



Improve Outcomes of

Cryosurgery

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for Actinic Keratoses

Cryosurgery remains the gold standard for treatment of actinic keratosis. Proper technique helps unlock the power of liquid nitrogen.

Actinic keratoses, the pre-malignant lesions that result from carcinogen exposure, most commonly occur as a direct result of prolonged exposure to the sun's ultraviolet rays in susceptible people. They may clinically present in several forms, however, they are most frequently seen as scaly, crusted, inflamed, erythematous lesions of varying sizes. Over 80 percent of actinic keratoses occur on the head, neck, and upper extremities. These pre-malignant lesions are responsible for a large number of patient visits to the dermatologist. Between 1990 and 1994, patients in the United States had almost three million annual dermatology visits for actinic keratoses, making them the third most common reason for an office encounter with the dermatologist.¹ Given the vast number of patient visits and ability of these lesions to progress to squamous cell carcinomas, prompt and efficient treatment is a necessity. In many cases, cryosurgery represents optimal treatment for these lesions; proper administration, as described below, offers excellent efficacy with minimal risk of adverse effects.

The Case for Cryosurgery

Cryosurgery remains a very effective treatment for actinic keratoses with few complications and no patient downtime when performed with the proper technique. The goal of cryosurgery is to reduce the skin temperature of the target lesion, which consequently causes freezing of the cells.² This results in necrosis of the tissue, however the extent of the desired necrosis varies depending on the target lesion. For example, a malignant lesion such as a squamous cell or basal cell carcinoma would require deeper freezing with a double freeze/thaw cycle, as opposed to the single cycle that is usually sufficient for actinic keratoses. Liquid nitrogen is the preferred cryogen since it is colder and thus has greater

freezing capabilities than nitrous oxide or carbon dioxide. Lubritz and Smolewski reported a 98.8 percent cure rate with cryosurgery in the treatment of 70 patients with 1,002 actinic lesions.³

The depth of the tissue that is frozen as a result of cryotherapy depends on a couple of factors: the duration of the freezing time and the lateral spread or width of the tissue that has been frozen. When treating superficial lesions, such as actinic keratoses, the freezing time should be short. Usually, only one freeze/thaw cycle is necessary, which will minimize post-operative complications.

While cryosurgery is amongst the most effective and common treatment modalities that dermatologists employ when tending to actinic keratoses, some shy away from it due to fear of infections and resulting hypopigmentation. The best way to avoid the latter complications is to refrain from over-freezing these lesions. Consider the pathology of actinic keratosis. These lesions do not display keratinocyte atypia beyond the basal layer. Therefore, a prolonged freeze time beyond eight seconds is not warranted. A short freeze time is rather effective and will decrease the patient's risk of developing vesicles. It will also decrease the chances of damaging the melanocytes, which could result in hypopigmentation. When performed properly, cryosurgery of actinic keratoses should not lead to these complications.

Modes of Treatment

There are several different techniques for cryosurgical therapy, the oldest of which is called the "dipstick technique." This technique is performed by direct contact to the lesion with a cotton-tipped applicator that has been saturated with liquid nitrogen. While this may be preferred for the treatment of verruca, most agree that it is not the best method for the treatment of actinic keratosis. With the cotton tipped applicator, the freeze time is generally more difficult to control and can often lead to unnecessary vesicle formation. Other techniques include the open spray technique, a confined spray that involves the use of a cone with direct skin contact, and a cryoprobe in which a pre-cooled metal tip is placed directly on the lesion.

The preferred technique for the treatment of actinic keratosis is the open spray technique. This method allows the use of

Pearls For Best Results: Cryosurgery for Actinic Keratoses

- Use a hand-held open spray device (not a cotton tip).
- Use a C tip aperture.
- Tip should be 1 cm from the target lesion.
- Spray at a 90-degree angle to the target.
- Freeze time should not exceed eight seconds.
- One freeze-thaw cycle is usually adequate.
- Discuss possible side effects with the patient.

liquid nitrogen in a closed system that permits intermittent spray. It is the gold standard for the treatment of actinic keratosis. The duration of freezing is much easier to control with an open spray than with a cotton tipped applicator. Several apertures are available. Actinic keratoses are most easily treated with a C-tip aperture so that surrounding normal skin is not unnecessarily frozen. You can get the best results by holding the spray tip about one centimeter from the target lesion at a 90-degree angle.

Actinic keratoses do not need to be treated aggressively; a four- to eight-second freeze time is usually more than sufficient. A shallow crust should form within a couple of days and fall off within one and a half weeks with resolution of the AK. If vesicles frequently result post-operatively, the clinician is

likely using a prolonged freeze time during treatments. This is unnecessary, since there is no need to over-freeze actinic keratoses. These lesions can always be re-evaluated after a few weeks and retreated if the results are not satisfactory.

Advantages of Cryosurgery

Among the advantages of cryosurgery for the treatment of actinic keratoses is the relative ease of administration. Performing cryosurgery does not necessitate the use of a medical assistant, as the clinician can perform it alone quite efficiently. Local anesthesia is almost never warranted. The only thing that may occur with treatments is a brief, slight sting. Bleeding rarely occurs with cryosurgery, thus there are minimal bio-hazardous risks for the physician.

A physician can treat multiple lesions in one visit, making efficient use of both the physician's and the patient's time. This differs from the various topical treatments available, which require a minimum of six to 12 weeks of continuous application by the patient and often cause prolonged irritation and discomfort. The constant inflammation caused by these topical treatments often leads to patient frustration and thus results in noncompliance. Frequently, this is the case with elderly patients, who are the most common demographic presenting with actinic keratosis. Rather, physicians can successfully treat patients with cryosurgery at regular intervals without causing them agitation secondary to prolonged trauma.

Another great advantage to cryotherapy is that there are very few contraindications. Firstly, there are no age restric-

tions on those who are treated. Furthermore, allergic reactions do not occur. The only contraindications for cryosurgery are those patients who have cold urticaria or those with cryoglobulinemia or cryofibrinogenemia.

Potential Risks

While complications secondary to cryosurgery are rare, they may occur. Physicians should discuss risks with the patient prior to performing the procedure. The most common among these would be postoperative vesicle formation. All patients should be warned that vesicles may form as a result of the treatment so that vesicle formation, if it occurs, will not alarm them. If they occur, vesicles can be punctured with a sterile needle. However, if this becomes a frequent occurrence in the practice of treating actinic keratosis with cryotherapy, the clinician should evaluate whether he or she is freezing too deeply.

Another possible complication that may occur secondary to cryotherapy is the formation of a hypertrophic scar, however, this should not result from the treatment of actinic keratoses. The pathology of the atypia lies at the basal layer, therefore the depth of these lesions is superficial, thus freezing should not be performed to a magnitude that could potentially result in a keloid or hypertrophic scar. Hyperpigmentation may also occur due to over-aggressive freezing. Importantly, for patients who are darkly pigmented, remain cautious when utilizing cryosurgical techniques because melanocytes are sensitive to liquid nitrogen.

Other complications that may rarely occur include temporary pain or edema after treatments. Some other more infrequent events that have been related to cryosurgery include temporary neuropathy, parasthesia, syncope, bleeding, headaches, and febrile reaction.^{4,6} Treatment of actinic lesions on the dorsum of the hand should be done with caution, as this location is more sensitive and prone to postoperative complications than other anatomic sites.

Hand-held liquid nitrogen devices are available from several medical supply companies. One of the more common systems is made by Brymill, which offers two different sized models. The larger model has a 16oz./500ml capacity. It can hold liquid nitrogen for about 20 hours and will deliver about 80 10-second long treatments. The smaller model has a 10oz./300ml capacity that holds liquid nitrogen for about 10

Advantages to Use of Cryosurgery For Treatment Of Actinic Keratoses

- Quick and convenient
- Ease of delivery
- Cost-efficient
- Good cosmesis
- Relatively painless
- Anesthesia is not necessary
- Bloodless
- Few contraindications
- Little patient downtime with quick recovery
- Surgical assistants not needed

hours. This model will provide about 50 10-second long freeze treatments. While both models retail for about the same cost (roughly \$700), each has its own advantages. The 16oz. model will hold the liquid nitrogen in a larger quantity and for a longer time period, however, the 10oz. model weighs less and is easier to transport to different exam rooms. Both models perform similarly; the choice of one over the other is a matter of preference.

There are also several storage tank sizes available. Different tanks have different holding times for which viable liquid nitrogen can be stored. For example, a 20 liter tank can hold liquid nitrogen for anywhere from two to 10 months depending on the tank type. Liquid nitrogen can be delivered to your office through a local welding supply company. Generally, these compa-

nies will send a technician to the physician's office to fill the tanks for a nominal delivery charge.

When treating actinic keratoses with cryotherapy, proper documentation is crucial. Some insurance carriers may consider the simple documentation, "treatment of AK's with cryotherapy" insufficient documentation. Rather, it is best to be specific in the notes about the freeze technique and duration of freeze to ensure a clear interpretation of the procedure. For example, "single freeze of a 0.4cm hypertrophic actinic keratosis on the left arm with open spray technique for four seconds" would be a substantial description.

A Cornerstone Treatment

Cryosurgery is a highly cost effective and efficient modality and remains the cornerstone of dermatologic treatment of actinic keratosis. When performed properly, the cure rate is quite high with no patient downtime, thus yielding a very high patient satisfaction rate. For these reasons, it should be considered a primary treatment modality for actinic keratosis in any dermatologic practice. 

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