Perioperative stroke occurring in patients who undergo neck dissection for head and neck cancer: unanswered questions

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Stroke represents a major cause of disability among middle-aged and elderly people. Carotid artery stenosis is an important risk factor for stroke and is prevalent in elderly men with hypertension, diabetes mellitus, and those who smoke or have atherosclerotic disease, or both. Patients who undergo neck dissection for head and neck cancer may have some or all of the above characteristics and may experience surgical manipulation of the carotid arteries. This combination of medical and surgical factors may predispose such patients to perioperative stroke. A critical review of the literature was completed to determine the incidence of stroke perioperatively in patients undergoing a neck dissection for head and neck cancer. We found 2 studies that quoted the risk of stroke to be between 3.2% and 4.8%. The implications of these results are significant because they suggest a need for preoperative screening (with Doppler ultrasonography) or intervention (with carotid endarterectomy), or both. However, the quality of these 2 studies is such that future research is first needed to define the rate of stroke in head and neck surgery.

L'accident vasculaire cérébral constitue une cause importante d'incapacité chez les personnes d'âge mûr et les personnes âgées. La sténose de l'artère carotide constitue un important facteur de risque d'accident vasculaire cérébral et est prévalente chez les hommes âgés atteints d'hypertension ou de diabète, ainsi que chez ceux qui fument ou sont atteints d'athérosclérose, ou les deux. Les patients qui subissent un curage ganglionnaire cervical pour un cancer de la tête et du cou peuvent avoir une partie ou l'ensemble des caractéristiques ci-dessus et il peut être nécessaire de les soumettre à une manipulation chirurgicale des artères carotides. Cette combinaison de facteurs médicaux et chirurgicaux peut les prédisposer à l'accident vasculaire cérébral périopératoire. On a effectué une recension critique des publications afin de déterminer l'incidence de l'accident vasculaire cérébral périopératoire chez les patients subissant un curage ganglionnaire cervical pour un cancer de la tête et du cou. Nous avons trouvé deux études où l'on indique que le risque d'accident vasculaire cérébral se situe entre 3,2 % et 4,8 %. Les répercussions de ces résultats sont importantes parce qu'elles indiquent le besoin de dépistage (par échographie Doppler) ou d'intervention (par endartérectomie carotidienne) préopératoires, ou les deux. La qualité de ces deux études est telle qu'il faut d'abord effectuer d'autres recherches pour définir le taux d'accidents vasculaires cérébraux dans les cas de chirurgie de la tête et du cou.

Cancers of the head and neck typically occur in people over the age of 40 years who have a history of alcohol or tobacco abuse. Unlike many other carcinomas for which the fatal event is almost always disseminated malignant disease, as many as 60% of patients with head and neck cancer die without clinical evidence of metastasis beyond local or regional disease.[1] This is because head and neck cancers may invade adjacent structures and subsequently interfere with essential functions such as feeding and breathing. Therefore, with excision of the tumour and neck dissection to control regional spread to lymph nodes, localized spread can be prevented and long-term survival increased. This is good news for the patient provided the

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surgery and radiotherapy are safe procedures with an acceptable risk of adverse effects.

Neck dissection, either modified or comprehensive, involves exposure and manipulation of the vascular and neurologic structures of the neck. In patients with severe stenosis of the carotid artery, this could potentially lead to perioperative stroke, a complication with high morbidity and mortality.

In this article, we discuss the risk factors for stroke, the absence of clinical markers to predict carotid artery stenosis, and the incidence of perioperative stroke. We then critically review 2 published articles that discuss the incidence of stroke in patients who undergo head and neck surgery, and consider the implications of these results.

Risk factors for stroke

Stroke is the third leading cause of death in the Western world, and a major cause of disability among middle-aged and elderly people.[2] Carotid artery stenosis is the single most important risk factor for stroke.[2] Moderate carotid stenosis (50%–79% of the vessel's diameter) carries an annual risk of stroke of 2.1%.[3,4] In just over 15% of these patients the condition will progress to severe carotid stenosis (80%–99%) or to complete occlusion.[3,4] The annual risk of stroke rises to 6.9% with severe carotid stenosis.[4]

Carotid artery stenosis is related to a number of risk factors: hypertension, peripheral vascular disease (PVD), diabetes, smoking, atherosclerotic heart disease, male sex, age, and external radiotherapy to the head and neck.[5–7] Patients who undergo a neck dissection have many of these risk factors and thus may be at high risk for perioperative stroke.

A neck dissection may carry a greater risk of cerebrovascular accident than a non-neck procedure, simply because the neck is often hyperextended and rotated during surgery, which may cause intimal tearing of the carotid artery and thrombus formation or plaque ulceration from turbulent flow. Also, the carotid artery is often retracted, and this has the potential to dislodge a thrombus or plaque.

Predicting carotid stenosis

How can we determine which patients are most at risk for severe asymptomatic carotid artery stenosis? Ascher and associates[8] conducted a study in which carotid Doppler ultrasonography was completed on asymptomatic patients who underwent vascular surgery. Twenty-one percent of these patients, especially those who were male, elderly and smokers, had carotid artery stenosis over 70%.[8] Studies attempting to correlate clinical features (such as risk factors or carotid bruits) with severe carotid artery stenosis suggest that clinical features cannot successfully predict stenosis.[9–11] In the North American Symptomatic Carotid Endarterectomy Trial, over one-third of patients with high-grade stenosis had no detectable bruits.[11] Therefore, the definitive way to screen for carotid artery stenosis seems to be by Doppler ultrasonography. However, this technique requires additional resources such as qualified radiology technicians, radiologists and health system funding if it is to be used as a routine preoperative test. Its potential value as such depends, to a great extent, on the incidence of perioperative stroke.

Incidence of perioperative stroke

The incidence of perioperative stroke in non-head and neck surgery is between 0.08% and 0.2%.[12] During carotid endarterectomy, the risk has been reported to be between 0.9% and 3.6%.[12,13] However, there is relatively little in the literature on the incidence of perioperative stroke in patients who undergo neck dissection. We identified only 2 papers that discuss this topic, one of which is a retrospective case series and the other a personal communication to an author.[12,14] Here, we review these 2 articles in detail.

In 1993, Nosan and colleagues[14] published a retrospective case series of 5 patients who suffered a stroke postoperatively out of a total of 105 patients who underwent head and neck procedures between 1989 and 1991, yielding an incidence estimate of 4.8%. In all 5 patients stroke was diagnosed between the first and ninth postoperative day (mean 3.2 d). Four of the 5 were thought to have involved emboli (3 to the cerebral hemispheres and 1 to the brainstem); the fifth patient suffered a stroke secondary to hypoperfusion.

In 1998, Rechtweg and colleagues[12] described their experience with simultaneous carotid endarterectomy and neck dissection in 3 patients who underwent surgery for metastatic disease. Preoperative evaluation revealed bilateral carotid artery stenosis greater than 90% in all of them. In 2 patients there was no local morbidity, no neck recurrence and a patent carotid artery confirmed by Doppler ultrasonography. The third patient died of myocardial infarction. In their discussion, Rechtweg and colleagues reported a personal communication from Yoo and colleagues in Toronto, who reviewed 441 patients undergoing neck dissection and described an incidence of perioperative stroke of 3.2%. Because this was a personal communication, no other information on the methods, statistics, or discussion was available.

Critical review of the articles

From these 2 papers, it would seem that the risk of stroke in patients who undergo major head and neck surgery may be as high as 4.8%. This is significantly higher than the 0.08%–0.2% perioperative risk of stroke in patients who undergo non-head and neck surgery.[12]

These 2 studies have important limitations and represent a low level of evidence. The article by Nosan and colleagues[14] is written mainly as a case series. The authors did not clearly state how they identified the 5 cases of perioperative stroke from the total number of head and neck procedures done at their hospital or why they chose to include only those procedures carried out between 1989 and 1991. Furthermore, details of the 100 patients without stroke are not provided. Given the small number of total cases, confidence intervals (although not provided) are likely to be quite large, so the quoted perioperative stroke incidence of 4.8% must be viewed with caution.

The second article[12] is also a case series describing the authors' experience with simultaneous carotid endarterectomy and neck dissection. The incidence of perioperative stroke in head and neck surgery is merely cited in the form of a personal communication between the author and a group of investigators in Toronto. Therefore, we have no information regarding patient profiles, methods, or statistics. Again, the quoted incidence of 3.2% must be viewed with caution.

Conclusions

It is essential to determine the incidence of perioperative stroke in patients who undergo head and neck surgery simply because, if the incidence is indeed as high as 3%, we could consider progressing to studies evaluating the yield of preoperative carotid Doppler ultrasonography. However, if the incidence of perioperative stroke is not significantly increased compared to the baseline risk in a general surgical population, it could be argued that the benefits of preoperative screening are minimal.

The agenda of research questions around this clinical issue should initially involve further assessment of the risk of stroke in head and neck surgery. If the stroke risk is in fact elevated, ensuing research questions will include: (1) further research into the diagnostic yield of noninvasive screening evaluations with Doppler ultrasonography or other techniques, (2) benefits and safety of prophylactic carotid endarterectomy before head and neck procedures and (3) potential alterations to surgical techniques for neck dissection to modify the risk of stroke.

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