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### Permalink

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### Journal

Dermatology Online Journal, 24(12)

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### Publication Date

2018

### DOI

10.5070/D32412042451

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# Local and distal involution of recalcitrant warts after a single intralesional dose of measles, mumps, and rubella vaccine

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## Abstract

Verruca vulgaris is a prevalent childhood condition, but treatments are often poorly tolerated. Early treatment is preferable because delays increase the probability of pain, disfigurement, and failed eradication. However, typical treatments require multiple sessions without promising cure. We describe the use of a single intralesional treatment with the measles, mumps, and rubella (MMR) vaccine to successfully eliminate both local and distant recalcitrant warts as well as the proposed mechanism of this method. There are no other known reports of complete wart regression at distant untreated sites after a single intralesional MMR treatment.

*Keywords: verruca vulgaris, intralesional therapy, measles, mumps, and rubella vaccine*

## Introduction

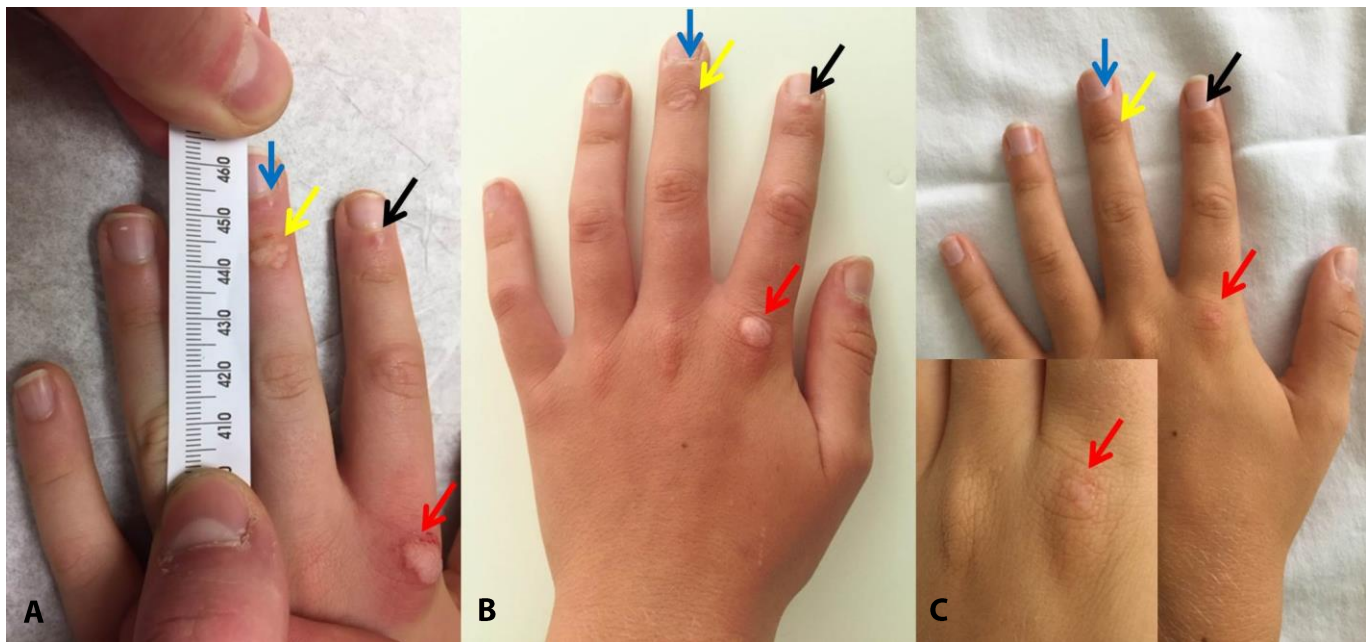
Warts are inherently difficult to eradicate. The human papillomavirus (HPV) infectious cycle terminates within differentiated keratinocytes, which are distant from active immune sites and programmed to die. Ultimately, mature virions shed via desquamation without releasing pro-inflammatory cytokines. Thus, antigen-presenting cells remain quiescent without chemotactic stimuli and HPV is shrouded from immune surveillance. Additionally, HPV genomes encode proteins that downregulate keratinocyte interferon expression and inhibit interferon

signaling, which are crucial to Th1-mediated host cytotoxicity [1].

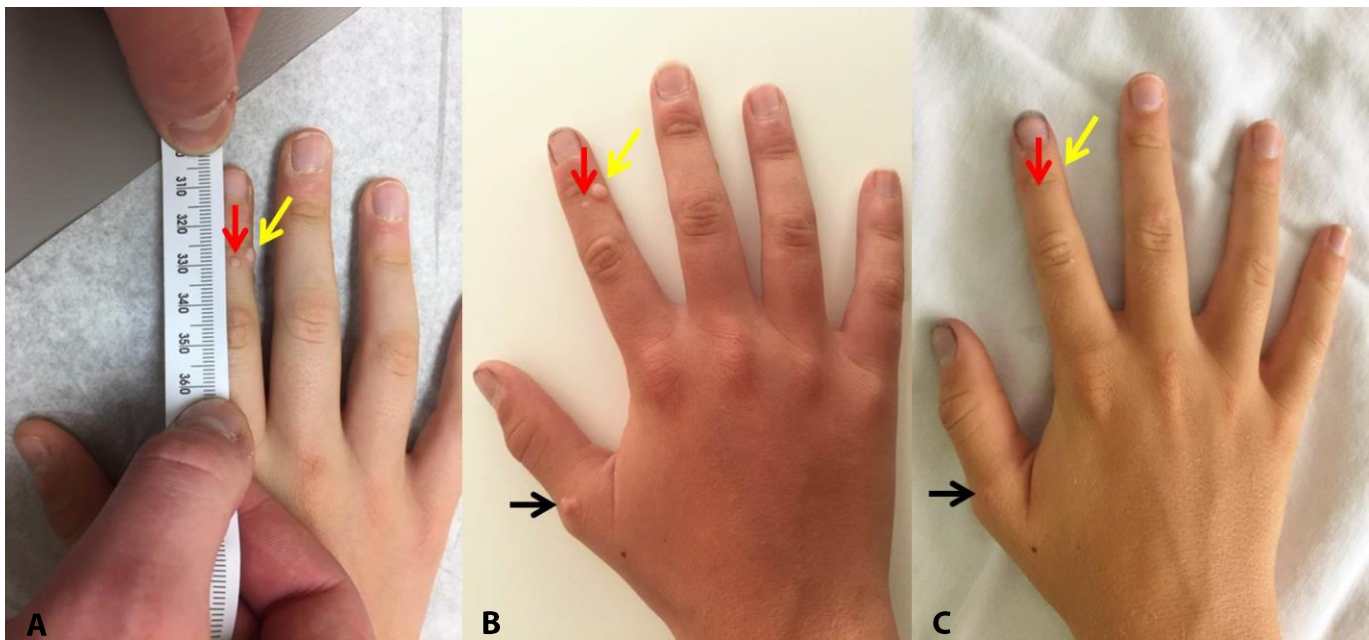
Topical wart therapies are usually protracted over at least three months and can be painful and disfiguring, which limits their use on challenging locations, like the larynx and genitals. Approaches include various concentrations and combinations of keratolytics, blistering agents, cryotherapy, thermal ablation, and immunomodulators, with little evidence demonstrating superiority of one formulation [2]. We describe a promising and affordable therapy consisting of a single intralesional measles, mumps, and rubella (MMR) vaccine dose that can be broadly utilized.

## Case Synopsis

A healthy 10-year-old boy presented with verrucae on both hands and his right elbow. Several rounds of debulking followed by cryotherapy were initially attempted. Because of unsatisfactory improvement after 13 months, topical salicylic acid and imiquimod were trialed for three months but failed. The patient and his parents elected for a single intralesional injection of the MMR vaccine into the two largest warts on his left hand. The patient was previously vaccinated against MMR but not HPV. Four weeks after the single treatment, the injected warts demonstrated involution. Four months later, all treated warts as well as untreated warts demonstrated complete involution without recurrence (**Figures 1, 2**).



**Figure 1.** Verrucae on left hand, two of which received intralesional injection with M-M-R II, Merck. Lesion number 1 (red arrow, treated with 0.3ml of MMR vaccine), lesion number 2 (yellow arrow, treated with 0.2ml of MMR vaccine), lesion number 3 (black arrow, untreated), and lesion number 4 (blue arrow, untreated). **A)** The day of treatment. **B)** Four weeks post-treatment. **C)** Four months post-treatment with lesion number 1 inset, showing involution, return of skin lines, and mild hypopigmentation.



**Figure 2.** Verrucae on right hand, none of which received intralesional injections. Lesion number 5 (red arrow), lesion number 6 (yellow arrow), and lesion number 7 (black arrow). **A)** The day of treatment. **B)** Four weeks post-treatment. **C)** Four months post-treatment.

## Case Discussion

The MMR live-attenuated vaccine is safe and effective for its intended purpose and its application as wart therapy is promising [3]. We theorize a two-part mechanism explaining the MMR vaccine's anti-

wart action. The first part is a non-specific bystander effect common to all intralesional therapies. The wheal stretches intracellular connections, microtrauma damages local cells, and pro-inflammatory cytokines are released [4]. Damaged

HPV-infected keratinocytes release viral particles, allowing for recognition by antigen-presenting cells. The magnitude and durability of local wart clearance by innate responses are low and transient and associated with recurrences in the absence of additional immune stimulation. Studies utilizing a saline control versus the MMR vaccine demonstrate local wart regression in the saline group, albeit a low percentage [3].

The second part is a robust adaptive immune response that overcomes HPV's evasion strategies. The MMR live-attenuated vaccine is highly immunogenic in both MMR-naïve individuals and especially in previously-immunized individuals, distinguishing the vaccine from current intralesional wart therapies [3, 5]. Memory cells persist with both MMR and HPV-specific targeting and Th1 cells circulate to eradicate HPV, explaining the observed improvement at distant untreated sites in our report and others [3]. Our case is unique because there are no other known reports of complete wart regression at distant untreated sites after just a single local intralesional MMR vaccine treatment.

## Conclusion

The potent cell-mediated response achieved by intralesional injection of a live-attenuated vaccine

previously administered during childhood yields a tolerable and affordable wart treatment and may aid management of additional viruses with stubborn cutaneous manifestations. Future studies from our case can improve wart therapy for inaccessible anatomic locations and elucidate durability of effect and crossover protection against additional HPV types.

## Acknowledgements

Drs. Cantor and Hardy are military service members of the U.S. Government. This work was prepared as part of their official duties. Title 17, USC, § 105 provides that copyright protection under this title is not available for any work of the U.S. Government. Title 17, USC § 101 defines a U.S. Government work as a work prepared by a military service member or employee of the U.S. Government as part of that person's official duties. The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, or the United States Government.

Neither author reports any conflicts of interest.

We thank the patient and his parents for granting permission to publish this information.

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