41 - EFFECTS OF LASER THERAPY, LOW-LEVEL ON INDUCED CONTRACTION OF WOUNDS IN RATS WISTAR

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INTRODUCTION:

Over the years, several studies have been performed to understand the tissue repair process, as well as the possible effects of laser therapy on the healing of wounds (JUNIOR, 2006).

The process of wound healing consists of a complex series of stages, independent and simultaneous, which are described in phases. From a morphological standpoint, it identifies them with three consecutive phases, as inflammatory phase, fibroplasia or proliferative phase, and remodeling or maturation phase (SANTOS, 2004).

The low-intensity lasers such as ruby, helium-neon, arsenic, gallium, and

aluminum-gallium-arsenic have a photobiological effect that promotes acceleration of theevents of the tissue healing process. Act at the cellular level, through photochemistry interaction, and may promote increased cellular metabolism and consequently to induce different effects, such as analgesic, anti-inflammatory and repairer. (SASSIOTO,2004).

This study aims to evaluate the healing effect of different doses (8 and 4J/cm² J/cm²) In Ga P laser (670nm) on the contraction of wounds surgically induced in male Wistar rats adults from the vivarium of the Federal University of Viçosa (UFV), Viçosa, MG.

MATERIALS AND METHODS:

It was used 18 male rats (Rattus norvegicus albinos, Rodentia mammalia) Wistar, 56 days old and weighing 300 grams, measuring 17 cm on average ear to the beginning of the tail from the animal house of the Federal University of Viçosa. During the study, the animals were in boxes, containing three specimens, the envorinment temperature at 22 ± 2 º C, light / dark cycle in 12 hours with water troughs and food "ad libitum". This study followed the standards College Brazilian Animal Experimentation (COBEA). The project was approved by the Ethics Committee in the use of animals in the Biological Sciences and Health Faculty - UNIVIÇOSA, 181.06 Protocol.

Obtained under anesthesia with muscular injection (0.1 mL/100 g bodyweight) of a 1:1 of ketamine (50 mg) and xylazine 2% (20 mg) solution, it was held to shaving with the dorsal region, followed by antisepsis with polyvinylpyrrolidone-iodine and delineation of the operative field of 2 cm ² with fenestrated sterile field. Upon completion of the surgery, the animals received a single dose of morphine (10 mg / kg) by intramuscular analgesic purpose. And then the animals were divided randomly into three groups: G1 (n = 6): control untreated submitted to the achievement of surgical wounds. G2 (n = 6): Submitted to the achievement of wounds treated with laser 4J/cm². G3 (n = 6): Submitted to the achievement of wounds treated with laser 8J/cm². For treatment, it was used the laser device PHYSIOLUX DUAL - Each generation of continuous emission laser with a wavelength of 670 nm (InGaP - visible red), 6mW output power, manufactured by BIOSET Electronic Technology Industry Ltd. , São Paulo, goggles for 670nm laser in order to avoid possible damage to the region ocular.Foi applied once daily during 15 days of treatment.

The animals were anesthetized with Xylazine (2%), 10mg/Kg associated with ketamine (10%), 100mg/kg, intramuscularly in the inferior member. The animals were sacrificed 7 and 15 days after induction of surgical ferida.Os animals were photographed using digital camera model "EXILIM" (Casio), 7.2 mega pixels and the area calculated by the software QUANTIPORO (FERNANDES FILHO, 2001) and calculate the percentage of wound contraction, we used the formula:

$$\text{Contraction of the wound area} = \frac{\text{home - the day of measurement area}}{\text{Initial area}} \times 100$$

(AGREN, 1997).

RESULTS AND DISCUSSION:

The summary of the variance analisys of wound contraction is presented in Table 1. In the assessment of dermal wounds induced in rats found that the design was effective to detect significant differences for laser treatments IN GA P (0, 4 and 8 J/cm²) and times of assessment at 7 and 15 days after induction of the wound.

Table 1 – Summary of variance analysis of wound contraction induced in Wistar rats treated with laser of 0 (control), 4:08 J/cm².

FV	GL	SQ	QM	Fc
Repetition	2	0.000006	0.000003	68.275**
Treatment (Trat)	2	0.000003	0.000001	29.257**
Error 1	4	1.85E-0007	4.64E-0008	
Time	1	0.000073	0.000073	64.975**
Time X Trat	2	0.000006	0.000003	2.481NS
Error 2	6	0.000007	0.000001	
Total	17	0.000095		
CV 1 (%)	3.48			
CV 2 (%)	17.14			
Geral overage	0.0062			

**: F test significant at 5% probability. NS F test significant at 5% probability

Since the F test in variance analysis with replications was significant, showing there was difference in the repetition, it´s interesting to note the importance of using a larger number of animals to represent a recurrence or a greater number of replicates to obtain a significant result.

The experimental precision measured by the variation coefficient (CV1 and CV2%%), represented in Table 1, shows the credibility of the experiment passed by an experimental error below.

Granulation tissue, when contracting, retracts the wound edges of skin to the center of the wound, allowing the area to be reepithelization becomes smaller, which was observed in our experiment. From the seventh day, it was observed in all three treatments (0, 4 and 8 J/cm²), the partial closure of the scar tissue. As for the fifteenth day there was, on average, complete closure and formation of new tissue was not detected significant difference for the two evaluation periods.

According to Ferreira (2010), the treatment with laser therapy of low intensity (660 nm) with 3 joules, for 07 consecutive days, is effective to improve epithelialization of tissues, both young and aged, and it can not, therefore, conclude that only by bringing the edges of the wound indicates the reepithelialization, but mainly the analysis of the blades through the formation of the epidermis.

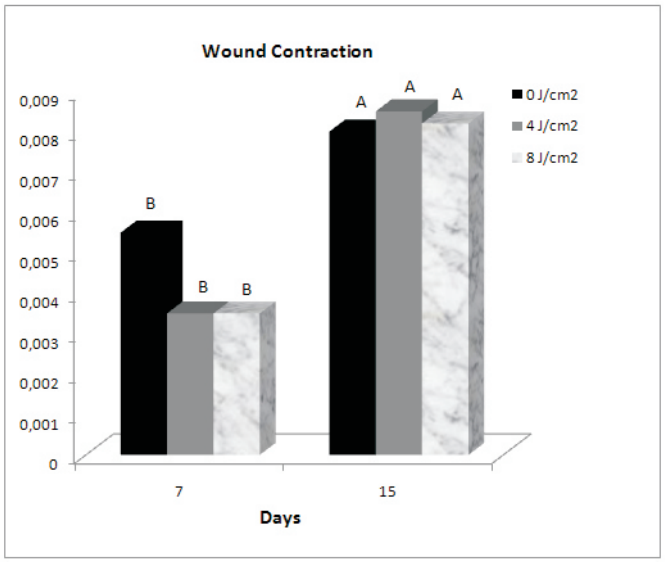

Figure 1– Analysis of wound contraction in groups 0, 4 and 8 J/cm² Times 7 and 15 days.

The statistical difference made by the Tukey test at 5% significance level to 0; 4 and 8 J/cm², demonstrating that the control treatment was more effective in time of 7 days in wound contraction and that the treatments of 4 and 8 J/cm2, which achieved the same statistic behavior. However, between the seventh and fifteenth day, the groups that received treatment had better contraction response. In the end of the fifteenth day, the three groups had similar treatment, as shown in Figure 1. Corroborating with Hall et al (1994), which evaluated the effect of laser GaAlAs, 0.2 J/cm², up to 21 days, wound healing in rats and observed clinically and histologically that the use of laser produced no results significant.

CONCLUSION:

The wound contraction time for 15 days did not represent significantly able to differentiate between the three groups together, but when considering the time corresponding to day 7 to day 15 the group treated with a dose of 4 J/cm², it obtained a better response suggesting that laser therapy works in a specific phase of the process of wound healing.

REFERENCES:

AGREN, M.S.; MERTEZ, P.M.; FRANZÉN, L.A. comparative study of three occlusive dressing in the treatment of full thick ness wounds in pigs. Journal of the American Academy of Dermatology, v.36, p.53-58, 1997.

FERNANDES FILHO, E.I.; VIANA, J.H.M. Quantiporo: um novo programa para tratamento e quantificação de imagens digitais para aplicações em ciência do solo. In: CONGRESSO BRASILEIRO DE CIÊNCIA DO SOLO, 28, 2001, Londrina.

FERREIRA, M.A. Efeitos do laser de baixa intensidade no processo de cicatrização em ratos jovens e idosos: estudo morfométrico e morfológico. Alfenas, 2006. Disponível em: tese.unifenas.br/tde_busca/arquivo.php?codarquivo =22. Acesso em: 22 Abril 2010.

HALL, G. et al. Effect of low-level energy laser irradiation on wound healing. An experimental study in rats. Swed. Dent. J., v.18, p.29-34, 1994.

JÚNIOR, A.M.R. et al. Modulação da proliferação fibroblástica e da resposta inflamatória pela terapia a laser de baixa intensidade no processo de reparo tecidual. Anais Brasileiros de Dermatologia, v.81, n.2, 2006.

SANTOS, A.G. et al. Clerodane diterpenes from leaves of Casearia sylvestris Swartz. Química Nova, v. 30, n. 30,p. 1100-1103, 2007.

SASSIOTO, M.C.P et al. Efeito da Casearia sylvestris no reparo ósseo com matriz óssea bovina desvitalizada em ratos. Acta Cirurgica Brasileira, v. 19, n. 6, p. 637-641, 2004.

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EFFECTS OF LASER THERAPY, LOW-LEVEL ON INDUCED CONTRACTION OF WOUNDS IN RATS WISTAR

ABSTRACT

The process of wound healing consists of a complex series of stages, independent and simultaneous. The aim of this study is to evaluate the healing effect of different doses of lasers InGAP, the contraction of skin wounds surgically induced in male Wistar rats. We used 18 animals, 56 days, weight 300g and measuring 17cm in middle ear to the beginning of the tail, divided into 3 groups of 6 animals. The group I control (no treatment), the 4 J / cm ² Group II, and the Group III 8 J / cm², applications were daily for 15 consecutive days, were performed euthanasia on the 7th and 15th day, the area of the wounds were photographed and measured by software QUANTIPORO. It was performed variance analysis, Tukey post hoc, and the significance level of 5% using the Genes software 2006.The wound contraction for the day 15 results were not significant, but, by analyzing the time corresponding to 7 to 15 day, the group treated with a dose of 4 J/cm² obtained a better response suggesting that laser therapy works in a specific phase of the process of wound healing.

KEYWORDS: Wound healing, low-intensity laser, wound contraction

EFFETS DE LA THERAPIE LASER, DE BAS NIVEAU SUR LA CONTRACTION INDUITE DES PLAIES CHEZ DES RATS WISTAR

RÉSUMÉ

Le processus de cicatrisation des plaies se compose d'une série complexe d'étapes, indépendante et simultanée. Le but de cette étude est d'évaluer l'effet de guérison de différentes doses de lasers EnGAP, la contraction des plaies cutanées chirurgicalement induite chez les rats mâles de la souche Wistar. Nous avons utilisé 18 animaux, 56 jours, poids: 300 g et mesure 17 cm sur l'oreille moyenne le début de la queue, divisée en 3 groupes de 6 animaux. Groupe I de contrôle (non traité), Groupe II 4J/cm ², 8 J / cm ² Groupe III, les demandes ont été tous les jours pendant 15 jours consécutifs ont été réalisés l'euthanasie, le 7 et le 15, la zone des plaies ont été photographiées et mesurées par le logiciel QUANTIPORO. Nous avons effectué une analyse de variance, Tukey post-hoc, et le niveau de signification de 5% en utilisant le logiciel de 2006.Le gènes contraction de la plaie pour les 15 jours les résultats ne sont pas significatives, mais en analysant le temps correspondant à 7 ° au jour le jour 15, le groupe traité avec une dose de 4 J / cm ² obtenu une meilleure réponse suggère que la thérapie laser fonctionne dans une phase spécifique du processus de cicatrisation de la plaie.

MOTS-CLÉS: la guérison des plaies, laser de faible intensité, contraction de la plaie.

EFECTOS DE LA TERAPIA LASER, DE BAJO NIVEL EN LA CONTRACCIÓN INDUCIDA DE HERIDAS EN RATAS WISTAR

RESUMEN

El proceso de cicatrización de la herida consiste en una compleja serie de etapas, independiente y simultánea. El objetivo de este estudio es evaluar el efecto curativo de diferentes dosis de rayos láser EnGAP, la contracción de las heridas de la piel inducida quirúrgicamente en ratas macho de la cepa Wistar. Se utilizaron 18 animales, 56 días, 300 g de peso y 17cm de medida en el oído medio el principio de la cola, divididas en 3 grupos de 6 animales. Grupo I control (sin tratamiento), Grupo II 4J/cm ², 8 J / cm ² Grupo III, las solicitudes al día durante 15 días consecutivos se llevaron a cabo la eutanasia en el día 7 y 15 de la zona de las heridas fueron fotografiados y medidos por el software QUANTIPORO. Se realizó el análisis de varianza, post hoc de Tukey, y el nivel de significancia del 5% con el software de 2006.The genes contracción de la herida para el día 15 los resultados no fueron significativos, pero analizando el tiempo que corresponde a 7 ° día a día 15, el grupo tratado con una dosis de 4 J / cm ², obtuvo una mejor respuesta que sugiere que la terapia con láser trabaja en una fase específica del proceso de cicatrización de la herida.

PALABRAS CLAVE: la curación de heridas, láser de baja intensidad, la contracción de la herida.

EFEITOS DA TERAPIA LASER DE BAIXA INTENSIDADE SOBRE A CONTRAÇÃO DE FERIDAS INDUZIDAS EM RATOS WISTAR

RESUMO

O processo de cicatrização de feridas é composto por uma série de estágios complexos, independentes e simultâneos. O objetivo deste estudo é avaliar o efeito cicatrizante de diferentes doses dos lasers InGAP, na contração de feridas cutâneas induzidas cirurgicamente em ratos machos da linhagem Wistar. Utilizou-se 18 animais, 56 dias, peso 300g e medindo em média 17cm da orelha ao inicio da cauda, divididos em 3 grupos de 6 animais.Grupo I controle (sem tratamento), Grupo II 4j/cm², Grupo III 8j/cm², as aplicações foram diárias por 15 dias consecutivos, foram realizadas eutanásias no 7° e 15° dia, a área das feridas foram fotografadas e calculada pelo software Quantíporo. Foi realizada a análise de variância, post hoc Tukey, e o nível de significância de 5%, utilizando o programa Genes 2006. A contração das feridas para o tempo 15 dias não apresentou resultado significativo, porém ao analisar o intervalo de tempo correspondente do 7° dia para o 15° dia o grupo tratado com a dose de 4j/cm² obteve melhor resposta sugerindo que a terapia laser atua em uma fase especifica do processo de cicatrização de feridas.

PALAVRAS CHAVES: Cicatrização, laser de baixa intensidade, contração de ferida.