

Pain Issues and Treatment of the Person with an Amputation

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KEYWORDS

- Pain issues • Amputation • Residual limb pain • Pain treatment algorithm
- Phantom limb pain

KEY POINTS

- The clinician must specifically define what patients with amputations mean when they relate that they have pain.
- The most common causative factor for residual limb pain is with the prosthetic fit.
- Standard pain medications can be useful in the acute postoperative period to control the postsurgical pain.
- The use of a pain treatment algorithm for the person with an amputation who is experiencing pain can provide a rational guide for the progression of treatment options.

Most people with amputations should not experience pain that interferes with their quality of life or requires regular medication more than 6 months following the amputation surgery.^{1–13} In fact, most people with amputations do not experience significant pain more than 3 months following the amputation.

However, the clinician must specifically define what patients with amputations mean when they relate that they have pain. The pain must be carefully differentiated to treat it properly. By far, most problematic pain that is present more than 6 months after the amputation is related to a poorly fitting prosthesis and should be properly labeled as residual limb pain. This practice gets the treating physician to differentiate between nociceptive versus neuropathic pain. The most commonly used treatments can fit into 5 general categories: (1) medications, (2) prosthetic changes, (3) psychosocial treatments, (4) noninvasive therapies (ie, physical therapy, pain modalities), and (5) surgery.

Most people with acquired amputations experience phantom limb pain, at least in the acute postoperative period. This pain is carefully defined as pain that is present in the part of the limb that has been removed and not in the tissues of the limb that is remaining. Most often, this pain subsides but may be present for a split second

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on occasion throughout the life of people with amputations. Usually, however, it significantly decreases and does not require treatment beyond 3 months after the amputation surgery. It is also important that the phenomenon of phantom sensation be differentiated from phantom pain. Most people with acquired amputations will experience some phantom sensation throughout their lives. However, the amount of phantom sensation will usually diminish over time. This experience is described as feeling that the amputated portion of the limb is still present. With time, the distal end of the limb (hand or foot) will move closer to the end of the residual limb, which is called *telescoping*. It is important to explain this experience to the patients with new amputations so they better understand that it is a real phenomenon that is to be expected and that will change over time.

Residual limb pain is defined as pain that is present in some part of the limb that remains following the amputation. There are a variety of potential causes of this type of pain, and these require a careful history and investigation in order to provide a treatment approach that is likely to decrease the pain and not result in chronic medication use or opiate addiction.

One of the presently confounding things in pain treatment are the number of medications and modalities that are available for use to try to diminish the pain experience. Sherman wrote about many of these modalities in the 1970s and 1980s. Most of these treatments are in use today, but now we have many more treatment options to try. One of the problems in treatment is the physicians themselves. We now have a subspecialty in pain management, and many of these physicians do not have extensive knowledge in musculoskeletal anatomy, kinesiology, proper prosthetic fitting techniques, or the mechanics of prosthetic function or gait analysis. All of these areas enter into the proper assessment and treatment of people with amputations who have pain. Another issue in pain treatment is the need for careful follow-up and treatment coordination. There is a tendency to shotgun treatment rather than take time to carefully try one modality before adding another treatment or several treatments at a time. Thus, the pain treatment algorithm for the person with an amputation has been developed (Figs. 1 and 2).

In addition to specific treatment modalities, there are several lifestyle changes that will assist to diminish the pain experience. These changes can be more difficult to achieve than simply providing a medication or a transcutaneous electrical stimulation (TENS) unit. These changes include the following: (1) cessation of smoking, (2) decrease in stress, (3) decrease in depression, (4) control of edema, (5) distraction from the pain, and (6) increasing activity level.

RESIDUAL LIMB PAIN

The most common causative factor for residual limb pain is with the prosthetic fit. In an amputation with prosthetic restoration, pressures are put on tissues of the remaining leg or arm that were not designed to be pressure bearing. Most sockets require an intimate fit to provide maximum function and provide pressure points that can often be uncomfortable or painful. For the people with transtibial leg amputations, these points are often the fibular head or the distal anterior kick point. In people with transfemoral amputations, this point is usually the distal lateral area where the distal femur comes in contact with the lateral socket wall. This point of contact is essential for keeping the pelvis as level as possible during the stance phase of the above-knee prosthesis. In the arm prostheses, it is often the distal ends of the radius and ulna for people with transradial amputations and the distal anterior end of the humerus for people with transhumeral amputations.

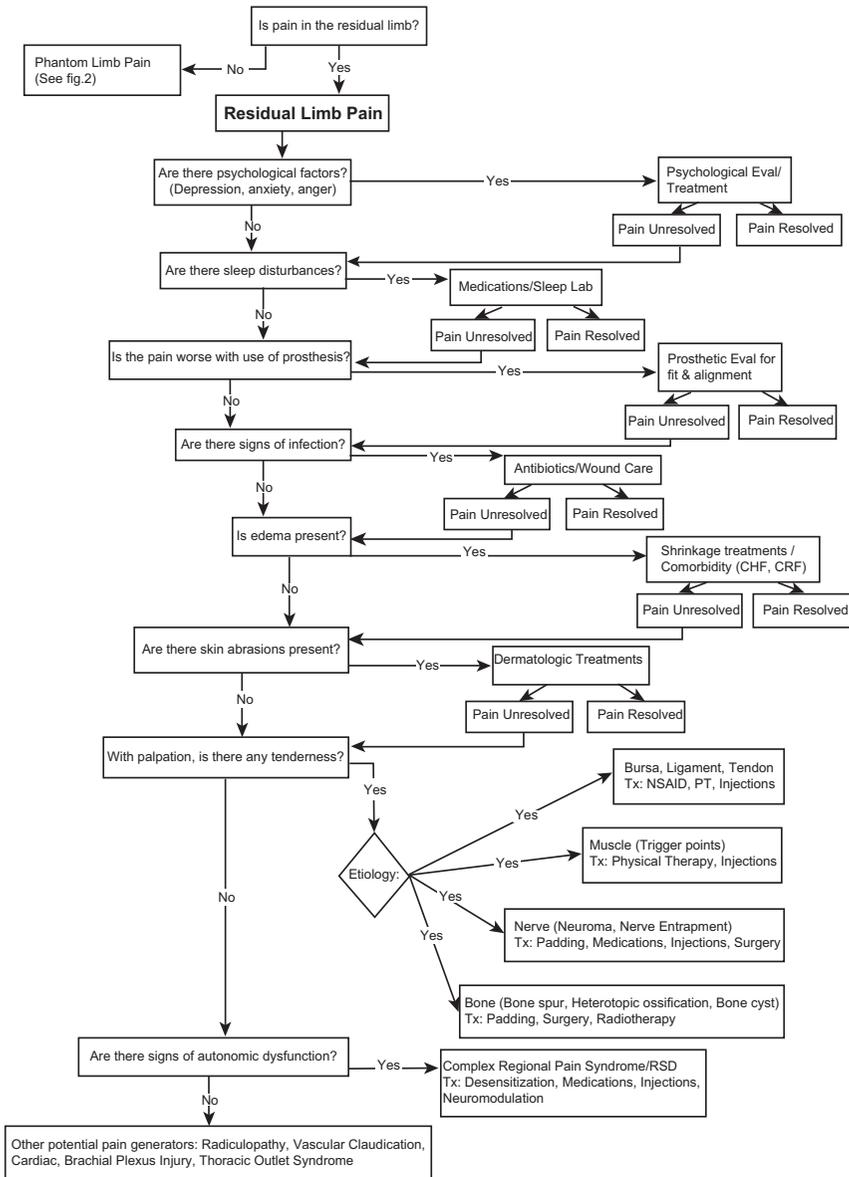


Fig. 1. Residual limb pain algorithm. NSAID, nonsteroidal antiinflammatory drugs; PT, physical therapy. (From Hompland S. Pain management for upper extremity amputation. In: Meier RH, Atkins DJ, editors. Functional restoration of adults and children with upper extremity amputation. New York: Demos, 2004; with permission.)

Residual limb pain may be caused when the socket exerts excess pressure on the residual limb soft tissues, especially on nerves or a neuroma that has formed at the cut end of a peripheral nerve.

In some cases, residual limb pain is a result of the underlying bone changes that could be bony overgrowth from the margins of the cut bone or the development of

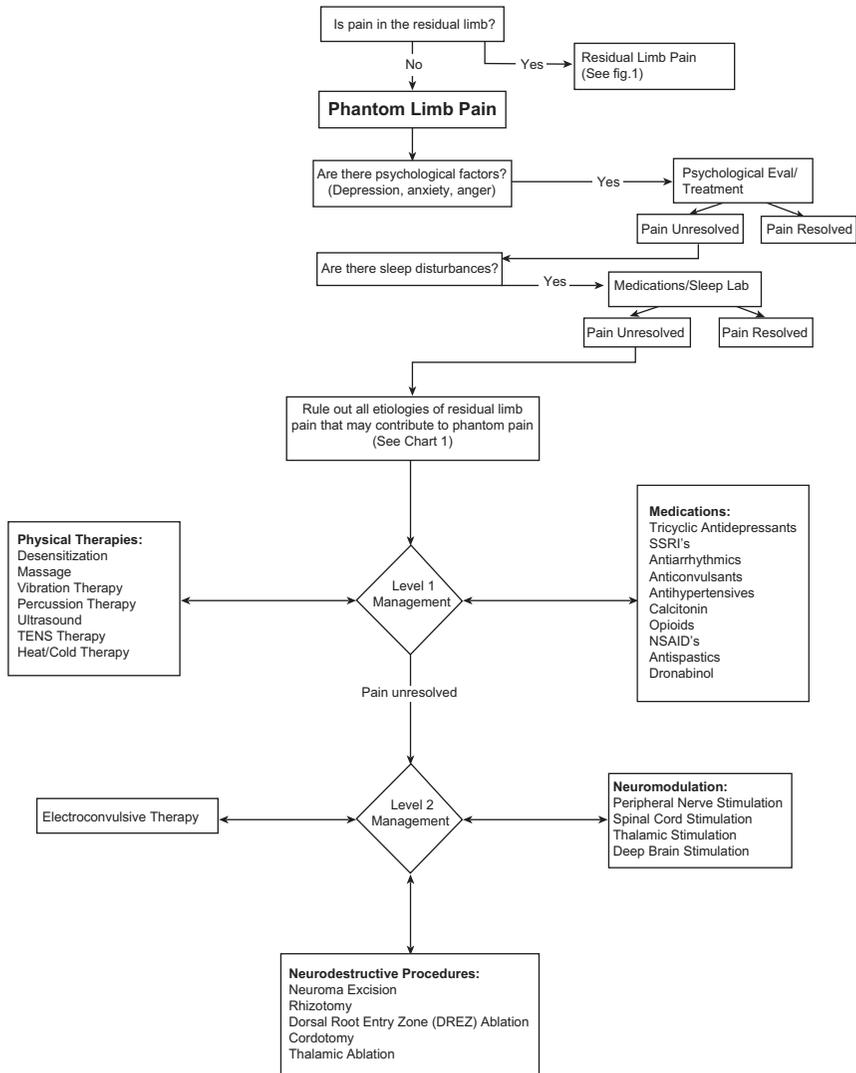


Fig. 2. Phantom limb pain algorithm. (From Hompland S. Pain management for upper extremity amputation. In: Meier RH, Atkins DJ, editors. Functional restoration of adults and children with upper extremity amputation. New York: Demos, 2004; with permission.)

heterotopic bone within the soft tissues of the residual limb. These painful bone growths may require surgical removal.

An additional consideration for pain generation in the person with an amputation should be musculoskeletal imbalance. All people with amputations have an alteration in their usual body mechanics. Often this results in a musculoskeletal imbalance that is often seen in a change in their posture. It is common that myofascial pain becomes a secondary source of pain in the affected extremity or the contralateral extremity.

Last but not least as a cause for residual limb pain is the presence of the pathophysiology that caused the amputation. Is there a peripheral neuropathy that is

causing the pain? Was there a nerve insult during the traction injury that led to the amputation? Is there claudication because of the original dysvascular disease that caused the amputation? Has the tumor that required the amputation returned? Is infection brewing within the bone or soft tissues, which is causing the residual limb pain?

PHANTOM LIMB PAIN

Phantom limb pain is usually present for a few weeks following the amputation and subsides over time, with an occasional occurrence that is usually over in an instant. Phantom limb pain should not require opiates or synthetic opiate medication for more than 3 months and often less. For whatever reason, phantom pain seems to be more problematic in people with arm amputations than in people with leg amputations. With prolonged (greater than 6 months) phantom pain that is severe, the quality of life can be greatly reduced and narcotic addiction or medication tolerance is often present.

GENERALIZED TREATMENT MODALITIES THAT SHOULD ALWAYS BE USED

The following list contains modalities that should always be used when phantom pain is present and causing any distress for people with amputations:

1. Control edema present in the stump
2. Establish a restful sleep pattern (at least 6 hours of uninterrupted sleep a night)
3. Decrease anxiety
4. Decrease stress
5. Restore the locus of control of their life to the person with the amputation
6. Restore meaningful function
7. Use desensitization techniques for the residual limb
8. Decrease depression
9. Cessation of smoking

Cessation of smoking is a must if pain control is a continuing problem and there is any hope of decreasing the phantom pain.

RESIDUAL LIMB EVALUATION FOR PAIN

Prosthetic fit has already been mentioned as a common cause for residual limb pain. The physician evaluating the person for pain must assess the fit of the prosthetic socket, and this assessment may also require input from the prosthetist who has fabricated the prosthesis. Prosthetic suspension may also contribute to the pain by causing shear or drag on the soft tissues during prosthetic wearing and function.

If people with amputations have a diabetic neuropathy or have had an extremity traction injury, there may be neuropathic pain present. Often pain in the residual limb is attributed to the presence of a neuroma. As is known, all amputations result in neuroma formation, but only a few of these lead to problematic pain. If on palpation, a neuroma is felt and pressure on that neuroma reproduces the pain experience, then it is likely the source of the pain. On occasion, magnetic resonance imaging of the residual limb is helpful in visualizing the presence, size, and location of a problematic neuroma.

Even if a neuroma is present, if the cause of the amputation was dysvascular disease, claudication in the limb should be considered as a cause of residual limb pain. The vascular supply to the remaining limb should be assessed.

Control of edema in the amputated limb is essential, especially when the prosthesis is not being worn. Edema in itself may result in a painful situation. Residual limb volume measurements may be necessary in order to assess the amount of edema that is forming in the limb.

Assessment for bony prominences or new bone formation is best accomplished with careful palpation of the bone and soft tissues of the residual limb. In addition, a plain film may help establish the contours of the bony edges. On occasion, the prominence of bony edges is related to whether a myoplastic closure was performed or that the myoplastic closure has come apart. In this situation, the pain may be produced when the bony edges are immediately under the skin with no other soft tissue padding to be protective during prosthetic wearing.

MEDICATIONS

Standard pain medications can be useful in the acute postoperative period to control the postsurgical pain. However, if phantom pain enters the pain picture, then pregabalin seems to provide better results in alleviating the phantom pain than gabapentin does. In addition, whichever of these medications is used for treating phantom pain, their dosages should be increased every 2 weeks until there is good pain relief or toxicity is present. Because there is a temptation to provide pain relief as quickly as possible, often many medications are thrown at the problem. Multiple medication use makes it difficult to know which, if any, of the medications in use might be providing the most effective pain relief. It is more effective if one pain treatment method is changed at a time to be able to discern which treatment is most efficacious.

There are several alternative medications that are in use today. Because the author is in a state where the use of marijuana is considered legal within the state, reports from patients indicate that, for some, marijuana is the only substance that provides adequate pain relief. A way to test this using a legal substance is to try dronabinol to see if it provides pain relief compared with the other medications that have been used.

THERAPEUTIC MODALITIES

Several noninvasive modalities can be tried to see what effect they might have to decrease the pain. These modalities need to be applied by an experienced therapist and used in a rationale manner for an appropriate period of time before they are deemed helpful or not. These modalities include but are not limited to the following:

1. Desensitization techniques
2. Massage, both scar and soft tissue
3. Edema control
4. Ultrasound
5. TENS
6. Exercise
7. Hot/cold contrast
8. Interferential current
9. Mirror therapy

MISCELLANEOUS PAIN TREATMENT MODALITIES

Several other modalities for pain treatment have come into and gone out of vogue. If they are to be used, they need to be provided by a skilled therapist. These modalities include the following:

1. Acupuncture
2. Magnets
3. Farabloc (Farabloc Development Corp, Coquitlam, BC)
4. Biofeedback
5. Electromagnetic stimulation
6. Kinesiotherapy
7. Eye Movement Desensitization and Reprocessing (see article by Belon and Vigoda, elsewhere in this issue)

PSYCHOLOGIC FACTORS THAT INFLUENCE THE PAIN EXPERIENCE

The relationship between the pain experience and the emotional well-being of patients with amputations cannot be overemphasized. To treat one without understanding the influence of the other is foolhardy and shortsighted. To divorce these issues is only treating a part of patients and does not provide comprehensive medical care. There are many emotional challenges for patients with amputations, especially in the early postamputation phase. The issues to be considered should include the following: (1) loss of life control, (2) anxiety, (3) changes in body image, (4) changes in functional abilities, (5) depression, (6) sleep disturbance, (7) eating disturbance, and (8) nightmares (daymares, flashbacks) and posttraumatic stress disorder. These issues and their treatment are discussed in the article by Belon and Vigoda, elsewhere in this issue.

INVASIVE TECHNIQUES FOR PAIN TREATMENT

For some patients with amputation pain who have not found relief with more conservative pain treatments, a more invasive form of management may be appropriate. The most simple of these is represented by an injection in the area of a neuroma. Often this technique uses a local anesthetic that may be combined with an injectable steroid medication. In some cases, a sympathetic block or blocks are tried to see if there is a significant sympathetic contribution to the pain.

Revision of the residual limb with resection of a neuroma can also be successful, but the neuroma may also return. Other nerve surgery may use peripheral nerve stimulation for pain relief. In some cases, a trial of spinal stimulation is warranted, and consideration for the implantation of a permanent spinal cord stimulator is appropriate.

Central nervous system surgery has been attempted in the past but without consistent success. The techniques include a dorsal root entry zone procedure or brain stimulation.

USE OF A PAIN TREATMENT ALGORITHM FOR THE PERSON WITH AN AMPUTATION WITH PROBLEMATIC PAIN

The use of a pain treatment algorithm for a person with an amputation who is experiencing pain can provide a rational guide for the progression of treatment options. Although the differentiation of phantom limb pain from residual limb pain has been presented, the 2 pain phenomena may occur simultaneously. However, the treatment of one type of amputation pain is usually quite different than the other treatment options. The algorithm suggested here does try to separate these 2 differing types of pain and the treatment options available. In both algorithms, the least invasive and less complex treatments are offered first, progressing through the more complex and invasive options.

If the pain-treating physician is 4 months into using these algorithms without signs of pain relief, then another specialist may need to provide some input to the treatment options, especially if a lot of narcotic or synthetic narcotic is still required. By this time, most people with amputations will have had a significant decrease in their post-amputation pain and not require regular medication or the stronger pain medications. Dependency can be a real issue at this time; other factors may be driving the need for medication, not just the presence of pain.

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