

C 2.2 Investigations for Acute Limb Ischaemia

Ideally, patients with acute limb ischaemia (ALI) should be evaluated in the same fashion as those with chronic symptoms (see B 2.1, Clinical Evaluation of Intermittent Claudication, p S48; B 2.2, Investigations of Patients With Intermittent Claudication, p S54; D 2.1, Clinical Evaluation of Critical Limb Ischaemia, p S150; D 2.2, Investigations for Critical Limb Ischaemia, p S152), but the severity and duration of ischaemia at the time of presentation rarely allow this to be done at the outset. Nevertheless, there are studies that should be considered in this setting. These include an objective evaluation of the arterial circulation in the legs with noninvasive methods or arteriography. A systemic evaluation also should be performed, in terms of cardiac disease and possible sources of emboli. Furthermore, important concurrent disease and atherosclerotic involvement of other circulations should be investigated, the latter also serving as the foundation for an assessment of operative risk.

C 2.2.1 Arteriography

Arteriography is of major value in localising an obstruction and visualising the distal arterial tree (although this may be difficult in acute occlusions). It often allows a distinction to be made between embolus and thrombus, because the former often has either a sharp cutoff, reverse meniscus, or a clot silhouetted by contrast media. It also assists in distinguishing patients who will benefit more from percutaneous treatment than from Fogarty catheter embolectomy or open revascularisation procedures.

The fear of contrast media harming an acutely ischaemic leg or causing renal damage has been difficult to dissociate from the harmful effects of ischaemia and reperfusion. Fortunately, current digital subtraction angiography (DSA) techniques have reduced risks associated with the use of contrast media. The more important consideration, however, is whether the delay in performing formal angiography in an angiographic suite can be tolerated in the face of limb-threatening ischaemia. It therefore should be reserved for clearly viable extremities or selected cases with marginal threat. Other patients, that is, those with acutely threatened limbs, should be transported immediately to the operating suite for thromboembolectomy, during which intraopera-

tive arteriography can be performed (see also Recommendation 60, p S132).

C 2.2.2 Doppler Arterial Study

Doppler-determined segmental limb pressures are ordinarily of no value in acute arterial occlusions. The pressure gradient criteria developed for chronic ischaemia do not apply here. Even the ankle:brachial pressure index (ABPI), if measurable in the acute setting, bears little relationship to that discussed for chronic critical limb ischaemia, and there is no way to predict the ultimate ABPI in the acute period. In fact, if the ABPI can be measured, the limb is a non-threatened extremity. Nevertheless, it is extremely valuable to assess the legs' arterial tree with a Doppler ultrasound probe, because any arterial signals detected over pedal arteries may be of great significance in gauging degree of severity.

It was shown in the Vietnam War that soldiers suffering extremity arterial injuries with audible Doppler arterial signals over ankle or pedal arteries could tolerate the delay of evacuation to a remote military hospital without loss of limb viability.¹ This approach was subsequently tested in civilian practice and found to be reliable, although obviously the same degree of delay was not involved, nor would it be acceptable. It could, however, allow for transfer to a nearby hospital, formal arteriography or other evaluations, and preparations rather than immediate emergency surgery. The presence or absence of audible arterial Doppler signals over pedal arteries has therefore been used to augment the clinical examination in assessing the severity of ischaemia (see C 2.3, Clinical Classification, p S122. Although the presence of clearly audible Doppler arterial signals suggests a less immediate limb threat, the converse, the absence of Doppler arterial signals, does not necessarily mean immediate limb threat (ie, false-negative tests far exceed false positives). Similarly, venous Doppler sounds may be misinterpreted as arterial signals, which implies that a limb may appear to be less threatened than it is in reality, thereby delaying treatment. The risk of misinterpretation of Doppler signals is limited by experience and it should be emphasised that the use of arterial Doppler signals in ALI is *not* meant to replace clinical examination but rather to augment it. As pointed out by Earnshaw, the presence or absence of neurologic deficits is an overriding consideration.² This is discussed more fully later in the Management Algorithm (C 4.11, p S138).

C 2.2.3

Other Imaging Techniques

Duplex scanning

Duplex scanning may be of value in detecting and localising an obstruction in the arterial tree^{3,4,5,6} but it has not been properly evaluated for this purpose in acute ischaemia outside of the trauma setting. The lack of availability in most Emergency Departments is only part of the problem. The other is that arteriography is preferable because it provides clearer detail on which to base therapy and is an essential first step in catheter-directed lytic therapy.

Magnetic resonance angiography

Magnetic resonance angiography (MRA) also might be of use in some settings, but further studies are needed to determine to what extent MRA may replace angiography.^{7,8,9,10,11,12,13,14}

Recommendation 46: Imaging in acute limb ischaemia

Pre-intervention full imaging (usually by angiography) should be performed, if possible, to confirm the diagnosis and to illustrate the distribution and localisation of the occlusion(s). It is of paramount importance that any imaging not unduly delay the subsequent therapeutic intervention (see also Recommendation 63).

C 2.2.4

Other Routine Laboratory Studies

Even in the setting of immediate limb-threatening ischaemia, basic blood tests can be drawn and an assessment of anaesthetic risk performed. Any coagulation tests should be drawn immediately, before heparin is given. An electrocardiogram should be obtained on every patient, and an echocardiogram should be obtained as soon as time allows in those with possible embolus. However, because almost all patients will be immediately anticoagulated in any event (see C 4.1, Immediate Management, p S128), the treatment of the ischaemic limb must take priority. It also should be realised that standard echocardiography is not helpful in a significant percentage of such cases, and transesophageal echocardiography may be required. If the limb is viable or is made so by prompt intervention, a complete diagnostic workup can be undertaken. In cases of probable

microembolism, with normal peripheral pulses, diagnostic procedures to explore the microcirculation may have to be used in addition to searching for a source (see D 2.2.5, Microcirculatory Investigations, p S153).

References

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