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Single Case

## A Case of Verrucous Carcinoma Treated by Combination of Radiotherapy and Mohs' Chemosurgery

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## Keywords

Verrucous carcinoma · Radiotherapy · Chemosurgery · Mohs' paste

## Abstract

Verrucous carcinoma (VC) is a rare subtype of squamous cell carcinoma. VC is histologically a benign tumor, but it grows significantly and eventually forms a huge mass. Many different treatments are known, but the first-line treatment is surgical resection. VC has strong local infiltration and frequently recurs, making its local control very difficult in unresectable cases. We present a rare case of VC that could be treated with combined radiotherapy and Mohs' chemosurgery, as a new option for unresectable VC.

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## Introduction

Verrucous carcinoma (VC) is histologically a benign tumor, but it has a malignant aspect, infiltrating into the surrounding tissues. Resection is the mainstay for its treatment, but local control of VC is difficult [1] and even more difficult in unresectable cases.

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**Fig. 1.** Proliferation of epidermal keratinocytes outwardly and inwardly with atypia.



Fig. 2. A large verrucous lesion on the right foot.

#### **Case Report**

The patient was a 48-year-old female who had a verrucous lesion on her right foot. Her lower legs had edema, and on her right sole she had a large verrucous mass with a foul odor. Computed tomography revealed no clinical findings suggestive of metastasis. We performed excision of the lesion, and histopathological evaluation showed that epidermal keratinocytes proliferated outwardly and inwardly, and squamous cells with atypia grew in a honeycomb pattern, infiltrating into the reticular layer of the dermis (Fig. 1). We diagnosed this lesion as VC. Seven years after excision, recurrence occurred at the same site. Owing to underlying diseases such as congenital lymphedema, myelodysplastic syndrome, and a history of recurrent sepsis, we could not perform radical surgery under general anesthesia and performed a second surgery with no margin for the purpose of decreasing the tumor volume. However, 6 months later, the lesion had formed an  $11 \times 9 \times 7$  cm large mass (Fig. 2). Therefore, we performed radiotherapy (66 Gy/33 Fr) for 6.5 weeks with 2 Gy daily and the size of tumor reduced to some extent. However, the majority of the lesion remained in the closing stages of the radiotherapy; we added the chemosurgery with Mohs' paste (ingredients: zinc chloride 50 g, distilled water 25 mL, zinc oxide starch 25 mL, appropriate amount of glycerin to adjust the viscosity). The site of the lesion developed ulceration, but it was epithelialized in 6 months (Fig. 3). The patient has shown no findings suggestive of recurrence nearly a year after the treatment.

#### Discussion

VC is a subtype of squamous cell carcinoma, which forms a wart-like or papillary tumor in the oral cavity, vulva, and soles [2]. It has been reported that chronic stimulation and inflammation contribute to the onset of VC, and that chronic stimulation is also associated



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**Fig. 3.** Condition after combined radiotherapy and Mohs' chemosurgery.

with the onset of verrucous skin lesions on the feet in diabetic neuropathy, which has a clinical course similar to that of VC [3]. Based on that report and the fact that the soles, genitals, and oral cavity are the most common sites for VC, it is speculated that there is a close relationship between these chronic stimuli and the development of VC.

VC rarely metastasizes, but its local growth is significant. The first-line treatment is surgical resection [1]. A number of other treatments may be applied, including chemotherapy, radiotherapy, cryotherapy, and immunotherapy, but there are often difficulties with local control of the lesion, especially in unresectable cases [4]. Mohs' paste is often used as a palliative treatment [5], and it can be applied to VC. It has the effect of denaturing proteins and fixing tissues. It has been reported that Mohs' paste reduces the tumor volume and improves QOL by reducing bleeding and odor [6]. According to the review of 39 articles by Takeuchi et al. [7], the tumor volume was reduced in all cases to which Mohs' paste was applied, but in any cases where Mohs' paste alone might have been applied, a complete response was not obtained. Generally, it is not used alone for curative purposes, but it is in combination with other treatments such as surgical resection [8]. To the best of our knowledge, the use of combined radiotherapy and chemosurgery with Mohs' paste for VC has not been reported. However, it is thought that such combined therapy, as in our case, can be an effective treatment aimed at local control. The effect of radiotherapy is caused by damaging the DNA of tumor cells to produce a cell-killing effect and enhance tumor immunity [9]. Tharp et al. [10] reported that the local control rate by radiotherapy was 46% in the summary of treatment results reported in the past. Basic research suggests that radiotherapy activates EGFR tyrosine kinases. EGFR enhances the ability of cancer cells to survive, such as angiogenesis and proliferation, through the expression of VEGFR. Therefore, high EGFR expression leads to resistance to radiotherapy [11]. It has been reported that Mohs' paste may suppress angiogenesis even at high levels of VEGF (vascular endothelial growth factor-A) [12]. Mohs' paste may be effective as a radiosensitizer by stopping this mechanism of radiation resistance.

In our case, the tumor shrank after radiotherapy alone, but it failed complete removal. Mohs' paste was essential for adequate control of the disease and worked in a synergistic manner due to the difference of the mechanism of action. It appears that the approach of prioritizing chemosurgery over radiotherapy is also a treatment option. It is desirable to accumulate experience of cases in the future in order to evaluate the effectiveness of combined therapy.

#### **Statement of Ethics**

Written informed consent was obtained from the patient for publication of the details of their medical case and any accompanying images. All procedures adopted in this study were conducted ethically in accordance with the World Medical Association's Declaration of



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Helsinki. This paper is exempt from ethical committee approval since we present a single case study. Ethical approval is not required for this study in accordance with local guidelines.

## **Conflict of Interest Statement**

The authors declare no potential conflicts of interest.

## **Funding Sources**

None of the authors received any financial support for the present study.

## **Author Contributions**

Kozo Kawaguchi was the main contributor, acquired and analyzed patient data, and wrote and submitted the manuscript. Yuichi Kurihara made substantial contributions to the process of manuscript revision. Kozo Kawaguchi and Yuichi Kurihara contributed to the examination and treatment of the patient. Michiaki Akashi performed histological examination of the skin. Takeshi Nakahara supervised the writing of the manuscript.

## **Data Availability Statement**

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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