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壳聚糖护创敷料用于烧伤创面的治疗效果和安全性研究*

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摘要 目的:探讨壳聚糖护创敷料用于烧伤创面的治疗效果和安全性。**方法:**采用回顾性方法分析,选取中国人民解放军空降兵医院烧伤科(本院)自2014年1月-2018年9月就诊的80例烧伤患者的临床资料,根据治疗方法分为对照组(40例,给予单纯紫草油覆盖创面)与研究组(40例,给予壳聚糖护创敷料覆盖创面),比较两组创面愈合时间、疼痛度、瘢痕生长及不同时期分泌物细菌培养阳性率。**结果:**研究组的创面愈合时间(18.45 ± 4.64)及瘢痕生长评分(3.23 ± 1.12)均低于对照组(22.45 ± 5.23 、 5.34 ± 1.23),均有显著差异($P < 0.05$)。治疗后7 d、14 d、21 d研究组的创面疼痛度低于对照组($P < 0.05$)。治疗后3 d、7 d、14 d研究组的细菌培养阳性率低于对照组($P < 0.05$)。两组治疗期间均没有出现不良事件和严重不良事件的发生。**结论:**壳聚糖护创敷料用于烧伤创面患者治疗中,可缩短创面愈合时间,抑菌,减少创面愈合后的瘢痕增生,从而减轻患者疼痛,安全性高,值得临床推广应用。

关键词: 烧伤创面;壳聚糖护创敷料;愈合;临床效果

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Therapeutic Effect and Safety of Chitosan Wound Dressing for Burn Wounds*

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ABSTRACT Objective: To investigate the efficacy and safety of chitosan wound dressing in treating burn wounds. **Methods:** The clinical data of 80 burn patients treated in our hospital from January 2014 to September 2018 were retrospectively analyzed. According to the treatment methods, the patients were divided into the control group (40 cases were treated with purely shikonin oil) and the research group (40 cases were treated with chitosan wound dressing). The wound healing time, pain degree, scar growth and positive rate of bacterial culture in different periods were compared between the two groups. **Results:** The wound healing time (18.45 ± 4.64) and scar growth score (3.23 ± 1.12) in the study group were lower than those in the control group (22.45 ± 5.23 , 5.34 ± 1.23), and there were significant differences ($P < 0.05$). The wound pain of the study group was significantly lower than that of the control group at 7 d, 14 d, and 21 d after treatment ($P < 0.05$). The positive rate of bacterial culture in the study group was lower than that in the control group at 3 d, 7 d, and 14 d after treatment ($P < 0.05$). No adverse events and serious adverse events occurred during the treatment period. **Conclusion:** The chitosan wound dressing is used in the treatment of patients with burn wounds, which can shorten the wound healing time, inhibit bacteria and reduce the scar hyperplasia after wound healing. Hence, it can reduce the pain of patients with high safety characteristics and is worthy of clinical application.

Key words: Burn wound; Chitosan wound dressing; Healing; Clinical effect

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前言

日常生活中烧伤是一种极为常见的皮外皮损之一,仅次于摔伤擦伤、交通事故及暴力伤害等。对于烧伤患者而言,不仅仅是挽救生命,更为重要的减轻患者疼痛,促进患者创面愈合,尽快恢复自理能力^[1]。由于烧伤创面的特殊性,对覆盖材料提出了较高要求^[2,3]。而壳聚糖护创敷料具有较好组织相容性、无刺激性,且成痂快,痂壳柔软,不出血,有较广谱的抗菌作用,并抑制成纤维细胞过度增殖的作用^[4,5]。近年来,壳聚糖护创敷料逐渐

用于临床,主要是其抑制和杀灭病原微生物、保护伤口,促进伤口的愈合,在外科创伤、手术创面、烧烫伤创面等的覆盖隔离有重要的作用。但是对于其对烧伤患者的疗效和安全性目前还有待研究,因此,本文现将壳聚糖护创敷料用于烧伤创面的治疗效果及安全性报告如下。

1 资料与方法

1.1 一般资料

选择本院自2014年1月-2018年9月就诊的80例烧伤

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患者,纳入标准:所有患者入院前均未进行任何处理;烧伤后 24 h 内入院,入院前未做任何处理;创面均为较浅的深 II° 创面;创面无感染征;依从性良好;获得家属或者法定监护人的知情同意。排除标准:非过敏体质;免疫性疾病;妊娠期及哺乳期

妇女;近期有过敏疾病者;入院 3 个月前参加过其他药物及器械试验者;精神病者。根据治疗方法分为对照组(n=40)与研究组(n=40),其基本资料如下表 1 所示,经统计学分析,具有可比性($P>0.05$)。

表 1 两组患者基本资料比较
Table 1 Comparison of basic data between the two groups of patients

Groups	Gender (Male/ Female)	Age (years)	Height (cm)	Weight (kg)	Wound area (cm ²)	Trauma	
						Limbs	Trunk
Control group(n=40)	29/11	44.78± 5.34	163.23± 10.12	65.34± 8.23	95.34± 10.12	11	29
Study group(n=40)	30/10	45.45± 5.64	165.45± 10.11	66.78± 8.12	96.45± 12.34	10	30

1.2 研究方法

对照组:给予单纯紫草油覆盖创面。入院后快速清创,采用常规碘伏消毒创面及周围皮肤,低位引流完整水疱后,将污染物及污染腐皮去除,最大限度保留其他完整腐皮。采用生理盐水擦创面后,涂抹复方紫草合剂并使用无菌纱布包扎创面。

研究组:给予壳聚糖护创敷料覆盖创面。清创方法与对照组相同,在皮肤破损位置涂抹复方紫草合剂后覆盖壳聚糖护创敷料。

两组使敷料中间的生物材料紧贴在伤口部位,每 2-4 d 更换,更换时需再次清洁创面。若发生揭脱困难时,采用生理盐水湿润后方可揭脱。

1.3 观察指标

比较两组创面愈合时间、疼痛度、瘢痕生长及不同时期基底的分泌物细菌培养阳性率及治疗安全性。

(1) 采用修订版面部表情疼痛量表对创面疼痛进行评分,共 0-5 分,0 分表示完全无疼痛,1 分表示偶尔感觉到疼痛,2 分表示有轻微疼痛感,3 分表示中度疼痛感,4 分表示重度疼痛感,5 分表示剧烈疼痛,无法自由活动。比较不同时间点的创面

疼痛评分^[7]。

(2) 随访 3 个月,采用温哥华瘢痕量表对瘢痕进行评分^[6]。

(3) 在治疗后第 3 d、第 7 d 及第 14 d 换药时对创面基底的分泌物进行细菌培养。

(4) 安全性指标主要有不良事件和严重不良事件的发生率,严重不良事件指患者在实验过程中,出现需住院治疗、延长住院时间、伤残、影响工作能力、危及生命或死亡、导致先天性畸形等事件。

1.4 统计学方法

应用 SPSS 19.0 统计软件进行,创面愈合时间、疼痛度、瘢痕生长等计量数据用($\bar{x} \pm s$)表示,用 t 检验。细菌培养阳性率采用百分比(%)表示,用卡方(χ^2)检验。若 $P<0.05$ 表明有显著差异。

2 结果

2.1 两组创面愈合时间及瘢痕生长评分比较

研究组的创面愈合时间及瘢痕生长评分均短于 / 低于对照组($P<0.05$)。详见表 2。

表 2 两组创面愈合时间及瘢痕生长评分比较($\bar{x} \pm s$)

Table 2 Comparison of wound healing time and scar growth score between the two groups($\bar{x} \pm s$)

Groups	Wound healing time (d)	Scar growth score (score)
Control group(n=40)	22.45± 5.23	5.34± 1.23
Study group(n=40)	18.45± 4.64*	3.23± 1.12*

Note: compared with the control group, * $P<0.05$.

2.2 两组不同时期的疼痛评分比较

治疗前,两组的创面疼痛无统计学意义($P>0.05$);治疗后 7 d、

14 d、21 d 两组的创面疼痛评分均降低($P<0.05$),且研究组的创面疼痛度低于对照组($P<0.05$)。详见表 3。

表 3 两组不同时期的疼痛评分比较($\bar{x} \pm s$, 分)

Table 3 Comparison of pain scores between the two groups at different periods($\bar{x} \pm s$, score)

Groups	Before treatment	7 d after treatment	14 d after treatment	21 d after treatment
Control group(n=40)	4.56± 0.23	4.02± 0.12*	3.54± 0.23*	2.15± 0.34*
Study group(n=40)	4.67± 0.16	3.89± 0.32* [#]	2.12± 0.15* [#]	1.23± 0.16* [#]

Note: compared with the same group before treatment, * $P<0.05$, compared with the control group at different periods, [#] $P<0.05$.

2.3 两组不同时期的细菌培养阳性率

治疗前,两组的细菌培养阳性率无统计学意义($P>0.05$);治疗后 3 d、7 d、14 d 两组的细菌培养阳性率显著低于治疗前

($P<0.05$),且研究组的细菌培养阳性率低于对照组($P<0.05$)。详见表 4。

表 4 两组不同时期的细菌培养阳性率(%)

Table 4 Positive rate of bacterial culture in different periods of the two groups (%)

Groups	Before treatment	7 days after treatment	14 days after treatment	21 days after treatment
Control group(n=40)	16(40.00)	12(30.00)*	9(22.50)*	5(12.50)*
Study group(n=40)	15(37.50)	8(20.00)**	4(10.00)**	1(2.50)**

3 讨论

皮肤是人体的第一道防线,有着较强的生物、化学及物理屏障功能,可防止水分、电解质的流失,起到传感及免疫的作用,有效维持体内环境的稳定性^[8-10]。然而,烧伤所引起的皮肤损伤,势必引起细菌感染,并加剧皮肤的新陈代谢,使得皮肤内的水分及蛋白质过度流失,若不及时给予治疗,直接威胁患者生命安全^[11]。

烧伤患者的治疗目的在于尽快促进创面愈合,改善创面外观及功能^[11]。烧伤创面的早期主要是通过清创及外敷来预防感染,促进细胞迁移、增殖及分化,修复表皮层^[12]。而对于深二度创面的愈合重点是重塑结缔组织^[13]。在处理创面时,根据实际情况留取坏死表皮,以防感染。最大限度保护残留的上皮组织,减少瘢痕。因此,选择正确的烧伤敷料具有重要意义^[14]。传统的敷料主要采用紫草油浸透的纱布来覆盖创面,再采用无菌纱布包扎,可以促进创面愈合^[15]。但该方法创面坏死痂皮与敷料粘连,去除敷料时,容易再次损伤,使得创面渗出血,加重患者疼痛^[16,17]。理想的创面愈合不仅要保持创面基底的湿润性,还要对渗液处理,并预防感染^[18]。

壳聚糖是一种半合成的有机高分子,有着较好的生物相容性,较高的生物安全性,较低毒性,被广泛应用到生物医学领域^[19,20]。该敷料的外观为膜片,由壳聚糖凝胶膜、背衬、离型纸组成,有着较好的阻水性,且黏性持久^[21,22]。本研究组的创面愈合时间及瘢痕生长评分均短于/低于对照组;治疗后7 d、14 d、21 d两组的创面疼痛评分均降低,且研究组的创面疼痛度低于对照组;治疗后3 d、7 d、14 d两组的细菌培养阳性率显著低于治疗前,且研究组的细菌培养阳性率低于对照组,说明壳聚糖护创敷料可为皮肤细胞的生长提供有力环境,表面正电荷与血液红细胞表面负电荷相互作用,产生凝集粘附,快速止血,使创面快速愈合。也可产生抑菌作用,尤其是表皮存在的金黄色葡萄球菌、绿脓杆菌、化脓性金黄色葡萄球菌^[23-25]。同时,壳聚糖对人体组织有着较高亲和性,用于创面,人体并不会产生排斥反应。可促进胶原产生及创面愈合^[26,27]。此外,壳聚糖可吸附伤口炎症部位的酸性物质所释放的质子,进而起到镇痛效果。与传统的纱布包扎相比,可有效清除坏死组织,在创面形成一层较薄的干痂,可加速创面的愈合^[28,29]。同时该敷料可有效保护创面健康组织,从而降低换药中的疼痛^[30]。本研究两组治疗期间均没有发生不良事件和严重不良事件,说明壳聚糖护创敷料用于创伤患者具有一定的安全性,疗效显著。

综上所述,烧伤创面患者采用壳聚糖护创敷料可促进创面愈合,缩短愈合时间,抑菌,减少创面愈合后的瘢痕增生,从而减轻患者疼痛,安全性高,能有效促进患者早日康复。

参考文献(References)

- [1] Hadisi Z, Nourmohammadi J, Nassiri SM. The antibacterial and anti-inflammatory investigation of Lawsonia Inermis gelatin-starch nano-fibrous dressing in burn wound [J]. *Int J Biol Macromol*, 2017, 107(Pt B): 2008-2019
- [2] Kshersagar J, Kshirsagar R, Desai S, et al. Decellularized amnion scaffold with activated PRP: a new paradigm dressing material for burn wound healing[J]. *Cell Tissue Bank*, 2018, 19(3): 423-436
- [3] Garude K, Srinivasan S, Mody NB, et al. Bed pad as an alternative painless, comfortable and economical burn wound dressing[J]. *Indian J Plast Surg*, 2017, 50(3): 317-319
- [4] Saeed SM, Mirzadeh H, Zandi M, et al. Designing and fabrication of curcumin loaded PCL/PVA multi-layer nanofibrous electrospun structures as active wound dressing[J]. *Prog Biomater*, 2017, 6(1-2): 39-48
- [5] Dolat AA, Mojtaba V, Rakhshani MH, et al. Comparison of the Effect of Nanosilver Spray and 1% Silver Sulfadiazine Cream on the Healing of Second-Degree Burn Wound [J]. *Translational Biomedicine*, 2018, 9(1)
- [6] Glik J, Kaweck M, Kitala D, et al. A new option for definitive burn wound closure?-pair matching type of retrospective case-control study of hand burns in the hospitalised patients group in the Dr Stanislaw Sakiel Centre for Burn Treatment between 2009 and 2015 [J]. *Int Wound J*, 2017, 14(5): 849-855
- [7] Khalid A, Ullah H, Ul-Islam M, et al. Bacterial cellulose-TiO₂, 2r, nanocomposites promote healing and tissue regeneration in burn mice model[J]. *RSC Adv*, 2017, 7(75): 47662-47668
- [8] Loh E YX, Mohamad N, Fauzi MB, et al. Development of a bacterial cellulose-based hydrogel cell carrier containing keratinocytes and fibroblasts for full-thickness wound healing [J]. *Sci Rep*, 2018, 8(1): 2875-2886
- [9] Hayati F, Ghamsari SM, Dehghan MM, et al. Effects of carbomer 940 hydrogel on burn wounds: an in vitro and in vivo study [J]. *J Dermatol Treat*, 2018, 29(6): 593-599
- [10] Yang D, Davies A, Burge B, et al. Open-to-Air Is a Viable Option for Initial Wound Care in Necrotizing Soft Tissue Infection that Allows Early Detection of Recurrence without Need for Painful Dressing Changes or Return to Operating Room [J]. *Surg Infect*, 2018, 19(1): 65-70
- [11] Bi H, Khan M, Li J, et al. Use of Incisional Negative Pressure Wound Therapy in Skin-Containing Free Tissue Transfer [J]. *J Reconstr Microsurg*, 2018, 34(3): 200-205
- [12] Dariush S, Nazanin P, Nooshin B, et al. Electrospun polyvinylidene pyrrolidone/gelatin membrane impregnated with silver sulfadiazine as wound dressing for burn treatment [J]. *Bulle Mater Sci*, 2018, 41(3): 72-73
- [13] Muguregowda HT, Kumar P. Wound Healing Potential of Intermittent

- tent Negative Pressure under Limited Access Dressing in Burn Patients: Biochemical and Histopathological Study [J]. *World J Plast Surg*, 2018, 7(1): 58-66
- [14] Varaei S, Ardabili FM, Irani PS, et al. The Effect of Aloe Vera Gel and Nitrofurazone on Dressing Related Pain of Superficial Burn Wounds[J]. *World J Plast Surg*, 2017, 6(2): 254-256
- [15] Mohamad N, Loh E YX, Fauzi MB, et al. In vivo evaluation of bacterial cellulose/acrylic acid wound dressing hydrogel containing keratinocytes and fibroblasts for burn wounds [J]. *Drug Delivery and Translational Research*, 2019, 9(2): 444-452
- [16] Elfeky GS, Sharaf SS, Shafei AE, et al. Using chitosan nanoparticles as drug carriers for the development of a silver sulfadiazine wound dressing[J]. *Carbohydr Polym*, 2017, 158(23): 11-19
- [17] Massand S, Cheema F, Brown S, et al. The use of a chitosan dressing with silver in the management of paediatric burn wounds: a pilot study[J]. *J Wound Care*, 2017, 26(sup4): S26-S30
- [18] Vakilian S, Norouzi M, Soufi-Zomorrod M, et al. inermis -loaded nanofibrous scaffolds for wound dressing applications[J]. *Tissue Cell*, 2018, 51(20): 32-38
- [19] Herndon DN, Branski LK. Contemporary Methods Allowing for Safe and Convenient Use of Amniotic Membrane as a Biologic Wound Dressing for Burns[J]. *Annals of Plastic Surgery*, 2017, 78(2 Suppl 1): S9
- [20] Wiser I, Schein O, Rubin JD, et al. The Effect of Silver-coated Dressing on Pain Management and Hospitalization Duration in Pediatric Partial-thickness Burns: A Retrospective, Matched Cohort Study[J]. *Wounds*, 2017, 28(6): 175-180
- [21] Wattanaploy S, Chinaronchai K, Namviriyachote N, et al. Randomized Controlled Trial of Polyhexanide/Betaine Gel Versus Silver Sulfadiazine for Partial-Thickness Burn Treatment [J]. *Int J Low Extrem Wounds*, 2017, 16(1): 45-50
- [22] Li Z, Zhou F, Li Z, et al. A Hydrogel Crosslinked with Dynamic Covalent Bonding and Micellization for Promoting Burn Wound Healing [J]. *ACS Appl Mater Interfaces*, 2018, 10(30): 25194-25202
- [23] Yergoz F, Hastar N, Cimenci CE, et al. Heparin mimetic peptide nanofiber gel promotes regeneration of full thickness burn injury[J]. *Biomaterials*, 2017, 134(23): 117-127
- [24] He L, Wang C, Chen L, et al. A functional chitosan-based hydrogel as a wound dressing and drug delivery system in the treatment of wound healing[J]. *Rsc Advances*, 2018, 8(14): 7533-7549
- [25] Momeni M, Zarchaghighi M, Hajimiri M, et al. In vitro and in vivo investigation of a novel amniotic-based chitosan dressing for wound healing[J]. *Wound Repair Regen*, 2018, 26(1): 87-101
- [26] Hiranpattanakul P, Jongjitpissamai T, Aungwerojanawit S, et al. Fabrication of a chitin/chitosan hydrocolloid wound dressing and evaluation of its bioactive properties [J]. *Res Chemi Interme*, 2018, 44(8): 1-16
- [27] Anbazhagan S. Application of tetracycline hydrochloride loaded-fungal chitosan and Aloe vera extract based composite sponges for wound dressing[J]. *J Advan Res*, 2018, 14(10): 63-71
- [28] Ranjbar R, Yousefi A. Effects of Aloe Vera and Chitosan Nanoparticle Thin-Film Membranes on Wound Healing in Full Thickness Infected Wounds with Methicillin Resistant *Staphylococcus Aureus*[J]. *Bull Emerg Trauma*, 2018, 6(1): 8-15
- [29] Zhou D, Yang R, Tao Y, et al. Preparation of chitin-amphiphathic anion/quaternary ammonium salt ecofriendly dressing and its effect on wound healing in mice [J]. *Int J Nanomedicine*, 2018, 13 (12): 4157-4169
- [30] Tsioli V, Gouletsou PG, Galatos AD, et al. The Effect of a Hydrocolloid Dressing on Second Intention Wound Healing in Cats [J]. *J Am Anim Hosp Assoc*, 2018, 54(3): 125-131

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- [22] Cheng Z, Yuan Y, Han X, et al. An open-label randomised comparison of aripiprazole, olanzapine and risperidone for the acute treatment of first-episode schizophrenia: Eight-week outcomes [J]. *J Psychopharmacol*, 2019, 33(10): 1227-1236
- [23] Nakamura Y, Shibata I, Mahlich J. Modeling the Choice Between Risperidone Long-Acting Injectable and Generic Risperidone from the Perspective of a Japanese Hospital [J]. *Neurol Ther*, 2019, 8(2): 433-447
- [24] Ivanets NN, Vinnikova MA, Ezhkova EV, et al. Aripiprazole and quetiapine in the treatment of patients with 'dual diagnosis' of schizophrenia and drug addiction[J]. *Zh Nevrol Psikhiatr Im S S Korsakova*, 2019, 119(9): 52-61
- [25] Ribeiro ELA, de Mendonça Lima T, Vieira MEB, et al. Efficacy and safety of aripiprazole for the treatment of schizophrenia: an overview of systematic reviews [J]. *Eur J Clin Pharmacol*, 2018, 74 (10): 1215-1233
- [26] Henrique ICB, de Mendonça Lima T, de Melo DO, et al. Economic evaluations on the use of aripiprazole for patients with schizophrenia: A systematic review[J]. *J Clin Pharm Ther*, 2020, 45(1): 1-15
- [27] Hereta M, Kamińska K, Rogóż Z. Co-treatment with antidepressants and aripiprazole reversed the MK-801-induced some negative symptoms of schizophrenia in rats [J]. *Pharmacol Rep*, 2019, 71 (5): 768-773
- [28] Aguilar M, Malcolm B. Effect of long-acting aripiprazole monohydrate on inpatient encounters: A retrospective mirror image study[J]. *Ment Health Clin*, 2019, 9(4): 258-262
- [29] Lachance A, Corbeil O, Corbeil S, et al. Case Reports of Aripiprazole and Problematic Gambling in Schizophrenia: A Critical Review of the Evidence[J]. *J Clin Psychopharmacol*, 2019, 39(4): 393-397
- [30] 任智勇, 崔莉莉, 赵轶, 等. 帕利哌酮阿立哌唑对首发精神分裂症患者的临床疗效观察[J]. *中国药物与临床*, 2019, 19(4): 635-637