Doppler-Assisted Percutaneous Angiography

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Abstract. The Doppler ultrasonic blood velocity detector was used to determine the location and patency of non-palpable femoral and brachial arteries, facilitating their percutaneous puncture. This technique was used to achieve a more optimal demonstration of the peripheral circulation distal to aorto-iliac occlusive disease as well as for retrograde catheter angiography of vascular beds distal to more central stenoses or occlusions. This technique may also aid in percutaneous puncture for emergency angiography in hypotensive patients, percutaneous transluminal angioplasty, or femoral vein punctures.

Key words: Angiography, technique – Ultrasound, Doppler studies.

Method of Vessel Localization and Puncture

The Doppler ultrasonic blood velocity detector 1 is used to localize the femoral arteries in the inguinal crease by beginning auscultation medially and proceeding laterally along the crease. Usually the first "sound" encountered is the phasic "howling windstorm" [1, (p. 54)], of the femoral vein. This can be confirmed by noting the decreased intensity (pitch) during inspiration and the converse effect of expiration. Beginning just lateral to the femoral vein, the femoral artery signal will be detected. The normal multiphasic arterial signal is altered distal to an obstruction. The systolic sound is diminished, and the diastolic sounds are usually obliterated, leaving only a single pulsatile sound to identify the artery [1 (p. 35)]. After arterial localization, the signal is followed 1–2 cm above and below the crease, and the course of the vessel is mentally noted. Pressure on the skin in the inguinal crease with the transducer can mark the site for puncture. Prior localization obviates the need to use a sterile transducer and permits detection of completely occluded vessels that would not therefore be suitable for puncture.

The brachial artery is similarly localized by searching the medial portion of the antecubital fossa until an arterial signal is heard. Once detected, the signal can be followed proximally to the level of the mid-humerus where the artery is of satisfactory size for percutaneous puncture.

For peripheral femoral arteriography, the common femoral artery is punctured with an 18-gauge Amplatz needle with a Teflon sheath. 2 The sheath is advanced proximally to the point of distal occlusion. For retrograde catheterization, the vessel is punctured and a catheter is inserted over a guide wire. The catheter may then be advanced proximally to any position desired which is distal to the obstruction.

Illustrative Case Reports

Case 1

An elderly woman was admitted with a non-healing osteomyelitis of the right leg. No right femoral pulse was palpable, and catheter

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1 Doppler Model 801-A. Parks Electronics Laboratories, Beaverton, Oregon 97005, USA
2 Becton-Dickinson & Co., Rutherford, New Jersey 07070, USA
Fig. 1 A-C. A Late film from an abdominal aortogram demonstrates complete occlusion of the right common iliac artery just beyond its origin. No collateral reconstitution of the distal iliac artery is seen. B Doppler assisted "blind" puncture of the right common femoral artery reveals patency of the external iliac artery to the bifurcation. C The "runoff" is now well visualized, demonstrating patency of all the major vessels.