Carotid endarterectomy should be performed early after a cerebral ischemic event in order to be most effective

Karotidnu endarterektomiju treba uraditi što pre posle simptoma moždane ishemije kako bi korist bila najveća

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Introduction

At least one million people in Europe have severe carotid stenosis. Stroke remains the third most common cause of mortality in the Western world. Of those patients who suffer the first stroke approximately one third die, one third recover and one third are disabled. Stroke is the leading cause of disability in adults. As our aging population increases, the financial burden arising from stroke increases too.

Carotid endarterectomy reduces the risk of subsequent stroke in patients with symptomatic stenosis but there is one neglected fact: the risk of stroke is highest in the first weeks following initial symptoms, which means that long waiting could be dangerous.

The European Carotid Surgery Trial and the North American Symptomatic Carotid Endarterectomy Trial show that carotid endarterectomy reduces the risk of subsequent stroke in patients with symptomatic stenosis but there is one neglected fact: the risk of stroke is highest in the first weeks following initial symptoms, which means that long waiting could be dangerous.

Analysis of the data pooled from these two prospective multicentric trials reveals that this benefit is substantially decreased if surgery is delayed for more than two weeks following initial symptoms of cerebral ischemia. It appears that the number of patients needed to be treated in order to prevent one ipsilateral stroke at five years is five for patients undergoing endarterectomy within two weeks versus 125 for patients undergoing surgery after 12 weeks.

The benefit of carotid endarterectomy for women is largely achieved within the first 2 weeks, with women deriving less benefit with later surgery compared with men. It could be due to sex difference in carotid plaque morphology.

The benefit of early endarterectomy is a reflection of the fact that the risk of stroke is highest in the first weeks following initial symptoms; the risk of recurrent stroke following transient ischemic attacks and minor stroke, respectively, are estimated to be 8.0% and 11.5% at one week, 11.5% and 15.0% at one month, and 17.3% and 18.5% at three months.

Delays of surgery are associated with a high risk of major stroke. The Oxford Vascular Study reported a risk of stroke prior to endarterectomy of 21% in symptomatic patients waiting 2 weeks and 32% in those waiting 12 weeks.

Concerns that early operative intervention incurs higher procedural risk have been challenged by recent systematic reviews showing that early surgery (within one to six weeks of symptoms) is not associated with increases in absolute risks of stroke and death in neurologically stable patients with recent transient ischemic attack or minor stroke.

However, the same data show high risks in patients with evolving major stroke that undergo emergency surgery.

It is clear that if carotid endarterectomy is to be effective in terms of secondary stroke prevention, surgery must be performed as early as possible following initial symptoms of transient ischemic attack or minor stroke. Accordingly, many National Clinical Guidelines for Stroke now recommend that carotid endarterectomy be performed in appropriate patients within two weeks of the presenting event. The latest

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Potential reasons for carotid endarterectomy delay

Long waiting for carotid endarterectomy do not have trend for shortening. More contemporary reports have not shown improvements in performance: the recent GALA trial (General Versus Local Anesthetic for Carotid Endarterectomy) noted a median delay of 82 days 23, and the more recent UK carotid audit of 4,591 operations performed between 2005 and 2007 found that only 20% of patients underwent carotid endarterectomy within two weeks of symptoms, with 30% of patients waiting more than 12 weeks 14. In a recent audit published in Canada, only one third of patients underwent endarterectomy within two weeks of symptoms 25, 26.

To enhance secondary stroke prevention, greater efforts are needed to minimize delays to diagnosis and surgical treatment for patients with symptomatic carotid stenosis 2, 12–14, 19, 24–26.

Potential reasons for delays to carotid endarterectomy include: patient factors (delayed symptoms recognition and presentation to medical attention); physician factors (delayed diagnosis and referrals); resource availability (rapid access to vascular imaging); institutional/system level factors relating to operating room availability and staffing.

The referral pathway from initial symptoms to surgical procedure is often a multistep, nonlinear process, involving: presentation to primary care or emergency services, referral to specialist services, carotid imaging and addition to an elective theatre list.

A public awareness campaign would help in Serbia. Unfortunately, initial presentation to health services is hampered by the public's lack of awareness of the symptoms, signs and potential sequelae of transient ischemic attack and early stroke.

Carotid artery disease is implicated in almost 40%–50% of all strokes. Public awareness of the symptoms and signs of transient ischemic attack and early stroke must be increased in order to reduce the delay of initial presentation to health services. Recent public service campaigns promulgating the use of FAST (Face Arm Speech Test) and the concept of a “brain attack” should aid in this endeavor. In addition, the use of the ABCD2 score may assist primary and secondary care services in identifying those patients with transient ischemic attacks who are at high risk for early stroke 27.

It is necessary to explain the difference between neurologically stable and unstable patients to primary care serv-

ice 28. Namely, emergency endarterectomy for stroke in evolution has a higher operative risk, but the risk is somewhat lower in patients with crescendo TIA. Surgery in the first week in neurologically stable patients with TIA or minor stroke is not associated with higher operative risk than a delayed surgery 19.

The benefit of carotid endarterectomy for preventing recurrent stroke is maximal when surgery is performed within 2 weeks after minor ischemic stroke or TIA. The benefit is reduced when surgery is delayed more than 2 weeks and essentially lost if delayed more than 3 months 28.

Symptomatic patients may be referred from primary care services to a range of specialist services, including neurologists and care of the elderly physicians, cardiologists and ophthalmologists, before being referred to a vascular surgeon for consideration for operative intervention. The Oxford audit reported a median delay from symptoms to referral to vascular services of 9 days (3–33 days) 16. The fastest pathway from referral to surgery was through neurologists and stroke physicians (30 days). Referrals via care of the general practitioners were considerably slower (68 days) 25, 28.

For patients with acute high-risk TIA’s and minor strokes, carotid imaging should be performed within 24 hours. Imaging can be accomplished rapidly and noninvasively when carotid ultrasound is available. Computerized tomography (CT) and magnetic resonance (MR) angiography is another/additional option. But, delays to carotid imaging remain significant: a prospective population based study from Oxford reported a median time from presenting symptoms to scanning of 33 days 16 and the 2004 Royal College of Physicians Sentinel Audit reported that only half of stroke patients underwent carotid imaging within 12 weeks 19. This delay is perhaps unsurprising given the lack of adequate provision of specialist imaging services throughout the Europe.

The delay from consultation at a vascular surgery clinic to carotid endarterectomy is very heterogenous 29. The pressure on vascular surgery and anesthetic services and the relative paucity of expedient theatre time available in many centers accounts for much of this delay.

There are few trials examining the impact of specific changes in the practice of delays of carotid endarterectomy. Two local UK centers have audited delays to surgery following the introduction of a “fast-track” carotid imaging service, reporting significant reductions in delays from symptoms to surgery of 80 to 22 days and 120 to 38 days, respectively 28, 29.

It is evident that comprehensive and significant changes in practice are required if we are to be able to maximize the potential benefits in terms of stroke reduction from carotid endarterectomy for symptomatic patients and meet the guidelines for waiting times. Considerable reorganization of services is required. The impact of changes in practice, including facilitation of rapid referrals to on-call consultants, quick access (within seven days) to a single-visit clinic and utilization of vacant general surgery theatre lists, with the aim to perform surgery within a two-week target, is promising 28, 30, 31.

A shift from reliance to direct contact for referral to telephone, fax or web based programmes should reduce the
time from initial presentation to specialist clinic consultation.

The speed of referral to vascular services from different specialist varies widely; this is likely to be a reflection of how “stroke-oriented” the specialist is and their ease of access to imaging services. Development of multi-specialist clinics, which enable carotid imaging, neurology and vascular surgical opinions to be obtained in a single visit, would be crucial to reducing times from referral to imaging and surgery.

Delays between the decision to operate and the actual surgical procedure will only be addressed by significant increases in the provision of theatre time, specialist surgeon and surgical procedure will only be addressed by significant in-carotid imaging, neurology and vascular surgical opinions to access to imaging services.

Organization and investment in such specialized services will undoubtedly only be feasible within a few centralised specialist stroke centers and as a part of more comprehensive strategy to improve emergency care of patients with stroke.

Conclusion

Clinicians and administrators must be aware that carotid endarterectomy for symptomatic stenosis is a time-sensitive treatment and, therefore, imaging and urgent operatory room should be available.

The “onset-to-endarterectomy” time should be monitored as a key performance indicator for stroke prevention. Careful audit of specific changes in practice will be required. Waiting lists have been established for other surgical procedures and it is hoped that carotid endarterectomy will join procedures that are being tracked regionally and nationally.

REFERENCES


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