Long-Term Sequelae of Stroke

ROBERT W. TEASELL, MD, FRCPC

SUMMARY

Scant attention has been paid to the long-term consequences and complications resulting from a stroke. Many stroke survivors go on to develop a variety of medical, musculoskeletal, and psychosocial complications, years after the acute stroke. The family physician is regularly called upon to deal with these problems, but is often hampered by a lack of resources.

RÉSUMÉ

On a accordé trop peu d'attention aux conséquences à long terme et aux complications résultant d'un accident vasculaire cérébral. Nombreux sont les survivants d'accidents cérébrovasculaires qui conserveront une variété de complications médicales, musculo-squelettiques et psychosociales pendant des années après la phase aiguë de l'accident. On demande régulièrement au médecin de famille de s'occuper de ces problèmes mais son rôle est souvent amoindri par le manque de ressources.

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DESPITE A DRAMATIC DECLINE in the mortality from stroke since 1950, the annual incidence of stroke in the general population remains at between one and two per 1000 each year. Based on an extrapolation from American figures, there are an estimated 50 000 new cases of stroke in Canada annually.[1] There are approximately six to eight stroke survivors per 1000 each year, and patients live an average of 7 years after the stroke.[2-4]

Stroke remains the single most costly disease, surpassing cancer and heart disease, in its cost to society as a whole.[5,6] Fifteen percent of stroke survivors require long-term institutional care, while 70% are left with a significant functional disability in mobility, activities of daily living, social integration, and gainful employment.[7]

Management of the stroke patient still remains largely focused on the acute in-hospital phase, with its emphasis on medical diagnosis and treatment, including intensive rehabilitation. The immediate consequences of stroke during this acute phase are well recognized. For many stroke survivors and their families, the acute stroke is the beginning of an ongoing struggle with physical impairment and the subsequent disability. With time, the immediate clinical consequences of the stroke are complicated by a variety of less well-known medical, musculoskeletal, and psychosocial difficulties (*Table 1*). It is the family physician who is often left to manage these complications.

Dr Teasell *is Assistant Professor of Medicine, University of Western Ontario, and is Chief of Physical Medicine and Rehabilitation, University Hospital, London, Ont.*

Medical complications

The late medical complications of stroke (*Table 1*), the subject of most research on the condition, are the most familiar to physicians treating stroke patients.

Stroke recurrence. Stroke recurrence is a continuous concern, as the occurrence of stroke is a significant risk factor for the development of further strokes.[1,8] Patients who have had a stroke are five times more likely to have another stroke than matched controls.[9] It is important that risk factors be adequately controlled and preventive measures instituted to prevent stroke from recurring. These preventive measures include low-dose acetylsalicylic acid[10] or, in the case of cardiac emboli, anticoagulation therapy,[10] reduction of elevated cholesterol levels, treatment of hypertension[11-14] and diabetes, and cessation of smoking.[15]

Concurrent cardiovascular disease. Stroke is associated with a high incidence of concurrent cardiovascular disease.[16] The most common cause of death after an atherothrombotic stroke or transient ischemic attack is not a second stroke but rather a

myocardial infarction, cardiac arrhythmia, or congestive heart failure.[17,18] Patients with pre-existing cardiac disorders leading to cardiac embolism often require long-term anticoagulation therapy,[19,20] which carries with it a serious cumulative risk of hemorrhage.[21]

Table 1. **LATER COMPLICATIONS OF STROKE**

MEDICAL
• Stroke recurrence
• Cardiovascular disorders (ie, arrhythmias, infarcts)
• Seizures
• Aspiration or pneumonia
• Urinary incontinence
• Constipation
• Multi-infarct dementia
MUSCULOSKELETAL
• Spasticity

Seizures. Seizures occur in 5% to 9% of all stroke survivors.[8,22,23] In one study of hemispheric stroke patients, who were followed for 2 to 4 years, the incidence was as high as 9%, being more likely to occur in cortical infarcts (26%) than in subcortical infarcts (2%).[22] The electroencephalogram does not appear to be predictive of the risk of seizure.[22] Prophylactic anticonvulsant medications are unnecessary in uncomplicated strokes with no previous history of seizures.

Risk of aspiration. Swallowing difficulties and the risk of aspiration are common in patients with bilateral hemispheric, brainstem, and even unilateral hemispheric strokes.[24-26] In any stroke patient who appears to be having recurrent respiratory problems, silent aspiration should be suspected. Silent aspiration is defined as "penetration of food below the level of the true vocal cords, without cough or any outward sign of difficulty."[27] The only consistent way to diagnose aspiration is a videofluroscopic modified barium study designed to examine swallowing.[28] Compensatory techniques, such as proper positioning while eating, coughing after swallowing, and a pureed or soft dysphagia diet, reduce the chances of aspiration in those who are considered high risk.[28] Some patients require long-term gastrostomy or jejunostomy feeding tubes to maintain adequate nutrition and hydration and to prevent recurrent bouts of pneumonia.

Neurogenic bladder. Following a stroke, patients often experience variable degrees of urinary frequency, urgency, or incontinence due to an incomplete neurogenic (upper motor neuron) bladder. Anticholinergic medications, such as oxybutynin chloride, can be used to reduce urgency and frequency. Where a regular, socially acceptable, voiding pattern cannot be established, consultation with a urologist may be necessary. An external catheter (condom drainage) with men or diapers with women are acceptable means of managing incontinent stroke patients. An indwelling catheter, because of its associated complications, should be used only as a last resort to manage persisting incontinence.

Musculoskeletal complications

Musculoskeletal problems following a stroke invariably involve the hemiplegic side and, in some cases, do not become apparent until several years have passed. Stroke patients often complain bitterly about the pain associated with these complications.

Spasticity and hypertonicity. Although spasticity and hypertonicity are regarded as maladaptive responses to loss of higher central nervous system control, not all the consequences are considered negative (*Table 2*). However, the increased tone that develops as a result of an upper motor neuron lesion leads to often painful and disfiguring contractures of joints,[29,30] as well as abnormal gait patterns, which put excessive strain on various musculoskeletal structures.

Conservative treatment of contractures consists of passive range of motion exercises, splinting, and proper positioning of limbs.[31] Pharmacological treatment of spasticity in stroke patients is rarely successful without excessive sedation. Diazepam (6 to 20 mg per day), baclofen (15 to 80 mg per day), or dantrolene sodium (50 to 400 mg per day), given three to four times daily, may be tried as a last resort.[32-34] Again, treatment must take into account the positive benefits of spasticity (*Table 2*).

Genu recurvatum. Genu recurvatum, or hyperextension of the hemiplegic knee, is commonly seen. Repeated knee hyperextension can lead to progressive stretching of the posterior knee capsule and ligaments leading to ligamentous instability, thereby increasing the risk of osteoarthritis of the knee.[35] Management involves a physiotherapy assessment to determine whether this anomaly can be corrected. An ankle-foot orthosis, set in 5° of dorsiflexion, can help the patient overcome the knee hyperextension by forcing the knee to flex during stance phase.

Plantarflexion. Plantarflexion contracture of the ankle is a common complication that results in a decreased base of support and genu recurvatum during stance phase[36] of gait and difficulty in clearing the foot during swing phase. Generally, the contracture can be partially corrected with physiotherapy and an ankle-foot orthosis.

Inversion of the foot and ankle. Inversion of the foot and ankle is often also present, causing the patient to walk on the lateral aspect of the foot, which can be quite painful. This inversion often interferes with proper fitting of an ankle-foot orthosis. Surgical lengthening of the Achilles tendon is rarely considered, although it does not resolve the problem of increased tone in the gastrocnemius and soleus muscles.

Painful hemiplegic shoulder. A painful hemiplegic shoulder is common following stroke,[37-39] occurring in up to 72% of hemiplegic patients.[40,41] The two conditions most frequently associated with shoulder pain are glenohumeral subluxation[37,42-46] and a frozen (spastic) shoulder.[37,47-49] Lateral and downward subluxation of the glenohumeral joint often occurs during the initial flaccid stage[37,41,50,51] and can lead to shoulder pain[37,43-46] or a brachial plexus traction injury.[52] At present, a frozen or contracted shoulder is considered the major source of pain in the hemiplegic patients[44,48,49,53] and is often accelerated by the inappropriate use of arm slings. Referral to a physiotherapist for shoulder mobilization, followed by a home program performed either by the patient or family is the treatment of choice.

Shoulder-hand syndrome is a form of sympathetically mediated pain that has been estimated to affect the arm in one out of every eight patients with hemiplegia.[54] The syndrome is characterized by pain, swelling, hyperesthesia, and vasomotor instability of the wrist and hand, in association with shoulder pain and decreased range of motion.[55] It generally develops within 3 months of the stroke.[54]

Table 2. **EFFECTS OF SPASTICITY**

POSITIVE EFFECTS
• Keeps hemiplegic knee and hip in extension while bearing weight
• Reduces risk of venous thromboembolism
• Reduces risk of osteoporosis

Diagnosis is confirmed with the three-phase radionuclide bone scan, which demonstrates increased periarticular uptake at the shoulder and wrist of the affected upper extremity.[56] This syndrome often responds positively, at least initially, to a short course of high-dose steroids,[57-60] stellate ganglion (sympathetic) blocks,[61-63] and physiotherapy emphasizing range of motion exercises.[58,59,64]

Wrist and hand flexion. Wrist and hand flexion contractures develop in the hemiplegic wrist and hand. A fixed flexion contracture of the hand interferes with restoration of hand function. It can be painful (therefore increasing spasticity) and often is unsightly. Prevention, with regular range of motion exercises and positional splints, is the key to management. Splints should maintain a gentle stretch on flexor muscles, keep the wrist in 20° to 30° of extension, and should not increase spasticity.

Fractures. Fractures of the hip, humerus, and distal radius on the hemiplegic side are not uncommon. Fractures of the lower extremity in an ambulatory patient should be managed aggressively. A fracture is often the event that leads to loss of independence for stroke patients and to eventual institutionalization.

Orthopedic surgical intervention. For contractures, orthopedic surgical intervention is rarely required. Surgery should not be con-

sidered unless it improves the patient's level of function and bed or wheelchair positioning, or allows for better hygiene.

Table 3. **CAUSES OF DECREASED SEXUAL ACTIVITY FOLLOWING STROKE**

Fear of stroke recurrence
Sexual impotence • Psychological (depression or feeling unattractive) • Iatrogenic (medications)
Paralysis, weakness, or spasticity interfering with positioning

Psychosocial complications

Psychosocial complications of debilitating stroke, which are very common, almost inevitably, have a profound impact on the patient, as well as the immediate circle of family and friends.

Depression. Clinically significant depression occurs in more than 30% of stroke patients.[65-67] This depression is more than a simple grief reaction to physical and cognitive impairments and disabilities. Rather, it is likely more complex, being related, at least partly, to the brain damage itself.[65,66] The nature of this relationship is still unclear.[68] The significance of the depression is that it reduces motivation, with an adverse effect on activities of daily living and socialization, and it often adds to family problems and stresses.

The diagnosis of depression can be difficult to establish in a stroke patient, especially if aphasia is present. The emotional lability often seen in the early stages of a stroke or the flat affect often seen with right hemispheric lesions can be misinterpreted as depression. Indications of depression include an unexplained deterioration in level of functioning, insomnia, loss of appetite with weight loss, and statements that indicate dysphoria, guilt, or hopelessness.

Treatment should include positive feedback, emotional support, and where available and accepted by the patient, psychological counseling. Nortriptyline (Aventyl) has been shown to significantly improve depression after a stroke, beginning with a dose of 25 mg daily and increasing the dosage gradually until serum levels are therapeutic.[69] Trazodone HCl (Desyrel) is preferred by some because it is reported to have fewer cardiac and anticholinergic side effects. There is a risk of excessive sedation with all antidepressants.

Family difficulties. Family difficulties following a stroke are often not well appreciated. A stroke involving one member affects the well-being of the entire family. Family members providing care to a stroke victim face their own adjustment problems, as their personal needs are often sacrificed to meet the care needs of the stroke patient. The brunt of the long-term care of the stroke patient generally falls onto the spouse and, where the spouse is unavailable, a daughter or son.[70,71] The caregivers are often under great stress, with limited opportunities for rest, and themselves suffer higher rates of depression and deterioration of health.[17,72] Family roles often become reversed – a child may become caregiver for his or her parent. The cognitive, communication, and behavioral problems consequent to the stroke further exacerbate an already stressful situation.

Families, like the patient, go through stages of adjustment, including initial denial, and later anger and frustration. Eventually, family members come to accept the permanence of the disability, and a new equilibrium is established as the family adjusts roles to accommodate the changed capabilities of the stroke patient. Unfortunately, this new equilibrium can take years to establish, and some families break down under the burden of care required. Family coping and reintegration is mainly dependent on how well family members communicate and solve problems.[73] Lack of socialization is a common and vexing problem for many stroke patients and their families. Community senior clubs and local stroke groups can be beneficial.

Decreased sexual activity. Decreased sexual activity or abstinence is common following a stroke for several reasons (*Table 3*), although sexual libido is generally unchanged.[74] For married stroke patients younger than 50 years of age, one study showed the frequency of sexual intercourse decreased significantly; 41% of men and 17% of women ceased intercourse altogether, while 29% of men and 42% of women reduced their frequency of intercourse.[75] Patients and spouses need to be reassured that sexual activity is permissible and that they can still achieve satisfaction and intimacy.

Functional disability. Driving a motor vehicle is one of the most complicated of learned skills, requiring good vision, intact reflex responses, and rapid decision making. If one or more of these factors is impaired, then the individual's driving skills need to be retested. In cases of neglect (usually left-sided) or homonymous hemianopsia, the patient should not drive.

When patients were employed at the time of the stroke, return to work becomes an issue. Those with significant deficiencies should delay the decision to return to employment for several months to allow maximum neurological and functional recovery. The patient's abilities must be carefully measured against the demands of the particular job; a vocational counselor can be quite helpful.

Conclusion

Many stroke victims develop a variety of medical, musculoskeletal, and psychosocial complications, years after a stroke. These complications can add to the original disability imposed by the stroke. The family physician, who is in an ideal position to do so, is often called upon to deal with these complications. Because stroke is a common disorder, family physicians can help their stroke patients by understanding the potential complications that can arise following a cerebrovascular event. ■

Requests for reprints to: *Dr Robert Teasell, Physical Medicine and Rehabilitation, University Hospital, 339 Windermere Rd, London, ON N6A 5A5*

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