Instrumental Diagnosis of Venous Thromboembolism

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Venous thromboembolism (VTE) is still one of the main causes of morbility and mortality in surgical or medical hospitalized patients. Typical onset is surely deep vein thrombosis (DVT) of the leg (distal or proximal), less frequently of the upper limbs. The most dangerous manifestation of VTE still remains pulmonary embolism (PE). DVT annual incidence overall is influenced by the age, increasing from 1/10.000 for individuals younger than 40 years to 1-2/100 for those older than 60 years, while PE annual incidence in general population is about 0.7/1000, accountable for 10% of deaths [1] in hospitalized patients (60% for medical illness) [2, 3]. Virchow famous triad (blood stasis, vascular damage, hypercoagulability) remains from 1856 to this day the physiopathological mainstay, although enriched with recent acquisitions. Diagnosis often delayed by poor signs and symptoms in nearly 70% of VTE. Sequelae of VTE, not secondary for relevance, include embolization (mainly pulmonary embolism), post-thrombotic syndrome and recurrence, all weighty in terms of morbidity and mortality and patient's quality of life.

VTE DIAGNOSIS: A COMPLEX ISSUE

TEV diagnosis is still a social and health problem. Clinical suspicion of course is the starting point but clinical diagnosis is unreliable due to poor sensibility or sensitivity of clinical signs and symptoms. Preclinic prediction tests introduced in more complexes diagnostic algorithms including laboratory testing (D-dimer) have been developed to improve accuracy of diagnostic rate [4] but certainly diagnosis come from imaging demonstration of the thrombus or vascular occlusion. Echocolordoppler associated with vascular ultrasonography compression (CUS) today is the most frequently used imaging method for diagnosing DVT with high sensitivity and specificity (97% and 98% respectively), useful for non invasiveness, widely availability, ultrasound but non radiation use, low cost [5]. Vascular echocolordoppler enable evaluation of the entire superficial and deep venous system, direct visualization of thrombus or presumption of his presence by inability to compress vein lumen (CUS) (Fig. **1**), evaluation of valvular damage and assessment of haemodynamic parameters [5].
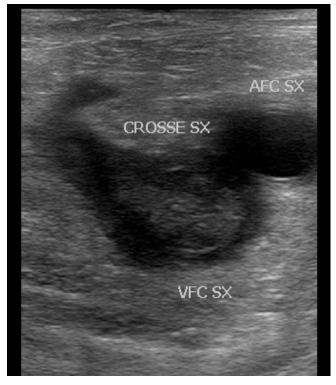

Fig. (1). Echocolordoppler with CUS in left femoral vein DVT.

Repeatability make this imaging method very useful in patient's follow-up (evaluation of residual thrombus) [6, 7], confining venography to isolated and very rare cases (still gold standard imaging method in this type of illness).

Vascular radiological imaging methods (AngioCT, Angio MR) are interesting alternative options mainly for evaluation of large vessels, still bounded by high cost, use of contrast injection and radiations and require considerable radiologist experience.

PE diagnosis bears the same clinical limitations of poor signs and symptoms of DVT to deserve appellation of "great masquerade". Standard chest X-ray, is absolutely not specific and has very low usefulness [8]. Ventilation/perfusion (V/Q) lung scanning remains the reference imaging method for PE diagnosis because in case of pulmonary vascular occlusion albumin macroaggregate marked with Tc99m will not raise obstructed vascular bed, determining non perfused

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(cold) but normally ventilated areas [9, 10]. However, invasive pulmonary angiography is still gold standard method (even if almost obsolete). For the daily diagnosis of PE multislice spiral AngioCT, today performed with single iodinated contrast passage, nowadays is surely comparable to V/Q scanning in reliability, sensitivity and sensibility, allowing embolus detection in the pulmonary vessels (till subsegmentary) as reduction or lack of trickle of contrast with less or non contrasted distal areas. Limitations remain due to high cost, radiologist learning curve still hard, contrast and radiation use [11, 12].

CONCLUSIONS

VTE with its typical manifestation of DVT and PE today remains a diagnostic complex challenge, still burden with high morbidity and mortality, often underdiagnosed or late determined due to poor specificity or sensitivity of signs and symptoms. Clinical suspicion is still the mainstay in order to have an early diagnosis and to avoid sequelae. Development of preclinic prediction tests introduced in more articulated diagnostic algorithms including laboratory testing (D-dimer) allowed to improve diagnostic rate but confirmatory diagnosis still remains instrumental. So, today clinicians have reliable and specific imaging methods to detect VTE objectively as ultrasonographic or radiological approach. Further improvement of sensibility and specificity of these methods together with clinical experience of physicians may improve the work on this hard social and health disease.

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