doi:10.11659/jjssx.09E022091

·临床研究·

腔内射频消融术联合超声引导下泡沫硬化剂治疗非血栓性下肢静脉性溃疡

李志刚[1],孙 默[2],王吉阳[3],何 楠[4],李拥军[3] (1.北京中医药大学附属护国寺中医医院血管外科,北京 100035;2.北京中医药大学附属护国寺中医医院老年病科,北京 100035;3.北京医院血管外科,北京 100730;4.首都医科大学附属北京安贞医院血管外科,北京 100029)

[摘 要] **目的** 探讨腔内射频消融术(RFA)联合超声引导下泡沫硬化剂注射(UGFS)治疗非血栓性下肢静脉性溃疡的疗效。**方法** 回顾性分析135例(患肢152条)经RFA联合UGFS或RFA联合点式剥脱治疗的非血栓性下肢静脉性溃疡患者的临床资料,其中RFA联合UGFS组的患者61例(68条患肢),RFA联合点式剥脱组的患者74例(84条患肢)。比较2组患者手术时间、住院时间、手术前后溃疡愈合情况、静脉临床严重程度评分(VCSS)、视觉模拟量表(VAS)评分及术后并发症等指标。**结果** 2组患者手术时间、住院时间比较差异有统计学意义($P<0.05$)。2组患者术后1个月、3个月溃疡愈合情况比较,差异无统计学意义($P>0.05$);2组患者术前和术后1个月、3个月VCSS评分比较,差异均无统计学意义($P>0.05$);2组患者术后1个月、3个月VAS评分比较差异均有统计学意义($P<0.05$)。2组患者并发症发生率比较差异有统计学意义($P<0.05$)。**结论** 两种方式对溃疡愈合的疗效相当,但RFA联合UGFS具有手术创伤更小、住院时间短、恢复快、并发症少等优点。

[关键词] 射频消融术;静脉性溃疡;静脉曲张;泡沫硬化剂注射;点式剥脱

[中图分类号] R654.4 [文献标识码] A [收稿日期] 2022-09-16

Endovascular radiofrequency ablation combined with ultrasound-guided foam sclerotherapy for treatment of non-thrombotic venous ulcer of lower extremities

LI Zhi-gang[1], SUN Mo[2], WANG Ji-yang[3], HE Nan[4], LI Yong-jun[3] (1. Department of Vascular Surgery, Huguosi Hospital Affiliated to Beijing University of Chinese Medicine, Beijing 100035, China; 2. Department of Geriatrics, Huguosi Hospital Affiliated to Beijing University of Chinese Medicine, Beijing 100035, China; 3. Department of Vascular Surgery, Beijing Hospital, Beijing 100730, China; 4. Department of Vascular Surgery, Beijing Anzhen Hospital, Capital Medical University, Beijing 100029, China)

Abstract: Objective To explore the efficacy of endovascular radiofrequency ablation (RFA) combined with ultrasound-guided foam sclerotherapy (UGFS) in the treatment of non-thrombotic venous ulcer of lower extremities. **Methods** The clinical data of 135 patients (152 affected limbs) with non-thrombotic venous ulcer of lower extremities treated with RFA combined with UGFS or RFA combined with point stripping were retrospectively analyzed. Among them, 61 patients (68 affected limbs) were included in the RFA combined with UGFS group and 74 patients (84 affected limbs) were included in the RFA combined with point stripping group. The operation time, hospital stay, ulcer healing before and after operation, venous clinical severity score (VCSS), visual analogue scale (VAS) score and postoperative complications of the two groups were compared. **Results** There were statistically significant differences in the operation time and hospital stay of patients between the two groups ($P<0.05$). There was no statistically significant difference in the ulcer healing of patients 1 and

[基金项目] 吴阶平医学基金(320.6750.19089-36)

[通信作者] 李拥军,E-mail:liyongjun4679@bjhmoh.xn

[10] 吴云鹏,田 伟,吴剑波,等. 糖尿病对肩袖损伤、修复及并发症影响的文献综述[J]. 骨科,2021,12(1):92-96. doi:10.3969/j.issn.1674-8573.2021.01.019.

[11] Rashid MS, Cooper C, Cook J, et al. Increasing age and tear size reduce rotator cuff repair healing rate at 1 year[J]. Acta Orthop, 2017,88(6):606-611. doi:10.1080/17453674.2017.1370844.

[12] 包呼日查,齐岩松,陶立元,等. 肩袖损伤修补金属锚钉置入角度——有限元分析[J]. 中华肩肘外科电子杂志,2019,7(1):56-62. doi:10.3877/cma.j.issn.2095-5790.2019.01.008.

[13] 陈 胜,魏合伟,郑维蓬,等. 骨质疏松与肩袖术后再撕裂的相关性临床研究[J]. 实用骨科杂志,2021,27(11):966-970. doi:10.13795/j.cnki.sgkz.2021.11.002.

[14] 张志宇,马宜君. 关节镜下双排缝合固定与缝线桥固定修复肩袖损伤的疗效观察[J]. 贵州医药,2022,46(10):1556-1557. doi:10.3969/j.issn.1000-744X.2022.10.023.

[15] 贺 权,杨自权. 肩袖损伤后关节镜下无结缝线桥固定术和有结缝线桥固定术疗效比较的meta分析[J]. 重庆医学,2023,52(6):902-905. doi:10.3969/j.issn.1671-8348.2023.06.020.

(编辑:贺绍梅)

3 months after operation between the two groups (P>0.05). There was no statistically significant difference in the VCSS scores of patients before operation and 1 and 3 months after operation between the two groups (P>0.05). There were statistically significant differences in the VAS scores of patients 1 and 3 months after operation between the two groups (P<0.05). There was a statistically significant difference in the incidence of complications between the two groups (P<0.05). **Conclusion** The two methods have similar efficacy for ulcer healing, but RFA combined with UGFS has the advantages of less surgical trauma, shorter hospital stay, faster recovery, and fewer complications.

Keywords: radiofrequency ablation; venous ulcer; varicose veins; foam sclerotherapy; point stripping

慢性下肢静脉疾病(chronic venous disease,CVD)的发病率居高不下,静脉性溃疡是CVD的终末阶段,其中以非血栓性静脉性溃疡占多数,严重影响患者的生活质量[1]。手术治疗可以加速静脉性溃疡愈合,其目的是消除病理性的静脉反流,包括大隐静脉反流、小隐静脉反流及穿通静脉反流等[2]。腔内射频消融术(radiofrequency ablation,RFA)是目前治疗静脉性溃疡的主流术式,临床上常常结合小腿静脉点式剥脱,可促进溃疡愈合,但仍会导致一定的创伤[3]。注射泡沫硬化剂具有更加微创、便捷等优点,临床上运用广泛,其原理是使泡沫接触静脉内皮细胞后产生无菌性炎症,进而引起血管纤维化、最终闭塞并转化为条索被人体吸收,联合运用超声可更加精准地治疗病变。但各中心治疗静脉性溃疡的疗效差异较大[4],且目前较少有对RFA联合超声引导下泡沫硬化剂注射(ultrasound-guided foam sclerotherapy,UGFS)与RFA联合点式剥脱治疗静脉性溃疡的疗效进行比较的直接证据。本研究通过对比RFA联合UGFS与RFA联合点式剥脱治疗下肢静脉性溃疡的临床疗效,以期为临床非血栓性下肢静脉性溃疡的治疗提供参考。

1 资料与方法

1.1 临床资料

回顾性分析2018年1月至2020年12月北京中医药大学附属护国寺中医医院血管外科收治的经RFA联合UGFS与RFA联合点式剥脱治疗的非血栓性下肢静脉性溃疡患者的临床资料。纳入标准:慢性静脉功能不全C6级,术前彩超证实为非血栓性病变。排除标准:动脉、神经性溃疡;存在重度髂静脉压迫;静脉畸形;KT综合征;对硬化剂过敏;心脏彩超提示明显右向左分流的先天性心脏病;重度肺动脉高压;布加综合征。共纳入135例患者,患肢152条,其中RFA联合UGFS组的患者61例(68条患肢),RFA联合点式剥脱组的患者74例(84条患肢)。2组患者年龄比较差异有统计学意义(P>0.05),性别、BMI、溃疡病程、溃疡面积、高血压、糖尿病、既往丹毒病史、大隐静脉反流、病理性穿通静脉反流等基础资料比较差异无统计学意义(P>0.05)。本研究经北京中医药大学附属护国寺中医医院医学伦理委员会审核通过(BJZYY-2021-00657)。

1.2 方法

术前常规进行静脉临床严重程度评分(venous clinical severity score,VCSS)[5]和溃疡面积记录。静脉彩超评估深静脉瓣膜情况、是否存在病理性穿通静脉(incompetent perforator veins,IPVs)及大、小隐静脉的反流情况。常规心脏彩超评估是否合并先天性心脏病。RFA采用美敦力二代ClosureFast射频导管,肿胀麻醉液配方:465 mL生理盐水+25 mL 1%利多卡因+0.5 mL肾上腺素+15 mL碳酸氢钠溶液。泡沫硬化剂为1%或3%聚多卡醇,使用2个5 mL注射器连接三通阀,聚多卡醇2 mL+空气8 mL(1∶4)配制成泡沫。手术步骤:彩超确认大隐静脉走行,定位于膝关节下方穿刺并置入7 F短鞘,导入射频导管至大隐静脉汇入口以远2 cm,彩超确认,如遇主干迂曲,则使用0.018in导丝于彩超引导下辅助通过大隐静脉汇入口后再导入射频导管。彩超引导下在大隐静脉周围注射肿胀麻醉液使血管与周围组织分离,射频导管头长度为7 cm,温度24 ℃,启动射频装置后,第一节行2次射频治疗(20 s 1个周期,间隔5 s,最高温度120 ℃)。将导管撤离至下一个标记点,行1次射频治疗,按大隐静脉近端至远端的顺序依次消融,超声再次确认大隐静脉闭合情况,退出导管导鞘完成操作。

RFA联合点式剥脱组患者,于小腿明显的曲张静脉处及溃疡周边明显的曲张静脉处进行点式剥脱,剥离后术中超声再次确认小腿无残余明显曲张静脉及病理性穿通静脉。RFA联合UGFS组患者小腿及溃疡周边曲张静脉行泡沫硬化剂注射:彩超定位下,根据病变血管粗细,选择合适的硬化剂浓度进行注射,超声依次确认病变管腔内硬化剂充盈,确认病理性穿通静脉内硬化剂充盈且无明显反流。术后下肢弹力绷带加压包扎1周后,改穿Ⅱ级弹力袜,维持3个月。

1.3 观察指标及术后随访

比较2组患者住院时间及手术时间。所有患者术后随访3个月,包括门诊随访和电话随访,观察并比较

术后1个月、3个月的VCSS评分、视觉模拟量表(visual analogue scale,VAS)评分[6]、溃疡愈合情况及术后并发症(包括疼痛、麻木、瘀斑、静脉炎等)发生情况。

1.4 统计学方法

采用SPSS 17.0统计学软件对数据进行处理,计量资料以均数±标准差($\bar{x}\pm s$)表示,采用t检验。计数资料以率(%)表示,采用χ^2检验。P<0.05表示差异具有统计学意义。

2 结果

2.1 手术时间、住院时间、VCSS评分、VAS评分和溃疡愈合情况比较

2组患者手术时间、住院时间比较,差异有统计学意义(P<0.05),见表1。2组患者术后1个月、3个月溃疡愈合情况比较,差异无统计学意义(P>0.05);2组患者术前和术后1个月、3个月VCSS评分比较,差异均无统计学意义(P>0.05);2组患者术后1个月、3个月VAS评分比较差异均有统计学意义(P<0.05),见表2。

表1 2组患者手术时间及住院时间比较($\bar{x}\pm s$)

组别	n	手术时间(min)	住院时间(d)
RFA联合UGFS组	68	22.1±8.3	2.1±0.8
RFA联合点式剥脱组	84	40.4±6.8	4.4±1.5
t		−13.251	−11.181
P		0.024	0.037

表2 2组患者VCSS评分、VAS评分和溃疡愈合情况比较

组别	n	VCSS评分(分)			VAS评分(分)		溃疡愈合[条(%)]	
		术前	术后1个月	术后3个月	术后1个月	术后3个月	术后1个月	术后3个月
RFA联合UGFS组	68	13.6±2.4	6.6±1.3	3.8±1.1	2.1±0.8	1.8±0.6	3(57.35)	57(83.82)
RFA联合点式剥脱组	84	13.2±3.1	6.9±1.2	4.1±1.4	4.12±1.1	2.8±0.9	50(59.52)	68(80.95)
t/χ^2		0.197	0.783	−1.105	−9.128	−6.342	0.073	0.212
P		0.631	0.418	0.312	0.001	0.010	0.951	0.698

2.2 术后并发症比较

2组患者瘀斑、麻木、疼痛、静脉炎等并发症发生率比较,差异均有统计学意义(P<0.05),见表3。

表3 术后并发症比较[条(%)]

组别	n	瘀斑	麻木	疼痛	静脉炎
RFA联合UGFS组	68	0(0)	0(0)	2(2.9)	8(11.8)
RFA联合点式剥脱组	84	6(7.1)	8(9.5)	10(11.9)	2(2.4)
t/χ^2		5.057	6.836	4.152	5.384
P		0.018	0.012	0.024	0.016

3 讨论

本研究回顾性分析了135例非血栓性下肢静脉性溃疡患者的临床资料,结果显示,对于C6级慢性静脉功能不全的患者,在排除了血栓性病变之后,使用RFA联合UGFS或RFA联合点式剥脱治疗都可以促进静脉溃疡的愈合,随访3个月,2组中约80%的静脉性溃疡得到痊愈,总体疗效相当。然而RFA联合UGFS不管在住院时间、手术时间还是术后并发症方面都明显优于RFA联合点式剥脱,虽然结果显示使用UGFS的患者术后静脉炎的发生率增高,但经规范抗炎治疗后,症状都得到好转,并无明显不良事件发生。本研究中RFA联合UGFS组中高龄的患者更多,其原因为对于部分高龄及不适合行点式剥脱的患者,本中心更倾向于选择RFA联合UGFS进行治疗,并且相对于RFA联合点式剥脱,RFA联合UGFS在手术时间方面更有优势,我们认为不会对后续的结果及疗效评估产生影响。以上结果均说明RFA联合UGFS相比RFA联合点式剥脱具有创伤更小、住院时间短、恢复更快和并发症更少的优点。

目前,有研究显示硬化剂治疗下肢静脉性溃疡具有一定的疗效[4,7]。一项来自巴西的前瞻性研究显示,在消除隐静脉反流后,UGFS治疗静脉性溃疡效果显著,在180 d的随访期间内,77%的患者溃疡得到了痊愈,并无严重并发症发生[8],本中心得出的结果与之相似。一项回顾性研究显示,在143例静脉性溃疡患者中使用泡沫硬化剂作为首次治疗方案,约92.3%的患者静脉性溃疡得到治愈,愈合时间为2~3个月,并且证实联合腔内热消融可降低复发率[9]。IPVs作为溃疡迁延不愈的重要危险因素,手术消除IPVs并同时处理具有病理性反流的隐静脉可提高溃疡的愈合率[10]。一项来自英国20个中心的RCTs对450例静脉性溃疡患者的治疗情况进行观察,其中近50%的患者使用了泡沫硬化剂进行治疗,结果显示,治疗后6个月的溃疡愈合率为85.6%,中位愈合时间为56 d[11]。本研究使用泡沫硬化剂注射或点式剥脱剥离IPVs,并在超声引导和定位下进行,证实IPVs闭合或剥离完全,且联合RFA,约80%的患者溃疡得到了痊愈,证实了两种手术方案治疗静脉性溃疡的有效性和安全性,当然这个结论还需更多的高级别临床研究佐证。RFA联合UGFS可在局部麻醉、日间下进行,对高龄或无法耐受

全身麻醉手术的患者,具有较高的应用价值。

研究表明,浅静脉手术作为静脉曲张术式的辅助手段,其溃疡复发率低于单纯加压治疗,国际静脉溃疡管理指南也建议对浅静脉曲张进行治疗[12-13]。点式剥脱本身会对皮肤造成一定的创伤,尽管有许多的改良方案,如通过微切口或使用静脉钩行改良的点式剥脱等,但术后患者常出现瘀斑、疼痛、麻木等相关并发症,这些症状可能会长期存在,影响患者生活质量[14-17]。对于大部分患者,虽然点式剥脱引起的相关并发症在术后会得到改善,对总体的疗效并未有明显的干扰[18],但是避免多处的点式剥脱可进一步提升患者的手术体验[19-21]。因此,对于慢性静脉性溃疡患者,应尽量减少对溃疡周围皮肤的创伤,从而降低相关不良事件的发生率。

本研究基本反映了C6级CVD患者早期随访数据,但仍有许多不足之处:①许多指标没有细化,如具体病变硬化剂的选择、术后超声随访数据及隐静脉反流时间;②对于溃疡的大小、深浅并未细分,未对同一溃疡面积下不同深浅的愈合时间进行比较;③观察及随访的时间仅3个月,时间轴短;④本研究为回顾性分析,证据级别较低,结论仍需要更多大样本的前瞻性研究来证实。

[参考文献]

[1] Singer AJ, Tassiopoulos A, Kirsner RS. Evaluation and management of lower-extremity ulcers[J]. N Engl J Med, 2017, 377(16): 1559-1567. doi: 10. 1056/NEJMra1615243.

[2] Barwell JR, Davies CE, Deacon J, et al. Comparison of surgery and compression with compression alone in chronic venous ulceration (ESCHAR study): randomised controlled trial[J]. Lancet, 2004, 363(9424): 1854-1859. doi: 10. 1016/S0140-6736(04)16353-8.

[3] Sincos IR, Baptista APW, Coelho Neto F, et al. Prospective randomized trial comparing radiofrequency ablation and complete saphenous vein stripping in patients with mild to moderate chronic venous disease with a 3-year follow-up[J]. Einstein (Sao Paulo), 2019, 17(2): eAO4526. doi: 10. 31744/einstein_journal/2019AO4526.

[4] Hager ES, Washington C, Steinmetz A, et al. Factors that influence perforator vein closure rates using radiofrequency ablation, laser ablation, or foam sclerotherapy[J]. J Vasc Surg Venous Lymphat Disord, 2016, 4(1): 51-56. doi: 10. 1016/j. jvsv. 2015. 08. 004.

[5] Rutherford RB, Padberg FT Jr, Comerota AJ, et al. Venous severity scoring: An adjunct to venous outcome assessment[J]. J Vasc Surg, 2000, 31(6): 1307-1312. doi: 10. 1067/mva. 2000. 107094.

[6] 高万露,汪小海. 视觉模拟疼痛评分研究的进展[J]. 医学研究杂志,2013,42(12):144-146.

[7] Cabrera J, Redondo P, Becerra A, et al. Ultrasound-guided injection of polidocanolmicrofoam in the management of venous leg ulcers[J]. Arch Dermatol, 2004, 140(6): 667-673. doi: 10. 1001/archderm. 140. 6. 667.

[8] de Abreu GCG, de Camargo O Jr, de Abreu MFM, et al. Ultrasound-guided foam sclerotherapy for chronic venous disease with ulcer. A prospective multiple outcome cohort study[J]. J Vasc Bras, 2020, 19: e20180108. doi: 10. 1590/1677-5449. 180108.

[9] Pihlaja T, Torro P, Ohtonen P, et al. Ten years of experience with first-visit foam sclerotherapy to initiate venous ulcer healing[J]. J Vasc Surg Venous Lymphat Disord, 2021, 9(4): 954-960. doi: 10. 1016/j. jvsv. 2020. 11. 012.

[10] Abdul-Haqq R, Almaroof B, Chen BL, et al. Endovenous laser ablation of great saphenous vein and perforator veins improves venous stasis ulcer healing[J]. Ann Vasc Surg, 2013, 27(7): 932-939. doi: 10. 1016/j. avsg. 2012. 09. 014.

[11] Gohel MS, Heatley F, Liu X, et al. A randomized trial of early endovenous ablation in venous ulceration[J]. N Engl J Med, 2018, 378(22): 2105-2114. doi: 10. 1056/NEJMoa1801214.

[12] O'Donnell TF Jr, Passman MA, Marston WA, et al. Management of venous leg ulcers: clinical practice guidelines of the Society for Vascular Surgery® and the American Venous Forum[J]. J Vasc Surg, 2014, 60(2 Suppl): 3S-59S. doi: 10. 1016/j. jvs. 2014. 04. 049.

[13] Gohel MS, Barwell JR, Taylor M, et al. Long term results of compression therapy alone versus compression plus surgery in chronic venous ulceration (ESCHAR): randomised controlled trial[J]. BMJ, 2007, 335(7610): 83. doi: 10. 1136/bmj. 39216. 542442. BE.

[14] Setia A, Schmedt CG, Beisswenger A, et al. Safety and efficacy of endovenous laser ablation (EVLA) using 1940 nm and radial emitting fiber: 3-year results of a prospective, non-randomized study and comparison with 1470 nm[J]. Lasers Surg Med, 2022, 54(4): 511-522. doi: 10. 1002/lsm. 23500.

[15] Brown CS, Obi AT, Cronenwett JL, et al. Outcomes after truncal ablation with or without concomitant phlebectomy for isolated symptomatic varicose veins (C2 disease)[J]. J Vasc Surg Venous Lymphat Disord, 2021, 9(2): 369-376. doi: 10. 1016/j. jvsv. 2020. 05. 016.

[16] Ahuja A, Grant T, Dumanian G, et al. Development of traumatic neuromas in a patient following endovenous laser ablation and microphlebectomy procedures: a rare complication from the removal of varicose veins[J]. Cureus, 2021, 13(6): e15830. doi: 10. 7759/cureus. 15830.

[17] Dexter D, Kabnick L, Berland T, et al. Complications of endovenouslasers[J]. Phlebology, 2012, 27(Suppl 1): 40-45. doi: 10. 1258/phleb. 2012. 012s18.

[18] Orhurhu V, Chu R, Xie K, et al. Management of lower extremity pain from chronic venous insufficiency: a comprehensive review[J]. Cardiol Ther, 2021, 10(1): 111-140. doi: 10. 1007/s40119-021-00213-x.

[19] de Zeeuw R, Wittens C, Loots M, et al. Transilluminated powered phlebectomy accomplished by local tumescentanaesthesia in the treatment of tributary varicose veins: preliminary clinical results[J]. Phlebology, 2007, 22(2): 90-94. doi: 10. 1258/026835507780346141.

[20] Luebke T, Brunkwall J. Meta-analysis of transilluminated powered phlebectomy for superficial varicosities[J]. J Cardiovasc Surg (Torino), 2008, 49(6): 757-764.

[21] Chetter IC, Mylankal KJ, Hughes H, et al. Randomized clinical trial comparing multiple stab incision phlebectomy and transilluminated powered phlebectomy for varicose veins[J]. Br J Surg, 2006, 93(2): 169-174. doi: 10. 1002/bjs. 5261.

(编辑:刘 艺)