performed in patients (*n*=50) submitted to body contouring surgery, regarding the clinical evolution of the scars. Blood samples were collected before (t_0) and 3 to 5 days after surgery (t_5) corresponding to the inflammatory phase of wound healing. Blood cell count, protein inflammatory biomarkers, vitamin D, vitamin A and vitamin E were quantified. Three months after surgery scars were evaluated and classified as normal or hypertrophic by two independent observers.

Results: In the end of the study 80% of patients developed a normal scar (control group, n=40) and 20% of patients presented hypertrophic scars (HT group, n=10). Patients in the HT group presented higher monocyte count (8.55% vs. 7.19%, p=0.036) and C-reactive protein levels (CRP: 6.12mg/L and 2.30mg/L, p=0.015) in t_0 comparing with the control group. In t_5, patients in the HT group, showed an decrease in neutrophil (53.97% vs 61,55%, p=0.0065) and increase in basophil (0.45% vs. 0.22%, p=0.0003) and lymphocyte count (32.47% vs. 27.11%, p=0.037) compared with patients with normal scars (Fig.1).

Before surgery, Vitamin D plasma levels were found to be decreased by almost 50% (23.96ng/ml vs 13.33ng/mL, p=0.06) in patients that developed hypertrophic scars., in contrast no differences were found in vitamin E and vitamin A levels (Fig.2).

Conclusion: There is different systemic inflammatory profile response in patient during the formation of hypertrophic scars. Furthermore, vitamin D plasma levels are marked reduced in these patients. Considering the powerful anti-inflammatory effect of Vitamin D these findings could be related.

References

1. Wolfram D, Tzankov A, Pulzl P, Piza-Katzer H:Hypertrophic scars and keloids--a review of their pathophysiology, risk factors, and therapeutic management; Dermatologic surgery : official publication for American Society for Dermatologic Surgery [et al]; 35; 171-181; 2009.
2. Harant H, Wolff B, Lindley IJ:1Alpha,25-dihydroxyvitamin D3 decreases DNA binding of nuclear factor-kappaB in human fibroblasts; FEBS letters; 436; 329-334; 1998.
3. Hosomi J, Hosoi J, Abe E, Suda T, Kuroki T:Regulation of terminal differentiation of cultured mouse epidermal cells by 1 alpha,25-dihydroxyvitamin D3; Endocrinology; 113; 1950-1957; 1983.
4. Burkiewicz CJ, Guadagnin FA, Skare TL, do Nascimento MM, Servin SC, de Souza GD:Vitamin D and skin repair: a prospective, double-blind and placebo controlled study in the healing of leg ulcers; Revista do Colegio Brasileiro de Cirurgioes; 39; 401-407; 2012.

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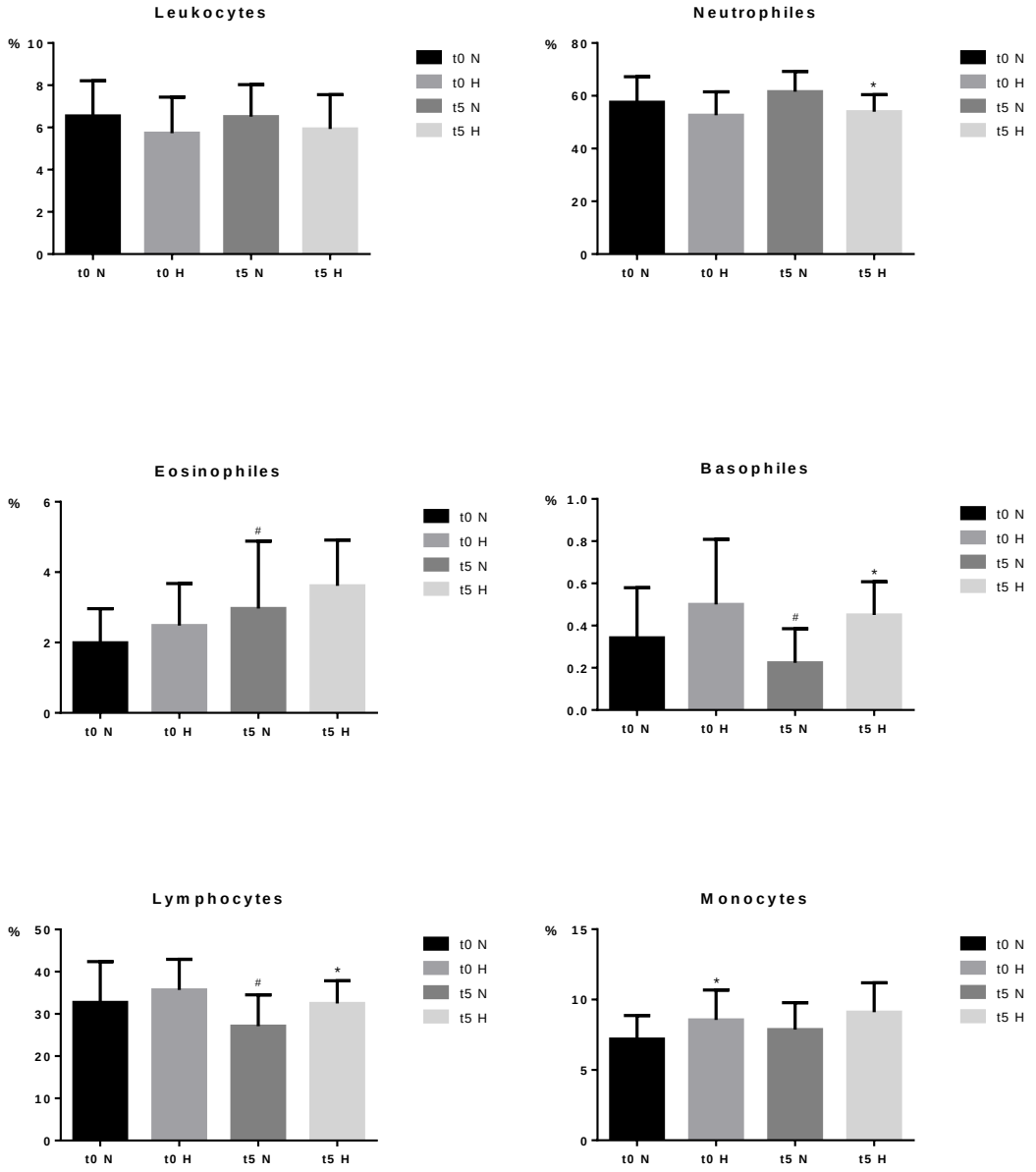

Figure 1: Percentage of inflammatory cells at t_0 and t_5 in patients who develop normal scars (N) and hypertrophic scars (H). #, * P<0.05

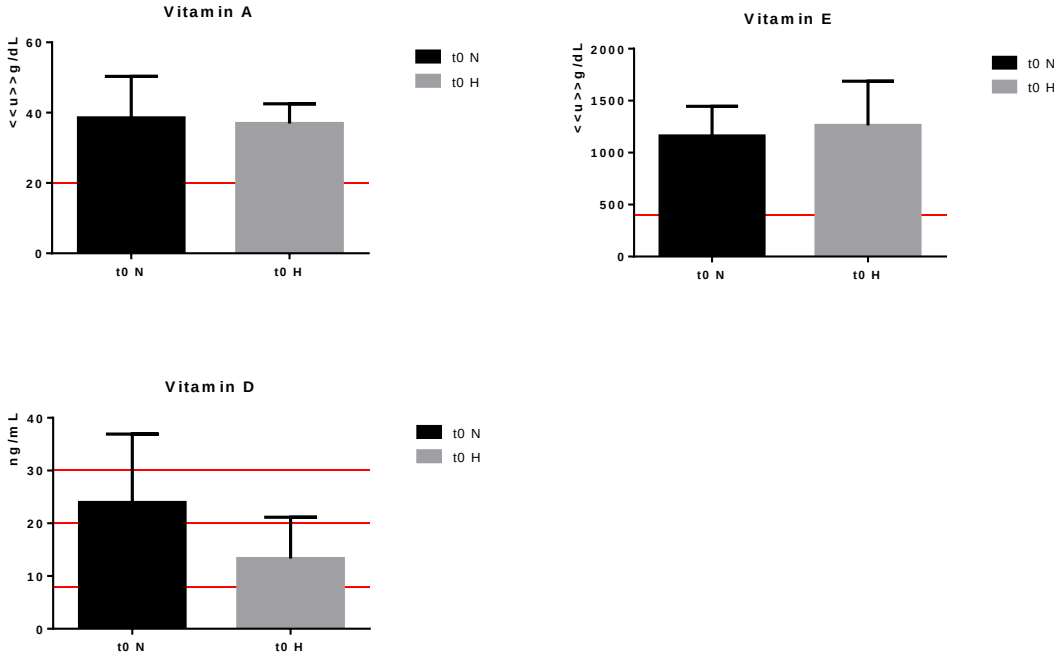

Figure 2: Serum levels of Vitamin A, E and D at t_0 of patients who develop normal scars (N) and hypertrophic scars (H).