

doi: 10.13241/j.cnki.pmb.2019.13.013

体位性心动过速综合征儿童 P 波离散度 *

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摘要 目的:比较体位性心动过速综合征(POTS)晕厥患儿与非体位性心动过速综合征晕厥患儿体表 12 导联心电图 P 波离散度。探讨 P 波离散度作为心电学标志在体位性心动过速综合征患儿中的意义。**方法:**2016 年 7 月至 2018 年 1 月对我院门诊晕厥患儿 186 例行基础直立倾斜试验 (HUTT)。取单纯体位性心动过速阳性反应作为 HUTT-POTS 组,共 45 例,HUTT 阴性反应作为 HUTT-(-)组,共 39 例。体位性心动过速阳性反应标准:平卧时心率在正常范围,直立倾斜试验的 10 分钟内心率较平卧位增加大于等于 40 次/分和(或)心率最大值达到标准(6~12 岁大于等于 130 次/分,13~18 岁大于等于 125 次/分);同时收缩压下降幅度小于 20 mmHg,舒张压下降幅度小于 10 mmHg。测量两组患儿平卧位 12 导联心电图 P 波离散度(PWD,PWD= $P_{\max}-P_{\min}$)并比较。**结果:**HUTT-POTS 组男性比例为 51%。两组患儿年龄、性别、体重指数间差异无统计学意义。两组患儿平卧位收缩压、舒张压、心率间差异无统计学意义。PWD 在 HUTT-POTS 组(35.22 ± 9.53 ms)较 HUTT-(-)组(15.5 ± 6.47 ms)增高, $P < 0.01$,两组患儿 PWD 差异有显著统计学意义。**结论:** PWD 可以作为体位性心动过速综合征患儿自主神经功能紊乱的心电学标志。

关键词: 直立倾斜试验;体位性心动过速综合征;P 波离散度

中图分类号:R541.71;R725.4 文献标识码:A 文章编号:1673-6273(2019)13-2460-03

P-Wave Dispersion in Children with Orthostatic Tachycardia Syndrome*

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ABSTRACT Objective: In this study, we evaluated P-Wave Dispersion (PWD) in children with Orthostatic Tachycardia Syndrome (POTS). In order to discuss the significance of PWD as an electrocardiographic sign in POTS. **Methods:** A total of 186 outpatient children with history of syncope were recruited in this study from July 2016 to January 2018 in our hospital. Among them, 84 children were divided into two groups based on the results of head-up tilt testing (HUTT). 45 children who were diagnosed with POTS by HUTT were selected to constitute HUTT-POTS group. 39 children with HUTT negative served as the HUTT- (-) group. Positive response criteria for Postural Tachycardia: Heart rate in normal range during supine position. The fastest heart rate increased more than 40 times per minute in the 10 minutes of the upright tilt test than in the supine position. Or the maximum heart rate is greater than standard. (≥ 130 BPM in age 6-12; ≥ 125 BPM in age 13-18). At the same time, the decrease of systolic blood pressure is less than 20 mmHg, while the decrease of diastolic blood pressure is less than 10 mmHg. All standard 12-lead ECGs were obtained in both groups. Compare the PWD in two groups (PWD= $P_{\max}-P_{\min}$). **Results:** The proportion of male in the HUTT-POTS group was 51%. There were no statistical differences between HUTT-POTS group and HUTT- (-) group in age, sex ratio, Body Mass Index (BMI), supine blood pressure and supine heart rate. The difference value between the fastest heart rate of the first ten minutes after tilt and the heart rate in supine position was statistically different between 2 groups. Mean PWD values were 35.22 ± 9.53 ms, 15.50 ± 6.47 ms in HUTT-POTS group and HUTT- (-) group respectively. The PWD difference between two groups was statistically significant ($P < 0.01$). **Conclusion:** We suggest that PWD could be an electrocardiographic sign of autonomic dysfunction in children with POTS.

Key words: Head-up tilt testing; Postural orthostatic tachycardia syndrome; P-Wave Dispersion

Chinese Library Classification(CLC): R541.71; R725.4 **Document code:** A

Article ID: 1673-6273(2019)13-2460-03

前言

体位性心动过速综合征 (postural orthostatic tachycardia syndrome, POTS) 属于一种儿童晕厥类型,在临床极为常见,高

发人群为年长儿童,自立状态下心率加快且不伴血压下降是其
主要临床表现。在诊断中,除年龄、诱因以及临床表现外,直立
倾斜试验(head-up tilt testing, HUTT)是一种有效的客观检查
手段^[1]。P 波离散度(P-Wave Dispersion, PWD)=P 波最长时限

* 基金项目:上海市科学技术委员会资助项目(10DZ1951200)

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(收稿日期:2019-04-30 接受日期:2019-05-23)

-P 波最短时限(不同导联, 12 导联心电图同步记录), 其值提升说明有非匀质性电活动存在于心房内不同部位^[2]。自主神经介导性晕厥是以由自主神经介导反射调节异常或自主神经功能障碍作为主要因素所致的晕厥。其中以血管迷走性晕厥及体位性心动过速综合征为主, 占自主神经介导性晕厥患儿的 95%。Melis 等和 LEE 等研究了 P 波离散度与血管迷走性晕厥的关系^[3,4]。Ceare de Gregorio 等研究了 HUTT 诱发晕厥时 P 波时限与 P 波振幅的变化^[5]。本文主要关注 P 波离散与单纯体位性心动过速综合征之间的关系。

1 材料与方法

1.1 研究对象

选取 2016 年 7 月至 2018 年 1 月在我院门诊就诊的晕厥患儿 186 例为研究对象, 并进行 HUTT。从基础 HUTT 中选取单纯体位性心动过速综合征 (POTS) 患儿 45 例, 作为 HUTT-POTS 组; 选取阴性患儿 39 例, 作为 HUTT-(-) 组。所有患儿均接受心肌酶检查等常规血生化检查、头颅 CT、常规 12 导联电脑心电图、脑电图、彩色超声心动图。将有贫血、高血压等其他会引发自主神经系统症状的基础疾病、内分泌疾病及其他会引发晕厥的心理疾病、心源性疾病等患儿排除在外。同时, 排除经 HUTT 检查为血管迷走性晕厥阳性反应患儿。POTS 诊断标准参照儿童晕厥诊断指南(2016 年修订版)^[6]。

1.2 基础直立倾斜试验

试验前禁食、禁饮至少 4 小时。试验前患儿监护人均已签署知情同意书。试验中光线暗淡, 温湿度适宜, 环境安静, 避免分散患儿注意力。患儿安静平卧 10 分钟, 测量患儿基础心率、血压和常规 12 导联心电图, 然后再站立于倾斜床上(倾斜 60 度), 密切监测血压、心率、心电图变化及临床表现, 直至出现阳性反应。如未出现阳性反应, 则需完成 45 分钟的全过程后终止试验。当出现阳性反应时, 应在 10 秒内恢复平卧位。试验过程中持续监测心率, 血压每 3 分钟测量 1 次。

体位性心动过速综合征阳性反应的判断标准: 平卧时心率在正常范围, 直立倾斜试验的 10 分钟内心率较平卧位增加大

于等于 40 次 / 分和(或)心率最大值达到标准(6~12 岁大于等于 130 次 / 分, 13~18 岁大于等于 125 次 / 分); 同时收缩压下降幅度小于 20 mmHg, 舒张压下降幅度小于 10 mmHg。

1.3 P 波离散度测量

基础直立倾斜试验前做常规 12 导联电脑心电图, 心电图记录应用麦迪克斯心电系统。记录纸速 50 mm/s。P 波测量起点为 P 波起点与等电位线交点处, P 波测量终点为其终点与等电位线交点。使用计算机自动测量法, 根据多个导联采样点的比较, 确定 P 波起始线, 最大 P 波时限的示意线, 以及最小 P 波时限的示意线。三条线确定后测定 $P_{\min}$ 值、 $P_{\max}$ 值、及 PWD 值, $PWD = P_{\max} - P_{\min}$ ^[2]。测量 3-5 个连续的 RR 间期取平均值。为减少测量者误差, 同一位医生完成所有测量。

1.4 统计学方法

采用 IBM SPSS Statistics 24 软件。以均数 $\pm$ 标准差表示符合正态分布的计量资料。采用两独立样本 t 检验两组间比较。以百分比表示计数资料, 采用 χ^2 检验组间比较。检验水准 $\alpha=0.05$ 。

2 结果

2.1 两组患儿一般资料比较

根据基础直立倾斜试验结果, HUTT-POTS 组 45 例, 平均年龄: 9.84 ± 2.93 岁, HUTT-(-) 组 39 例, 平均年龄: 9.72 ± 3.04 岁。HUTT-POTS 组男性比例为 51%。两组患儿的性别、年龄、体重指数(body mass index, BMI) 差异无统计学意义。两组患儿平卧时基础血压、心率之间的差异无统计学意义。

2.2 P 波离散度比较

HUTT-POTS 组与 HUTT-(-) 组平均 PWD 值分别为 35.22 ± 9.53 ms 和 15.51 ± 6.47 ms, 两组间的差异有显著统计学意义, $P < 0.01$ (表 1)。

3 讨论

自主神经介导性晕厥是以由自主神经介导反射调节异常或自主神经功能障碍作为主要因素所致的晕厥。其中以血管迷走性晕厥及体位性心动过速综合征为主, 占自主神经介导性晕

表 1 两组间一般资料, 血压、心率及 PWD 比较($\bar{x} \pm s$)

Table 1 Comparison of sex, age, BMI, BP, HR, PWD between 2 groups ($\bar{x} \pm s$)

	HUTT-POTS group n=45	HUTT-(-) group n=39	t/χ^2	P
Sex (male ratio%)	23(51%)	16(41%)	$\chi^2=0.50$	0.39
Age (age)	9.84 ± 2.93	9.72 ± 3.04	$t=0.54$	0.65
BMI(Kg/m ²)	17.05 ± 2.95	17.24 ± 3.75	$t=0.27$	0.79
SBP(mmHg)	107.80 ± 1.43	106.87 ± 9.66	$t=0.40$	0.69
DSP(mmHg)	63.42 ± 8.34	65.54 ± 7.61	$t=1.22$	0.23
HR(bpm)	77.64 ± 14.09	78.79 ± 12.49	$t=0.39$	0.70
Heart rate difference value(bpm)	47.82 ± 10.75	25.18 ± 7.80	$t=10.90$	<0.01*
PWD(ms)	35.22 ± 9.53	15.51 ± 6.47	$t=10.91$	<0.01*

注: BMI: Body Mass Index, 体重指数, SBP: Systolic Blood Pressure 收缩压, DSP: Diastolic Blood Pressure, 舒张压, HR: Heart Rate, 心率, Heart rate difference value: The difference value between the fastest heart rate of the first ten minutes after tilt and the heart rate in supine position, 倾斜试验 10 分钟内最快心率与平卧位心率的差值, PWD: P-Wave Dispersion, P 波离散度 * $P < 0.01$ 。

厥患儿的 95%^[7,8]。Maclean 等医学学者在 1944 年将直立性心动过速(orthostatic tachycardia, OT)的概念提了出来,同时对 4 例 OT 患者的临床特征进行了报道,即心率在直立位时显著加快,同时伴乏力、心悸等,且无法对运动进行耐受。Low 及 Schondorf 在 1993 年对 POTS 进行了正式命名,同时在评价过程中应用直立倾斜试验,发现 POTS 患者有自主神经功能失常的表现存在^[9,10]。北京大学第一医院儿科在 2005 年将儿童、青少年 POTS 的诊断标准提了出来,同时指出,POTS 极易引发儿童晕厥^[11]。现阶段,临床还没有完全弄清楚 POTS 的发病机制,可能为血管在自主神经功能失调的情况下收缩,过度激活自主神经,无法有效调节血容量,引发感染等。此外,基因变异、免疫学方面等也有新的发现^[12]。我们的结果显示 POTS 患儿中男女比例接近 1:1,与廖莹等报道的 POTS 儿童无性别差异结果一致^[13]。提示 POTS 在儿童中发病率无性别差异。

Karatas 等第一次报道心率校正的 QT 间期(QTc)在直立不耐受综合征中的预测作用^[14-18]。他们的结论提示 QT 间期延长和 QTc 间期延长可以在直立不耐受综合征中看到,也许与自主神经功能失调有关。单一心房细胞组成了几乎所有心房,和心室肌相比,其和心室内类似的相对完整的希浦传导系统缺乏,因此心房中具有较慢的传导速度、较长的除极时间。

心电图 P 波理论上反映了心房除极。P 波大小因心房内传导时间不同而变化。和心室肌相比,心房肌中具有更为丰富的自主神经末梢分布,因此植物神经会在更大程度上影响其电生理特征。Cheema 等发现用 β -受体激动剂可以使 P 波时限缩短, β -受体阻滞剂可以使 P 波时限延长^[19,20]。他们指出,在不同自主神经条件下 P 波平均时限随不同条件而变化。PWD 是在窦性节律下反映 P 波不均一性的简单而有用的指标^[21]。

成人 PWD 正常值 <40 ms,当其 >40 ms 时,提示心房内存在非均质性电活动^[22]。儿童 PWD 正常值未见报道。我们的结果显示,HUTT-POTS 组 PWD 均值显著高于 HUTT(-)组,提示 PWD 可作为 POTS 患儿自主神经功能紊乱的心电学标志。

已有资料表明^[23-27],PWD 在几天内的重复性测量结果相关性高,相关系数可达 0.80。提示 PWD 这项指标可靠性强。然而关于 PWD 的临床资料有限,多数在选择性人群中进行,还需更大的前瞻性研究以及非选择性的一般人群中进行研究。

参 考 文 献(References)

- [1] Arnold AC, Ng J, Raj SR. Postural tachycardia syndrome-Diagnosis, physiology, and prognosis[J]. *Auton Neurosci*, 2018, 702(17): 30354-30355
- [2] 郭继鸿. P 波离散度[J]. *临床心电学杂志*, 1999, 8(3): 189-192
- [3] Melis Demir Kose, Ozlem Bag, Baris Guven, et al. P-Wave Dispersion: An Indicator of Cardiac Autonomic Dysfunction in Children With Neurocardiogenic Syncope [J]. *Pediatr Cardiol*, 2014, 35(4): 596-600
- [4] Lee DH, Lee KM, Yoon JM, et al. P wave dispersion on 12-lead electrocardiography in adolescents with neurocardiogenic syncope[J]. *Korean J Pediatr*, 2016, 59(11): 451-455
- [5] Cesare de Gregorio, Concetta Lentini, Patrizia Grimaldi, et al. P-wave voltage and peaking on electrocardiogram in patients undergoing head-up tilt testing for history of syncope [J]. *European Journal of*

- Internal Medicine*, 2014, 25(10): 383-387
- [6] 中华医学会儿科学分会心血管学组,《中华儿科杂志》编辑委员会,北京医学会儿科学分会心血管学组,等. 儿童晕厥诊断指南(2016 年修订版)[J]. *中华儿科杂志*, 2016, 54(4): 246-250
- [7] 张清友,杜军保. 儿童直立不耐受的诊断及治疗[J]. *临床儿科杂志*, 2006, 24(5): 349-352
- [8] 张清友,杜军保,王喻丽. β -受体阻滞剂联合口服生理盐水治疗儿童体位性心动过速综合征疗效分析[J]. *临床儿科杂志*, 2006, 24(5): 357-360
- [9] Schondorf R, Low PA. Idiopathic postural orthostatic tachycardia syndrome: an attenuated form of acute pandysautonomia [J]. *Neurology*, 1993, 43(1): 132-137
- [10] Low PA, Sandroni P, Joyner M, et al. Postural tachycardia syndrome (POTS)[J]. *Cardiovasc Electrophysiol*, 2009, 20(3): 352-358
- [11] 张清友,杜军保,李万镇. 小儿体位性心动过速的临床特征及随访研究[J]. *中华儿科杂志*, 2005, 43: 165-169
- [12] Elisabeth Lambert, Gavin W. Lambert. Sympathetic dysfunction in vasovagal syncope and the postural orthostatic tachycardia syndrome [J]. *Frontiers in Physiology*, 2014, 5(280): 1-9
- [13] 廖莹,张凤文,陈丽,等. 体位性心动过速综合征 109 例临床特征分析[J]. *中国实用儿科杂志*, 2010, 25(3): 212-215
- [14] Karatas Z, Alp H, Sap F, et al. Usability of QTc dispersion for the prediction of orthostatic intolerance syndromes [J]. *Eur J Paediatr Neurol*, 2012, 16(5): 469-474
- [15] Cheema AN, Ahmed MW, Kadish AH, et al. Effects of autonomic stimulation and blockade on signal-averaged P-wave duration [J]. *J Am Coll Cardiol*, 1995, 26(9): 497-502
- [16] Sucu M1, Ercan S, Uku O, et al. Atrial electromechanical conduction delay in patients with neurocardiogenic syncope [J]. *Pacing and Clinical Electrophysiology*, 2014, 37(5): 597-602
- [17] Anjum I, Sohail W, Hatipoglu B, et al. Postural Orthostatic Tachycardia Syndrome and Its Unusual Presenting Complaints in Women: A Literature Minireview[J]. *Cureus*, 2018, 10(4): e2435
- [18] Gee ME, Watkins AK, Brown JN, et al. Ivabradine for the Treatment of Postural Orthostatic Tachycardia Syndrome: A Systematic Review [J]. *Am J Cardiovasc Drugs*, 2018, 18(3): 195-204
- [19] Baker J, Racosta JM, Balint B, et al. Utility of Time and Frequency Domain Parameters of Heart Rate Variability in the Context of Autonomic Disorders Characterized by Orthostatic Dysfunction [J]. *J Clin Neurophysiol*, 2018, 35(2): 123-129
- [20] Boris JR, Bernadzikowski T. Demographics of a large paediatric Postural Orthostatic Tachycardia Syndrome Program [J]. *Cardiol Young*, 2018, 28(5): 668-674
- [21] Kraikriangsri C, Khositseth A, Kuptanon T. P-wave dispersion as a simple tool for screening childhood obstructive sleep apnea syndrome [J]. *Sleep Med*, 2019, 54(2): 159-163
- [22] Rowe PC, Marden CL, Heinlein S, et al. Improvement of severe myalgic encephalomyelitis/chronic fatigue syndrome symptoms following surgical treatment of cervical spinal stenosis [J]. *J Transl Med*, 2018, 16(1): 21
- [23] Bai W, Chen SY, Jin HF, et al. Vascular dysfunction of postural tachycardia syndrome in children[J]. *World J Pediatr*, 2018, 14(1): 13-17

- [6] Paparodis R, Jaume JC. Response to: "Oh, no--equations! Reanalysis of the data reveal even stronger associations between Hashimoto's thyroiditis and differentiated thyroid cancer"[J]. *Thyroid*, 2015, 25(1): 142
- [7] 曾蓉,牛恒,张国桥,等.MCP-1/CCR2 信号轴在甲状腺乳头状癌合并桥本氏甲状腺炎患者中的表达及意义 [J]. *第三军医大学学报*, 2017, 39(7): 660-667
- [8] Dong LQ, Sun XM, Xiang CF, et al. Hashimoto's thyroiditis and papillary carcinoma in an adolescent girl: A case report [J]. *Mol Clin Oncol*, 2016, 5(1): 129-131
- [9] Guastamacchia E, Giagulli VA, Licchelli B, et al. Selenium and Iodine in Autoimmune Thyroiditis [J]. *Endocr Metab Immune Disord Drug Targets*, 2015, 15(4): 288-292
- [10] 陈征,董汉华,叶真.合并桥本病的甲状腺乳头状癌的临床研究及外科治疗[J].*临床耳鼻咽喉头颈外科杂志*, 2016, 12(7): 532-534
- [11] Zeng RC, Jin LP, Chen ED, et al. Potential relationship between Hashimoto's thyroiditis and BRAF (V600E) mutation status in papillary thyroid cancer[J]. *Head Neck*, 2016, 38(10): 19-25
- [12] Kim SJ, Myong JP, Jee HG, et al. Combined effect of Hashimoto's thyroiditis and BRAF (V600E) mutation status on aggressiveness in papillary thyroid cancer[J]. *Head Neck*, 2016, 38(1): 95-101
- [13] Baser H, Ozdemir D, Cuhaci N, et al. Hashimoto's Thyroiditis Does Not Affect Ultrasonographical, Cytological, and Histopathological Features in Patients with Papillary Thyroid Carcinoma [J]. *Endocr Pathol*, 2015, 26(4): 356-364
- [14] Antonelli A, Ferrari SM, Corrado A, et al. Autoimmune thyroid disorders[J]. *Autoimmun Rev*, 2015, 14(2): 174-180
- [15] 吴娜,孙丰源,李佳,等.甲状腺相关眼病患者血清 TRAb、TPOAb、TGAb 水平变化及意义[J].*山东医药*, 2015, 24(30): 59-60
- [16] Mandal A, Sahi PK. Hashimoto's Thyroiditis in South Indian Centre: Correspondence[J]. *Indian J Pediatr*, 2016, 83(12-13): 1512-1513
- [17] 范尧夫,刘克冕,张会峰,等.中西医结合治疗桥本甲状腺炎甲状腺功能减退的 Meta 分析 [J]. *中国实验方剂学杂志*, 2016, 36(3): 221-224
- [18] Solter D, Solter M. Thyrotropin and thyroid hormone economy in euthyroid Hashimoto's thyroiditis [J]. *Acta Clin Croat*, 2015, 54(1): 52-56
- [19] 茅建娅,王薇,别克扎提,等.甲状腺乳头状癌合并桥本甲状腺炎的临床病理研究[J].*中国普通外科杂志*, 2016, 25(5): 665-669
- [20] Djurovic J, Stojkovic O, Ozdemir O, et al. Association between FokI, ApaI and TaqI RFLP polymorphisms in VDR gene and Hashimoto's thyroiditis: preliminary data from female patients in Serbia [J]. *Int J Immunogenet*, 2015, 42(3): 190-194
- [21] Girardi FM, Barra MB, Zettler CG. Papillary thyroid carcinoma: does the association with Hashimoto's thyroiditis affect the clinicopathological characteristics of the disease[J]. *Braz J Otorhinolaryngol*, 2015, 81(3): 283-287
- [22] Zayed AA, Ali MK, Jaber OI, et al. Is Hashimoto's thyroiditis a risk factor for medullary thyroid carcinoma? Our experience and a literature review[J]. *Endocrine*, 2015, 48(2): 629-636
- [23] Borkhuu, Oyungerel, 金山, 等.桥本氏病患者血清促甲状腺激素浓度与其合并甲状腺乳头状癌的相关性研究[J].*中华内分泌外科杂志*, 2016, 10(4): 269-271
- [24] Liu Y, Yun X, Gao M, et al. Analysis of regulatory T cells frequency in peripheral blood and tumor tissues in papillary thyroid carcinoma with and without Hashimoto's thyroiditis[J]. *Clin Transl Oncol*, 2015, 17(4): 274-280
- [25] Ates I, Yilmaz FM, Altay M, et al. The relationship between oxidative stress and autoimmunity in Hashimoto's thyroiditis[J]. *Eur J Endocrinol*, 2015, 173(6): 791-799
- [26] Popko K, Osińska I, Kucharska A, et al. Cytometric analysis of perforin expression in NK cells, CD8⁺, and CD4⁺ lymphocytes in children with autoimmune Hashimoto's thyroiditis--a preliminary study[J]. *J Pediatr Endocrinol Metab*, 2015, 28(7): 789-792
- [27] Kristensen B, Hegedüs L, Madsen HO, et al. Altered balance between self-reactive T helper (Th)17 cells and Th10 cells and between full-length forkhead box protein 3 (FoxP3) and FoxP3 splice variants in Hashimoto's thyroiditis[J]. *Clin Exp Immunol*, 2015, 180(1): 58-69
- [28] 郑旭东. 桥本氏病患者血清促甲状腺激素水平升高对甲状腺组织癌变的影响[J].*实用癌症杂志*, 2018, 33(3): 395-397
- [29] Sleddering MA, Vlasveld LT. Complete resolution of autoimmune thyroiditis after R-CHOP in a patient with thyroid lymphoma[J]. *Neth J Med*, 2015, 73(10): 478-480

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- [24] Sharif K, Watad A, Bragazzi NL, et al. On chronic fatigue syndrome and nosological categories [J]. *Clin Rheumatol*, 2018, 37 (5): 1161-1170
- [25] Martín JM, Torres C, Cordero P, et al. Bascule syndrome associated with syncopal episodes[J]. *Pediatr Dermatol*, 2018, 35(2): e142-e143
- [26] Muppidi S, Razavi B, Miglis MG, et al. The clinical utility of qualitative electroencephalography during tilt table testing - A retrospective study[J]. *Clin Neurophysiol*, 2018, 129(4): 783-786
- [27] Watari M, Nakane S, Mukaino A, et al. Autoimmune postural orthostatic tachycardia syndrome[J]. *Ann Clin Transl Neurol*, 2018, 5 (4): 486-492