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FEATURES

Reviving An Ancient Therapy To Manage Chronic Pain

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Controlling pain has become a sophisticated, albeit inexact science. Artful pain assessment, integrated care, the titration of medications and the effective use of therapies and modalities are tailored for each patient. Indeed, meticulous clinicians must avoid tunnel vision and take the proper steps in diagnosing and treating chronic pain. Just as a specific and accurate diagnosis of chronic pain is necessary for effective treatment, obtaining a detailed history on the type of pain is essential. Note the mode of injury or deformity onset, the onset of pain and assess the type of pain as to consistency, duration and intensity. Have the patient describe the pain. Is it burning, cramping, stabbing, shooting and/or aching? Is there itching and/or soreness? Assess the patient's past self-treatments as well as prior professional treatments as to the amount of improvement and their duration of relief. Determine if there are any activities that exacerbate the symptoms or put them in remission. Note environmental responses like weather, activities, shoe gear and the time of day that symptoms occur. No detail is too small. Identify the location(s) of the pain and provide detailed maps for the areas. Determine areas of normal and abnormal functions. Perform a thorough systems assessment. Evaluate gait and limitations of function. Note trigger points of pain,

areas of dysfunction and guarding. Make a generalized differential and working diagnosis. Confirm the diagnosis with testing and further examination for details. As far as diagnostic testing goes, X-rays, CT scans, MRI scans, stress examinations and fluoroscans give details to the extent of pathology in bone and soft tissues. EMG and nerve conduction testing will give detailed assessment of the nervous system and the muscle function. Technetium scans and vascular studies will give detailed systems assessment. Medications that control chronic pain include antispasmodic/seizure medications like Neurontin and Topamax. These medications are effective for neuropathies and sympathetic mediated pains. Sleep medication helps the tolerance of pain and stress. Antidepressants, tranquilizers, anti-anxiety medications and mood elevators help to control pain and reduce the secondary changes to chronic pain. Muscle relaxors, peripheral vasodilators and antiinflammatories reduce chronic pain. Oral and interstitial steroids and local anesthetics are effective for immediate relief. Pain medication is necessary but can be overemphasized. Narcotics in modern chronic pain control are best used for breakthrough pain and acute pain relief. There is little long-term benefit for a patient to control the causes of chronic pain or resolve the painful stimuli with sustained narcotic use. The chronic use of narcotics for pain control is only a temporary band-aid. Chronic pain produces a fear in the patient and a panicked feeling that the pain will return or increase. The anticipation of the pain recurring sustains the patient's use of narcotics and dependency results.

Understanding The Sources Of Pain It's important to understand that pain has three sources of stimuli: somatic, sympathetic and the pain reflex arc, and the higher brain centers for pain perception. There is an initiating or primary source of pain that triggers the pain stimuli. A common starting source of pain may be injury, surgery, fracture, hematoma, periostitis, contusion, instability, joint dislocation or infection. Chronic pain results when there is delayed healing. Secondary scarring, extensive swelling, delayed union and non-union, synovitis, adhesion and contractures, nerve entrapment, hypertrophic scarring and degenerative joint disease are all causes of painful delayed healing. Secondly, the autonomic nervous system will normally filter pain stimuli through the spinal reflex arc. Chronic pain produces an overload of the sympathetic system, exaggerates pain and produces referred pain sites, and secondary symptoms and

signs. Finally, the upper motor functions and brain perceptions will heighten rather than dampen the pain stimuli. Brain functions that perceive emotions of anxiety, fear, stress and depression produce a chemical response that will magnify the pain. There is a release of chemicals, hormones, histamines, adrenaline and epinephrine that will exaggerate pain. There is a loss of sleep, a decrease in serotonin levels and suppression of natural endorphins. Exploring Biological Treatments As An Alternative While seemingly unusual, biological treatment methods have been used for hundreds of years to control pain. For example, colchicine and boswellia are refined from herbs and are used for neuritis, arthritis and gout pain. Maggots have also been used to debride painful wounds, assist in wound healing and help reduce the pain. Medical leeches have actually been used for thousands of years for many different indications. There are over 650 varieties of leeches. There are only four varieties that are usually used for medical treatments: the European medical leech, the Chinese medical leech, the South African medical leech and the giant Amazon leech. These leeches have a mouth with a needle-like proboscis or a mouth with a sucker and three jaws. Each jaw has 100 sharp teeth that produce a Y-shaped incision, which produces three equal skin flaps. The European medical leech (*Hirudo medicinalis*) is the most commonly used in the United States. The leeches are raised in clean conditions for raising non-contaminated specimens. These leeches are shipped overnight in a cooler. Once they are received, they should be stored in refrigeration. One must be sure to maintain their environment with a clean water change and the addition of a special salt called Hirudo. The sustained oozing and loss of blood from leeching is limited to the salvage of plastic and reconstructive surgery. However, the use of the biologically active ingredients in leech saliva has many effects that are useful in pain management. While many of these ingredients have not fully been identified, there are protein substances that are local anesthetics, anticoagulants and thrombolytic agents. The saliva contains antiinflammatory and vasodilatory agents. The saliva also contains enzymes that reduce scarring and substances that have antimicrobial action. A Closer Look At The Biological Ingredients Of Leech Saliva There is a local anesthetic effect to the leech bite that lasts for hours. The local anesthetic is a polypeptide chain that initially affects the feeling "A" nerve fibers and the larger "B" nerve fibers. Once it

wears off, there is itching and bruised sensations from the bite. There is also a long-term anesthetic effect from the saliva that specifically affects the “C” nerve fibers and the small “B” nerve fibers that control the sympathetic nervous system. This anesthetic effect can last several months and provide long-term relief from sympathetic mediated pain. Leeching reduces the severe burning pain and the painful vasospasms from sympathetic mediated pain. Initial observations of sympathetic pain relief occurred when treating congested skin flaps and de-gloving injuries. The leeching prevented the demarcation. There was reduced congestion and those patients with severe sympathetic pain also had a marked reduction of pain for several months. I also observed sympathetic pain relief in patients with reflex sympathetic dystrophy (RSD), acute arteritis, Berger’s disease and Raynaud’s conditions. The leech saliva’s strong anticoagulant of hirudin, a heparin-like substance, prevents clotting. Hirudin has a more local effect around a bite than a systemic effect like heparin and therefore has less risk. The hirudin dissolves a thrombus similar to streptokinase. The use of the thrombolytic action is effective for treating cerebral vascular accidents, acute myocardial infarction and thromboectomies. The internal use of hirudin is in an injected concentrate. The localized effect will reduce coagulation, dissolve the local clots and thrombosis, and improve the circulation to a skin flap. Be advised that the bite wound will ooze for hours or more depending on the concentration of leeches. The circulation can be improved as long as the tissue has not died or nor is in full thrombosis. Ischemic pain relief and relief of pain from internal congestion will continue to occur as long as one keeps the bite from clotting. The bite wound oozes and mechanically relieves the venous congestion. The biological active ingredients in the saliva, an antihistamine and antiinflammatory, help to stabilize cellular membranes to reduce the A-V shunting and the resulting demarcation of flaps. A peripheral vasodilatation action in the leech saliva is tied to the localized sympathetic response. Blood flow increases as the arteries, capillaries and veins dilate. Lymphatic functions improve as the edema, congestion and shunting are reduced. This helps minimize demarcation. Angiogenesis is encouraged within the leech saliva. Observed capillary budding increases as the arterials and small vein are encouraged to bud. The increased blood flow increases warmth and reduces the vasospasm. The saliva of the leech

contains enzymes that reduce scar tissue and reduce adhesions. The leech produces the enzyme hyaluronidase, two types of fibrinases and a collagenase. The enzymes reduce the density of scar tissue and help to reduce fibro-blast formation in hypertrophic scars and keloids. When Are Medical Leeches Indicated? As noted above, leech saliva contains antimicrobial activity, antiviral activity and antibacterial activity. The use of leeches is not contraindicated in the presence of infection. Within the leech gut is a bacterial flora that is usually non-pathological to humans. There is some risk to severe debilitated patients with HIV. Antibiotic prophylaxis is recommended. Indications for leeching include: • Venous congestion • Vasospasm • Hematoma • Painful subcutaneous adhesions • Hypertrophic scars • Painful cicatrix • Shunting to skin flaps • Severe hyperesthesia • Interstitial edema • Sympathetic mediated pain • RSD • Causalgia • Berger's disease • Nerve compression • Degloving injuries • Joint swelling

What One Study Revealed Sixty-seven patients were leeches for the treatment of painful conditions that were resistant to traditional care. The age range of patients was from 13 to 96. The pain level before the leeching surgery ranged from a 5 to 10 (severe and uncontrolled). After the procedure, the pain usually was absent and continued to be reduced significantly for three weeks to six months. Patients were treated for itching (similar to what one might have after an insect bite) after the procedure for up to 10 days. The age range was not a criteria for success. Improvement was based on pathology and all ages responded equally well.

Case Study One: A 53-Year-Old Patient With RSD A 53-year-old female presented with severe pain from an acute flare of her RSD. She had a sensitive hypertrophic scar from a surgical procedure for tarsal tunnel syndrome. Her symptoms were burning, hyperesthesia and shooting pain that extended proximally to the mid-calf region. She said the pains were an 8 out of 10 on the pain scale and prevented her from sleeping. We placed 12 leeches along the scar and along the medial tarsal. The preoperative edema before the leeching procedure has remained reduced and the patient's residual pain of 2 to 4 out of 10 has been controlled with medication and orthotics two years and seven months after the procedure.

Case Study Two: A 16-Year-Old Patient With RSD And A Severely Painful Hypertrophic Scar A 16-year-old patient initially sustained a posterior tibial rupture. She developed RSD after the posterior tibial

tendon repair and a severe painful hypertrophic scar. She was treated for two years and remained on crutches with a 9 out of 10 pain level. We performed the scar "Z" plasty and reduced the scar tissue 50 percent but the pain was still a 7 to 8 out of 10. The scar and surrounding tissue was hyperesthetic. We performed the leeching procedure for the patient on two separate occasions before the hypertrophic scar was fully reduced and the pain was in remission. We applied 10 leeches along the scar line and they had engorged 3 to 5 cc of blood. The scabs had some itching and responded to topical steroid medication. Six weeks after the first leeching, the proximal part of the incision had reduced 50 percent and this 50 percent is faded. There was an 80 reduction of pain that enabled the patient to walk without crutches. The patient currently walks pain-free, is off all medications and has been able to be on her feet all day for the last 18 months.

Case Study Three: A 52-Year-Old Patient With Severe Burning, Forefoot Edema And Hyperesthesia

A 52-year-old female presented with severe burning, hyperesthesia, dependency edema, interstitial edema and fibrosis with pain and subcutaneous adhesions. She had severe forefoot edema as well. She had many prior treatments including manipulation, pain blocks, antiinflammatory medications, cortisone injections, support stockings and sympathetic blocks. We proceed to apply 12 leeches as a blanket grid and over her scars. Three days after the leeching procedure, the patient had significant reduction of the swelling. The patient's edema remains reduced and controlled. The scarring adhesion has diminished. Her pain has been reduced from 7 to 8 out of 10 to a 2 to 3 out of 10 and is controlled with non-narcotics. It has been two years and two months since the leeching procedure.

Case Study Four: A Patient With Severe Berger's Disease

Another patient had severe Berger's disease. The patient had not quit smoking even after a partial amputation to the right lateral forefoot. There was a painful non-healing ulcer to the medial arch that responded to leech therapy and began to develop granulation tissue.

Case Study Five: A War Veteran With Scrape Metal Wounds

Another patient was a war veteran who presented with scrape metal wounds in the right leg. He had severe hyperesthesia, cramping and burning pain, severe vasospasm to the posterior tibia and peroneal arteries with patent blood flow proximally. There was dystrophic skin changes and scarring. The pain was severe to the mid-calf with multiple trigger points. One week after the

leeching procedure, the patient's shiny shin had diminished and his skin temperature had increased from less than 83° F to 94° F. The trigger point pain that was residual was 1 cm in diameter at the anterior-lateral ankle. The pain level had been a 10 preoperatively, requiring IV narcotics for pain control.

Addressing Secondary Pathologies And Obtaining Appropriate Consults

Chronic pain treatment is effective when one treats the primary causes of pain. However, one must also address secondary pathologies such as weakness, disuse muscle atrophy and osteopenia. Home therapy, splints, bracing, orthotics and effective physical therapy can help to reverse the chronic changes. Other secondary pathologies include depression, anxiety, difficulty in sleeping, postural strain, myositis and gastric distress. In these instances, one should pursue appropriate consultations with anesthesiologists, psychiatrists, psychologists, surgeons, physical therapists, vascular surgeons, neurologists or other specialists in order to correlate necessary treatments. TENS and interferential unities use electrical fields to modulate the nervous impulse and block pain. Spinal cord stimulators can control severe cases of chronic pain. The control and reduction of chronic pain is a complex process that requires a stepwise approach. The symptoms and primary pathology are treated with less risky and less invasive procedures initially. When these procedures are ineffective, then you need to weigh the surgical procedures. When these are inadequate to relieve chronic pain, more invasive procedures may be needed. Unusual and new procedures are indicated when there is resistance to controlling or resolving the chronic pain.

Final Words

The use of leeches is an effective treatment for chronic pain. While it is an ancient modality, that does not diminish its effectiveness. The use of leeches is cost effective and, in the proper perspective, is actually more effective than many traditional chronic pain treatments. That said, comparative studies are still needed to confirm the effectiveness of leeching procedures for chronic pain management.

Dr. Grumbine is a Fellow of the American College of Foot And Ankle Surgeons and is board-certified in foot and ankle surgery by the American Board of Podiatric Surgery and the American Board of Podiatric Orthopedics and Primary Podiatric Medicine. He is also a Fellow of the American Professional Wound Care Association and has a private practice in Orange, Calif. Editor's Note: For a related article, see "Choosing Medications For Painful Diabetic Neuropathy" (Diabetes

Watch, pg.16) in the July 2003 issue.

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