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Compression US in Isolated Calf Venous Thrombosis¹

IN a recent issue of *Radiology*, Yucel et al (1) described their experience with compression ultrasound (US) in isolated calf venous thrombosis. However, the conclusions they reached may be misleading because of the suboptimal compliance of their study with basic standards of methods for diagnostic test research.

The first problem with compliance applies to the type of disease studied, the "isolated calf venous thrombosis," which in fact represents the amalgamation of two different entities, superficial and deep calf venous thrombosis. If the authors concentrated on only deep venous thrombosis, they would achieve a sensitivity of 85% (11 of 13 cases). Superficial thrombophlebitis should have been included in the analysis of conditions mimicking deep venous thrombosis to avoid the spurious increase in true-positive results. Notwithstanding, sensitivity of 85% is still an impressive figure, until one examines the 95% confidence limits, which range from 55% to 98%. The lower limit overlaps the values reported in studies published earlier, and it is not at all clear whether the new approach is an improvement; it may even be worse. The problem is in the small number of patients with deep venous thrombosis who were studied, a fact that minimizes the statistical power of the study.

The criteria used in patient selection raise the question whether the sample is

representative of the populations in which US examination is needed in actual practice. The sample studied by Yucel et al is highly biased, including only patients with unilateral calf symptoms and a sonographically normal femoropopliteal system. For example, there is no doubt that symptomatic calf thrombi are bulkier, more extensive, and therefore much easier to detect than small thrombi in the soleal sinuses of asymptomatic high-risk patients. This sampling bias has probably made it difficult to quantify overestimation of sensitivity. Extrapolation of the results to a more general population is not possible.

Discrepancies also appear in the description of the anatomic extent of thrombosis. The authors claim initially that they scanned the gastrocnemius, soleal, peroneal, and posterior tibial veins of every patient, but they later state that once they had established the diagnosis of calf deep venous thrombosis, they did not attempt to identify every site of thrombosis to avoid prolonging the examinations. While this approach may be permitted in routine, everyday practice, it is unacceptable in the formal prospective evaluation of a diagnostic technique. All sonographically visible calf veins should have been examined in a consistent manner, and the results should have been stratified by location to reveal potential pitfalls across the full anatomic spectrum of calf deep venous thrombosis.

The described sonographic technique seems highly operator dependent. Since the reliability of the method was not evaluated, it is uncertain whether the reported sensitivity and specificity can be accomplished by the average sonographer or by only the most skillful and experienced sonographer. Reliability refers to the extent to which serial measurements of a relatively stable phenomenon are reproducible. Reliability is assessed by the examination being repeated by at least one additional operator, with the operators being blinded to each other's findings during interpreta-

tion (2). The practice of interpreting the venograms with full knowledge of the sonographic result—"to avoid spurious false-positive US studies"—may have introduced diagnostic review bias. This type of bias encourages concordance between the findings on US scans and venograms and inflates the level of both sensitivity and specificity.

The ability of US to reveal calf thrombi has not yet met the expectations of most authorities, who believe that the venous system of the calf is too complex to yield cost-effective and reliable results at US. Calf venous thrombosis is a controversial topic in the deep venous thrombosis problem (3). Previously published studies have shown that calf deep venous thrombosis is self-limiting, without risk of pulmonary embolism or postphlebotic syndrome. Other investigators believe that calf deep venous thrombosis does have a high recurrence rate, as well as a significant probability of proximal propagation. Since serious complications could follow such propagation, a reasonable strategy would be to perform serial sonographic follow-up examinations of the popliteal vein for a few days, instead of increasing the examination time exponentially by trying to exclude disease in the numerous meandering calf veins.

Compression US is a powerful noninvasive alternative to venography, though still insufficiently sensitive for calf deep venous thrombosis. Authors expecting to challenge this cumulative evidence should base their conclusions on firmer ground, as the enthusiasm for a new technique may sometimes result in overstatement of the true potential.

References

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