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Duplex ultrasound evaluation of hemodialysis access: A standardized protocol

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Duplex ultrasonography(DUS) is non-invasive and can be performed at the bed-side, and needs neither contrast agent nor irradiation. Moreover, using DUS, it is possible to inspect the status of the inflow artery and vessel wall, which is difficult to be figured out by fistulography. DUS has the advantage to provide information on functional aspects such as flow rate and RI (resistive index) in the access with stenosis, and pre-procedural recognition on therapeutic targets in the occluded access by thrombosis. Therefore, DUS is a powerful tool for establishing a therapeutic plan on the thrombo-occlusive access and for planning a strategy for surgical revision. As DUS can scan from the hand to the distal subclavian vein, if patients are already known that they have no central vein disease, most problems of vascular access can be diagnosed by physical examination and DUS. Although skilled medical staff can detect most access problems with physical examination, the information obtained by physical examination is difficult to quantify, visualize, or share. Thus it is wise to utilize DUS together with physical examination in vascular access management. For example, in case that a patient with high bifurcation of brachial artery visits your hospital for vascular access creation, it is not easy to know the anatomical variation of the brachial artery by physical examination alone before surgery, which is not possible with venography as well, while the incidence of the variation is up to 12-18%. In addition, the guidelines of vascular access present the criteria of access maturation by vein diameter and blood flow volume at present. Therefore, there is no way to determine whether the arteriovenous fistula has reached maturation goals according to the criteria of guidelines without using DUS. Thus, from the determination of maturation to the planning of surgical revision for access, DUS is essential for dialysis staffs. However, each ultrasonographer or center performs DUS by their own way without a standardized protocol at present, which results in the well-known flaw of DUS which findings depend on the examiners. We believe that if examiners carry out DUS according to a standard protocol and strive to reduce errors during the examination, it is possible to decrease the dependency on examiners. Therefore, the purpose of this presentation is to introduce a standardized protocol that can reduce examination errors in DUS for vascular access.