Neuropathy

Nerve damage is a serious but often preventable complication.

A common complication of diabetes is diabetic neuropathy. Neuropathy means damage to the nerves that run throughout the body, connecting the spinal cord to muscles, skin, blood vessels, and other organs.

Diabetic neuropathy can be painful and disabling. Fortunately, severe forms do not occur often. And many times, symptoms go away after several months.

What Is Neuropathy?

Diabetic neuropathy is actually a group of nerve diseases. What these disorders have in common is that they affect the peripheral nerves, that is, the nerves that are outside the brain and spinal cord.

There are three types of peripheral nerves: motor, sensory, and autonomic. Motor nerve fibers carry signals to muscles to allow motions like walking and fine finger movements. Sensory nerves take messages in the opposite direction. They carry information to the brain about shape, movement, texture, warmth, coolness, or pain from special sensors in the skin and from deep in the body.

Autonomic nerves are nerves that are not consciously controlled. These nerves have functions such as controlling the pace of heart beats, maintaining blood pressure, and controlling sweating.

Some symptoms of neuropathy occur when the nerve fibers are lost. If the loss of nerve fibers affects the motor fibers, it can cause muscular weakness. If loss of nerve fibers affects the sensory fibers, it can cause loss of feeling. And if the loss of nerve fibers affects autonomic fibers, it can cause loss of functions not normally under conscious control, like digestion.

Neuropathy symptoms can also be caused by nerves that are damaged or are healing. These symptoms include prickling, tingling, burning, aching, or sharp jabs of needle-like pain. These are signs of the increased nerve activity that occurs in damaged or healing nerves.

Different types of symptoms can occur together. It is common to have pain even though many fibers have been lost.

What Causes Neuropathy?

Researchers do not yet know what causes diabetic neuropathy. Glucose control seems to play a role. Neuropathy is more likely to affect people who have had diabetes a long time or whose glucose control is poor.

But no one is sure how high glucose levels must be before nerve damage happens. Glucose probably does not hurt nerve cells directly. Instead, it may affect other systems of the body, which in turn affect the nerves.

Neuropathy can be prevented, at least in some cases. The Diabetes Control and Complications Trial studied complications in people on tight glucose control and those on regular diabetes treatment. Only one-third as many people in the tight-control group got neuropathy as in the standard-treatment group.

In addition, avoiding alcohol and cigarettes will probably help protect your nerves from damage.

People with diabetes should be aware that other diseases can also cause neuropathy. There are at least 50 other causes of neuropathy. These include disorders of the immune system, infectious diseases, and nutritional lacks.

Types of Neuropathy

Neuropathies are classified based on the answers to a few basic questions.

Are both sides or only one side of the body affected? Neuropathy that affects both sides of the body is called symmetric. If it affects only one side, it is asymmetric.

Which class of nerves is affected? Neuropathy can affect motor, sensory, and autonomic nerves.

How many nerves are affected? Neuropathy which affects only one nerve is called mononeuropathy. Polyneuropathy is when several nerves are affected.

What parts of the body are affected? The affected parts may be far from the trunk or close to it. Neuropathy in the hands and feet is distal neuropathy. In proximal neuropathy, the thigh muscles are often

affected, often to different degrees. When this type produces a large amount of pain, it is called *femoral neuropathy.* But when weakness in the thigh occurs without pain, it is called *diabetic amyotrophy.*

Different doctors classify neuropathy differently. But there are a few well-known types of neuropathy.

Distal symmetric polyneuropathy. Distal symmetric polyneuropathy is the most common form of neuropathy. It strikes both sides of the body. The legs and feet are usually affected, although the hands may be also.

People with this form of neuropathy have numbness and prickling sensations or tingling. Some people feel pain in the toes or feet. The feet can sometimes be so tender that walking on a rough surface hurts.

Doctors often find that people with this form of neuropathy have lost part of their ability to feel a pinprick or a vibration. For example, they are less able to feel a tuning fork vibrating against the toe.

This type of neuropathy tends to develop only after many years of poor blood glucose control. Tight glucose control can prevent most cases.

Charcot's joint. Charcot's joint, also called neuropathic arthropathy, occurs when a joint breaks down because of a problem with the nerves. It most often occurs in the foot.

In a typical case of Charcot's joint, the foot has lost most sensation. The person no longer can feel pain in the foot and loses the ability to sense the position of the joint. Also, the muscles lose their ability to support the joint properly. The foot then becomes unstable, and walking just makes it worse. An injury, such as a twisted ankle, may make things even worse. Joints grind on bone. The result is inflammation, which leads to further instability and then dislocation. Finally, the bone structure of the foot collapses. Eventually, the foot heals on its own—but because of the breakdown of the bone, it heals into a deformed foot.

People at risk of Charcot's joint are those who already have neuropathy. They should be aware of symptoms such as swelling, redness, heat, strong pulse, and insensitivity of the foot. Early treatment can stop bone destruction and aid healing.

Cranial neuropathy. Cranial neuropathy affects the 12 pairs of nerves that are connected with the brain and control sight, eye movement, hearing, and taste.

Most often, cranial neuropathy affects the nerves that control the eye muscles. It begins with pain on one side of the face near the affected eye. Later, the eye muscle becomes paralyzed. Double vision results. Symptoms usually get better or go away within two to three months.

Autonomic neuropathy. Autonomic neuropathy affects the autonomic nerves, which control the bladder, intestinal tract, and genitals, among other organs. You may not want to even think about this disease, because it can cause problems with urination, digestion, or erection. But unfortunately, it's common. Some types of autonomic neuropathy affect more than one-quarter of people with diabetes.

Paralysis of the bladder is a common symptom. When this happens, the nerves of the bladder no longer respond normally to pressure as the bladder fills with urine. As a result, urine stays in the bladder, leading to urinary tract infections.

Autonomic neuropathy can also cause impotence when it affects the nerves that control erection with sexual arousal. However, sexual desire does not usually decrease.

Diarrhea can occur when the nerves that control the small intestine are damaged. The diarrhea occurs most often at night. Constipation is another common result of damage to nerves in the intestines.

Sometimes, the stomach is affected. It loses the ability to move food through the digestive system, causing vomiting and bloating. This condition, called *gastroparesis*, can change how fast the body absorbs food. It can make it hard to match insulin doses to food portions.

Scientists do not know the precise cause of autonomic neuropathy and are looking for better treatments.

Compression mononeuropathy. Compression mononeuropathy occurs when a single nerve is damaged. It is fairly common. There seem to be two kinds of damage. In the first, nerves are squashed at places where they must pass through a tight tunnel or over a lump of bone. Nerves of people with diabetes are more prone to compression injury. The second kind of damage arises when blood vessel disease caused by diabetes restricts blood flow to a part of the nerve.

Carpal tunnel syndrome is probably the most common compression mononeuropathy. It occurs when the median nerve of the forearm is compressed at the wrist. Symptoms include numbness, swelling, or prickling in the fingers with or without pain when driving a car, knitting, or resting at night. Simply hanging the arms by one's sides usually stops the pain within a few minutes. If the symptoms are severe, an operation can give complete relief from pain.

Other neuropathies. Femoral neuropathy is also common. It occurs most often in people with non-insulin-dependent (type II) diabetes. A pain may develop in the front of one thigh. Muscle weakness follows, and the affected muscles waste away. A different kind of neuropathy that also affects the legs is called *diabetic amyotrophy.* In this case, weakness occurs on both sides of the body, but there is no pain. Doctors do not understand why it occurs, but blood vessel disease may be the cause.

Another common mononeuropathy is thoracic or lumbar radiculopathy. It is like femoral neuropathy, except it occurs in the torso. It affects a band of the chest or abdominal wall on one or both sides. It seems to occur more often in people with type II diabetes. Again, people with this neuropathy get better with time.

Unilateral foot drop is when the foot can't be picked up. It occurs from damage to the peroneal nerve of the leg by compression or vessel disease. Foot drop can improve.

How Is Neuropathy Diagnosed?

Your symptoms are one way of diagnosing neuropathy. Your doctor will ask you to describe your symptoms. Also, the doctor will ask whether your muscles feel weak (not tired); how often you get muscle cramps; whether you keep having prickling, numbness, or pain; whether you have been fainting or vomiting; and whether your bladder control and sexual ability are normal.

Another way to diagnose neuropathy is with a neurological evaluation. The doctor performs several simple and painless tests. These may measure muscle strength, autonomic nerve function, and sensation (such as whether you can feel a pinprick or a vibration).

A third approach is an electromyographic examination. In this test, a disk is pasted to the skin over the muscle. The doctor applies a small electric shock to nerves. A machine reads and records the voltage from the disks. In neuropathy, the speed of the impulse along the nerve gets slower, showing something is wrong. Most people do not find the shocks uncomfortable.

In people with severe neuropathy, the doctor may also do a second kind of electromyographic test. In it, a needle

inserted into muscles measures electrical discharges. This more in-depth test can show whether a nerve fiber is breaking down or healing. This test is uncomfortable for most people, but is worthwhile because it can give a firm diagnosis.

A fourth way to diagnose neuropathy is with standardized tests that measure muscle strength and loss of ability in sensory and autonomic nerves.

To diagnose Charcot's joint, the doctor may take an X ray of the joint and possibly do a bone scan.

Treatment

We are still looking for a way to heal nerves damaged by neuropathy. Right now, treatment aims to make the symptoms of neuropathy better. And tight blood glucose control may heal early neuropathy.

Most doctors say that people with neuropathy should do three things. They should reach an ideal weight, follow a regular exercise program, and control their blood glucose levels.

Recent research suggests that no one therapy works best for everyone. Instead, treatment should be tailored to the location of the pain and what kind of pain it is.

Once neuropathy has started, it is important to head off injuries and further complications. For example, when you lose feeling in your feet and toes, it is easy to injure your foot without ever feeling it. For this reason, you should check your feet every day. Also check your shoes to make sure they contain no stones, staples, rough spots, or other sharp or lumpy objects that could hurt your feet.

Loss of feeling is why electric blankets and heating pads carry warning labels that say people with diabetes should not use them without talking to their doctors first. You can be seriously burned by an electric blanket or heating pad because you cannot feel how hot it really is.

Treatment for Charcot's joint attempts to prevent joint damage. Two ways to prevent damage are keeping the joint from moving and avoiding bearing any weight on the joint while it heals. The foot is usually put into a cast. This preserves joint function and limits the damage. Later, as the foot heals, the person wears special shoes. In people whose joints have already healed into a deformed shape, surgery may help restore the joint.

Be on the alert for urinary infections. These tend to happen again and again when your bladder is affected by autonomic neuropathy. Tell your doctor if you have cloudy or bloody urine, painful urination, low back pain, and fever. One way to prevent these infections is to urinate every three to four hours when you are awake, even if you don't feel as if you need to.

There are drugs that can treat faintness or diarrhea caused by autonomic neuropathy.

A major goal of treatment for neuropathy is relieving pain. Pain medicines can help. But they are best used regularly throughout the day before pain becomes severe. Once the pain becomes overwhelming, pain medicines work less well. Narcotics can relieve pain, but they are used only as a last resort. Neuropathy can hurt for months. Use of narcotics for that long can lead to addiction.

Several other therapies for distal symmetric polyneuropathy are available as well. Capsaicin creams, which contain hot pepper extract, can be rubbed on the skin over the pain. These creams block pain signals. Imipramine is an antidepressant that can relieve nerve pain. Antidepressants also help people with the depression, anxiety, and insomnia that neuropathy sometimes causes. Mexiletine is a heart drug that also seems to relieve nerve pain. Muscle relaxants and stretching may relieve pain in the muscles caused by neu-

ropathy. A new class of drugs called aldose reductase inhibitors is being tested as a possible treatment.

Impotence in men can be treated in several ways. Injection of certain drugs can cause erection, as can the use of vacuum devices. Another option is a surgically implanted prosthesis. However, before considering surgery, your doctor will explore other possible causes of impotence. For example, there may be a psychological basis, or it may result from blood vessel disease or be a side effect of high blood pressure medicines.