Surgeons use this to their advantage when repairing transected (surgically severed) nerves via direct end-to-end attachment, nerve grafting or by using neural tunnels to guide the regenerating neurons to rejoin with the severed segment. On the other hand, stump neuromas are characterized by disorganized architecture with nerve tissue growing out in various directions, leading to a bulb-shaped thickening or “stump.”

The formation of a stump neuroma is a natural occurrence after nerve injury; however, not all neuromas are painful. The incidence of painful neuromas is thought to be between 10 to 30 percent. It is unclear why some are painful and others are not, but it most likely relates to the area and tissue into which the nerve regenerates.

If the neuroma is located well above the end of the residual limb and is buried in adequate soft tissue, pressure and traction are unlikely to produce any local pain. Moreover, large neuromas located near the surface of the skin may not be painful when covered by a carefully fitted prosthetic socket. The pressure of the socket wall can be so well-distributed over a large surface area of the residual limb that no pain is felt at the neuroma site. If the socket does trigger discomfort, adjusting the socket will generally relieve the pain.
Pain from neuromas often varies in intensity and duration, and is described as aching, cramping or shooting. Conservative measures are usually adequate for treatment. These include physical modalities (treatment methods), medicine and neurolysis (temporary destruction of nerves for pain relief). However, if these fail, one should consider surgical intervention.

**Physical Modalities**

Physical modalities used to treat limb pain due to neuroma include ultrasound, massage, vibration, percussion, transcutaneous electrical nerve stimulation (TENS) and acupuncture, as well as modification of the prosthetic socket for pressure relief. Most physical modalities have had varying success in reducing pain.

**Medical Interventions**

Injection therapy can be a useful method for treating neuromas. Corticosteroids are widely accessible and are the most common injectable. However, overuse of injected steroids can lead to a number of side effects, including weight gain and high blood pressure, so patients usually receive only a limited number of injections. Other medical interventions for limb pain resulting from neuromas include nonsteroidal anti-inflammatory drugs (NSAIDs), tricyclic antidepressants, and anticonvulsants. These treatments have had limited success. Most other medicine regimes have been the subject of sporadic case studies and have not been shown to be effective.

**Neurolysis**

Minimally invasive neurolysis with the use of cryo (freezing of the nerve) nerve blocks has been shown to be effective in pain control for neuromas. Radiofrequency neurolysis is effective but difficult to perform in many cases. Neurolysis is usually effective for 3 to 5 months, with longer results reported on repeated procedures.

**Surgical Treatment**

Large neuromas buried in a scar or located in an exposed position may be so painful that the amputee is severely impaired. Although surgical removal is the treatment of choice in these cases, this technique has failed to yield uniform results. Pain relief is often temporary due to the eventual development of a new neuroma.

Most surgical treatments are geared toward reducing the abnormal interaction between regenerating nerves and surrounding connective tissue. Although multiple techniques are available for limiting regrowth, possibly the simplest procedure is to relocate the nerve. When possible, the surgeon will relocate the nerve away from weight-bearing areas and toward locations that will minimize pressure. Ideally, the surgeon will attempt to discourage regrowth at the end of the nerve. Although there is nothing clinically available that stops nerve regeneration completely, there have been many studies exploring techniques to minimize this.

Surgeons have used epineural sleeves for many years with good success. Nerve capping has also had varying success. Various silicone caps are most popular, with success rates averaging at 70 percent.

Nerve transplantation into local veins has garnered attention recently in attempting to slow down nerve regrowth. Transplanting the nerve into a vein has proven clinically effective in both upper- and lower-extremity neuromas. Researchers have also described using local bone or muscle as a transplant medium with good success in most locations throughout the body. Although both techniques yielded good results, implantation into bone was considered superior.

**Reference Sources**

