

- humerus plate[J]. J Bone Joint Surg Am, 2009, 91(11): 2771.
- [6] Lee CW, Shin SJ. Prognostic factors for unstable proximal humeral fractures treated with locking-plate fixation[J]. J Shoulder Elbow Surg, 2009, 18(1): 83-88.
- [7] 王蕾. 肱骨近端骨折的治疗理念与思考[J]. 中国骨伤, 2013, 26(1): 1-3.
Wang L. Therapy conception and thinking of proximal humeral fractures[J]. Zhongguo Gu Shang/China J Orthop Trauma, 2013, 26(1): 1-3. Chinese.
- [8] Gardner MJ, Griffith MH, Dines JS, et al. The extended anterolateral acromial approach allows minimally invasive access to the proximal humerus[J]. Clin Orthop Relat Res, 2005, 434: 123-129.
- [9] Cheung S, Fitzpatrick M, Lee TQ. Effects of shoulder position on axillary nerve positions during the split lateral deltoid approach[J]. J Shoulder Elbow Surg, 2009, 18(5): 748-755.
- [10] 刘杰, 李少华, 李振华, 等. 经皮微创新型锁定钢板治疗老年肱骨近端骨折的病例对照研究[J]. 中国骨伤, 2013, 26(1): 4-8.
Liu J, Li SH, Li ZH, et al. Case-control study on minimally invasive percutaneous new plate osteosynthesis applied in proximal humerus fractures in elder patients[J]. Zhongguo Gu Shang/China J Orthop Trauma, 2013, 26(1): 4-8. Chinese with abstract in English.
- [11] 赵吉鹏, 胡万坤, 张秋林, 等. 有限切开经三角肌入路肱骨近端锁定接骨板治疗肱骨近端骨折[J]. 中国骨伤, 2012, 25(2): 155-157.
Zhao JP, Hu WK, Zhang QL, et al. Application of PHILOS plate through mini-open deltoid-splitting approach for the treatment of proximal humeral fractures[J]. Zhongguo Gu Shang/China J Orthop Trauma, 2012, 25(2): 155-157. Chinese with abstract in English.

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创面封闭式引流结合富血小板血浆治疗难愈性创面短期疗效观察

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【摘要】 目的: 观察 VSD 结合富血小板血浆治疗难愈性创面疗效和特点。方法: 2010 年 4 至 2012 年 6 月 15 例难愈性创面患者, 男 11 例, 女 4 例; 年龄 18~45 岁, 平均 35.2 岁。创面形成时间 6~24 个月, 治疗前均经长期换药或多次治疗不愈, 应用 VSD 结合自体富血小板血浆进行治疗, 以创面愈合为指标, 总结治疗效果和临床特点。结果: 15 例患者均获随访, 时间 3~8 个月, 平均 5 个月, 所有患者创面治愈, 无复发。结论: VSD 结合富血小板血浆治疗难愈性创面疗效确切, 明显缩短了疗程, 减少了手术带来的各种创伤, 且降低了治疗成本。

【关键词】 封闭式负压引流术; 富血小板血浆; 创伤和损失

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Short-term curative effect of vacuum sealing drainage (VSD) combined with platelet rich plasma (PRP) for the treatment of the refractory wounds CHEN Zhen-yu and ZHANG Hui-zeng. Department of Orthopaedics, General Hospital of Hebei Central Energy Xingtai Mining Group, Xingtai 054000, Hebei, China

ABSTRACT Objective: To observe the efficacy of the treatment of refractory wound by VSD combined with platelet-rich plasma. **Methods:** From April 2010 to June 2012, 15 patients with refractory wound were treated including 11 males and 4 females with an average age of 35.2 years old ranging from 18 to 45 years old. The formation time of wound was from 6 to 24 months, which was unhealed after long-term medication or repeated treatment. The VSD combined with autologous platelet-rich plasma was applied to treat the wound. The wound healing was an indicator and treatment and clinical features were summarized. **Results:** All the patients were followed up for 3 to 8 months (means 5 months). The wound of all patients were healed without recurrence. **Conclusion:** The curative effect of VSD combined with platelet rich plasma for treatment of refractory wounds is obvious. It could reduce the treatment course and the treatment cost.

KEYWORDS Vacuum sealing drainage (VSD); Platelet-rich plasma (PRP); Wounds and injuries

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难愈性创面在创伤骨科是一种常见的并发症, 多数因创伤感染引起, 治疗起来比较棘手, 不论从经济上还是精神上都增加了患者的负担, 创面封闭式

负压引流技术(vacuum sealing drainage, VSD)和富血小板血浆(platelet-rich plasma, PRP)技术均是治疗难愈性创面的有效方法。2010 年 4 月至 2012 年 6 月联合应用两种方法治疗难愈性创面患者 15 例,临床效果满意,现报告如下。

1 临床资料

本组 15 例,男 11 例,女 4 例;年龄 18~45 岁,平均 35.2 岁。左踝部 5 例,右足跟部 5 例,骶尾部 2 例,右小腿下段前外侧 2 例,左小腿上段前内侧 1 例。创面大小为 0.5 cm×0.5 cm~3 cm×8 cm,创面形成时间 6~24 个月,平均 16 个月,所有患者经长期换药无明显效果,其中 1 例皮瓣转移术后窦道形成伴慢性骨髓炎,患者均不愿再次接受植皮或皮瓣转移手术。

2 治疗方法

本组患者均在手术室会诊麻醉下彻底清创,创面边缘 2 mm 皮缘切除,刮匙刮净分泌物及坏死组织,双氧水、生理盐水交替冲洗,蘸干后 1%新洁尔灭溶液浸泡创面 10 min,生理盐水冲洗干净后蘸干。依创面大小剪取 VSD 覆盖固定于创面,无菌半透膜密封,接负压吸引器,密封接口,显示管形良好。术后 3 d 无菌生理盐水冲洗,每日 3 次,依负压吸引分泌物多少在术后 7~10 d 拆除。根据创面大小不同,用

预先装有 1~2 ml 枸橼酸钠抗凝剂的 20 ml 一次性无菌注射器以 18G 针头自患者肘静脉抽取静脉血 5~20 ml,注入无菌离心机专用试管并置入水平悬摆式离心机,首先以 1 500 r/min(约 200 g)离心 10 min,试管里的全血分为 3 层,上层是上清液,下层是红细胞,两层交界处可见一很薄的浅黄色层,即 PRP 层,以 20 ml 一次性无菌注射器(针头换成一次性无菌硬膜外穿刺针)自试管底部缓慢吸取下层的红细胞约 4/5;再将剩余部分缓慢放入离心机内再次以 1 500 r/min 离心 10 min,可见在底部薄层的红细胞表面沉积有白膜样物质,即为血小板和白细胞沉积层,其上部为透明的血浆层,再次以 20 ml 一次性无菌注射器(针头换成一次性无菌硬膜外穿刺针)自血浆表面开始吸取约 4/5,将剩余部分震荡混匀抽入无菌注射器中,与溶解好的凝血酶注射器共同安装至双注射器喷枪,同时将二者从喷枪中喷出并覆盖创面,由于喷出前经喷嘴处已混合,因此 PRP 在几秒钟内形成凝胶,无菌皮膜封闭创面,每周更换 1 次至痊愈。

3 结果

对所有患者进行随访,时间 3~8 个月,平均 5 个月。评价创面愈合情况:完全愈合,结痂脱落或皮肤



图 1 男,45 岁,左小腿挤压伤,左胫腓骨上段骨折,术后骨外露行皮瓣转移术,术后窦道形成再次骨外露,3 个月换药未愈,扩创后 VSD 覆盖,10 d 后拆去 VSD 行 PRP 治疗,8 周痊愈,随访 10 个月无复发 1a. 扩创后 VSD 治疗后创面 1b. PRP 治疗 2 周后创面 1c. PRP 治疗 8 周创面 1d. PRP 治疗 16 周创面 1e. PRP 治疗 24 周创面 1f. 治愈后 8 周

Fig.1 A 45-year-old male patient with calf crush injury on left, and the upper segment of tibiofibula fractures, After operation, because the bone was exposed, skin flap transfer operation was done, the bone was exposed once again because of fistula formation. The wound were not healed after dressing change for 3 months, the VSD was covered after debridement for 10 days, then PRP treatment was used. The wound was healed after 8 weeks, and followed up for 10 months without recurrence 1a. The wound

of VSD treatment after debridement 1b. The wound of PRP treatment for 2 weeks 1c. The wound of PRP after 8 weeks' treatment 1d. The wound of PRP after 16 weeks' treatment 1e. The wound of PRP after 24 weeks'treatment 1f. The cured wound at 8 weeks later

肤色正常;显效,创面缩小 80%以上,肉芽及上皮组织生长良好;好转,创面缩小达 50%,创面边缘有新的肉芽组织生长,但边缘有少量渗液;无效,治疗前后创面无变化或恶化^[1]。经过 VSD 结合富血小板血浆治疗后,创面均完全愈合,且愈合良好,无复发。典型病例见图 1。

4 讨论

4.1 VSD 结合富血小板血浆治疗难愈性创面的患者选择 此类患者往往经历过较严重的外伤,多为车祸或意外伤害,从心理和身体上已经造成较大的伤害,治愈的迫切性较强,且惧怕再次手术治疗,经过普通创伤科处理后均不能达到甲级愈合,经长期换药伤口没有好转,拒绝再次手术治疗。

4.2 应用 VSD 及制备富血小板血浆的特点 VSD 是 Fleischmaunw 等^[1]首创,对促进创面(尤其是慢性创面)的愈合作用在临床应用中已得到充分肯定,是一种简便而有效的理想方法。该方法可充分减少创面分泌物,保持创面新鲜,为富血小板血浆治疗创造良好条件,缩短了病程,提高了疗效。术中创面周缘皮肤必须切除到正常组织,保证皮下不留死腔,创面彻底清创,VSD 密封 7 d 后拆除,如引流较多则应更换 VSD。

PRP 由纤维蛋白胶(fibrin glue,FG)发展而来。FG 从自体或异体血浆中经过离心的方法提取出来,含有高浓度的纤维蛋白原,可以用来封闭创面,止血,加强创面收缩,促进伤口愈合^[2-3]。而 PRP 中不仅有高浓度的纤维蛋白,而且含有高浓度的血小板,其被激活后释放出大量生长因子,其中 EGF、VEGF、IGF 等均有较好的促进骨与软组织修复的作用^[4-6],Kazakos 等^[7]通过研究得出 PRP 在修复慢性难愈合伤口方面,效果尤其明显。袁霆等^[8]通过对 4 种 PRP 制作方法进行对照研究,得出 Landesberg^[9]法(两次离心均为力 200 g、10 min)和 Aghalood 等^[10](第 1 次离心力 215 g、离心 10 min,第 2 次离心力 863 g 离心 10 min)法的离心时间,两次均为 10 min,血小板回收率高,是较理想的离心时间。因此选用 Landesberg 法制备 PRP 喷致创面,待形成凝胶后以 VSD 专用半透性生物贴膜密封,每周更换 1 次至痊愈,期间依创面变小减少静脉采血量。

4.3 制备 PRP 其他注意事项 术前与患者良好沟通,严格配合治疗,从采血到离心再到创面密封,过

程严格无菌操作,所用器具采用一次性使用,避免交叉感染或形成医源性感染,术后尽量抬高患肢,减少静脉回流从而减少创面的渗出。

VSD 结合富血小板血浆治疗难愈性创面疗效确切,吸取了两者的优势,减少了患者精神和身体上的创伤,缩短了疗程,减轻了经济负担,具有较好的临床应用前景。

参考文献

- [1] Fleischmaunw W, Strecker W, Bombelli M, et al. Vacuum sealing as treatment of soft tissue damage in open fractures[J]. Unfallchirurg, 1993, 96(9):488-492.
- [2] 陈帅,张宁,陈维善,等.富血小板血浆修复骨缺损的机制研究进展[J].中国骨伤,2012,25(3):258-261.
Chen S, Zhang N, Chen WS, et al. Research progress of the mechanism of repairing bone defect with PRP[J]. Zhongguo Gu Shang/China J Orthop Trauma, 2012, 25(3):258-261. Chinese with abstract in English.
- [3] 柯希煌,练克俭.富血小板血浆与骨再生[J].中国骨伤,2006,19(9):570-572.
Ke XH, Lian KJ. Platelet rich plasma and bone regeneration [J]. Zhongguo Gu Shang/China J Orthop Trauma, 2006, 19(9):570-572. Chinese with abstract in English.
- [4] Lacci KM, Dardik A. Platelet-rich plasma; support for its use in wound healing[J]. Yale J Biol Med, 2010, 83(1):1-9.
- [5] Dohan Ehrenfest DM, Rasmuson L, Albrektsson T. Classification of platelet concentrates: from pure platelet-rich plasma (P-PRP) to leucocyte-and platelet-rich fibrin (L-PRF)[J]. Trends Biotechnol, 2009, 27(3):158-167.
- [6] Hu Z, Peel SA, Ho SK, et al. Platelet-rich plasma induces mRNA expression of VEGF and PDGF in rat bone marrow stromal cell differentiation[J]. Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 2009, 107(1):43-48.
- [7] Kazakos K, Lyras DN, Verettas D, et al. The use of autologous PRP gel as an aid in the management of acute trauma wounds[J]. Injury, 2009, 40(8):801-805.
- [8] 袁霆,张长青.骨组织与软组织修复作用中富血小板血浆的制作及其原理[J].中国临床康复,2004,8(35):7939-7941.
Yuan T, Zhang CQ. Fabrication and principle of platelet-rich plasma in the the repair of bone and soft tissues[J]. Zhongguo Lin Chuang Kang Fu, 2004, 8(35):7939-7941. Chinese.
- [9] Landesberg R, Roy M, Glickman RS. Quantification of growth factor levels using a simplified method of platelet-rich plasma gel preparation[J]. J Oral Maxillofac Surg, 2000, 58(3):297-301.
- [10] Aghalood TL, Moy PK, Freymiller EG. Investigation of platelet-rich plasma in rabbit cranial defects: a pilot study[J]. J Oral Maxillofac Surg, 2002, 60(10):1176-1181.

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