

ORIGINAL ARTICLES

Carotid Endarterectomy: Are We Meeting the Two Week Target?

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Abstract**Objective**

It has been recommended that carotid endarterectomy should be carried out within fourteen days of the index event if maximum stroke prevention benefit is to be achieved. The aim of this study was to see whether this target was being met in our region and where in the pathway delays occurred.

Methods

This was a retrospective review of all patients (n=75) undergoing carotid endarterectomy in 2006 in a regional vascular unit. Eleven patients were excluded as the timing of onset of symptoms was unclear, leaving 64 patients for further analysis.

Results

The median time-interval from onset of symptoms to surgery was 47 days (interquartile range 32-65 days). Five of 64 patients (4.5%) had a carotid endarterectomy within 14 days. Median time from onset of symptoms to presentation to health services was one day (IQR 0-7 days), from presentation to health services to neurovascular clinic was 16 days (IQR 10-23 days), from neurovascular clinic to vascular surgery clinic was 13 days (IQR 9-24 days), and from vascular surgery clinic to operation was 13 days (IQR 8-22 days). Fifteen of the 51 patients (29%) attending a neurovascular clinic and five of the 57 patients (9%) attending a vascular surgery clinic were seen within 14 days.

Conclusion

The fourteen-day target is difficult to achieve due to the number of steps in the referral pathway. This delay may be jeopardising outcome. Reduction in the delay to surgery would require a multi-disciplinary approach and should involve education of the general public.

Key Words

Carotid endarterectomy, stroke, transient ischaemic attack, vascular surgery

Introduction

Carotid endarterectomy (CEA) is important in the secondary prevention of stroke in patients with carotid territory symptoms and evidence of severe carotid artery disease.^{1,2,3} The risk of a further stroke, estimated at up to eight to 12% in the first seven days,⁴ is highest immediately following the index event and declines rapidly thereafter. As a result, it is thought that the greatest benefit is gained from CEA if it is performed as soon as possible after the index event. To prevent one ipsilateral stroke over five years, it is estimated that five patients must undergo carotid endarterectomy if surgery is undertaken within two weeks⁵. This compares to 125 patients to prevent one stroke if CEA is delayed for 12 weeks or more. The National Clinical Guidelines for Stroke⁶ recommends that carotid endarterectomy is performed as soon as the patient is fit for surgery, preferably within two weeks of the index event. In order to achieve this target, it is recommended that patients should undergo carotid imaging within seven days of symptoms. This study looked at whether these targets were being met and where in the referral pathway delays were occurring.

Methods

A prospective surgical database was interrogated to identify all patients undergoing carotid endarterectomy following transient ischaemic attack (TIA), amaurosis fugax and cerebrovascular accident (CVA) in this regional vascular centre during 2006. Referrals are received from physicians in the central hospital and also from the local regional stroke unit, two district general hospitals and from general practitioners. Demographic data were collected from the database. Further information was retrieved from case notes and from the patient's general practitioner. This included the date of onset of symptoms, first presentation to medical services, attendance at neurology clinic, duplex imaging, vascular surgery clinic attendance and date of operation.

Results

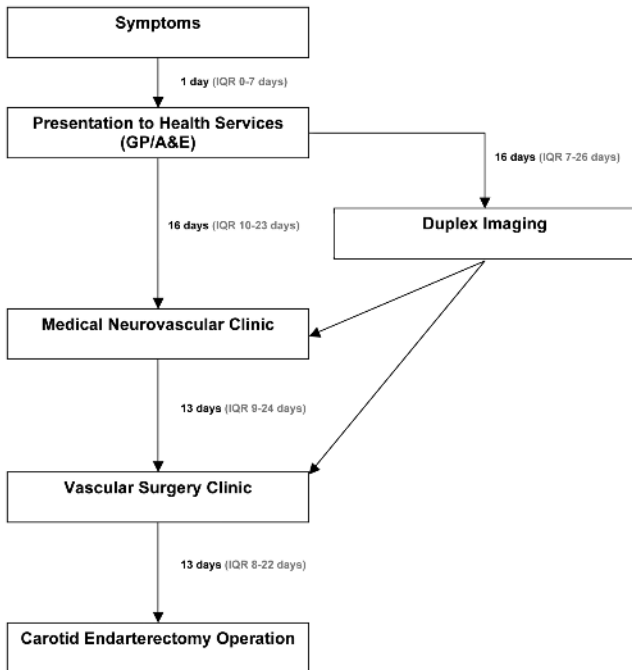
Seventy-five CEAs were performed for symptomatic carotid stenoses at the Royal Infirmary of Edinburgh (RIE) in 2006. In 11 patients it was not possible to assess accurately the date of initial symptoms due to inadequate information, leaving 64 patients for further analysis. Forty patients (63%) were male and the mean age was 73 years. Referrals to the Vascular Surgical Service were received from a number of sources. The majority of patients 36 (56%) were referred from an outpatient neurovascular clinic, 20 (31%) from the local stroke unit and 16

(25%) from a district general hospital in the region. Twenty-five (39%) patients were referred following admission as an inpatient, 10 (16%) in the regional stroke unit, eight (12.5%) in the central hospital and seven (11%) in a district general hospital. One patient was referred directly to the regional vascular clinic by a general practitioner, and two patients were transferred to the vascular ward from another hospital specialty.

The median delay from symptoms to imaging was 16 days (IQR 7-26 days) and 18 of 64 patients (28%) were imaged within the target of seven days. The median delay from symptoms to surgery was 47 days (interquartile range 32-65 days), and only five of 64 patients (7.8%) underwent CEA within the target of 14 days.

The median delay from symptoms to first presentation to primary care (general practitioner or emergency department), was one day (IQR 0 - 7) (Figure 1).

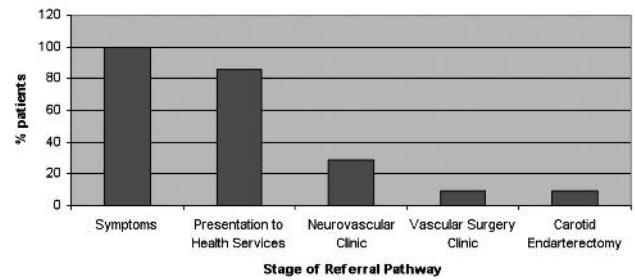
Figure 1: Time Taken to Progress Through Each Step of the Referral Pathway.



The longest delay in presentation was 349 days and 11 out of 60 patients (18%) in whom the date of presentation was determined presented more than seven days after the index event (date of presentation was unknown in eight patients). From the time of presentation to primary care, the median time to be seen in a neurovascular clinic was 16 days (IQR 10 - 23) and subsequently to be seen in a vascular surgery clinic was a further 13 days (IQR 9 - 24). Carotid endarterectomy was performed a median of 13 days (IQR 8-22) after the vascular surgery appointment.

It was possible to ascertain the date of first presentation to health services for 60 of the 64 patients, and 51 (86%) of these patients presented within two weeks (Table 1) with nine (15%) taking longer than two weeks to present. Fifty-one out of the 64 cases were assessed in a medical neurovascular clinic, of which 15 (29%) were seen within the 14 day target. Fifty-seven of the 64 patients were seen as an out-patient in the regional vascular clinic, five of which (9%) were seen within 14 days of the onset of their symptoms. Five of 64 cases (7.8%) were operated on within the recommended 14 days.

Table 1: Percentage of Patients Reaching Each Step of the Referral Pathway Within Fourteen Days of Onset of Symptoms.



Three of these five patients bypassed the vascular outpatient clinic as there was a need to expedite surgery due to ongoing neurological events.

Discussion

Following a cerebrovascular event due to symptomatic internal carotid artery stenosis, it has been shown that the greatest risk of a further event exists immediately following the index event.⁴ For this reason the greatest benefit is derived from CEA when it is performed within two weeks of the onset of symptoms. This study has demonstrated that compliance with this target is difficult to achieve even in a large regional vascular unit. Delays occur at every step in the referral pathway.

The delay in presentation to a primary care physician is the most concerning finding of this study. Best medical therapy (BMT), including an anti-platelet agent is an effective temporising measure in the short term, preventing further cerebrovascular events until the time of surgery. Although most patients present to their GP promptly (median one day), 11 out of 60 (18%) took more than seven days to present. In such cases the institution of BMT is delayed and the patient remains vulnerable to further cerebrovascular events. The patients identified in this study probably represent only the “tip of the iceberg” and it is likely that other patients are rendered unsuitable for CEA after a disabling or fatal CVA following one or more minor events. The delay in presentation suggests that there is a major problem with public awareness of the importance of transient neurological symptoms. It is likely that some patients are reassured by the transient nature of the symptoms, which resolve over a few minutes or hours, and therefore, fail to appreciate their gravity and the need for prompt medical assessment. Furthermore, stroke is commonly perceived by patients and doctors as a condition for which little can be done. Increased publicity of CVA and TIA under the collective term “brain attack” has been suggested to encourage patients to present urgently for medical assessment, thereby yielding a greater proportion of such patients who might benefit from modern management strategies such as thrombolysis and CEA.⁹ Factors contributing to the delay in patients being seen in the neurovascular clinic for the first time could not be elucidated from this study. A number of factors are implicated including the postal system, the referral triage system within the department, and the availability of clinic appointments. It may be that electronic referral systems will reduce this time somewhat. Physicians should be encouraged to refer patients for consideration for surgery when they are admitted rather than waiting until they are discharged.

The number of steps in the referral pathway undoubtedly contributes to the delay in undergoing surgery.

This problem may be exacerbated when referrals are received from a large catchment area with a number of smaller centres referring patients to a larger central hospital for specialist treatment. A number of units have looked at streamlining this process with a one-stop clinic enabling imaging, a neurovascular consultation, and a surgical opinion to be obtained at a single visit. Unfortunately, this initially attractive approach is in fact rather uneconomical as the yield of patients requiring carotid endarterectomy from the referred population is low. It does, however, seem to be the most realistic way to achieve the stringent 14 day target.

Similar suggestions have been made to shorten the wait for carotid artery imaging. In this study the median delay from onset of symptoms to imaging was 16 days, and only 18 out of 64 patients had a scan within the recommended seven days. One report in the literature outlines the piloting of a 'Fast Track Duplex Service'¹⁰ and, although this scheme only aimed to guarantee a scan within 14 days of receiving a referral, a significant reduction in time to endarterectomy was indeed achieved.

The final delay in the referral pathway is between the vascular surgery consultation and the operation itself. Whilst the evidence would suggest that early operation maximises the benefit to be gained in terms of stroke prevention, there is concern amongst surgeons that operating on an unstable plaque with adherent thrombus is associated with a higher peri-procedural stroke rate.¹¹ There is evidence to suggest that this perceived increased risk is overestimated¹² but for this reason there remains a reluctance to expedite surgery, particularly in a climate where the success and complication rates for index procedures are under scrutiny. Some would argue that CEA should be regarded almost as a surgical emergency. CEA might be prioritised by placing suitable patients on the next available operating list rather than waiting until the consultant to which the patient was referred has space available on his/her list. This clearly has resource and funding implications in terms of provision of theatre time, consultant availability and post-operative care.

Conclusion

This study has demonstrated that both the seven day imaging and the fourteen day surgery targets for patients requiring carotid endarterectomy are difficult to achieve. This is likely to be exposing patients to a high risk of further events in the interval between index event and CEA, thereby compromising the risk to benefit ratio for CEA. There is a requirement to educate the public and the medical community to appreciate that TIA symptoms may herald the risk of a full stroke and should be considered a medical emergency. There are a number of steps in the referral pathway for CEA and delays occur at each stage. A global, multidisciplinary approach is required to address this issue.

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