

# Women and Stroke

*Jeffrey Teraoka, M.D.*

---

## INTRODUCTION

A stroke, or cerebrovascular accident (CVA), is defined as a sudden insult to the brain caused by any acute disruption of the cerebral vasculature resulting in interruption of normal blood circulation to certain areas of the brain. Women are affected by stroke in large numbers, largely because of the prevalence in women of high blood pressure, the most important risk factor for stroke. Stroke is the second leading cause of death in women, and for the many women who survive a stroke, it is a leading cause of disability.

Stroke has recently been termed “brain attack” as the interruption of normal blood circulation to the brain results -- similar to heart attack -- in impairment of motor, sensory, and/or cognitive functioning of the individual. Possible etiologic mechanisms include vascular occlusion that subsequently leads to infarction, vascular rupture causing hemorrhage, as from arteriovenous malformations (AVM), aneurysms, or other vascular anomalies. Embolic strokes are caused by embolism of clots or plaques from distant sites that lodge in the end vessels of the brain resulting in occlusion and infarction. Drug therapy is a relatively recent approach to the treatment of stroke, and a tremendous amount of research is under way to find effective new drugs that can minimize stroke damage. The Stanford Stroke Center is participating in FDA-approved clinical trials of a number of new drugs, which are showing promise for both emergency treatment of stroke as well as stroke prevention.

The side of the brain involved determines the specific characteristics of the impairments the patient manifests. For example, left brain involvement often causes language difficulty, i.e., the aphasias. This type of stroke would therefore necessitate more involvement of speech therapy as reading, writing, verbal expression and comprehension are affected. Right brain involvement leads to perceptual difficulties, visual spatial problems, and neglect or inattention to the affected side. Therapy is thus focused toward perceptual relearning skills, as well as attending to and utilization of the affected side. Therefore, the side of the brain that is injured often influences the focus or impetus of therapy.

The impairments associated with a stroke are severely disabling for the stroke survivor. Not only does it affect the victim, but also places significant strain on the spouse and family. Although complete healing of the actual impairments may never be feasible, adapting to them through problem solving and understanding can greatly relieve the stress and strain that accompanies any disability. Various recommendations and “helpful hints” regarding several aspects of stroke disability will be presented.

---

## EPIDEMIOLOGY/RISK FACTORS

Hypertension still remains the most important risk factor for stroke. Before thirty years of age, women have a higher incidence of stroke, however after thirty-five, the incidence for men exceeds women. After the age of sixty-five stroke affects women equally as men. The case fatality rate in women exceeds that for men. That is, about 16% of women versus 8% of men die from stroke.

Women have a lower risk for recurrence of stroke. The incidence of stroke in younger women is increasing due to increasing rates of smoking, as well as hypertension in females. Migraine headaches and vasculitis, both more common in females, are also associated with an increased risk for stroke. Women have a greater incidence of subarachnoid hemorrhage than men. The risk of stroke associated with atrial fibrillation is twice as high in females as it is in males.

The use of oral contraceptives has been associated with an increased risk for stroke in the younger female. Stroke risk with low estrogen preparations is much less than that for the prior generation of high estrogen contraceptives. The use of noncontraceptive estrogens has not been found to be associated with an increased risk for stroke or thromboembolic disease. The progesterone component in oral contraceptive preparations may decrease the risk of vascular disease.

Smoking increases the risk of both ischemic stroke and subarachnoid hemorrhage. The risk of stroke for a woman smoker is 2.5 times higher than a nonsmoker. The risk is even greater for a woman smoker on oral contraceptives, such that smoking plus OC use increases the risk for stroke to 4.7 times. Smoking should therefore be considered a contraindication to oral contraceptive use, or a woman should be urged to quit smoking if she wishes to use oral contraceptives. Smoking is also the most important risk factor for vascular disease in females.

Metamphetamine abuse is becoming more widespread and an emerging cause of stroke, especially in the younger population. Other stimulants such as cocaine have also caused an increase in the incidence of stroke. The etiology is most likely related to severe and sudden elevations in blood pressure, causing rupture of the cerebral vessels. There is also evidence that these drugs can also cause a vasculitis, which subsequently leads to infarction or hemorrhage.

The risk of stroke is also increased during pregnancy. It usually occurs during the last trimester or during the first six weeks postpartum. The accepted range of incidence is between 4.5/1000 B 1/26000. There is no current data on the relationship of childbearing to the risk of recurrent stroke. There is data that multiparous women may have an increased risk for stroke, though this appears more significant after the female is sixty-five years of age (post childbearing years). The magnitude of the risk decreased after adjusting for other factors such as race, smoking, blood pressure, diabetes, cholesterol level and other variables. There is no reported literature showing that a pregnant woman who is older in age is at an increased risk of having a stroke. Alterations in the coagulation and fibrinogen systems during pregnancy lead to a hypercoagulable state.

Increased viscosity and venous stasis also occur during pregnancy, which increase the risk of stroke.

Subarachnoid and intracerebral hemorrhages from ruptured aneurysms or arteriovenous malformations (AVM) occur more frequently during pregnancy. Some studies have stated that the risk for intracranial aneurysmal rupture increases five times during pregnancy. Also, females with known AVM have an 87% chance/risk of a subarachnoid bleed during pregnancy. These findings have been challenged by other studies that show no significant increase in bleeding with an aneurysm or AVM.

Eclampsia is still the leading cause of stroke, intracerebral hemorrhage and death during pregnancy in the world. In one study it accounted for 47% of nonhemorrhagic strokes during pregnancy. Focal deficits of sudden onset which resolve over the subsequent days associated with encephalopathic findings are common. Clinical and imaging findings are most consistent with localized edema due to vasomotor dysfunction from hypertension .

Cerebral Venous Thrombosis (CVT) can occur in women during the last trimester and post partum period. It may account for up to one third of pregnancy related strokes. It is characterized by headaches, seizures, or focal deficits few days after delivery. Pregnancy related hypertension, infections (except pneumonias) and cesarean delivery are the most important risk factors for this condition as it seems to be related to a hypercoagulable state that leads to an increased tendency for thrombosis (14,22). Postpartum cerebral angiopathy, a vasculitic condition, can also present during the post partum state, mimicking CVT.

Vasculitic diseases occur more commonly in females and often become exacerbated during pregnancy. Fifty percent of patients with Takayasu's arteritis, associated with large arterial vessel involvement, have exacerbation of symptoms during pregnancy. Systemic Lupus Erythematosus (SLE), causing smaller vessel disease, also tends to flare during pregnancy. SLE patients have an increased incidence of having antiphospholipid antibodies (APA), such as anticardiolipin and the lupus anticoagulant antibodies. APA are identified in 7-29% of patients with stroke. The IgG anticardiolipin antibody is most often associated with stroke risk.

Migraine headaches have also been associated with an increased risk for stroke. It is the presumed etiology in about 10% of young adults with stroke. Greater than 80% of strokes from migraines occur in women. Oral contraceptives may increase the risk of migraine associated strokes.

---

## SPASTICITY

Spasticity in a stroke patient is often characterized by tightness or increased tone of the involved extremity. The patient usually assumes a posture in which the upper extremity is adducted and internally rotated at the shoulder, flexed and pronated at the elbow, and flexed at the wrist and fingers. The lower extremities usually held with the hip internally rotated and extended, the knee hyperextended, and foot plantar flexed and supinated. Spasticity is difficult to control. It can be lessened through trial use of different

medications such as baclofen (lioresol), up to one hundred mgs a day in four divided doses; diazepam (Valium), starting at five mgs. three times per day; tizanidine (Zanaflex), up to twenty-four mgs. per day in four divided doses; and dantrolene (Dantrium) starting at fifty mgs. three times per day (4). An intrathecal baclofen pump may sometimes be indicated in severe cases of spasticity not controlled with oral agent. Weightbearing through the affected extremity often helps decrease spasticity to some degree. Range of motion exercises help decrease tone though needs to be done on a daily basis.

Nerve blocks and motor point blocks are effective in alleviating severe spasticity in specific muscle groups, especially if hygiene, positioning, and functional movements are compromised because of excessive tone. Temporary blocks can be done with bupivacaine or lidocaine to determine whether the intended long term paralysis will be effective, and in fact not detrimental to the patient's function. This can be followed by the use of 6% phenol or denatured alcohol to effect a longer term neurolysis, i.e., about nine months. The use of botulinin toxin has become more popular in motor point blocks as it is easy to inject and with very few side effects. Its effect usually lasts about two to six months.

---

## BOWEL/BLADDER FUNCTION

Urinary incontinence occurs in about 50-60% of new stroke patients. With appropriate interventions, this will improve to about 14% having incontinence after six months. Persistent incontinence significantly affects a patient's self esteem, independence, and can also influence the ultimate discharge disposition. It is therefore important to fully evaluate and treat the cause as effectively as possible.

Stroke most often leads to an uninhibited bladder, in which the patient has difficulty withholding urination until the proper time. Stroke can also lead to detrusor hyperreflexia in which the bladder contracts at lower filling volumes, or with minimal unassociated stimulation. Women may also have an element of stress incontinence due to internal sphincter incompetence. Urologic studies including urodynamic studies and voiding cystourethrograms are often necessary to further evaluate the true etiology of the problem. It is also important to initially check post void residual volumes remaining in the bladder after voiding, to ensure near complete elimination of urine. If the residual volumes are greater than 100-125 cc., an intermittent catheterization program should be instituted until volumes normalize.

Incontinence due to an overactive or hyperreflexic bladder can be treated with anti-cholinergic agents such as oxybutinin (Ditropan) or tolterodine (Detrol). Dosing of oxybutinin can be started at 2.5-5mg qd-bid, increasing to 10mg bid if indicated. Detrol is usually given at 1-2mg bid. Side effects may include dry mouth, gastric upset, constipation, or lethargy. Sphincter incompetence can be initially treated with a trial of alpha agonist agents such as phenylpropanolamine 50mg bid-tid; however, it often eventually requires surgical correction. Behavioral interventions such as timed voiding or voiding according to a set schedule (e.g., every two hours while awake) is also effective regardless of the etiology of incontinence for women. Kegel exercises have been advocated to help tone the pelvic floor muscles, such that the patient can regain or improve voluntary control of the micturition response.

Despite trials of the previous treatment options, many patients will continue to have incontinence to some extent. Containment devices such as absorbent pads (Depends) are often indicated, especially at night. A bedside commode can be useful at night if the bathroom is further away and balance, proprioception, and vision are impaired. Unfortunately, females do not have the option of wearing a condom catheter. An indwelling catheter should only be used as a last resort. This necessitates wearing a collection bag and tubing, predisposes one to infection or colonization by resistant bacteria, and considerably lessens the potential to ever regaining continence.

Bladder management is also beginning to be achieved through implantable and nonimplanted electrical stimulation units that stimulate the sacral nerve roots or other sites within the micturition pathway. These devices can facilitate bladder contraction, or alternatively facilitate continence by increasing the tone of the sphincter. Although these units have shown good promise in patients with myelomeningocele, spinal cord injury and multiple sclerosis, their use in stroke patients requires further research and refinement.

---

## CHRONIC PAIN

Pain often occurs in the stroke patient due to shoulder pain from subluxation and abnormal mechanics around the joint due to spasticity or joint contracture. Rotator cuff syndromes with supraspinatus tendinitis and subacromial bursitis due to impingement of the humerus on the acromion are also common because of the abnormal mechanics. Slow, regular and consistent range of motion exercises are necessary to increase the extent of movement around the joint. Intra-articular steroid injections are also helpful in decreasing pain and inflammation within the joint, and affording further range of motion. The use of slings to support the hemiparetic arm is still controversial. A poorly fitted or prescribed sling may actually push the humerus incorrectly into the glenoid fossa, causing more dysfunction and pain. The use of lap boards or supporting the extremity by placing it in the person's pocket may be a better option, however the use of a sling may still be judiciously prescribed after careful evaluation.

Pain can also be an entity of itself if the stroke involves the thalamus. Central Pain Syndrome associated with thalamic CVAs can cause significant dysesthesia throughout the affected side, even in the face of good motor recovery. Treatment includes desensitization techniques, as well as the use of medications such as gabapentin, tricyclic antidepressants (TCA), or anticonvulsants that help alleviate neuropathic pain. Gabapentin (Neurontin) can be started at 300mg tid, increasing up to 3600mg per day as tolerated. Usual side effects include dizziness, lethargy, and mental clouding. The TCAs such as amitriptyline (Elavil) and nortriptyline (Pamelor) can be initiated at 25mg qhs, then increased up to 100-150mg qhs if needed. Side effects include dry mouth, upset stomach, mental clouding, urinary hesitancy, lethargy/sleepiness, and potential heart arrhythmias such as conduction blocks. Carbamazepine (Tegretol) can be started at 300mg bid, increasing the dose as the level is checked. Appropriate blood levels range between 4-12ug/ml. Again, sleepiness and mental clouding are the most common side effects. More serious adverse effects such as neutropenia, thrombocytopenia, aplastic anemia or liver disease, though rare, have occurred and therefore need monitoring.

---

## ACTIVITY/EXERCISE

It is essential for the stroke survivor to remain as active as possible. Continued therapy either through prescription or community programs not only helps facilitate further functional recovery, but also helps maintain the current gains, and provides an avenue for socialization and community reentry. Community college adaptive physical education programs have been vital in providing continued therapy, and stroke activity centers are arising as well to allow patients continued therapy even after prescribed therapy has been terminated.

Fatigue may be a prominent symptom during the first year after a stroke. This is due to both mental and physical effects from the stress of having a stroke, as well as deconditioning, depression, increased energy demands from impaired mechanics, and neurobiochemical changes within the brain leading to depression. Rest periods during the day may be helpful to regain one's energy, however, sleeping for extended periods during the day will prevent the person from sleeping at night. Although motivation to stay active and indulge in exercise is good, it is also important not to push too hard and overexert or fatigue oneself, as poor habits and techniques in functioning may develop. Level of physical activity and fitness after a stroke is essential. Exercise helps reduce tone, maintains and helps increase joint range of motion, facilitates functional movements as used in ambulation and activities of daily living. It also contributes to psychological well-being and stress reduction. The lack of physical activity has been found to be a risk factor for stroke. Exercise can help decrease the contribution of risk factors toward another stroke, i.e., lowering blood pressure and modifying cholesterol levels.

The best types of exercise after a stroke constitute an aerobic type of activity, which also incorporates functional movements into the exercise. Walking, general stretching or calisthenics are good starting exercises. Aquatic therapy, i.e., exercises performed in the pool, is an excellent form of therapy as it helps optimize tone as well as lessening the "confines" of gravity on the torso and lower extremities. This allows freer movements that may actually facilitate the gait pattern, and thus allow a person to "walk in the water" which would otherwise be difficult to do on land. Tai chi is becoming very popular as an exercise after stroke as it consists of slow, easy movements combined with balance and coordination training. Generally, exercises that cause significant exertion and physical stress should be avoided, such as contact sports, and fast paced activities. Isometric exercises and weight lifting should also be avoided as they can increase the intracerebral blood pressure during the strain of lifting or Valsalva maneuver.

---

## PSYCHOSOCIAL ISSUES

The effects of a stroke are psychologically devastating. A woman's confidence may be greatly shaken by the consequences of the stroke on her physical appearance, role as a spouse/significant other, professional, homemaker, and productive individual in society. Society still places a significant amount of emphasis on a woman's physical appearance, and the hemiparesis and other physical alterations that often result from stroke may make her feel unattractive and unacceptable. This may lead to isolation and depression, or create stress in her relationships with others, especially with spouses/significant others.

There are some studies that have suggested that women are more likely to suffer significant depression after a stroke than men. This may be because many stroke patients are women who were living alone at the time of the stroke. There has been a suggestion that patients with left hemisphere strokes tend to have an increased incidence of depression. More recent studies have disputed this, with the evidence pointing more towards an equal distribution for both hemispheric stroke. Patients with right brain involvement may however present with features that mimic depression, that is, a flat affect and loss of inflection of speech due to the inability to convey emotion or mood, termed "aprosodia".

Significant depression has been found to occur in at least one third of stroke patients, and it is not uncommon for caretakers to develop depression as well. It is crucial to recognize that the woman who has had a stroke can benefit from receiving confirmation from others that she is still attractive and accepted, and that she is still basically the same person "within." The woman who has had a stroke should be encouraged to discuss issues of concern and adjustment with all members of her support system and any other involved parties. Counseling by a social worker or rehab counselor is often necessary to guide this process. In addition, creative alternatives and adaptations should be sought to facilitate her resumption of her activities.

Information regarding a woman's return to work after having a stroke is sparse. This is becoming much more of a relevant issue as the incidence of stroke in younger, working age women is increasing. Many women need to maintain their income and/or their profession, and it is often difficult for a woman to regain her position or obtain one at a similar level after having a stroke. It is important that she know about her options with regard to obtaining the assistance of a rehabilitation or vocational counselor and/or a case manager to help her get back into gainful employment. It is also important for her physician to be supportive and to help her obtain the necessary resources.

---

## SEXUALITY

It is controversial regarding the influence that a stroke has on the actual physiologic responses surrounding sexual function. Although many studies have documented changes in vaginal lubrication, orgasmic response, sexual satisfaction and libido, many authors have concluded that these impaired responses are influenced by psychogenic and psychosocial factors rather than true organic factors. Depression, anxiety, and fear will all influence a woman's sexual responsiveness. These along with negative

perceptions of body image, changes in roles and relationships, as well as the actual physical limitations and obstacles will also complicate the intimate relationship of the couple. Physical intimacy does not necessarily mean the need for intercourse; physical reassurance and affection through touching, hugging and cuddling can often mean just as much as the actual sexual act. This can also lead to further creative experimentation and adaptations that may ultimately culminate into an intimate physical relationship unhindered by the physical limitations of the stroke. Again, counseling by a professional may be necessary to start the process of adjustment and acceptance.

Spasticity can affect women during sexual activity. Sudden increases in tone or clonus can interfere with sexual intimacy. Spasticity also tends to increase with increasing arousal and during orgasm. Experimentation with different positions may help decrease the interference of the spastic extremity. With this, although the spasticity may increase, it will not affect the intimacy or spontaneity of the sexual act. For example, sidelying on the affected extremity will allow freedom of the unaffected side, yet restrain the interfering movements of the affected side.

A major concern of patients has been the possibility of having another stroke with any sexual activity. It is often such a significant source of anxiety that sexual intimacy is avoided altogether. There is no convincing evidence that sexual activity increases the risk of having a stroke, however there is some suggestion that there may be an increased risk of intracerebral bleeds due to elevations in blood pressure during sex. It is therefore important for the physician and team to discuss this issue and help allay any fears of the patient and significant other. In other words, it is important for health care professionals to ask the woman who has had a stroke about issues related to sex and sexuality, and to be prepared to address her concerns.

---

## CLINICAL EVALUATION (HISTORY AND PHYSICAL EXAM)

Initial evaluation of a stroke patient should focus on identifying risk factors that may have contributed to the initial stroke as well as possible subsequent strokes. History of hypertension, migraine headaches, and cardiac disease, including arrhythmias and murmurs may reveal potential causes of the stroke. History of previous problems during pregnancy and the post partum period is vital, especially for a female of childbearing age. A history of abnormal clotting or bleeding episodes, and any rheumatologic disorders is equally important. Family history may reveal other family members with stroke, hypertension, cardiac disease, rheumatologic diseases or other genetic diseases that can affect vascular integrity, i.e., Ehler-Danlos, or Marfan Syndrome. Diabetes and hypercholesterolemia are also very common tendencies in families. The use of birth control pills, cigarettes, illicit recreational drugs, especially stimulants, are certainly factors related to the increased incidence of stroke.

On physical examination, the mini-mental status exam may help reveal obvious cognitive problems. It is also important to take note of the patient's speech, for any evidence of an aphasia or dysarthria. If there is any question of swallowing difficulty (dysphagia), a swallowing evaluation by a speech and language pathologist or occupational therapist is essential to prevent the common complication of aspiration pneumonia. Gross visual field examination can detect field cuts (hemianopsia). The

examiner should also take note whether the patient tends to focus all efforts and attention toward the unaffected side. It is not uncommon for the patient to neglect the impaired side or not even realize that she has weakness of the involved extremity. Auscultation of the heart sounds and carotids may reveal an arrhythmia, murmur, or bruit that may have been a contributing factor toward the stroke.

Although evaluation of muscle strength is important, it is more relevant to take note of the patient's tone (i.e., spastic or flaccid) and of how much she is able to move each extremity relative to gravity and/or resistance and use the extremity in functional tasks. Sensation, especially proprioception, as well as balance and coordination should be noted. Range of motion of the joints, especially of the shoulder and ankle should be evaluated for any significant restriction of motion. Shoulder pain due to tightness of the surrounding capsule and tissues is common, as well as plantar flexion contractures of the ankle.

---

## CONCLUSIONS

Although many of these recommendations are not simple "cookbook" interventions, overcoming the disability and handicap associated with CVA requires time, acceptance, and close interaction between those intimately related to the stroke survivor in order to create better adjustment and treatment outcomes for an otherwise complex and potentially devastating disorder.

*"I had to start with my own mindful attitude, realizing that my spirit was influencing my choice between tragedy and happiness. But I would first have to look deep into my sorrows to find new direction. Only then could I seek everlasting joy. It was completely up to me now to elevate my own quality of life. I understood that when I panicked, I was without hope because I lost contact with myself. Despite the physical destruction caused by paralysis and aphasia, I was determined more than ever that nothing should prevent my healing. I knew that the inspiration for recovery was within me. My reasons for living would come from the heart. It was the onset of my metamorphosis"*

*-- Barbara Newborn, Return to Ithaca s*