

The Efficacy of Duct Tape vs Cryotherapy in the Treatment of Verruca Vulgaris (the Common Wart)

Dean R. Focht III, MD; Carole Spicer, RN; Mary P. Fairchok, MD

Objective: To determine if application of duct tape is as effective as cryotherapy in the treatment of common warts.

Design: A prospective, randomized controlled trial with 2 treatment arms for warts in children.

Setting: The general pediatric and adolescent clinics at a military medical center.

Patients: A total of 61 patients (age range, 3-22 years) were enrolled in the study from October 31, 2000, to July 25, 2001; 51 patients completed the study and were available for analysis.

Intervention: Patients were randomized using computer-generated codes to receive either cryotherapy (liquid nitrogen applied to each wart for 10 seconds every 2-3 weeks) for a maximum of 6 treatments or duct tape occlusion (applied directly to the wart) for a maximum

of 2 months. Patients had their warts measured at baseline and with return visits.

Main Outcome Measure: Complete resolution of the wart being studied.

Results: Of the 51 patients completing the study, 26 (51%) were treated with duct tape, and 25 (49%) were treated with cryotherapy. Twenty-two patients (85%) in the duct tape arm vs 15 patients (60%) enrolled in the cryotherapy arm had complete resolution of their warts ($P = .05$ by χ^2 analysis). The majority of warts that responded to either therapy did so within the first month of treatment.

Conclusion: Duct tape occlusion therapy was significantly more effective than cryotherapy for treatment of the common wart.

Arch Pediatr Adolesc Med. 2002;156:971-974

VERRUCA VULGARIS (the common wart) is a common pediatric complaint, occurring in 5% to 10% of all pediatric patients.¹

Warts are benign growths caused by the human papillomaviruses. They can occur on any epithelialized surface of the body. The peak incidence is between the ages of 12 and 16 years. Although two thirds of all warts in children will resolve spontaneously without treatment within 2 years,² patients frequently request treatment to hasten the resolution.

See also page 975

A variety of therapies have been studied for the treatment of warts, with success rates ranging from 32% to 93%.^{3,4} Some of the treatments for human papillomavirus listed by the American Academy of Dermatology include cryotherapy, salicylic acid, cimetidine, cantharidin, podophyllin resin, cryosurgery, carbon dioxide laser, no treatment, heat, and tape occlusion.⁵ Most of these

therapies are either expensive, painful, or labor intensive.

The current treatment of choice for warts in many pediatricians' offices is cryotherapy with liquid nitrogen. This method involves freezing a wart with liquid nitrogen for 10 to 20 seconds every 2 to 3 weeks. Precisely how cryotherapy destroys warts is not well understood, but the prevailing theory is that freezing causes local irritation, leading the host to mount an immune reaction against the virus.⁶ A major drawback to cryotherapy for many children is the fear and discomfort they experience with the procedure. The pain associated with cryotherapy has led some to recommend the use of lidocaine tape before the procedure.⁷ Other potential complications of cryotherapy include blistering, infection, and dyspigmentation of the skin. Cryotherapy is also inconvenient because it requires frequent clinic visits for success. When the freezing interval is increased from 3 to 4 weeks, there is a decrease in the cure rate from 75% to 40%.⁸

There are anecdotal reports in the literature of tape occlusion therapy for the

From the Department of Pediatrics, Madigan Army Medical Center, Tacoma, Wash. Dr Focht is now with the Department of Pediatric Gastroenterology and Nutrition, Children's Hospital Medical Center, Cincinnati, Ohio.

Table 1. Demographic Characteristics

Characteristic	Treatment	
	Cryotherapy (n = 25)	Duct Tape (n = 26)
Sex, No. (%) female	13 (52)	13 (50)
Age, mean ± SD, y	8.7 ± 4.2	9.1 ± 4.4
Baseline size of wart, mean ± SD, mm	5.4 ± 1.9	5.0 ± 2.4

treatment of common warts. Litt⁹ reported that adhesive tape left in place for 6½ days and then removed for 12 hours before the cycle was repeated was successful in treating periungual and subungual warts. Although there have been no randomized, prospective trials of tape occlusion vs standard therapies in the treatment of warts, one report indicated a success rate of approximately 80% using adhesive tape.¹⁰

Despite the lack of data, tape occlusion therapy has been endorsed at dermatology meetings as a safe and effective therapy and has been used successfully by dermatologists at our facility (M. Crowe, MD, Department of Dermatology, Madigan Army Medical Center, Tacoma, Wash, oral communication, September 2000). The mechanism of action of duct tape on warts is unknown, but, as with other therapies, it may involve stimulation of the patient's immune system through local irritation. Tape occlusion, if proven effective, could be an inexpensive, convenient, and painless alternative to cryotherapy in the treatment of pediatric warts. To test this hypothesis, we conducted a prospective, randomized trial of duct tape occlusion therapy vs our local standard of cryotherapy in the treatment of common pediatric warts.

PATIENTS AND METHODS

Patients aged 3 to 22 years who came to the pediatric or adolescent outpatient clinic at Madigan Army Medical Center for treatment of common warts, or who were noted to have common warts during a visit for another medical complaint, were recruited for our study. Exclusion criteria included immunodeficiency states; chronic skin diseases, such as eczema or psoriasis; allergy to adhesive tape; warts located on the face, periungual, perianal, or genital areas; and previous cryotherapy for the same wart. Although many warts were located on fingers, periungual warts were specifically excluded because of the concern about nail dystrophy associated with cryotherapy.¹¹

The study protocol was approved by the Madigan Army Medical Center Internal Review Board. After obtaining written informed consent for participation in the study, nursing personnel measured the diameter of the study wart in millimeters using a slide caliper. Patients were then randomized, using a computer-generated code, to 1 of 2 treatment arms: cryotherapy or duct tape. Patients in the cryotherapy arm received a standard application of liquid nitrogen to the wart for 10 seconds given by trained pediatric nursing personnel. Patients or their parents were instructed to gently debride the wart with an emery board or pumice stone the day prior to returning for further cryotherapy. Patients or their parents were told to return to the clinic every 2 to 3 weeks to repeat the cryotherapy application for a maximum of 6 treatments or until resolution of the wart. Upon return to the clinic for each cryotherapy treatment, the wart was remeasured by nursing personnel, who recorded results on the coded data sheet.

For patients randomized to the duct tape arm, a supply of standard duct tape was provided. The first piece of duct tape, cut as close to the size of the wart as possible, was applied to the wart in the clinic by nursing personnel. Patients or their parents were told to leave the tape in place for 6 days. If the tape fell off, parents were instructed to reapply a new piece of tape. At the end of the 6 days, they were told to remove the tape, soak the area in water, and then gently debride the wart with an emery board or pumice stone. The tape was left off overnight and was reapplied the following morning. The treatment was continued for a maximum of 2 months or until resolution of the wart, whichever came first. Patients in the duct tape arm were requested to return to the clinic every 4 weeks, if the wart was still present, for nursing personnel to remeasure the wart and record results on the data sheet.

Patients in both study groups were requested to record any complications of therapy, including local irritation, erythema, discharge, pain, or burning. They were also provided with the telephone numbers of study physicians to contact in case of concerns. Patients who did not return for scheduled follow-up were contacted by telephone on a monthly basis by study physicians to encourage follow-up and to determine if the wart had resolved. Therapy was to be discontinued if the wart became infected or overly irritated.

Study physicians and nursing personnel were blinded to the therapy being used. Patients in the duct tape arm were instructed to remove all tape prior to making a return clinic visit. This was effective in keeping nursing personnel blinded to which treatment arm a patient was in until after they measured the study wart. Nursing personnel then checked the data sheet to see which arm the patient was in for further therapy.

The primary outcome measure for the study was complete resolution of the study wart. Patients were categorized as responders if they had complete resolution of the wart after 2 months of treatment. A secondary outcome measure was time to resolution of the warts. We used χ^2 tests to analyze differences in the percentage of resolution between the 2 groups. We analyzed demographic variables, including age, sex, and location and baseline size of the warts, using χ^2 tests for categorical variables and the 2-tailed *t* test for continuous variables to detect any significant differences between the 2 groups. *P* ≤ .05 was considered statistically significant.

RESULTS

From October 31, 2000, to July 25, 2001, 61 patients were enrolled in the study. Nine patients, 3 from the duct tape group and 6 from the cryotherapy group, were not available for follow-up and were not included in our analysis. One patient enrolled in the duct tape arm lost his study wart in a trampoline toe-amputation accident and was also not included in our analysis. Of the 51 patients completing the study, 25 were in the cryotherapy arm, and 26 were in the duct tape arm. There were no statistically significant differences in the mean ages or sex of the patients or the baseline size of the warts between the 2 groups (**Table 1**). The most common location for the warts was on the finger in both groups, and there were no differences in the physical distribution of the warts between the 2 groups (**Table 2**).

We found that duct tape occlusion therapy of the warts was significantly more effective than cryotherapy. Twenty-two (85%) of 26 patients in the duct tape arm had complete resolution of their warts vs 15 (60%) of 25 patients in the cryotherapy arm (*P* = .05). Although patients were followed for a maximum of 2 months, we

What This Study Adds

Cryotherapy is one of the more commonly used procedures in physician's offices for treatment of the common wart. We know that cryotherapy is useful for the treatment of warts, but this procedure causes fear and discomfort for many children. Although there are a few anecdotal reports in the literature for use of tape occlusion therapy in the treatment of warts, no prospective, randomized controlled trial had yet to be performed.

This study shows that duct tape occlusion therapy is not only equal to but exceeds the efficacy of cryotherapy in the treatment of the common wart. Tape occlusion therapy can now be offered as a nonthreatening, painless, and inexpensive technique for the treatment of warts in children.

were unable to accurately record the exact time to disappearance of the warts due to the variability in when patients were contacted for follow-up or returned for more cryotherapy or wart measurements. However, the majority of warts that resolved with tape occlusion disappeared within 28 days of initiating therapy (16 [73%] of 22). Warts subjected to tape occlusion therapy were unlikely to resolve if no response was seen by 2 weeks. The majority of warts responding to cryotherapy (9 [60%] of 15) resolved after only 2 treatments, spaced at least 2 weeks apart. Based on this information, average time to resolution between the 2 treatments was comparable.

Although no major complications were noted in either group, adverse effects were more common in the cryotherapy arm. The most frequent complaints in the duct tape arm were difficulty in keeping the tape on and minor skin irritation. The most difficult site to keep the duct tape on was the palmar surface of the hand. No additional techniques were employed to secure the tape. If the duct tape fell off, parents were instructed to simply apply a new piece of duct tape. The main adverse effects seen in the cryotherapy arm were pain and burning at the site. Pain following freezing was universal but ranged from mild to severe. One patient undergoing cryotherapy vomited before each application.

Our follow-up in this study was limited to the end point of resolution. We did not collect any data on recurrence of the warts following completion of therapy.

COMMENT

In our study we found that the simple application of duct tape was more effective than cryotherapy in the treatment of the common wart. Cutaneous warts are a common diagnosis in the pediatric population, and many therapies exist for the treatment of these warts. Anecdotal reports have suggested the effectiveness of tape occlusion therapy. However, this is the first randomized, prospective study on the efficacy of tape occlusion therapy for warts. We also found that the warts that ultimately responded to tape therapy typically showed at least par-

Table 2. Location of Wart

Location	Treatment, No. (%) of Patients	
	Cryotherapy (n = 25)	Duct Tape (n = 26)
Finger	12 (48)	12 (46)
Back of heel	3 (12)	3 (11)
Plantar	7 (28)	8 (31)
Palmar	2 (8)	2 (8)
Other	1 (4)	1 (4)

tial resolution after 2 to 3 weeks of treatment. Warts that were unchanged in appearance by the 3-week mark were unlikely to respond.

Several potential benefits exist for using duct tape over cryotherapy. Duct tape is more practical for parents and patients to use, especially when compared with the multiple clinic visits required for freezing of a wart. In today's busy society, it can be difficult for parents to keep follow-up appointments every 2 weeks for cryotherapy of their children's warts. In our study, the lower success rate of the cryotherapy arm is likely partially attributable to longer-than-optimal intervals between treatments in some patients. There was better compliance with the prescribed treatment regimen within the duct tape group, primarily due to the ease of administration. Another benefit of tape occlusion therapy is that it is much less costly than cryotherapy. The treatment can be undertaken in the home using inexpensive duct tape. Finally, tape occlusion therapy appears to be less threatening to a young child than freezing. The use of duct tape for the treatment of warts was generally well received by our patients.

Although both cryotherapy and tape occlusion therapy are well-tolerated treatments, the adverse-effect profile for tape occlusion therapy appears to be better. A variety of adverse effects with cryotherapy of warts have been previously reported, including pain during the procedure, erythema, hemorrhagic blister formation, dyspigmentation, recurrence of the wart, infection, and nail dystrophy when treating periungual warts.⁶ Although most patients tolerate the cryotherapy well, children 6 years and younger will typically remember previous applications as painful.¹² In our study, all patients in the cryotherapy arm experienced pain, and 1 young child actually vomited in fear of pain before each application. The only adverse effect observed in the duct tape group during our study was a minimal amount of local irritation and erythema. Practical considerations limiting the use of duct tape therapy include difficulty for some patients in keeping the tape on, potential for exacerbation of underlying skin conditions such as eczema, and the cosmetic impracticality of using duct tape on the face.

Our study had several limitations. Because some parents were reluctant to make a return clinic visit if the wart had resolved, we did not have follow-up measurements of many of the warts in the clinic and had to rely on parental report of resolution over the telephone. This was more frequent in the duct tape arm because

therapy in that arm took place in the home. To minimize this problem, we requested that parents closely examine the child for any residual wart. There was also difficulty in obtaining timely follow-up for many patients, which made our secondary end point of time to resolution more imprecise.

Our study indicates that duct tape is an effective treatment for warts that can be used as an alternative treatment to cryotherapy. Location of the wart might be related to efficacy of therapy. Our treatment arms were comparable in baseline location of the warts, but the relatively small number of patients in each treatment arm prevented us from determining whether wart locations made a difference in response to the occlusion therapy. We observed that some patients treated with duct tape had resolution of other untreated warts following elimination of the treated wart. We hypothesize this to be secondary to stimulation of the host's immune system. Although our study was not designed to investigate the efficacy of treating one wart in the resolution of multiple warts, this would be an area for further investigation.

In conclusion, although many therapies exist for the eradication of warts, the use of duct tape appears promising as a safe and nonthreatening treatment modality for children. In our study, duct tape occlusion therapy was shown to be more effective than cryotherapy in the treatment of verruca vulgaris, and it caused few adverse effects.

Accepted for publication May 23, 2002.

Corresponding author and reprints: Dean R. Focht, III, MD, Department of Pediatric Gastroenterology and Nutrition, Children's Hospital Medical Center, 3333 Burnet Ave, Cincinnati, OH 45229-3039.

REFERENCES

1. Darmstadt GL, Lane A. Cutaneous viral infections. In: Behrman RE, Kliegman RM, Arvin AM, eds. *Nelson Textbook of Pediatrics*. 15th ed. Philadelphia, Pa: WB Saunders Co; 1996:1901-1903.
2. Messing AM, Epstein WL. Natural history of warts: a 2-year study. *Arch Dermatol*. 1963;87:306-310.
3. Yilmaz E, Alpsoy E, Basaran E. Cimetidine therapy for warts: a placebo-controlled, double blind study. *J Am Acad Dermatol*. 1996;34:1005-1007.
4. Kauvar ANB, McDaniel DH, Geronemus RG. Pulsed dye laser treatment of warts. *Arch Fam Med*. 1995;4:1035-1040.
5. Drake LA, Ceilley RI, Cornelison RL, et al. Guidelines of care for warts: human papillomavirus. *J Am Acad Dermatol*. 1995;32:98-103.
6. Plasencia JM. Cutaneous warts, diagnosis, and treatment. *Prim Care*. 2000;27:423-434.
7. Ichiki Y. Lidocaine tape (Penles) for reducing pain in the cryotherapy of warts. *Pediatr Dermatol*. 1999;16:481-482.
8. Bunney MH, Nolan MW, Williams DA. An assessment of methods of treating viral warts by comparative treatment trials based on a standard design. *Br J Dermatol*. 1976;94:667-679.
9. Litt JZ. Don't excise—exorcise: treatment for subungual and periungual warts. *Cutis*. 1978;22:673-676.
10. Walbroehl G. Treating periungual warts with adhesive tape [letter]. *Am Fam Physician*. 1998;57:226.
11. American Academy of Dermatology Committee on Guidelines of Care. Guidelines of care for cryosurgery. *J Am Acad Dermatol*. 1994;31:648-653.
12. Silverman RA. Office-based treatment of pediatric skin disease. *Pediatr Clin North Am*. 2000;47:859-865.