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# 实时灰阶超声造影股浅静脉瓣膜返流时间与病变严重程度的相关性探讨

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**摘要 目的:**探讨超声造影股浅静脉瓣膜返流与病变严重程度的关系。**方法:**回顾性分析 55 例 63 条诊断为原发性深静脉功能不全患者的临床和超声造影资料,记录股浅静脉瓣膜返流时间和 CEAP 临床表现分级,并进行两者的相关性分析。**结果:**统计学分析表明,CEAP 临床表现分级与瓣膜返流时间无相关性;但溃疡肢体组与非溃疡肢体组的股浅静脉瓣膜返流时间比较,两组有显著性差异( $P < 0.05$ )。**结论:**超声造影检查股浅静脉瓣膜返流时间有可能预测患肢静脉性溃疡的发生。

**关键词:**原发性下肢深静脉功能不全;超声造影

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## Correlation between Times of Valvular Regurgitation of Superficial Femoral Vein by Contrast-Enhanced Ultrasound and Clinical Severity

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**ABSTRACT Objective:** To explore the relationship between times of valvular regurgitation of superficial femoral vein detected via contrast-enhanced ultrasound and clinical severity. **Methods:** Retrospective analysis were applied in 55 cases (63 lower limbs) with different clinical stages of primary deep venous insufficiency (PDVI), times of valvular regurgitation of superficial femoral vein were examined by contrast-enhanced ultrasound. **Results:** There were no relationships between times of valvular regurgitation of superficial femoral vein and clinical severity. Times of valvular regurgitation of ulcerative and nonulcerative limbs presented significant difference in statistics ( $P < 0.05$ ). **Conclusion:** Times of valvular regurgitation of superficial femoral vein detected by contrast-enhanced ultrasound may act as a predictor for ulceration development in limbs.

**Key words:** Primary deep venous insufficiency; Contrast-enhanced ultrasound

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原发性下肢深静脉功能不全(primary deep venous insufficiency, PDVI)是一类由于瓣膜功能障碍引起血液返流、淤积,进而下肢静脉系统持续性高压为特征的临床常见疾病,由此所引发的下肢肿胀、色素沉着、皮炎和经久不愈的皮肤溃疡等症严重影响着病人的日常工作和生活。本文旨在探讨超声造影检测 PDVI 患者股浅静脉瓣膜返流时间与病变严重程度间的关系,为临床治疗和预后的评估提供理论依据。

### 1 资料与方法

#### 1.1 临床资料

55 例行超声造影检查,并经临床确诊 PDVI 病人,男性 32 例,女性 23 例;年龄 31~72 岁,平均年龄 53.2 岁;其中双侧下肢者 8 例,左侧下肢 27 例,右侧下肢 20 例,共 63 条下肢。

所有病例均详细记录了临床表现,包括静脉曲张、疼痛、水

肿、皮肤色素沉着及溃疡等,并按照 1994 年美国静脉论坛国际专家特别委员会提出的 CEAP 静脉分类系统即“临床-病因-解剖-病理-生理”的分类系统进行临床分级。

#### 1.2 方法

**超声造影检查:**超声造影使用仪器为飞利浦公司 IU22 超声诊断仪,探头型号为 L8-4 宽频线阵探头,选用脉冲反向谐波造影技术。超声造影剂为 SonoVue(意大利,Bracco 公司),其有效成分为脂质包裹的六氟化硫(SF<sub>6</sub>)气体。

患者 60 度半卧位,检查侧肢体稍外旋,在其足踝上方、膝下、大腿根部结扎止血带,以阻断造影剂进入浅静脉,使其经深静脉回流。将 SonoVue 0.5 mL 加入 0.85% 生理盐水 30 mL 中,充分震荡备用。头皮针行足背浅静脉穿刺,先注入生理盐水 5 mL,观察静脉是否通畅,然后快速注入含 SonoVue 的生理盐水 30 mL,观察股浅静脉瓣膜运动情况。将一宽约 24 cm 的血压计袖带捆在大腿上,袖带上缘与探头之间的距离 <5 cm,约 3 秒充气至 10.7 kPa(80 mmHg),然后快速放气(0.3 秒以内)。放气后观察股浅静脉的返流情况,记录返流时间。松开止血带,拔出穿刺针,压迫 30 s 止血。

#### 1.3 统计学处理

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各指标以均值±标准差表示,采用 t、F 检验和非参数相关(秩相关)分析。

## 2 结果

本次病例中,患者按照 CEAP 临床表现分级分为 5 组,其中 C25 侧下肢,C36 侧下肢,C425 侧下肢,C511 侧下肢,C68 侧下肢。

C2 组、C3 组与 C4 组之间及 C5 组与 C6 组之间行 F 检验,返流时间均没有统计学差异。各亚组间两两行 t 检验,C2 组与 C3 组、C3 组与 C4 组、C5 组与 C6 组返流时间之间没有统计学差异。P 值均>0.05。C4 组与 C5 组返流时间之间有统计学差异,t=4.14,P<0.05。说明溃疡肢体组与非溃疡肢体组返流时间有明显差异,溃疡肢体组返流时间明显增加。

超声造影检查股浅静脉第一对瓣膜返流时间与患者“临床表现”进行非参数相关(秩相关)分析,结果相关系数为 0.0013,呈负相关(P 值>0.05)。说明临床表现轻重与返流时间长短之间没有明确的规律。

表 1 股浅静脉第一对瓣膜超声造影返流时间

Table 1 Regurgitation time of the first pair of superficial femoral vein valve measured by CEUS

| CEAP 临床表现分级<br>CEAP Clinical Classification | 返流时间(s)<br>Regurgitation time (s) |
|---------------------------------------------|-----------------------------------|
| C <sub>2</sub> (n=5)                        | 3.05± 1.34                        |
| C <sub>3</sub> (n=5)                        | 3.09± 1.17                        |
| C <sub>4</sub> (n=25)                       | 3.85± 1.13                        |
| C <sub>5</sub> (n=11)                       | 5.34± 0.39                        |
| C <sub>6</sub> (n=8)                        | 5.37± 0.46                        |

## 3 讨论

下肢静脉病是外科常见病和多发病,其中原发性下肢深静脉功能不全约占 53.02%~69%<sup>[1,2]</sup>。下肢慢性静脉功能不全最重要的原因是深静脉瓣关闭不全<sup>[3]</sup>,可以发生在深静脉血栓形成(DVT)之后,此时多数静脉最终部分或完全再通<sup>[4,5]</sup>。在静脉炎症过程中,瓣叶变厚、缩短或嵌入静脉壁瘢痕中,使得瓣叶无法推动前向血流和阻止血液倒流。静脉不再是精致有活性的单向通道,而变成僵硬的厚壁管道,带有残余的无效瓣膜,纤维粘连使管腔缩小。但大多数慢性静脉疾病是由于返流引起的。返流是指由于静脉瓣缺失或关闭不全而引起的下肢静脉的离心血流。DVT 后,瓣膜损伤很常见,并有约一半出现返流<sup>[6]</sup>。返流结果是静脉高压,并促使在右心房与下肢静脉之间的血流不被静脉瓣所中断,血液的重力和静水压力全部作用于静脉壁上;肌肉泵的挤压作用失效,不能有效地通过肌肉收缩压迫深静脉使血液流出下肢,血液淤积于下肢;穿静脉,包括小腿穿静脉和隐腓或隐股静脉汇合处功能失常,血液向浅静脉、肢体远端流动,而不是向深静脉、近心端流动。小腿穿静脉的瓣膜功能不全使得因肌肉收缩导致的深静脉高压直接传导到浅静脉。而随后的静脉高压引起下肢沉重、疼痛、乏力等症状并出现水肿和静脉曲张。有时,静脉高压也与皮肤色素沉着、皮肤硬化、溃疡有关。

超声对返流的分级以及诱导返流的方法还没有统一。有的只报告某个静脉有无返流,有的报告一些参数,包括返流时间、返流峰值流速、返流量等<sup>[7-9]</sup>。有文献报告,如对返流进行量化,气囊加压法占优<sup>[10]</sup>。这是因为该法有较强的可重复性,压力带的大小一致,静脉容积的变化量也一致,且最终引起返流的因素--重力也是恒定的<sup>[11]</sup>。本实验亦采用血压计袖带加压来监测静脉的返流时间。

下肢深静脉近心端的逆向压力破坏股浅静脉瓣膜后,其远心端的瓣膜会相继发生功能不全,造成下肢静脉系统淤血和高压<sup>[12]</sup>。外科目前主要治疗方法为以股浅静脉瓣膜为中心,施行瓣膜重建手术和曲张静脉剥脱术。本研究表明,超声造影检查能清楚观察股浅静脉第一对瓣膜并记录其返流时间。

返流时间小于 0.5 秒被认为是正常,因为 95%的正常瓣膜在此时间段内关闭<sup>[7]</sup>。超声能检查深浅静脉及穿静脉,并确定返流的部位和范围,检查结果与静脉造影结果相当一致<sup>[13]</sup>。Vasdekis<sup>[9]</sup>等认为有严重静脉淤滞疾病的患者,通过返流的峰值流速可以将有皮肤脂肪硬化和溃疡的患者与没有皮肤改变的患者区别开来。Bergan<sup>[14]</sup>等认为股静脉和腓静脉的返流量和静脉淤滞的严重程度不太相关。Moulton<sup>[15]</sup>等对有静脉淤滞症状的 133 例患者进行研究发现,随临床分级增高,返流量趋于增大;返流速度也与临床分级有关。

多数学者认为深静脉功能不全的程度越重,则返流时间越长,但 Ridriguez<sup>[16]</sup>等发现多普勒超声返流时间和下肢静脉功能不全无相关性。本研究亦表明,临床表现轻重与超声造影股浅静脉返流时间长短之间没有明确的规律。在正常下肢静脉回流中,浅静脉仅占回心血量的 10%~15%,深静脉则高达 85%~90%。需要同时纠正深静脉和浅静脉的返流,才能改善静脉主干高压,解除对皮肤微循环的影响,控制或减轻患者的皮肤损害。下肢深浅静脉间存在许多穿支静脉,这些穿支静脉瓣膜功能是否正常与静脉返流持续时间有关。如果深静脉瓣膜关闭不全合并穿支静脉返流,深静脉血流可通过穿支静脉进入浅静脉,使深静脉返流流速减低,返流持续时间缩短。因穿支静脉瓣膜功能不全对深浅静脉返流的持续时间有一定影响,返流持续时间与临床症状的严重程度不成正比。诊断下肢静脉瓣膜关闭不全时,应考虑穿支静脉和浅静脉的情况。

慢性静脉性溃疡是下肢慢性静脉功能不全最严重和最难治的并发症。该病与远端静脉高压有关。凡引起下肢静脉高压的因素如各种原因引起的下肢静脉瓣膜功能不全,均可造成下肢溃疡形成。陈翠菊等<sup>[17]</sup>研究慢性溃疡发病原因,91.84%为原发性深静脉瓣膜功能不全。当瓣膜功能不全时,下肢静脉压进行性和持续性升高,即下肢远端静脉高压,导致了毛细血管扩张,血浆、血浆蛋白和红细胞漏出增加,远端肢体淤血、组织缺氧,发生皮肤营养障碍慢性溃疡发生。Weingarten 等<sup>[18]</sup>报道下肢慢性静脉功能不全患者的平均深静脉返流时间,溃疡侧显著长于非溃疡侧,而浅静脉系统返流时间两组没有差异。深静脉系统在溃疡发生中的作用可能比浅静脉系统更重要。本文溃疡肢体组与非溃疡肢体组返流时间有明显差异,溃疡肢体组返流时间明显增加。但样本量较小,尚需加大样本,以期预测溃疡发生的返流时间界限。

## 参 考 文 献(References)

- [1] Guarnera G, Furgiuele S, Mascellari L, et al. External banding valvuloplasty of the superficial femoral vein in the treatment of recurrent varicose veins[J]. *Inter Angiol*, 1998, 17(4): 268-272
- [2] Magnusson MB, Nelzen O, Risberg B. A colour Doppler ultrasound study of venous reflux in patient with chronic leg ulcers [J]. *Enu J Vasc Endovasc Surg*, 2001, 21: 353-360
- [3] Markel A, Manzo RA, Bergelin RO, et al. Incidence and time of occurrence of valvular incompetence following deep vein thrombosis [J]. *Wien Med Wochenschr*, 1994, 144: 216
- [4] Johnson BF, Manzo RA, Bergelin RO, et al. Relationship between changes in the deep venous system and the development of the postthrombotic syndrome after an acute episode of lower deep vein thrombosis: A one-to six-year follow-up[J]. *J Vasc Surg*, 1995, 21: 307
- [5] Lindner DJ, Edwards JM, Phinney ES, et al. Long-term hemodynamic and clinical sequelae of lower extremity deep vein thrombosis [J]. *J Vasc Surg*, 1986, 4: 436
- [6] Van Ramshorst B, van Bemmelen PS, Hoeneveld H, Eikelboom BC. The development of valvular incompetence after deep vein thrombosis: A followup study with duplex scanning [J]. *J Vasc Surg*, 1994, 20: 1059-1066
- [7] Van Bemmelen PS, Bedford G, Beach K, Strandness DE Jr. Quantitative segmental evaluation of venous valvular reflux with duplex ultrasound scanning[J]. *J Vasc Surg*, 1989, 10: 425-431
- [8] Van Bemmelen P, Beach K, Bedford G, Strandness DE Jr. The mechanism of venous valve closure[J]. *Arch Surg*, 1990, 125: 617-619
- [9] Vasdekis SN, Clarke GH, Nicolaides AN. Quantification of venous reflux by means of duplex scanning[J]. *J Vasc Surg*, 1989, 10: 670-677
- [10] Hanrahan LM, Araki CT, Rodriguez AA, et al. Distribution of valvular incompetence in patients with venous stasis ulceration [J]. *J Vasc Surg*, 1991, 13: 805-812
- [11] Masuda EM, Kister RL, Eklof B. Prospective study of duplex scanning for venous reflux: Comparison of Valsalva and pneumatic cuff techniques in the reverse Trendelenburg and standing positions [J]. *J Vasc Surg*, 1994, 20: 711-720
- [12] Kistner RL. Primary venous valve incompetence of the leg [J]. *Am J Surg*, 1980, 140: 218
- [13] Baldt MM, Bohler K, Zontsich T, et al. Preoperative imaging of lower extremity varicose veins: Colorcoded duplex sonography or venography? [J]. *J Ultrasound Med*, 1996, 15: 143-154
- [14] Bergan JJ, Moulton SL, Poppitt R, Beeman S. Patient selection for surgery of varicose veins using venous reflux quantification. In Veith FJ(ed): *Current Critical Problems in Vascular Surgery*[M]. St. Louis, Quality Medical Publishing, 1992: 138-149
- [15] Moulton S, Bergan JJ, Beeman S, Poppitt R. Gravitational reflux does not correlate with clinical status of venous stasis[J]. *Phlebology*, 1993, 8: 2-6
- [16] Rodriguez AA, Whitehead CM, McLaughlin RL, et al. Duplexderived valve closure times fail to correlate with reflux flow volumes in patients with chronic venous insufficiency [J]. *J Vasc Surg*, 1996, 23(4): 606-610
- [17] 陈翠菊,郭曙光,李胜宏.下肢静脉曲张性溃疡治疗方法研究[J]. *中华外科杂志*, 1993, 31: 236-237
- Chen Cui-ju, Guo Shu-guang Guo, Li Sheng-hong. Treatment of varicose ulcer of the lower extremities. *Chinese Journal of Surgery*, 1993, 31: 236-237
- [18] Weingarten MS, Branas CC, Czeredarczuk M, et al. Distribution and quantification of venous reflux in lower extremity chronic venous stasis disease with duplex scanning[J]. *J Vasc Surg*, 1993, 18: 753

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- [29] Ambrogi V, Paci M, Pompeo E, et al. Transxiphoid video-assisted pulmonary metastasectomy: Relevance of helical computed tomography occult lesions [J]. *The Annals of thoracic surgery*, 2010, 70(6): 1847-1852
- [30] Khanna C, Fan TM, Gorlick R, et al. Towards a drug development path that targets metastatic progression in osteosarcoma [J]. *Clinical cancer research : an official journal of the American Association for Cancer Research*, 2014, 12(7): 549-552
- [31] Kandioler D, Kromer E, Tuchler H, et al. Long-term results after repeated surgical removal of pulmonary metastases[J]. *The Annals of thoracic surgery*, 1998, 65(4): 909-912
- [32] Sajadi KR, Heck RK, Neel MD, et al. The incidence and prognosis of osteosarcoma skip metastases [J]. *Clinical orthopaedics and related research*, 2013, 426: 92-96
- [33] Luetke A, Meyers PA, Lewis I, et al. Osteosarcoma treatment - where do we stand A state of the art review [J]. *Cancer treatment reviews*, 2014, 40(4): 523-532
- [34] Hauben EI, Weeden S, Pringle J, et al. Does the histological subtype of high-grade central osteosarcoma influence the response to treatment with chemotherapy and does it affect overall survival? A study on 570 patients of two consecutive trials of the european osteosarcoma intergroup [J]. *European journal of cancer (Oxford, England : 1990)*, 2009, 38(9): 1218-1225
- [35] Antunes M, Bernardo J, Salet M, et al. Excision of pulmonary metastases of osteogenic sarcoma of the limbs[J]. *European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery*, 1999, 15(5): 592-596
- [36] Bacci G, Longhi A, Ferrari S, et al. Prognostic significance of serum alkaline phosphatase in osteosarcoma of the extremity treated with neoadjuvant chemotherapy: Recent experience at rizzoli institute[J]. *Oncology reports*, 2002, 9(1): 171-175
- [37] Laverdiere C, Hoang BH, Yang R, et al. Messenger rna expression levels of cxcr4 correlate with metastatic behavior and outcome in patients with osteosarcoma [J]. *Clinical cancer research: an official journal of the American Association for Cancer Research*, 2005, 11(7): 2561-2567