

Lower limb deep vein thrombosis left to right ratio and novel anatomical classification

Razão esquerda-direita de trombozes venosas profundas de membros inferiores e nova classificação anatômica

DOI:10.34119/bjhrv5n2-236

Recebimento dos originais: 14/01/2022

Aceitação para publicação: 28/02/2022

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ABSTRACT

In this cross-sectional analysis, 140 patients diagnosed with deep vein thrombosis (DVT) of the lower limbs and submitted to Doppler ultrasound (DU) were initially assessed. The ratio between left and right limbs (L:R Ratio) was 1.71:1 for all patients, 2.53:1 for females and 1.03:1 for males ($p = 0.0201$). L:R Ratio showed a linear correlation in all affected segments ($p = 0.0020$).

Keywords: deep vein thrombosis, doppler ultrasound, venous anatomy, cockett syndrome.

RESUMO

Nesta análise transversal, 140 pacientes diagnosticados com trombose venosa profunda (TVP) dos membros inferiores e submetidos à ultra-sonografia Doppler (DU) foram inicialmente avaliados. A relação entre os membros esquerdos e direitos (relação L:R) foi de 1,71:1 para todos os pacientes, 2,53:1 para as mulheres e 1,03:1 para os homens ($p = 0,0201$). A relação L:R mostrou uma correlação linear em todos os segmentos afetados ($p = 0,0020$).

Palavras-chave: trombose venosa profunda, doppler ultra-som, anatomia venosa, síndrome de cockett.

1 INTRODUCTION

The distribution of DVTs, for many years, followed the classification of proximal and distal thrombosis, in which proximal thrombi included segments above the popliteal vein. The range and location of lower limb DVTs, however, is extremely variable and may affect the iliac territories, common femoral, femoral, deep femoral, popliteal and the various conduction veins or muscular veins of the leg, or even vast territories comprising two or more of these segments.¹

Aiming the anatomical reclassification of DVTs, segmentation of venous territories (as proposed by the American Venous Forum, 2012)² can be beneficial, allowing to subdivide the affected territories and distinguish isolated or contiguous segments, thus, allowing a greater understanding of this pathology and the possibility of improved outcomes, particularly for cases involving iliac compression.³

2 METHODS

The research was carried out after the approval of the Oeste Paulista University (UNOESTE) Research Ethics Committee (approval number 3,154,385) under the Brazilian Platform CAEE 07381519.8.0000.5515.

This cross-sectional study was conducted in a single center, reference hospital in Sao Paulo, Brazil. Only patients diagnosed with DVT of the lower limbs that underwent at least one DU at the referral hospital were considered eligible. Bilateral thrombosis, children under 18 and pregnant or postpartum women were excluded.

We considered a confidence level of 95% ($p < 0,05$) [$CI < 10$] to calculate the initial sample size ($N = 140$). Binomial test was performed for comparisons between proportions and Pearson correlation coefficient was applied for linear correlations. The software used to perform the calculations was BioEstat 5.0®.

The topographic data of all thrombi was tabulated and stratified according to the affected segments as proposed by the American Venous Forum, 2012, as follows: iliac segment, common femoral segment, femoral and deep femoral segment, popliteal segment, and leg segment (distal/infra-popliteal).²

3 RESULTS

55 male patients and 85 female patients were initially assessed. The average age among all patients was 54.35 [95% CI 51.488 – 56.736], an overall median of 53 years.

There was a contrast between the ratio of left and right members affected (L: R Index) for men and women. We found L: R of 1.74: 1 for the entire sample, 2.53: 1 for women and 1.03: 1 for men, with statistical significance of ($p = 0.0201$) between the groups.

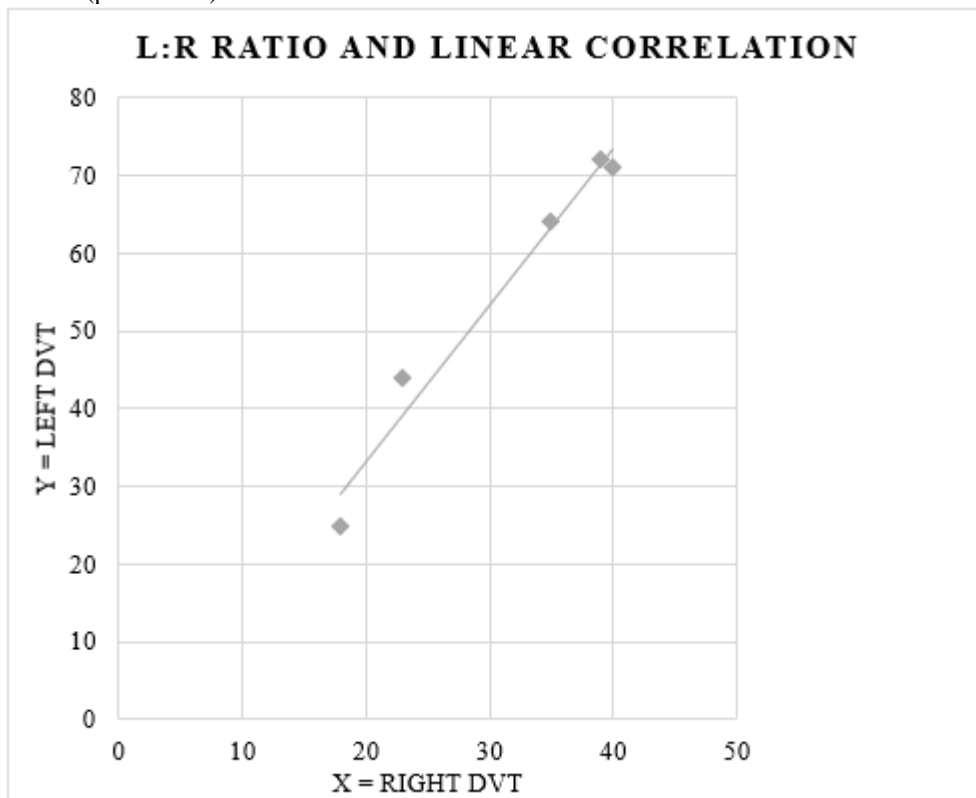
The isolated popliteal segment was the most affected isolated segment, with statistical significance, $N = 22$ ($p < 0.0001$). Although, most patients, $N = 115$ [95% CI 113.63 – 130.34] had more than one affected segment ($p < 0.0001$).

All segments showed linear correlation in the L:R index, r (Pearson) = 0.9857 ($p = 0.0020$) (TABLE 1, FIGURE 1, TABLE 2).

Table 1: Number of right and left limb DVTs by segments affected.

	<i>Right</i>	<i>Left</i>
<i>Distal</i>	18	25
<i>Popliteal</i>	39	72
<i>Femoral</i>	40	71
<i>Common</i>	35	64
<i>Femoral</i>		
<i>Iliac</i>	23	44

Figure 1, Table 2: Pearson linear correlation between lower limb DVT sites for left (x axis) and right limbs (y axis). $r = 0.9857$ ($p = 0.0020$).



Columns 1 e 2	
n (pairs) =	5
r (Pearson) =	0.9857
IC 95% =	0.79 a 1.00
IC 99% =	0.57 a 1.00
R2 =	0.9716
t =	10.1376
GL =	3
(p) =	0.0020
α 0.05 =	0.9674
α 0.01 =	0.8776

4 DISCUSSION

There was a statistically significant difference ($p = 0.0201$) for the L: R Ratio between females (2.54: 1) and males (1.03: 1). Findings that support a higher than 1.0 L:R ratio for all patients and a lower L:R in men when compared to women in greater populations, have already been reported.^{4,5}

This increased prevalence of thrombotic events in the left lower limb is widely explored and is explained by the compression of the right iliac artery over the left iliac vein, however, the great disparity between women and men demands a larger population sample. The differential diagnosis of iliac compression syndrome should always be considered for patients with left DVT, thus, in these cases, the left iliac vein should be assessed by the radiologist or DU technician, given its epidemiological relevance.^{3,6}

The laterality of the affected segments was consistently greater in the left limb, showing a strong linear correlation ($p = 0.0020$) between all segments. In this case, there is no significant difference between using the novel topographic classification and the classification between proximal and distal DVT. Regarding the involvement of extension of the thrombi, multiple segment involvement was more prevalent than the involvement of isolated segments, with great statistical relevance for the sample ($p < 0.0001$), in this case the novel classification should be considered clinically significant.¹

5 CONCLUSION

Our findings support a higher L:R ratio for all populations, being higher for women than men ($p = 0.0201$). Given the strong correlation between left DVT and iliac compression we suggest that the left iliac vein should always be assessed for left sided DVTs, regardless of the affected venous segment, considering the strong linear correlation ($p = 0.0020$) in all analyzed segments.

CONFLICTS OF INTEREST AND FUNDING

We declare no conflicts of interest.

This research did not receive any specific grant from funding agencies in the public, commercial or non-profit sectors.

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