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TITLE

Evaluation of cardiomegaly in peripheral arteriovenous malformation and influencing factors on cardiac size changes following embolization.

BACKGROUND

Arteriovenous malformations (AVMs) are a subset of congenital vascular malformations that are characterized by direct communication of an artery and vein without an intervening capillary. Low resistant shunt flow without passing capillary beds cause a hyperdynamic circulatory state and this condition can eventually progress to high-output cardiac failure (HOCF) with continued peripheral tissue hypoxemia. HOCF considered most significant consequence of AVM even they treated multi-staged embolization. However, to date, there have been no study evaluated prevalence of cardiomegaly in peripheral AVMs and changes in cardiac size after appropriate embolization. In this study, we analyzed the prevalence and influencing factors of cardiomegaly in AVMs, and also evaluated factors affecting changes in cardiac size after embolization.

METHODS

A retrospective review of patients who underwent embolization of peripheral AVMs in a single vascular anomalies center, from 2000 to 2022 was performed. Four-hundred-thirty-seven patients (median age: 32 years, interquartile range, 22 – 45 years) received 1238 sessions of AVM embolization. Cardiothoracic ratio (CTR) on chest radiography over 0.5 considered cardiomegaly. The prevalence of cardiomegaly in peripheral AVMs and factors influencing changes in heart size after AVM embolization were analyzed.

RESULT

One-hundred-eight patients showed cardiomegaly (24.7%) at initial presentation. In univariate analysis, type I or II AVM, diffuse involvement, and bone involving AVM showed significantly associated with cardiomegaly. In multivariate analysis, AVM type I or II (odds ratio [OR], 2.08; 95% confidence interval [CI], 1.28 - 3.33; P = .00030), diffuse AVM (OR, 2.02; 95% CI, 1.16-3.51, P=0.0127), bone AVM (OR, 2.27; 95% CI, 1.12 – 4.55, P = 0.0217), and abdomen & pelvic AVM (OR, 3.1; 95% CI, 1.82 – 5.26) and thorax-neck AVM (OR, 2.44; 95% CI, 1.17 – 5.10) had higher risk than extremity AVMs (P < .0001). Among 84 of cardiomegaly who had follow-up chest radiography, 77% (65/84) showed decreased cardiac size and 58% (49/84) showed normalized cardiac size (CTR < 0.5). Bone involvement (OR, 19.35; 95% CI, 1.82 – 206.22, P = 0.0141) and over 90% angiographic devascularization (OR, 6.1; 95% CI, 1.39 – 26.7, P = 0.0163) independent factors of decreased cardiac size.

CONCLUSIONS

In present study, 24.7% of peripheral AVM patients represented cardiomegaly on initial presentation and the majority of patients (77%, 65/84) showed decreased heart size after AVM embolization. Bone involvement and over 90% angiographic devascularization were predicting factors of decreased cardiac size.

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