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稳定溶解臭氧水对皮肤创面炎症的治疗效果*

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摘要 目的:探讨浓度为 1.8-3.2 mg/L 溶解臭氧水冲洗控制皮肤创口炎症引发的红肿痛的临床效果。**方法:**将 40 例接受激光皮肤除斑治疗的患者分为两组,其中实验组 20 例患者采用浓度为 1.8-3.2 mg/L 溶解臭氧水冲洗皮肤创面,而对照组 20 例患者采用冰袋冷敷的方式处理创面。观察并比较两组患者皮肤创面红肿的改善情况以及两种治疗方法的临床效果。**结果:**①疼痛症状改善情况:实验组显效 20 例,对照组显效 0 例,实验组患者显效率明显高于对照组,差异具有统计学意义($P < 0.01$)。②临床体征改善情况:实验组显效 20 例,对照组显效 0 例,实验组患者显效率明显高于对照组,差异具有统计学意义($P < 0.01$)。**结论:**浓度 1.8-3.2 mg/L 溶解臭氧水对于炎症引发的皮肤创面红肿症状具有显著的疗效,不仅能够抑制炎症发展,而且有利于促进创面愈合,值得在临床广泛推广应用。

关键词:臭氧水;杀菌;抑制炎症;皮肤创口

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Clinical Effect of Ozonated Water in Treatment of Skin Surface Wound*

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ABSTRACT Objective: To investigate the clinical effect of ozonated water with 1.8-3.2 mg/L on the treatment of fresh skin surface wound. **Methods:** Total 40 patients were divided into two groups. The 20 patients in the experimental group were treated with 1.8-3.2 mg/L ozonated water to control inflammatory reaction, while the others in the control group were treated by cold compress. Then the inflammatory reaction and pain of patients in the two groups were observed and compared. **Results:** (1) Inflammatory pain: the 20 patients in the experimental group feel almost no pain after topical treatment of 1.8-3.2 mg/L ozonated water, while the other 20 patients in the control group all feel mild pain after the treatment of cold compress. The treatment effect in experimental group was significantly better than that of the patients in the control group ($P < 0.01$). (2) Clinical sign: wound redness and welling in 20 patients of experimental group were significantly better than that of the patients in the control group ($P < 0.01$). **Conclusion:** The clinical effect of 1.8-3.2 mg/L ozonated water for the treatment of skin wound was obviously significant which can inhibit the inflammatory reaction and positively regulate the wound healing.

Key words: Dissolved ozone; Disinfection; Inflammation; Skin wound

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我国夏天天气炎热,空气污染日趋严重,城市人口皮肤污染严重,在有皮肤创口的情况下,需要安全有效方便的炎症反应(红肿痛)控制手段,以减轻痛苦、减少结痂和疤痕形成。如果有一种无痛杀菌并有炎症抑制作用的创口治疗技术,能杀灭微生物,又能控制过度炎症反应,我们就能全面调控皮肤伤口和创面的杀菌、炎症、结痂形成、疤痕形成和创面愈合。最近的研究表明,溶解臭氧水冲洗皮肤创口可能符合以上标准^[1-18]。2014 年 3-9 月我院采用浓度 1.8-3.2 mg/L 溶解臭氧水冲洗对 20 例皮肤激光治疗形成的皮肤创口治疗红肿痛,取得了比较冰袋冷

敷更好的炎症控制疗效,现将结果报告如下。

1 材料与方法

1.1 一般资料

本组 40 例均为我院 2014 年 3-9 月门诊收治的皮肤激光除斑治疗患者,按就诊顺序将 40 例皮肤激光除斑患者分为两组,实验组和对照组,每组各 20 例。其中,实验组包括男 10 人,女 10 人;年龄 20-56 岁,平均(36±16)岁,对照组包括男 10 人,女 10 人;年龄 22-55 岁,平均(37±14)岁。

1.2 实验方法

氧气源蓝氧冲洗机由义乌惠仕医疗器械有限公司提供,蓝氧水蓝氧浓度测定使用国标碘量法,溶解臭氧水浓度为 1.8-3.2 mg/L。实验组 20 例采用浓度 1.8-3.2 mg/L 溶解臭氧水充分冲洗浅层皮肤激光治疗形成的创口,观察红肿痛情况;对照组 20 例采用 30 min 冰袋(储存在负 10 度冰箱内的 Hot/Cold Pack,

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初始表面温度负 8-10 度, Shanghai Sunkey Industry Co., Ltd) 手控冷敷(以不引起痛感为准)浅层皮肤激光治疗后的皮肤伤口, 观察红肿痛情况。

1.3 疗效评价

①疼痛缓解情况:显效:疼痛症状体征显著改善或消失, 患者满意;有效:疼痛症状体征有改善或减轻, 患者仍有不适, 要求继续治疗;无效:疼痛症状体征无明显减轻, 患者不满意。②临床疗效评价:显效:创口无明显肿胀, 创口周边有宽度小于 1.5 毫米的轻度红肿围绕;有效:创口轻微肿胀, 红肿范围 >1.5 mm 且 <3.0 mm;无效:创口明显肿胀, 创口周边有宽度大于 3.0 mm 的红肿围绕。

1.4 统计学方法

采用 SPSS12.0 统计学软件进行统计学处理, 计量和计数资料组间比较采用 t 检验和 χ^2 检验, 以 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 两组患者疼痛缓解情况比较

实验组 20 例均无明显痛感, 显效 20 例, 总有效率 100%; 对照组 20 例均有痛感, 明显减轻, 有效 20 例, 总有效率 100%; 显效率两组比较 $P < 0.01$ 。见表 1、图 1、2。

表 1 两组患者疼痛症状改善情况比较

Table 1 Comparison of symptom pain between the two groups

Groups	Cases	Significantly Effective	Effective	Invalid	Total effect rate (%)
Experiment	20	20	0	0	100
Control	20	0	20	0	100

2.2 两组患者红肿体征改善情况比较

实验组 20 例创口无明显肿胀, 创口周边有宽度小于 1.5 毫米的轻度红肿围绕无明显红肿, 显效 20 例, 总有效率 100%;

对照组 20 例创口轻微肿胀, 创口周边有宽度大于 1.5 毫米和小于 3.0 毫米的轻度红肿围绕, 有效 20 例, 总有效率 100%; 显效率两组比较 $P < 0.01$ 。见表 2、图 1、2。

表 2 两组患者红肿体征改善情况比较

Table 2 Comparison of redness and swelling signs between the two groups

Groups	Cases	Significantly Effective	Effective	Invalid	Total effect rate (%)
Experiment	20	20	0	0	100
Control	20	0	20	0	100

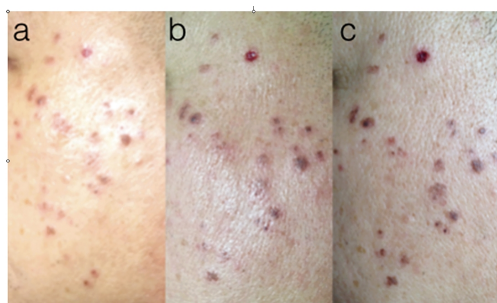


图 1 55 岁男性激光皮肤除斑治疗后, 使用浓度 1.8-3.2mg/L 溶解臭氧水冲皮肤表浅创口效果

注: a, 10 分钟; b, 3 小时; c, 24 小时。

Fig. 1 1.8-3.2 mg/L ozonated water wash was applied to a 54-years' old male after skin laser treatment

Note: a, 10 minutes later; b, 3 hours later; c, 24 hours later.

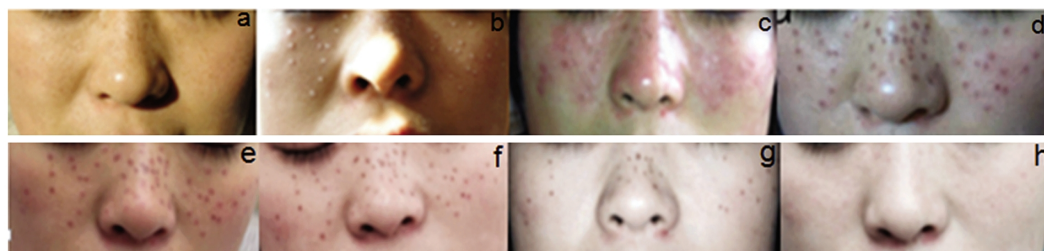


图 2 24 岁女性激光皮肤除斑治疗后, 使用浓度 1.8-3.2mg/L 溶解臭氧水冲皮肤表浅创口效果

注: a, 激光之前; b, 激光之后; c, 臭氧水冲洗中或者冲洗完; d, 冲洗后 40 分钟; e, 冲洗后 6 个小时之后; f, 冲洗后第 2 天; g, 冲洗后第 4 天; h, 冲洗后第 6 天。

Fig.2 1.8-3.2 mg/L ozonated water wash was applied to a 27-years' old female after skin laser treatment

Note: a, before laser treatment; b, immediately after laser treatment; c, immediately after ozonated water wash; d, 40 minutes later; e, 6 hours later; f, 2 days later; g, 4 days later; h, 6 days later.

3 讨论

大量文献研究表明,溶解臭氧水冲洗皮肤创口是安全的杀菌和炎症抑制的手段^[1-9],其作用机制很可能是通过抑制 TNF 和 IL-6 等分泌、灭活内毒素和直接氧化炎性因子或相关受体^[1]。本文使用浓度 1.8-3.2mg/L 溶解臭氧水充分冲洗快速达到了皮肤创口炎症的短期有效控制,包括减轻创口的红肿痛,取得了比冰袋冷敷更好的炎症控制效果。这一结论与其他作者实验所得结果基本相符^[1]。虽然控制效果的评估偏重于主观的临床症状,所使用的客观临床体征评估也明显受主观因素影响,但 100%的显效率支持浓度 1.8-3.2 mg/L 溶解臭氧水充分冲洗是快速有效的皮肤创口炎症抑制方法这个结论。对照组使用了公认有效的冰袋冷敷抑制炎症的方法,20 例均有效,明显不如浓度 1.8-3.2 mg/L 溶解臭氧水充分冲洗的治疗效果($P < 0.01$)。浓度 1.8-3.2 mg/L 溶解臭氧水充分冲洗治疗皮肤创口有杀菌和抑制炎症的治疗效果,值得进一步扩大到其它伤口和创口的临床研究。

综上所述,浓度 1.8-3.2 mg/L 溶解臭氧水充分冲洗是快速有效杀菌和抑制表浅皮肤创口炎症的临床方法,包括控制炎症疼痛和伤口红肿,有望成为一个常规的临床创口处理方法。

参考文献(References)

- [1] Hui MZ, Wei C, Guo Q. Clinical applications of ozonated water in human wounds, skin and mucosas [J]. Health Research (健康研究), 2013, 33(6): 412-414
- [2] Li ZY. Application of ozonated water in animal wounds [D]. The Second Military Medical University at Shanghai, 2010
- [3] Yu B, Huang HJ, Lin QR, et al. Effect of ozonated water on infected wound and inflammatory cytokines [J]. Journal of Chinese Practical Medicine, 2010, 26(10): 1719-1722
- [4] Cai DS, Chu LL, Bei L. Effect of ozonated water on rat kidney aquaporin and endotoxemia[J]. Shanxi Journal of medicine, 2012, 41(4): 315-317
- [5] Chu LL, Cai DS, Bei L. Effect of ozonated water on rat acute lung injury kidney and endotoxemia [J]. Guangdong Medicine, 2013, 34(14): 315-319
- [6] Yu B, Chen HQ, Lu CH, et al. Effect of ozonated water at various concentrations on rat rheumatoid arthritis particularly synovitis [J]. The Orthopedic Journal of China, 2011, 19(12): 1022-1025
- [7] Wu ZH, XuYL. Double tube drainage combined with ozone water washing treatment of multilocular liver abscess: analysis of 13 cases [J]. Journal of Chinese misdiagnosis, 2010, 10(31): 7758
- [8] Deng LL, Wu WM, Hong M. Ozonated water used for observing the effect of maternal perineal incision disinfection[J]. Journal of nursing, 2002, 17(01): 26-27
- [9] Hu Q, Xia ZJ, Zhao Y, et al. Application of ozonated water in the vagina preparation before gynecological transvaginal operation [J]. Medicine and Clinical Practice, 2009, 12(6): 410-411
- [10] Liu B, Zhang LY, Zhao AP, et al. Clinical effect of ozonated water treatment on colpitis[J]. China Healthcare Innovation, 2010, 5(4): 34
- [11] Wo Z, Gao SX, Zhou LJ, et al. Effect of gaseous ozone-filled bagging curative on wound infection [J]. Journal of clinical and Experimental Medicine, 2010, 9(16): 1266
- [12] Dhingra K, Vandana KL. Management of gingival inflammation in orthodontic patients with ozonated water irrigation--a pilot study[J]. International journal of dental hygiene, 2011, 9(4): 296-302
- [13] Kshitish D, Laxman VK. The use of ozonated water and 0.2% chlorhexidine in the treatment of periodontitis patients: A clinical and microbiologic study[J]. Original Research, 2010, 21(3): 341-348
- [14] Hayakumo S, Arakawa S, Mano Y, et al. Clinical and microbiological effects of ozone nano-bubble water irrigation as an adjunct to mechanical subgingival debridement in periodontitis patients in a randomized controlled trial [J]. Clinical Oral Investigations, 2013, 17(2): 379-388
- [15] Yilmaz S, Algan S, Gursoy H, et al. Evaluation of the clinical and antimicrobial effects of the Er:Yag laser or topical gaseous ozone as adjuncts to initial periodontal therapy [J]. Photomedicine and Laser Surgery, 2013, 31(6): 293-298
- [16] Hayakumo S, Arakawa S, Mano Y, et al. Clinical and microbiological effects of ozone nano-bubble water irrigation as an adjunct to mechanical subgingival debridement in periodontitis patients in a randomized controlled trial [J]. Clinical Oral Investigations, 2013, 17(2): 379-388
- [17] GonzA, Iez-MuA L, Flichy-FernA A J, et al. Effect of ozone therapy upon clinical and bacteriological parameters of the oral cavity: An update[J]. Journal of Clinical and Experimental Dentistry, 2011, 3(4): 325-327
- [18] Quirling KC, Lenzke M, Paschos S, et al. Effectiveness of ozone against periodontal pathogenic microorganisms [J]. European Journal of Oral Sciences, 2011, 119(3): 204-210