Disease/Medical Condition

**STROKE**

(also known as “cerebrovascular accident” [CVA], “cerebral apoplexy”, and “brain attack”; includes “ischemic stroke” [also known as “cerebral infarction” and “occlusive stroke”] and “hemorrhagic stroke” [which includes “intracerebral hemorrhage” and “subarachnoid hemorrhage”]; related conditions are “transient ischemic attack” [TIA] and “reversible ischemic neurologic deficit” [RIND])

Date of Publication: August 4, 2017

Is the initiation of non-invasive dental hygiene procedures* contra-indicated? Yes, if patient/client exhibits signs/symptoms of stroke-in-evolution (or TIA or RIND, which are initially indistinguishable from stroke) in the dental hygiene office. 911 should be called, and supportive care (including oxygen) provided pending arrival of emergency medical services (EMS).

- Is medical consult advised? Yes, if patient/client’s medical status is suspected to be unstable.
  - Yes, if oral infection is suspected.  

Is the initiation of invasive dental hygiene procedures contra-indicated?**

- Yes, within 6 months of stroke, TIA, or RIND.
- Yes, if patient/client exhibits signs/symptoms of stroke-in-evolution (or TIA or RIND) in the dental hygiene office. See above.
- Yes, if systolic blood pressure ≥ 180 mm Hg systolic and/or diastolic blood pressure ≥115 mmHg - this warrants immediate medical consultation. In patients/clients with recurrent stroke, invasive procedures should not be performed if systolic BP ≥ 160 mm Hg and/or diastolic BP ≥ 100 mm Hg. See Hypertension Fact Sheet for further details.
- Yes, if patient/client is taking anticoagulant or antiplatelet therapy. See below.

- Is medical consult advised? ......................................................... See above.
- Yes, if patient/client’s history reveals signs/symptoms of recent TIA or RIND.
- Yes, if drugs have been prescribed that may necessitate care plan alterations.

- Is medical clearance required?
  - Yes, if the patient/client has had a stroke, TIA, or RIND within 6 months.
  - Yes, if the patient/client is taking an anticoagulant (e.g., warfarin or a novel oral anticoagulant [NOAC]) or antiplatelet agent (e.g., clopidogrel, ticlopidine, or dipyridamole), which increases risk of bleeding.

- Antibiotic prophylaxis required? ............................................... No, unless patient/client has a concurrent cardiovascular condition that warrants prophylaxis.

- Is postponing treatment advised? ............................................. Possibly.
  - While some dental hygiene textbooks recommend that elective treatment be avoided within 6 months (and up to 12 months) after a stroke or transient ischemic attack, there is little evidence to support this recommendation as being appropriate for all patients/clients. Each stroke survivor has a unique experience with its own set of complicating factors and recovery rates. Therefore, according to some authorities, it may be more appropriate to consider each person on a case-by-case basis in conjunction with a medical consult; such an assessment will determine whether the patient/client is healthy enough to withstand the potential stress and medical impact of invasive procedures (such as within a few weeks post-CVA).
  - Should a patient/client demonstrate warning signs of a stroke while in the chair, dental hygiene treatment should be terminated and prompt transfer to the emergency department should occur.
  - Deferral is warranted when excessive bleeding tendency is observed or suspected. For patients/clients on warfarin, an International Normalized Ratio (INR) greater than 3.5 necessitates consultation with a physician regarding a possible reduction in dose.

1 Infection may cause changes in blood coagulation factors, which could trigger repeat CVA.
2 NOACs include dabigatran, rivaroxaban, apixaban, edoxaban, and betrixaban.
3 With the advent of intravenous thrombolytic therapy for management of acute ischemic stroke (e.g., tissue-type plaminogen activator [t-PA], or alteplase), time to treatment is critical. (“Time is brain.”) In Ontario, certain hospitals have been designated as district or regional stroke centres, which have transport/triage protocols and can offer timely thrombolytic therapy.

*See ‘Special Considerations’ section for界定.
**For cases in which the patient/client’s medical status is unstable, a prompt referral to the emergency department is advised.

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Oral management implications

■ Given the high incidence of stroke, the dental hygienist is likely to encounter patients/clients who present for scheduled treatment within a short period after occurrence of a CVA. Furthermore, the dental hygienist will also encounter patients/clients at high risk for stroke, including those with a history of TIA, RIND, hypertension, heart failure, diabetes, and smoking, as well as persons aged more than 75 years of age. The dental hygienist has a role to play in identification of the stroke-prone patient/client and in stroke prevention.

■ The dental hygienist should be sensitive to the fact that many patients/clients post-stroke are dependent on others for attendance at their appointments, having lost the ability to drive or easily self-ambulate. This may be inhibitory to attendance at multiple appointments, and may also be a reason why fewer, longer appointments may be preferred by some patients/clients over shorter, more frequent appointments.

■ Depending on the sequelae of the stroke, the dental hygienist may need to determine mental capacity, communication/comprehension ability, and power of attorney for personal care of the patient/client in order to take an appropriate history, obtain informed consent to treatment, and ensure appropriate dental hygiene education.

■ Because drug therapies for treatment and prevention of stroke are continually evolving, the hygienist should ensure each patient/client’s medication list and medical history are up to date.

■ Although intracerebral hemorrhage is responsible for only 15% of all CVAs, it represents more of a potential risk to the oral health practitioner, who must manage acutely anxious patients/clients during potentially painful dental hygiene/dental procedures.

■ The perceived stressful nature of a dental hygiene appointment may potentially precipitate a stroke while the patient/client at risk (e.g., someone who has had stroke or TIA) is in the chair. Therefore, mitigating measures may include:
  • ensuring the client’s INR number is within an acceptable range prior to providing care if the patient/client is on warfarin therapy (in consultation with the patient/client’s physician);
  • booking short appointments in the mid-morning (as appropriate);
  • incorporation of stress reduction protocols;
  • moving slowly around the patient/client and speaking clearly, with the mask off, facing the patient/client;
  • monitoring of patient/client’s blood pressure and modifying dental hygiene treatment as required; and
  • monitoring patient/client for symptoms/signs of stroke-in-evolution (e.g., new onset of one-sided facial and/or extremity weakness, slurring of speech, drooling, etc.).

■ The dental hygienist should be familiar with the signs/symptoms of new onset stroke: weakness (sudden unilateral loss of strength or sudden numbness in face, arm, or leg); asymmetry of face and pupils of eyes; difficulty speaking (sudden difficulty verbalizing or understanding or confusion); vision problems (sudden onset of blurriness); headache (sudden severe and unusual headache); altered consciousness; incontinence; and/or dizziness (sudden loss of balance, particularly in conjunction with other warning signs/symptoms). The mnemonic “FAST” is a helpful aid:
  • Face drooping
  • Arm weakness
  • Speech difficulty
  • If yes, then Time to call 911.

4 Certain over-the-counter, non-prescription supplements affect the efficacy of warfarin. For example, ginkgo biloba can increase warfarin’s anti-clotting effects, whereas coenzyme Q (CoQ10) can diminish them.

5 “Normal” INR for a healthy patient/client not on warfarin is 1.0. The higher the number, the more clotting is inhibited and the more likely bleeding will occur. For patients/clients on long-term warfarin therapy for nonvalvular atrial fibrillation, typical therapeutic target range is 2.0 to 3.0.

6 Both anxiety and pain are associated with potentially significant increases in blood pressure (primarily systolic) and heart rate. Marked variations in blood pressure increase the risk of recurrent CVAs.

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Oral management implications (cont’d)

- The dental hygienist should ensure maintenance of ABCs (Airway, Breathing, Circulation) pending arrival of emergency medical services (EMS).
- Orthostatic hypotension can be reduced by using supine positioning and returning the chair (and hence patient/client) to the upright position slowly.
- Dental/dental hygiene treatment may need to be modified depending on the nature and extent of post-stroke oral and other physical limitations. As well, decreased oral muscle function increases the risk of dentures being swallowed.
- Patients/clients with impairment of the gag reflex require adjustment of head position, as well as ongoing suction and evacuation to prevent aspiration of saliva and foreign matter.
- Vasoconstrictors should be used with caution, if at all, in patients/clients with a history of CVA, because they may increase the risk of adverse outcomes. The dentist should consider limiting epinephrine in adults to 0.04 mg (i.e., 2 cartridges of 1:100,000 or 4 cartridges of 1:200,000 epinephrine). Monitoring of blood pressure should occur pre-procedure and 5 minutes after injection; if systolic BP > 180 mm Hg or if diastolic BP > 110 mm Hg dental/dental hygiene treatment should not occur.
- Non-steroidal anti-inflammatory medications (NSAIDs) and aspirin (acetylsalicylic acid, or ASA) should be used cautiously, if at all, in patients/clients taking digoxin, captopril, propranolol, and diltiazem.
- Antimicrobials sometimes prescribed in the dental office may need to be reconsidered in light of potential adverse reactions with medications being used by survivors of stroke or by persons at elevated risk of stroke. For example, erythromycin, tetracycline, fluconazole, ketoconazole, and miconazole may interact with digoxin (used to treat atrial fibrillation) and phenytoin (used to treat seizure disorders). Metronidazole and tetracyclines decrease metabolism of warfarin.
- Patients/clients taking low-dose ASA (75 to 325 mg/day), antiplatelet agents, and oral anticoagulants (e.g., warfarin and novel oral anticoagulants) are at increased risk of bleeding. Therefore, post-procedure pain is often best managed with acetaminophen-containing products, and non-steroidal anti-inflammatory drugs (NSAIDs) should be avoided. Furthermore, the dental hygienist should be alert to signs of untoward bleeding or inhibited clotting (e.g., bruising, petechiae, etc.) in the patient/client (e.g., on hands and arms), which may necessitate medical referral +/- deferral of procedures.
- The dental hygienist should assess the ability of the patient/client to take care of his/her own mouth and teeth. Right-sided brain damage (associated with paralyzed left side) often entails difficulty performing tasks, including toothbrushing. Left-sided brain damage (paralyzed right side) may result in decreased auditory memory, and hence difficulty remembering instructions.
- During the immediate post-stroke phase, a caregiver is likely to perform daily hygiene functions. Therefore, the dental hygienist should ensure the caregiver(s) is educated regarding proper toothbrushing technique and/or given information about maintenance of any dental prosthesis. The patient/client may continue to need assistance in performing oral hygiene self-care well into the rehabilitation phase.
- If there is difficulty in grasping a toothbrush, modifications can be made to the handle with tubing, a tennis ball, or bicycle handle grip. Oral hygiene can be facilitated by an electric toothbrush or a water irrigation device.
- If flossing is problematic, alternatives include a small pointed toothbrush, a rubber-tipped stimulator, or special toothpicks.
- With swallowing problems, the patient/client should sit upright with his/her chin tucked down to keep liquid from pooling in the back of the throat. The mouth can be cleansed prior to brushing by swabbing with a moistened cloth. Toothpaste should not be used; instead, the toothbrush should be slightly moistened with water.
- For patients/clients with dentures, a denture brush with a wide, modified handle may prove helpful.
- Patients/clients with hemiplegia (paralysis of one side of body) may require education on how to maintain good oral hygiene given their physical limitations. Paralysis of the hand or arm may mean that assistance with brushing will be needed, and this may entail education of family members or a personal care giver in addition to the patient/client.

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Oral management implications (cont’d)

■ The dental hygienist should play a role in helping the patient/client change modifiable risk factors for stroke. Assessment, education, and referral for undiagnosed or poorly managed conditions such as smoking, hypertension, diabetes mellitus, and obstructive sleep apnea may be indicated.
■ Because low birth weight may be associated with increased risk of stroke in later life, dental hygienists who are educating female patients/clients about the effects of smoking and periodontal disease can also include the correlation of low birth weight and stroke.
■ Periodontal disease has been found to be correlated with risk of ischemic stroke in adults, with persons with gum disease having higher incidence of stroke than persons without gum disease. Thus, maintaining periodontal health by receiving regular dental/dental hygiene treatment may reduce the incidence of ischemic stroke, although intervention data to date is tenuous.

Oral manifestations

■ Stroke may cause: unilateral loss of voluntary facial muscle movement with resultant muscle atrophy; one-sided neglect and loss of sensation; dysphagia (therefore increasing risk of aspiration and pneumonia); impairment of gag reflex; slurred speech; and difficulty chewing.
■ Tongue function is sometimes poor, with food tending to collect in the cheeks and floor of the mouth. This may contribute to halitosis.
■ Periodontal disease and dental caries are common due to poor oral hygiene.
■ Changes in taste can occur directly as a result of stroke or secondary to certain medications used to treat hypertension (see below).
■ Side-effects of anti-hypertensive medications that may be used in post-stroke patients/clients include:
  - chronic cough (e.g., angiotensin converting enzyme inhibitors [ACEIs]);
  - taste changes (e.g., ACEIs, beta blockers, alpha-adrenergic blockers);
  - angioedema of lips, face, tongue (ACEIs, angiotensin II receptor blockers [ARBs]);
  - upper respiratory tract infections (e.g., ARBs);
  - gingival hyperplasia, with resultant pain and gingival bleeding (e.g., calcium channel blockers [CCBs]);
  - xerostomia (e.g., thiazide diuretics and alpha-adrenergic blockers);
  - lichenoid reactions (e.g., thiazide diuretics and beta blockers); and
  - lupus-like oral and skin lesions (e.g., direct vasodilators).
■ Stroke is a serious and often fatal neurologic event characterized by the rapid appearance (typically over minutes) of a focal deficit of brain function. About 80% of persons experiencing a CVA have an ischemic stroke (caused by inadequate blood supply, and hence oxygenation, to part of the brain), whereas the remaining 20% have a hemorrhagic stroke (caused by bleeding in the brain). Stroke is also categorized as primary or secondary, with secondary meaning the patient/client has had a prior stroke.
■ Ischemic stroke often results from a blood clot that blocks a blood vessel supplying blood to the brain. The clot may result from thrombus formation in an artery that is already narrow, or it may involve an embolus that travels in the circulation from elsewhere.

7 Some authorities further subdivide hemorrhagic stroke into primary intracerebral hemorrhage (15%), which usually results from hypertension, anA TIA is not a true stroke, because it does not entail central nervous system infarction. However, it is a risk factor for a future CVA.

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Related signs and symptoms

- More than 50,000 Canadians experience a stroke annually, with a further 15,000 transient ischemic attacks (TIAs) being reported. The third leading cause of death, stroke kills 14,000 Canadians each year. In North America, about 5% of the population older than 65 years of age has had at least one stroke.
- 300,000 Canadians live with sequelae of stroke.
- If a cerebrovascular accident is not fatal, the survivor is often debilitated in speech and/or motor function. Motor impairment is typically unilateral, involving face, arm, or leg alone or in combination. Other possible sequelae include sensory nerve deficits (vision, temperature, pain, and touch); bladder and bowel problems; cognition and memory problems; and depression (low mood, energy loss, appetite loss, insomnia, and reduced interests). Complete recovery occurs in 10% of patients/clients.
- Prior to a complete stroke occurring, one of three warning events may occur:
  - transient ischemic attack, which is a “mini stroke” that lasts less than 10 minutes;
  - reversible ischemic neurologic deficit that can last 24 hours before eventual recovery occurs; or
  - stroke-in-evolution.
- CVAs usually occur as a complication of other diseases, including cardiac arrhythmia which predisposes to clot formation, carotid artery plaque rupture, and carotid artery stenosis. In addition to TIA, RIND, and recent stroke, risk factors include advanced age, hypertension, diabetes mellitus, obesity, smoking, physical inactivity, bleeding disorders, and polycythemia (i.e., increase in the number of circulating red blood cells). Risk of brain hemorrhage is increased by abuse of certain substances, including alcohol and cocaine. In women, risk of stroke may be increased by hormone therapy and pregnancy.
- Obstructive sleep apnea is a risk factor for recurrent (secondary) stroke.

References and sources of more detailed information

- Canadian Dental Association. How do you manage a patient who’s had a stroke? CDA Oasis discussion.ca. [http://oasisdiscussions.ca/2013/05/15/st](http://oasisdiscussions.ca/2013/05/15/st)

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8 A TIA is not a true stroke, because it does not entail central nervous system infarction. However, it is a risk factor for a future CVA.
9 In particular, atrial fibrillation (AF), the most common sustained cardiac arrhythmia, puts a person at risk of ischemic stroke due to clots entering the cerebral circulation from hypomobile areas of the heart. 1 in 6 strokes occurs in persons with AF.

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**References and sources of more detailed information (cont’d)**

- Thrombosis Canada [www.thrombosiscanada.ca](http://www.thrombosiscanada.ca)
- Heart and Stroke (formerly Heart and Stroke Foundation of Canada) [http://www.heartandstroke.ca/stroke](http://www.heartandstroke.ca/stroke)
- Ontario Stroke Network [http://ontariostrokenetwork.ca](http://ontariostrokenetwork.ca)

* Includes oral hygiene instruction, fitting a mouth guard, taking an impression, etc.
** Ontario Regulation 501/07 made under *Dental Hygiene Act, 1991*. Invasive dental hygiene procedures are scaling teeth and root planing, including curetting surrounding tissue.

**Date:** June 14, 2017