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ORIGINAL

Platelet-Rich Plasma for the Treatment of Photodamage of the Skin of the Hands[☆]

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KEYWORDS

Photodamage;
Platelet-rich plasma;
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Abstract

Background: Platelet-rich plasma (PRP) provides growth factors that stimulate fibroblast activation and induce the synthesis of collagen and other components of the extracellular matrix. The objective of this study was to evaluate the effect of PRP in the treatment of photodamage of the skin of the hands.

Material and methods: Experimental study enrolling persons with photoaged skin on the dorsum of the hands (Glogau photoaging scale, type III, or Fitzpatrick wrinkle classification, type II) were included between August 2012 and January 2013. A histological comparison was made of skin biopsies taken before and after the application of PRP to the skin of the dorsum of the hands.

Results: The mean (SD) age of the 18 women enrolled was 47.9 (4.3) years. Histological analysis showed an increase in the number of fibroblasts ($P<.001$), number of vessels ($P<.001$), and collagen density ($P=.27$). These changes produced significant improvements in the Fitzpatrick wrinkle and elastosis scale ($P<.001$) and in the Glogau photoaging scale ($P=.01$).

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PALABRAS CLAVE

Fotodaño;
Plasma rico en
plaquetas;
Factores de
crecimiento

Conclusions: PRP induced a reduction in the manifestations of skin aging, including an improvement in wrinkles and elastosis.

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Plasma rico en plaquetas en el tratamiento del fotodaño cutáneo en las manos

Resumen

Introducción: El plasma rico en plaquetas (PRP) aporta factores de crecimiento que inducen la síntesis de colágeno y otros componentes de la matriz extracelular, y estimula la activación de fibroblastos. El objetivo de este estudio es evaluar el efecto del PRP en el tratamiento del fotodaño en manos.

Material y métodos: Estudio de tipo experimental. Se incluyeron individuos con envejecimiento en el dorso de las manos, de tipo 3 en la escala de fotodaño de Glogau o de clase II de la clasificación de arrugas y elastosis de Fitzpatrick, entre agosto de 2012 y enero de 2013. Se aplicó PRP en la piel del dorso de las manos y se tomaron biopsias cutáneas antes y después del tratamiento para la comparación histológica.

Resultados: Se trataron 18 mujeres con una edad media de $47,9 \pm 4,3$ años. El análisis histológico demostró un incremento en el número de fibroblastos ($p = 0,000$), número de vasos ($p = 0,000$) y cantidad de colágeno ($p = 0,27$), representado como un cambio en la escala de clasificación de arrugas y elastosis de Fitzpatrick ($p < 0,001$) y en la escala de fotodaño de Glogau ($p = 0,01$).

Conclusiones: El PRP indujo una reducción en los signos y síntomas del envejecimiento cutáneo, con mejoría en las arrugas y elastosis.

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Introduction

Skin aging is the result of accumulated damage that leads to the gradual biological and functional decline of cells over time (intrinsic aging) or the influence of environmental factors such as smoking, exposure to chemicals or UV radiation (extrinsic aging).¹

Constant exposure to UV radiation diminishes the structural function and integrity of the extracellular matrix through collagen degeneration and abnormal elastin structure, leading to the loss of both skin tone and elasticity, causing the signs of aging.²

Platelet activation in response to tissue damage and vascular exposure develops to promote hemostasis and secrete biologically active proteins³⁻⁶ that undertake functions related to chemotaxis, tissue proliferation and differentiation, angiogenesis, and regeneration of the extracellular matrix. A dose-response relationship between platelet concentration and the proliferation of mesenchymal cells, fibroblasts, and type 1 collagen has been observed *in vitro*.⁷⁻¹⁰

Growth factors in platelet-rich plasma (PRP) can stimulate fibroblast activation to regenerate damaged soft and hard tissues.^{2,3} These regenerative effects are attributed to the presence of biological factors such as platelet-derived growth factor, β -transforming growth factor, epidermal growth factor, insulin-like growth factor, and vascular endothelial growth factor, all of which are released locally after PRP is applied.¹¹ Increased dermal and epidermal thickness as well as enhanced numbers and organization of fibroblasts in photodamaged skin indicate that these factors

act on cell proliferation and reduce actinic elastosis^{12,13} even up to 3 months after application.⁶

Although PRP is used in a variety of conditions, only a few experimental studies have looked at the effects of PRP stimulation to treat skin aging.^{6,14-17}

Material and Methods

This experimental study was carried out between August 1, 2012, and January 31, 2013. After approval by the local medical research review board and ethics committee (file number R-2013-1301-142), we enrolled patients aged between 40 and 60 years who had mild skin photoaging according to the Glogau scale.¹⁸ The exclusion criteria were the use of topical treatments in the 6 months before the study, pregnancy, skin infection, a history of platelet dysfunction, use of corticosteroids, smoking, cancer, hemoglobin level less than 10 g/dL, or a platelet count less than 105×10^9 /L.

Three PRP application sessions were given 30 days apart.

Outcomes were assessed on the Glogau scale and the Fitzpatrick wrinkle scale¹⁹ and through histologic examination of posttreatment skin biopsies. Patients were asked not to change their routine skin care habits during the study.

Method for Obtaining PRP

We extracted autologous venous blood into sterile vacuum collection tubes containing a solution of 3.2% sodium citrate. The tubes were then placed in a digital centrifuge

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