# DOWNLOAD PDF CEREBROVASCULAR DISEASE AND UPPER-EXTREMITY VASCULAR DISEASE

## Chapter 1 : Buerger's Disease: UC Davis Vascular Center

*Peripheral vascular disease (PVD) is a blood circulation disorder that causes the blood vessels outside of your heart and brain to narrow, block, or spasm. This can happen in your arteries or veins.*

Page of The word cerebrovascular is made up of two parts â€" "cerebro" which refers to the large part of the brain, and "vascular" which means arteries and veins. Together, the word cerebrovascular refers to blood flow in the brain. The term cerebrovascular disease includes all disorders in which an area of the brain is temporarily or permanently affected by ischemia or bleeding and one or more of the cerebral blood vessels are involved in the pathological process. Cerebrovascular disease includes stroke, carotid stenosis, vertebral stenosis and intracranial stenosis, aneurysms, and vascular malformations. Restrictions in blood flow may occur from vessel narrowing stenosis , clot formation thrombosis , blockage embolism or blood vessel rupture hemorrhage. Lack of sufficient blood flow ischemia affects brain tissue and may cause a stroke. Blood Flow to the Brain The heart pumps blood up to the brain through two sets of arteries, the carotid arteries and the vertebral arteries. The carotid arteries are located in the front of the neck and are what you feel when you take your pulse just under your jaw. The carotid arteries split into the external and internal arteries near the top of the neck with the external carotid arteries supplying blood to the face and the internal carotid arteries going into the skull. Inside the skull, the internal carotid arteries branch into two large arteries â€" the anterior cerebral and middle cerebral arteries and several smaller arteries â€" the ophthalmic, posterior communicating and anterior choroidal arteries. These arteries supply blood to the front two-thirds of the brain. The vertebral arteries extend along side the spinal column and cannot be felt from the outside. The vertebral arteries join to form a single basilar artery near the brain stem, which is located near the base of the skull. The vertebrobasilar system sends many small branches into the brain stem and branches off to form the posterior cerebellar and posterior meningeal arteries, which supply the back third of the brain. The jugular and other veins carry blood out of the brain. Because the brain relies on only two sets of major arteries for its blood supply, it is very important that these arteries are healthy. Often, the underlying cause of an ischemic stroke is carotid arteries blocked with a fatty buildup, called plaque. During a hemorrhagic stroke, an artery in or on the surface of the brain has ruptured or leaks, causing bleeding and damage in or around the brain. Whatever the underlying condition and cause are, it is crucial that proper blood flow and oxygen be restored to the brain as soon as possible. Without oxygen and important nutrients, the affected brain cells are either damaged or die within a few minutes. Once brain cells die, they cannot regenerate, and devastating damage may occur, sometimes resulting in physical, cognitive and mental disabilities. Cerebrovascular Disease Statistics There were an estimated , cerebrovascular-related deaths in ; , of which were in people age 65 and older. Cerebrovascular disease is the most common life-threatening neurological event in the U. Intracranial atherosclerosis is responsible for approximately 40, of these attacks per year, representing 10 percent of all ischemic strokes. Stroke is the third leading cause of death in the United States. Of the more than , people affected every year, about , of these are first attacks and , are recurrent. About 25 percent of people who recover from their first stroke will have another stroke within five years. Stroke is a leading cause of serious long-term disability, with an estimated 5. The most recent prevalence statistics from the American Heart Association estimate that 5,, people have experienced stroke. Every year, an estimated 30, people in the United States experience a ruptured cerebral aneurysm and as many as 6 percent may have an unruptured aneurysm. Arteriovenous malformations AVMs are present in about 1 percent of the general population. The risk of hemorrhage from an AVM is 4 percent per year with a 15 percent chance of stroke or death with each hemorrhage. Cerebrovascular Diagnostic Tests The majority of cerebrovascular problems can be identified through diagnostic imaging tests. These tests allow neurosurgeons to view the arteries and vessels in and around the brain and the brain tissue itself. Cerebral angiography also called vertebral angiogram, carotid angiogram: Arteries are not normally seen in an X-ray, so contrast dye is utilized. The patient is given a local anesthetic, the artery is punctured,

usually in the leg, and a needle is inserted into the artery. A catheter a long, narrow, flexible tube is inserted through the needle and into the artery. It is then threaded through the main vessels of the abdomen and chest until it is properly placed in the arteries of the neck. This procedure is monitored by a fluoroscope a special X-ray that projects the images on a TV monitor. The contrast dye is then injected into the neck area through the catheter and X-ray pictures are taken. Carotid duplex also called carotid ultrasound: In this procedure, ultrasound is used to help detect plaque, blood clots or other problems with blood flow in the carotid arteries. A water-soluble gel is placed on the skin where the transducer a handheld device that directs the high-frequency sound waves to the arteries being tested is to be placed. The gel helps transmit the sound to the skin surface. The ultrasound is turned on and images of the carotid arteries and pulse wave forms are obtained. There are no known risks and this test is noninvasive and painless. A diagnostic image created after a computer reads x-rays. In some cases, a medication will be injected through a vein to help highlight brain structures. Bone, blood and brain tissue have very different densities and can easily be distinguished on a CT scan. A CT scan is a useful diagnostic test for hemorrhagic strokes because blood can easily be seen. However, damage from an ischemic stroke may not be revealed on a CT scan for several hours or days and the individual arteries in the brain cannot be seen. CTA CT angiography allows clinicians to see blood vessels of the head and neck and is increasingly being used instead of an invasive angiogram. A water-soluble gel is placed on the transducer a handheld device that directs the high-frequency sound waves to the artery or vein being tested and the skin over the veins of the extremity being tested. There is a "swishing" sound on the Doppler if the venous system is normal. Both the superficial and deep venous systems are evaluated. These electrical signals are printed out as brain waves. Lumbar puncture spinal tap: An invasive diagnostic test that uses a needle to remove a sample of cerebrospinal fluid from the space surrounding the spinal cord. This test can be helpful in detecting bleeding caused by a cerebral hemorrhage. A diagnostic test that produces three-dimensional images of body structures using magnetic fields and computer technology. It can clearly show various types of nerve tissue and clear pictures of the brain stem and posterior brain. An MRI of the brain can help determine whether there are signs of prior mini-strokes. This test is noninvasive, although some patients may experience claustrophobia in the imager. The magnetic images are assembled by a computer to provide an image of the arteries in the head and neck. The MRA shows the actual blood vessels in the neck and brain and can help detect blockage and aneurysms. Stroke Stroke is an abrupt interruption of constant blood flow to the brain that causes loss of neurological function. The interruption of blood flow can be caused by a blockage, leading to the more common ischemic stroke, or by bleeding in the brain, leading to the more deadly hemorrhagic stroke. Ischemic stroke constitutes an estimated 80 percent of all stroke cases. Stroke may occur suddenly, sometimes with little or no warning, and the results can be devastating. Stroke Symptoms Warning signs may include some or all of the following symptoms, which are usually sudden: Dizziness, nausea, or vomiting Confusion, disorientation or memory loss Numbness, weakness in an arm, leg or the face, especially on one side Abnormal or slurred speech Loss of vision or difficulty seeing Loss of balance, coordination or the ability to walk Types of Stroke and Treatment Ischemic Stroke Ischemic stroke is by far the most common type of stroke, accounting for a large majority of strokes. There are two types of ischemic stroke: A thrombotic stroke occurs when a blood clot, called a thrombus, blocks an artery to the brain and stops blood flow. An embolic stroke occurs when a piece of plaque or thrombus travels from its original site and blocks an artery downstream. The material that has moved is called an embolus. How much of the brain is damaged or affected depends on exactly how far downstream in the artery the blockage occurs. In most cases, the carotid or vertebral arteries do not become completely blocked and a small stream of blood trickles to the brain. The reduced blood flow to the brain starves the cells of nutrients and quickly leads to a malfunctioning of the cells. As a part of the brain stops functioning, symptoms of a stroke occur. During a stroke, there is a core area where blood is almost completely cut off and the cells die within five minutes. However, there is a much larger area known as the ischemic penumbra that surrounds the core of dead cells. The ischemic penumbra consists of cells that are impaired and cannot function, but are still alive. These cells are called

idling cells, and they can survive in this state for about three hours. Ischemic stroke is treated by removing the obstruction and restoring blood flow to the brain. One treatment for ischemic stroke is the FDA-approved drug, tissue plasminogen activator tPA , which must be administered within a three-hour window from the onset of symptoms to work best. Unfortunately, only 3 to 5 percent of those who suffer a stroke reach the hospital in time to be considered for this treatment. This medication carries a risk for increased intracranial hemorrhage and is not used for hemorrhagic stroke. For patients beyond the three-hour time window, intrarterial thrombolysis with drugs or mechanical devices may be an option. Carotid endarterctomy, and or stenting of the cervical and intracranial vessels, may help reduce recurrent stroke in some cases. The Merci Retriever, approved recently by the FDA, is a corkscrew-shaped device used to help remove blood clots from the arteries of stroke patients. At the neck, a small catheter inside the larger catheter is guided through the arteries until it reaches the brain clot. The Merci Retriever, a straight wire inside the small catheter pokes out beyond the clot and automatically coils into a corkscrew shape. It is pulled back into the clot, the corkscrew spinning and grabbing the clot. A balloon inflates in the neck artery, cutting off blood flow, so the device can pull the clot out of the brain safely. The clot is removed through the catheter with a syringe. Hemorrhagic Stroke A hemorrhagic stroke can be caused by hypertension, rupture of an aneurysm or vascular malformation or as a complication of anticoagulation medications. An intracerebral hemorrhage occurs when there is bleeding directly into the brain tissue, which often forms a clot within the brain. A subarachnoid hemorrhage occurs when the bleeding fills the cerebrospinal fluid spaces around the brain.

## Chapter 2 : Cerebrovascular disease - Wikipedia

*Cerebrovascular Diseases. Different parts of the brain control everything from the beating of the heart to the ability to see and hear; from the ability to breathe to the ability to think, walk, talk and make sense of the world.*

Outlook Cerebrovascular disease refers to a group of conditions that can lead to a cerebrovascular event, such as a stroke. These events affect the blood vessels and blood supply to the brain. If a blockage, malformation, or hemorrhage prevents the brain cells from getting enough oxygen, brain damage can result. Cerebrovascular diseases can develop in various ways, including deep vein thrombosis DVT and atherosclerosis , where plaque builds up in the arteries. Stroke , transient ischemic attack , aneurysms , and vascular malformations are all types of cerebrovascular disease. Other examples include a narrowing or blockage in the carotid, intracranial, or vertebral arteries, known as stenosis. In the United States U. In , it caused  Fast facts on cerebrovascular disease Here are some key points about cerebrovascular disease. More detail is in the main article. Cerebrovascular disease refers to a group of conditions that affect blood supply to the brain Early symptoms of a cerebrovascular attack include weakness and difficulty communicating Symptoms of a cerebral hemorrhage include a sudden, severe headache A cerebrovascular event is a medical emergency, and should be called immediately Symptoms Atherosclerosis causes blockages in the blood vessels and is a common cause of stroke. The signs and symptoms of cerebrovascular disease or a cerebrovascular attack depend on where the blockage or damage occurs, and how much cerebral tissue is affected. Different events may have different effects, but common signs and symptoms include: The American Stroke Association urges the public to know the F. Face drooping Speech difficulty Time to call Urgent medical attention is needed if anyone has symptoms of a cerebrovascular attack, because it can have long-term effects , such as cognitive impairment and dementia. Causes Cerebrovascular disease happens for a variety of reasons. If damage to blood vessels in the brain leads to a cerebrovascular attack, there will be little or no blood supply to parts of the brain. No blood means no oxygen, and, without oxygen, the brain cells will start to die. Brain damage is irreversible. Emergency help is needed. Atherosclerosis is one type of cerebrovascular disease. It occurs when high cholesterol levels, together with inflammation in the arteries of the brain, cause cholesterol to build up in the vessel as a thick, waxy plaque that can narrow or block blood flow in the arteries. This plaque can limit, or completely obstruct, blood flow to the brain. In time, this can cause a cerebrovascular attack, such as a stroke or a transient ischemic attack TIA. Types Some common forms of cerebrovascular disease are stroke, transient ischemic attack TIA , sometimes called a mini-stroke , and subarachnoid hemorrhage. An aneurysm, resulting from a deformity in a blood vessel, can lead to a cerebrovascular attack. An ischemic stroke occurs when a blood vessel that supplies blood to the brain is blocked by a blood clot or plaque. A clot, or thrombus, may form in an artery that is already narrow. A stroke happens when the lack of blood supply results in the death of brain cells. A hemorrhagic stroke occurs when a blood vessel in part of the brain becomes weak and bursts open, causing blood to leak into the brain. This puts pressure on the brain tissue, causing tissue damage. The hemorrhage can also cause a loss of blood supply to other parts of the brain. An aneurysm or a subarachnoid hemorrhage can result from defects in the blood vessels of the brain. If a blood vessel ruptures, the flow of blood that follows can damage brain cells. An embolism happens when a clot breaks off from elsewhere in the body and travels up to the brain to block a smaller artery. This may cause an embolic stroke. This is more common in people who have arrhythmias , such as atrial fibrillation. A tear in the lining of the carotid artery can lead to ischemic stroke in people aged under 40 years. The tear lets blood flow between the layers of the carotid artery, narrowing the artery and reducing blood flow to the brain. Risk factors Stroke is the most common type of cerebrovascular event. It is more likely among males aged over 65 years, and especially if they or a close relative have previously had a stroke. Factors that increase the risk of stroke and other types of cerebrovascular disease include:

## Chapter 3 : List of ICD-9 codes â€“ diseases of the circulatory system - Wikipedia

*Cerebrovascular disease includes stroke, carotid stenosis, vertebral stenosis and intracranial stenosis, aneurysms, and vascular malformations. Restrictions in blood flow may occur from vessel narrowing (stenosis), clot formation (thrombosis), blockage (embolism) or blood vessel rupture (hemorrhage).*

Programs in the Department of Neurology Cerebrovascular Diseases Different parts of the brain control everything from the beating of the heart to the ability to see and hear; from the ability to breathe to the ability to think, walk, talk and make sense of the world. Cerebrovascular disease can damage the brain by altering its blood supply, depriving brain cells of the oxygen necessary to their survival. Cerebrovascular disorders are common and potentially devastating. They include cerebral infarction and other types of stroke, cerebral or intercranial aneurysms widening and weakening of an artery , and vascular malformations tangled vessels in the brain. Damaged brain cells do not regenerate on their own, and so it is critical to contain and repair damage once it occurs, and equally critical to prevent it before it happens. Mayo Clinic believes that the best cure for cerebrovascular disease is prevention--preventing the degree of impairment following stroke and preventing cerebrovascular disorders themselves. To do that Mayo is focused on several lines of research that impact on one another. Blood carries oxygen via blood vessels to the brain, and a stroke occurs when blood supply to the brain is compromised. In a cerebral infarction or ischemic stroke, blood supply is cut off by a blocked blood vessel. In a transient ischemic attack TIA , blood supply is temporarily reduced. Ischemic strokes are the most common form of stroke. In a cerebral hemorrhage, a blood vessel leaks or bursts. Hemorrhagic strokes can occur in the brain itself an intracerebral hemorrhage or within the spaces that line the surface of the brain subarachnoid hemorrhage and subdural hemorrhage. A cerebral aneurysm is an artery with a weak spot that balloons out. If it bursts, it creates a hemorrhagic stroke. Cerebral aneurysms are silent killers with a fatality rate of 30 to 40 percent when they rupture. They occur in the young as well as the old and are present in two percent of the U. Vascular malformations can also lead to stroke if the tangled vessels in the brain cut off blood supply or burst, causing bleeding in the brain. Whether from infarction or hemorrhage, stroke leads to brain cell death in the affected area. In a chain reaction called the ischemic cascade, other cells near the affected area begin to die too, increasing the potential for damage and subsequent functional deficits. Of the nearly 5 million stroke survivors in this country, over one million have functional limitations that reduce or prevent their ability to carry out every day activities. They may not be able to eat, groom or bathe independently. They may not be able to walk. They may not be able to plan and problem solve. Vision may be altered. Short term memory can be affected. Speech problems can range from mildly slurred speech to the inability to understand and produce language in spoken or written form. The Framington Heart Study found that 26 percent of stroke survivors over age 65 end up in a nursing home. The annual direct and indirect cost of strokes in this country is approximately 50 billion dollars. The symptoms of stroke differ in type and severity according to the location and size of the affected area or lesion in the brain. Regardless of individual differences in outcome, stroke remains the single greatest cause of long-term disability in this country. It is the third leading cause of death. In the United States someone has a stroke every 45 seconds. Every three minutes someone dies of one. Cardiovascular epidemiology â€” Identifying risk factors in the population As a premier center for neurologic diseases, Mayo attracts thousands of patients from diverse age groups and ethnic backgrounds with both rare and common disorders to its three geographic locations. In addition, it has a repository of meticulously documented medical records going back over years. This precious resource--unique in the world--combined with its vast banks of tissue and blood samples enables researchers to track and define new risk factors for cerebrovascular disease and to readily access medical histories for prospective and retrospective research. Stroke epidemiology Large scale population studies identify risk factors, incidence of occurrence, and outcomes. Mayo Clinic has the longest-term and largest ongoing population studies of stroke anywhere in the world. The Rochester Epidemiologic Project has been collecting population data for over fifty

years across several generations. Its patient record-linkage system provides the setting to evaluate stroke type and subtypes for clinically detailed population-based studies. It is the resource used by The American Heart Association and the American Stroke Association to define the impact of stroke on our population--its recurrence, mortality and disability rates. This knowledge will help define how various stroke risk factors influence individual underlying mechanisms of stroke. It will also assist investigators in designing future drug trials for stroke prevention. In addition, Mayo Clinic is working on innovative methods of health care delivery to ensure that risk factors in patients are adequately monitored over the long term so as to reduce recurrent ischemic events. Among the initiatives in this area is the development of standardized guidelines for monitoring patients with known risk factors and standardized treatment and follow-up plans for continued risk-factor monitoring in patients who have had a first stroke or TIA. Investigators are focused on differing outcomes that may be associated with subtypes of ischemic stroke. This information will help health policy planners and practicing physicians in monitoring changes in the societal and economic burden of differing types of stroke, and in devising strategies to prevent, treat and improve outcomes for all types of stroke. Current areas of the epidemiology of stroke also include: Assessment of new metabolic and inflammatory markers e. Etiology and natural history of cerebral Venous Sinus Thrombosis Clinical and radiology manifestations and long term outcome in isolated central nervous system vasculitis. Among the initiatives in this area are: The association of intracranial aneurysms and intracranial arteriovenous malformation AVM Radiosurgery use of radiation to destroy affected tissue during surgery: Evaluation of a radiosurgery-based AVM grading system based on pre-operative clinical findings and AVM characteristics to predict outcomes following a single-session AVM radiosurgery Examination of the usefulness of this grading system with pediatric patients The natural course and best management for intracranial cavernous malformations Genetic and molecular mechanisms of stroke and stroke recovery Genetic research holds promise not only of identifying who is at risk for cardiovascular disorders, but also for producing gene treatments to protect the brain against stroke and reduce its impact when it occurs. These studies elevate the promise of finding rational gene targets for neuroprotectants -- drugs that provide immediate protection against impairment following ischemic strokes. Neurovascular genetics Changes in the lining of the arteries as we age atherosclerosis make us more vulnerable to stroke and heart attack. Mayo Clinic, considered a world leader in neurovascular genetics, is focused on the molecular structures and mechanisms responsible for these changes. Years of research at Mayo Clinic investigating the role of nitric oxide have contributed to the finding that loss of nitric oxide is a key component. Specifically, they are investigating Tetrahydrobiopterin BH4 , an essential factor in the activity of nitric oxide--looking into how BH4 is metabolized in the vascular system and means of controlling its biosynthesis and degradation in cerebral arteries. Mayo Clinic researchers were the first to demonstrate that in vivo gene delivery of a form of nitric oxide has beneficial effects on vascular function and may be important as a future treatment. Other projects are focused on analyzing the role of progenitor cells in maintaining normal cerebrovascular function. Progenitor cells, made in the bone marrow and circulating through the blood stream, were only recently identified as important in repairing injured blood vessels. Depletion of these cells is considered a risk factor for cerebrovascular disease, but their specific effect on vascular dysfunction in the brain has not been well studied. Mayo investigators have recently demonstrated that transplantation of progenitor cells does have a therapeutic effect on injured arteries The next step is to translate this body of work into human studies where it will have the potential not only to help prevent stroke, but also to improve blood supply to the brain, the heart, and the rest of the body as we age. Preventing the ischemic cascade Researchers at Mayo Clinic have determined that genes and gene products are key factors in the ischemic cascade. They suspect that genetic variability among the population individual differences in genetic make-up translates to significant differences among patients in stroke outcome. They are working to identify the genes responsible for making the brain more susceptible to injury in older people as well as those responsible for protecting it in younger people. Discovering these neuroprotectants is a first step toward using them to reduce damage following stroke. Mayo Clinic is the only institution addressing ischemic intolerance

in the aging brain and attempting to define the genes that help make injured brain tissue salvageable. Genetics of intracranial aneurysms Mayo researchers are investigating chromosomal regions related to the formation, enlargement, and rupture of intracranial aneurysms. They are correlating findings from molecular biology and genomics with imaging techniques, including computational fluid dynamics CFD which allows the computation of blood flow during aneurysm growth and rupture. More about research at Mayo Clinic.

## Chapter 4 : Cerebrovascular Disease - Facts, Diagnosis, and Treatment - Disabled World

*Cerebrovascular disease refers to a group of conditions that can lead to a cerebrovascular event, such as a stroke. These events affect the blood vessels and blood supply to the brain.*

Symptoms of Ischemic Stroke. Technique A history of cerebrovascular disease is important because specific therapy may be indicated to prevent further events, and because the history of cerebrovascular disease may be a "marker" for other underlying disease, especially coronary artery disease. Patients with TIAs may not seek help, however, and a history of TIAs may come to light only by asking, "Have you ever had any temporary episodes of weakness, numbness, visual problems, or speech difficulty? Therefore, patients should be asked if they have ever temporarily lost vision in one eye or had a sensation that a shade was being pulled down over the vision of one eye. A past history of a completed stroke can usually be elicited by merely asking, "Have you ever had a stroke? Occasionally, more detailed questioning about specific persistent neurologic symptoms is necessary. The patient should be encouraged to relate the story of the event spontaneously in his or her own words. More direct questioning may be necessary to assess symptoms at onset, whether or not they progressed, and how long they lasted. Ask if medical help was sought, diagnostic procedures were performed, or any conclusive diagnosis was made. Questions aimed at differentiating between ischemic stroke and hemorrhage should be asked: The time since the last event is important because the risk of ischemic stroke is greatest in the weeks immediately following TIAs. The most common cause of ischemic stroke is atherosclerotic disease. Hence, the patient should be questioned about risk factors, especially hypertension. Other causes of ischemic stroke should always be kept in mind especially emboli from a cardiac source , since treatment is different. Therefore, a history of chest pain, symptoms suggestive of MI, congestive cardiomyopathy, valvular disease, or atrial fibrillation should be sought. If symptoms have occurred in multiple vascular distributions, embolic events related to cardiac disease should especially be considered. Any history of recent illness or trauma should be sought in case the patient might have one of the other rare causes of ischemic stroke. Recognizing the special situation of subarachnoid hemorrhage is critical because recurrent hemorrhage is fatal in a high proportion of cases. There are often no focal neurologic signs, only a sudden severe generalized headache, often followed by a stiff neck, vomiting, and altered consciousness. Basic Science Cerebrovascular diseases are a heterogeneous group of disorders with a variable natural history. Outcome depends on many factors, including the underlying pathophysiology, collateral cerebral circulation, and concurrent illness, especially heart disease. The risk of an ischemic event increases with age and is correlated with both systolic and diastolic blood pressure, diabetes, and a history of ischemic heart disease or previous stroke. All epidemiologic studies have identified hypertension as the most important risk factor for stroke. Correlation with cigarette smoking and hyperlipoproteinemia is less conclusive. Although stroke is still the third leading cause of death in the United States, the incidence is declining, a fact that has been attributed to better identification and control of hypertension. Atherosclerosis commonly involves the large extracranial vessels that arise from the aortic arch. Although the carotid bifurcations are most frequently involved, atherosclerosis can also occur at the origins of the common carotid or vertebral arteries or in the intracranial vessels, including the carotid siphon and the basilar artery. Atherosclerosis probably results in ischemic symptoms through several mechanisms. The most widely accepted is platelet activation and aggregation at the site of an ulcerated complex atherosclerotic plaque, with production of thromboxane A2 from arachnidonic acid resulting in further platelet aggregation. Aggregated platelets can embolize, with specific symptoms dependent on the vessel of embolization. The severity of symptoms depends on the duration of vessel occlusion and the degree of collateral flow through tiny leptomeningeal and other end artery anastomoses. Atherosclerosis may also result in vessel stenosis or occlusion. In this situation, symptoms depend largely on how rapidly stenosis develops and the extent of collateral flow available through the circle of Willis and from extracranialâ€”intracranial anastomoses. The availability of collaterals varies considerably among different

people; thus, the same degree of stenosis or occlusion can result in very different symptoms. For example, total occlusion of the internal carotid artery may be asymptomatic in one individual, but result in a disastrous stroke in a patient with congenital absence of portions of the circle of Willis. Other factors that are probably important in determining outcome are blood viscosity, blood glucose, blood oxygen carrying ability, and tissue metabolic demand. Often, ulcerated plaque and stenosis coexist. In some patients, a different mechanism may result in symptoms. Pathologic examination of surgical specimens of atherosclerotic plaque removed during carotid endarterectomy shows a high frequency of recent hemorrhage into the plaque, an event that may have precipitated acute stenosis or embolization. Stenosis of small intracranial arteries can also result in ischemic symptoms. Patients with hypertension or diabetes can develop atherosclerosis of small intracranial arteries. A more common occurrence is the development of hypertension-related lipohyalinosis and fibrinoid necrosis in small end arteries and arterioles. When this results in occlusion, there is no available collateral flow, and a tiny "lacunar stroke" results. Among the many lacunar syndromes are pure motor hemiparesis with or without dysarthria due to lesions of the internal capsule or pons and pure sensory stroke due to lesions in the thalamus. Patients with lacunar strokes almost never have field defects, aphasia, or other higher cortical function loss. Although many cardiac conditions predispose to cerebral embolization Table  The risk of stroke is increased five times in patients with atrial fibrillation and fifteen times if there is associated mitral stenosis. The risk is highest in patients with large infarctions, those with congestive heart failure, or those with anterior infarctions where there is hypokinesis of the left ventricular apex. Emboli usually lodge in end arteries that have poor collateral circulation and therefore often cause major neurologic deficits. The middle cerebral artery distribution is usually affected. Other rare causes of ischemic stroke include hematologic disorders polycythemia, thrombocytosis, dysproteinemias, sickle cell disease , fibromuscular dysplasia, carotid dissections, and intracranial vasculitis of several etiologies lupus erythematosus, giant cell arteritis, syphilitic arteritis, granulomatous angiitis. Clinical clues and past history will usually help identify these unusual conditions. Ischemic events are divided into brief, completely reversible events called transient ischemic attacks TIAs and completed strokes. While the therapeutic goals of the latter are aimed at preventing and treating complications and maximizing recovery through rehabilitation, the therapeutic goal for TIAs is prevention of more serious events. TIAs are usually caused by small platelet or cholesterol emboli that temporarily occlude a vessel, then "break up" and move distally. This process may actually be visualized ophthalmoscopically in the branches of the ophthalmic artery following amaurosis fugax. Unfortunately, there is no uniformly reliable way to predict which patients will go on to infarction. The risk is highest the first 2 months after a TIA, and rapid therapeutic intervention is indicated. Risk of stroke is especially high in cases of "crescendo TIAs," which sometimes precede total vessel occlusion. The development of saccular aneurysms of the circle of Willis is thought to occur gradually at bifurcation sites where the arterial media may be congenitally absent. The internal elastic lamina at these locations becomes fragmented, possibly accelerated by atherosclerosis. Aneurysms have a predilection for certain locations, especially the posterior communicating artery, anterior communicating artery, and middle cerebral artery. Progressive enlargement seldom causes symptoms unless the aneurysm compresses an adjacent structure, for example the oculomotor nerve by a posterior communicating artery aneurysm. Congenital cerebral arteriovenous malformations AVMs consist of malformed, thin-walled, hyalinized vessels with adjacent gliosis and neuronal degeneration. AVMs may never rupture and often come to clinical attention as a cause for a seizure disorder rather than because of hemorrhage. The mortality and rebleeding risk are less than for saccular aneurysms. The peak incidence of hemorrhage from AVMs is under age 30, while the incidence of aneurysm rupture peaks between ages 40 and  The etiology of intracranial hematomas due to hypertension is unknown. In many cases, lipohyalinosis and fibrinoid necrosis probably cause weakness of the arteriolar media with subsequent rupture. Some events may be due to microscopic Charot-Bouchard aneurysms of small arteries and arterioles. Most hypertensive hematomas do not recur. A syndrome of recurrent intracerebral hemorrhage has been described in the syndrome of amyloid angiopathy, a condition of unknown etiology

consisting of amyloid deposits in vessel walls in elderly persons and often associated with dementia. Intracerebral hemorrhage also occurs with trauma, anticoagulant use, and bleeding dyscrasias. Rare causes include hemorrhage into a brain tumor or infarction. In some patients, the cause of hemorrhage cannot be determined. Although many intracerebral hematomas are devastating events, patients with small hematomas have a reasonable prognosis for a functional recovery. Clinical Significance Because cerebrovascular disorders are a diverse group of illnesses that are managed in very different ways, an accurate diagnosis is critical. The following points are important for proper diagnosis and management: Establish that a cerebrovascular event actually occurred, and determine the location of the event. Decide if the event was ischemic or hemorrhagic. Determine what steps are necessary for medical stabilization of the patient. Determine the underlying pathophysiology that caused the event e. Determine what can be done to prevent future, possibly more devastating, events. Decide if the occurrence of the cerebrovascular event may indicate an underlying disease especially cardiac diseases. Occasionally, other conditions can mimic cerebrovascular events. Primary or metastatic tumors usually progress insidiously, but occasionally symptoms begin acutely because of rapid tumor growth, hemorrhage into a tumor, or a seizure followed by focal neurologic signs. Although neuroradiologic procedures usually differentiate between stroke and tumor, occasionally small tumors are overlooked, and a follow-up CT or MRI scan is suggested in ambiguous cases. Distinguishing between TIA or stroke and migrainous phenomena may also be difficult. The latter usually occur in younger individuals, with a clear history of vascular headaches. They have a more insidious onset than TIA or stroke, and a gradual "spread" of symptoms. While migrainous events are usually transient, permanent neurologic deficits, such as hemiparesis, sensory deficit, and aphasia, are occasionally attributed to migraine. Diagnostic problems may arise when transient visual or neurologic events accompanied by headache occur in older patients. Although an attempt should be made to decide if an episode was migrainous by inquiring about rate of progression of a neurologic symptom, previous history of vascular headaches, history of "classic" visual events such as scintillating scotoma, and family history of migraine, in some cases no clear differentiation can be made. A final difficult area are patients with vague or nonlocalized neurologic events. The definition of a CVA as the acute or subacute onset of a focal neurologic event should be remembered, and patients with syncope, transient confusion, anxiety, and nonspecific symptoms should not be given this diagnosis. In patients with ischemic stroke or TIA, the underlying cause often determines therapy. Therefore, it is necessary to distinguish between events due to atherosclerosis, embolic events of cardiac origin, lacunar strokes, and strokes due to rare conditions. Atherosclerosis is a systemic arterial problem of which stroke and TIA are manifestations. The presence of known risk factors raises the possibility that such an event has an atherosclerotic etiology.

## Chapter 5 : Cerebrovascular Disease - Clinical Methods - NCBI Bookshelf

*Surgery M4 Director Clerkship Director Assistant Professor of Surgery SPECIALTIES Aortic disease; cerebrovascular disease; peripheral arterial disease; venous disease; vascular reconstruction in abdominal, upper and lower extremity oncologic resections; thoracic outlet syndrome EDUCATION Fellow - Vascular Surgery, Duke Residency - General Surgery, Duke Residency - Vascular Surgery.*

## Chapter 6 : Cerebrovascular Disease - Brigham and Women's Hospital

*Cerebrovascular Disease Symptoms and Signs of Cerebrovascular Disease The symptoms of cerebrovascular disease will depend on the location of the patient's hemorrhage, thrombus or embolism, as well as the extent to which the cerebral tissue has been affected.*

## Chapter 7 : Cerebrovascular disease: Causes, symptoms, and treatment

# DOWNLOAD PDF CEREBROVASCULAR DISEASE AND UPPER-EXTREMITY VASCULAR DISEASE

*The form of cerebrovascular disease that is commonly referred to us similar to coronary artery disease, also called, 'Ischemic disease,' one which causes a lack of blood flow. Because the disease occurs in blood vessels located outside of a person's heart, the condition is also considered to be a form of peripheral artery disease.*

## Chapter 8 : Cerebrovascular Diseases - Department of Neurology - Mayo Clinic Research

*In addition to our vascular and endovascular surgeons, patients also benefit from the teamwork of medical cardiologists, interventional cardiologists, cardiac surgeons, cardiovascular imaging experts and radiologists, and anesthesiologists, all experts in cerebrovascular disease.*

## Chapter 9 : Cerebrovascular Disease : Symptoms and Signs | Florida Hospital

*Cerebrovascular disease includes a variety of medical conditions that affect the blood vessels of the brain and the cerebral circulation. Arteries supplying oxygen and nutrients to the brain are often damaged or deformed in these disorders.*