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Technological achievements of the Echo Color Doppler venous extra- and intra-cranial study

The study of the venous circulation has always been the Cinderella of vascular studies.
Even in diagnostic ultrasound, applications in the field of venous disease came many years after those for the arterial circulation.
The intracranial and neck veins were only recently the subject of study because of the increased incidence of venous thrombosis due to the use of intravenous catheters in the jugular and subclavian veins, and because of the study of CCSVI.
In particular for the study of the latter, there is great interest in a particular technique, the Multigate Pulsed Doppler, applied to commercial devices with the name of QDP (Quality Doppler Profile) derived from studies started long ago in the University of Florence.
This particular technique allows to acquire Pulsed Doppler signals in real-time, simultaneously from many points of view of the same line, representing the velocity profile across the section of an entire vessel, thus allowing us to assess subtle changes in velocity in vessels with speeds as low as those in the veins.
A technology not limited to ultrasound is the one called "Virtual Navigator," which allows to overlay Echo Color Doppler images to those of a second level technique, such as CT or MRI, to allow an exact localization of the structures under study, which is particularly useful for studying intracranial veins, where the technical difficulties are maximal, owing to both signal attenuation due to the skull and to the low speed of intracranial venous circulation.
The technological innovations designed for these new challenges will also give rise to new diagnostic applications, regardless of whether or not the pathogenetic hypotheses of particular diseases is proved, and represent an important advancement of ultrasound technology at our disposal.