Duplex imaging immediately prior to carotid endarterectomy

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ABSTRACT

INTRODUCTION In this centre, angiography is used only in selected cases, whilst duplex ultrasound (DU) is the main imaging method prior to carotid endarterectomy (CEA). DU has no associated morbidity and so can be repeated immediately before surgery to detect changes in the carotid plaque or degree of stenosis.

PATIENTS AND METHODS We retrospectively examined our Vascular Surgery Audit database for the last 500 patients admitted for CEA. In each case, the DU scan was repeated immediately before surgery.

RESULTS From 500 admissions, repeat DU immediately prior to surgery detected 8 (1.6%) situations where CEA would no longer have been an appropriate intervention. In four cases, the degree of stenosis was found to be less than 70% on the repeat scan – in three cases the internal carotid artery (ICA) had occluded or sub-occluded and in one case there was a dissection of the ICA plaque.

CONCLUSIONS DU can be repeated, with no associated morbidity, immediately prior to surgery. Such a practice changes management decisions in 1.6% of admissions for CEA, allowing surgery unjustified by current evidence to be avoided. This policy also serves several other important purposes: it is a method of internal validation, provides a means of improving training of vascular technologists and of achieving quality assurance in DU techniques.

KEYWORDS

Duplex ultrasound – Carotid endarterectomy

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In this centre, duplex ultrasound (DU) is the main imaging method prior to carotid endarterectomy (CEA), with angiography used only in selected cases. There is a variable delay between listing a patient for surgery and performing CEA. During this time, the morphology of the carotid plaque may have altered or the artery may have occluded. For this reason, we feel it is important to repeat DU immediately prior to surgery. We audited the change in management effected by this policy.

Patients and Methods

We retrospectively examined our Vascular Surgery Audit database for the last 500 patients admitted for CEA over a period of 40 months. In all cases, there was an internal carotid artery stenosis (ICAS) of 70–99% when the patient was listed for surgery. The unit policy is to repeat the DU immediately prior to surgery.

Results

From 500 admissions for CEA, repeat DU immediately prior to surgery detected 8 (1.6%) situations where CEA would no longer have been an appropriate intervention. In these 8 cases, the median change in stenosis between the DU scan on which the decision to operate was based and the DU scan immediately prior to CEA was 10%, whilst the median length of time between these scans was 61.5 days. In four (0.8%) cases, the degree of stenosis was now found to be less than 70% on the repeat scan. In three cases (0.6%), the internal carotid artery (ICA) had occluded or sub-occluded. In one case (0.2%), there was a dissection channel extending from the ICA plaque distally. None of the patients in whom CEA was cancelled as result of repeating the DU immediately before surgery subsequently reported any anterior territory symptoms or underwent CEA over a median follow-up period of 89 weeks.

Discussion

For those patients who are symptomatic and have an ICAS of 70–99%, CEA is the treatment of choice.^{1,2} The randomised trials demonstrating benefit from CEA required patients to undergo intra-arterial contrast angiography, which is thus considered as the ‘gold standard’ against which other techniques are compared. Angiography carries a 1–2% risk of thrombo-embolic stroke in patients with ischaemic cerebrovascular disease,⁵ and there is thus an increasing tendency to rely on minimally invasive imaging to select patients for CEA. Nevertheless, these techniques will inevitably be considered inferior to the ‘gold standard’. The advantages of DU include no associated morbidity, minimal delay in imaging and ability to provide single visit clinics.

Previously reported experience of performing CEA without angiography has shown no adverse effect on measures of operative outcome,⁴ but controversy remains as to whether DU alone can be relied upon to select patients for CEA. Although sensitivity and specificity of DU is good (80% and 90%, respectively),⁵ reproducibility can be a problem and continual internal validation of the technique is required.

Repeating DU is of particular value in detecting those cases where the stenosis has progressed to occlusion or sub-occlusion (0.6%). Dissection through a carotid plaque (0.2%) is a very rare occurrence. One seldom advocated advantage of DU is that it can be repeated, with no associated morbidity, immediately prior to surgery.

Conclusions

We have shown that repeating DU will detect a small, but significant, number of cases where CEA is inappropriate or where further investigations are required and so unjustified surgical complications can be avoided. Although repeating DU immediately prior to CEA changes management decisions in only 1.6% of cases, this policy serves several other important purposes: it is a method of internal validation in the vascular studies laboratory, provides a means of improving training of technologists and achieving quality assurance in DU techniques.

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