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## Suture granulomas developing after the treatment of oral squamous cell carcinoma

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## ABSTRACT

**INTRODUCTION:** Suture granuloma is a benign tumor that develops because of the presence of surgical suture materials. It commonly occurs several years after different types of surgeries. Here we report a case involving a 64-year-old man who underwent head and neck surgery for oral squamous cell carcinoma and developed multiple suture granulomas mimicking tumor recurrence in the radiation field just a few days after the completion of adjuvant chemoradiation therapy.

**PRESENTATION OF CASE:** The patient underwent surgery for lymph node metastasis in the neck at 6 months after the resection of primary oral squamous cell carcinoma. Fifteen days after the completion of adjuvant chemoradiation therapy at a total dose of 50 Gy, small nodules appeared in the radiation field, along the areas of the subcutaneous surgical sutures. Cancer recurrence was initially suspected, but histopathological analysis of a biopsy specimen confirmed foreign body granuloma.

**DISCUSSION:** Chemoradiation therapy may enhance the immunoreaction of macrophages in the radiation field and promote the formation of granulation tissue in a short period of time. In addition, cisplatin, which was concurrently administered with radiation in our case, could have influenced the development of the suture granuloma.

**CONCLUSION:** In addition to tumor recurrence, suture granulomas should be considered a differential diagnosis for nodules occurring after surgery, even if they develop in the field of radiation.

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## 1. Introduction

Suture granuloma is a benign tumor caused by the presence of surgical suture materials. It commonly occurs several years after various types of surgeries [1]. These lesions consist of granulation tissue that develops as a reaction of some types of immune cells to a foreign body. In particular, this phenomenon has been reported to be an immunoreaction of macrophages [2,3]. Suture granulomas occurring in association with gastrointestinal surgery and thoracic surgery, among others, have been reported in the past [1]; however, there are few reports of this lesion occurring in association with head and neck surgery. Here we report a case involving a

64-year-old man who underwent head and neck surgery for oral squamous cell carcinoma and developed multiple suture granulomas mimicking tumor recurrence in the radiation field shortly after the completion of adjuvant chemoradiation therapy.

The authors confirm that the work has been reported in line with the SCARE criteria [4].

## 2. Presentation of case

A 64-year-old man underwent marginal mandibulectomy for squamous cell carcinoma of the lower gingiva and alveolus on the right side (T2N0M0, UICC 8<sup>th</sup> edition). Six months after primary tumor resection, metastases were detected in the right superior deep cervical lymph node and left submandibular lymph node. Cervical lymph node metastasis from oral squamous cell carcinoma was diagnosed, and bilateral neck dissection involving the entire neck region on the right side and the submandibular region on the left side was performed. Histopathological examination did not show the involvement of any other lymph nodes (pN2c, UICC 8<sup>th</sup> edition). However, adjuvant chemoradiation therapy was recommended because of bilateral lymph node involvement. Adjuvant

**Abbreviations:** CDDP, cisplatin; CT, computed tomography; US, ultrasonography; PET, positron emission tomography.

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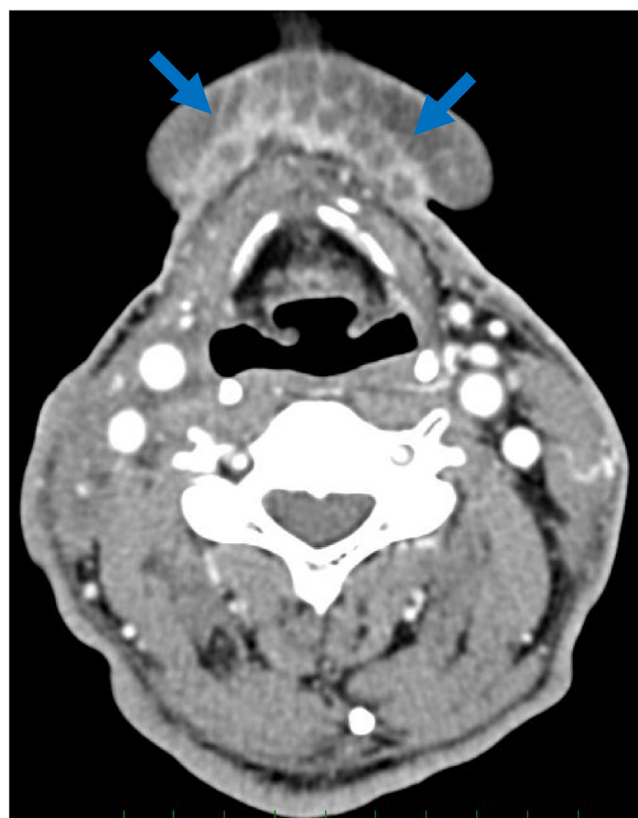
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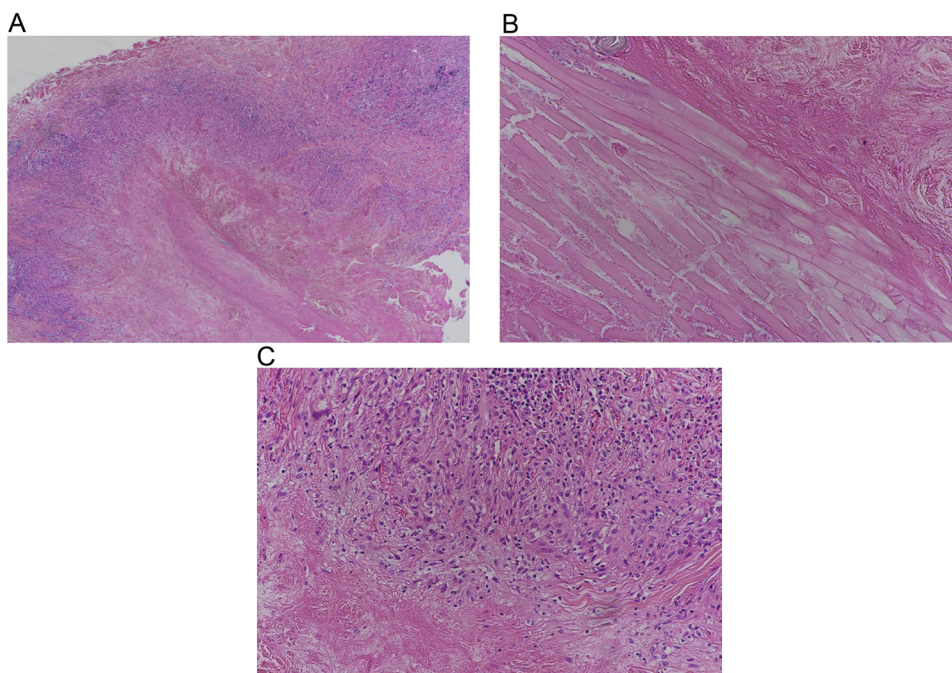
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**Fig. 1.** Findings of clinical examination for a 64-year-old man with suture granulomas after adjuvant chemoradiation therapy following head and neck surgery for oral squamous cell carcinoma. Several uniform nodules can be seen extending from the right cervical region to the bilateral submandibular regions. The nodules are arranged at regular intervals along the surgical scar.



**Fig. 2.** Computed tomography findings for a 64-year-old man with suture granulomas after adjuvant chemoradiation therapy following head and neck surgery for oral squamous cell carcinoma. Several masses with ring enhancement can be seen in the bilateral submandibular regions (blue arrows).

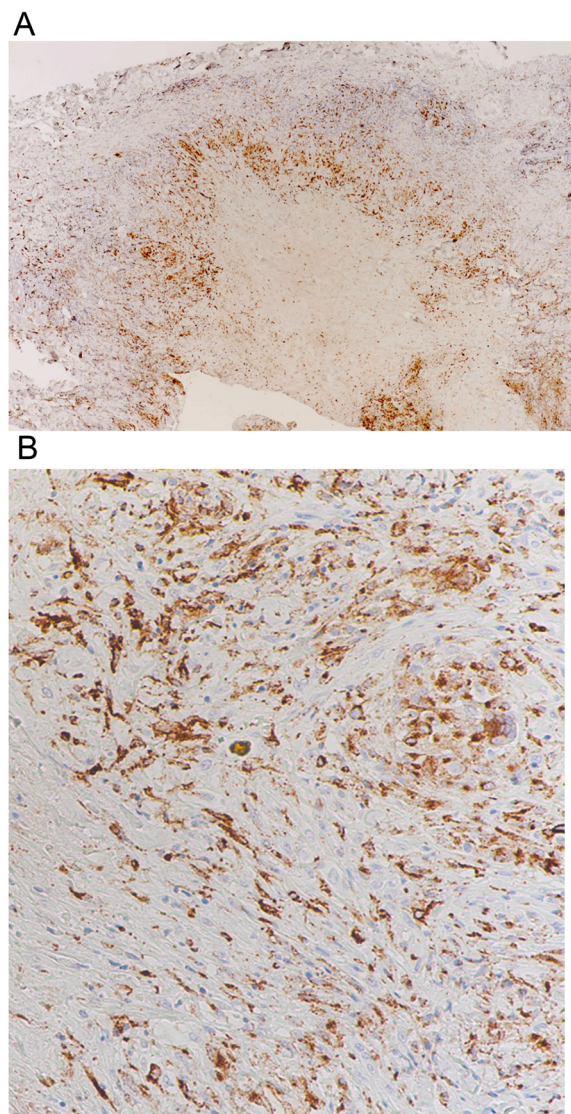


**Fig. 3.** Histopathological analysis of a biopsy specimen obtained from a 64-year-old man with suture granulomas after adjuvant chemoradiation therapy following head and neck surgery for oral squamous cell carcinoma.  
 A: Histopathological analysis of an excisional biopsy specimen shows a foreign body granuloma (low magnification).  
 B: The image shows suture materials with necrotic tissue (high magnification).  
 C: The image shows epithelioid cells and multinucleated giant cells in addition to inflammatory cells such as lymphocytes, neutrophils, and eosinophils (high magnification).

radiation therapy with CDDP (80 mg/m<sup>2</sup>) was initiated at 1 month after surgery, with the medication administered twice every 3 weeks during radiotherapy. Intensity-modulated radiation therapy was administered to both sides of the neck, with a total dose of 50 Gy delivered in 25 fractions. Fifteen days after the completion of chemoradiation therapy, several nodules were observed along the surgical scar in the radiation field (Fig. 1). They appeared to originate from beneath the skin and were arranged at regular intervals along the areas of the absorbable subcutaneous sutures placed during surgery. Most of the nodules appeared similar, with a diameter of 5 mm, and were mobile with no tenderness or itching. CT showed several nodules showing typical ring enhancement and mimicking metastatic lymph nodes. These extended from the right cervical region to the bilateral submaxillary regions (Fig. 2). US showed oval hypoechoic lesions with unclear borders and a heterogeneous internal echo directly beneath the skin along the surgical scar (Supplementary Fig. 1). To exclude metastasis and recurrence of oral squamous cell carcinoma, an excisional biopsy specimen was obtained under local anesthesia. The specimen was an elastic, hard, nonencapsulated mass with a yellow surface that was fixed to the surrounding tissues. Histopathological examination revealed a foreign body granuloma with necrotic tissue containing suture materials in the center and infiltration of epithelioid cells and multinucleated giant cells in addition to inflammatory cells such as lymphocytes, neutrophils, and eosinophils (Fig. 3). Immunohistochemical analysis showed cells with strong positivity for CD68, which is a marker of macrophages, surrounding the foreign bodies, i.e., the absorbable surgical sutures (Fig. 4). The cytoplasm of the macrophages showed strongly positive immunoreactivity for anti-CD68 monoclonal antibody labeling of the human CD68 antigen. The nodules disappeared at 4 months after the completion of chemoradiation therapy.

### 3. Discussion

We presented a case of suture granulomas that developed shortly after chemoradiation therapy in a 64-year-old man who had undergone head and neck surgery for oral squamous cell carcinoma. A foreign body granuloma is a nodular lesion containing granulation tissue that develops in response to different types of foreign bodies such as drugs and artificial substances, as well as chronic bacterial infection. An artificial substance such as surgical suture material frequently leads to the development of granulomas. There are many reports of suture granulomas associated with silk sutures, but not with absorbable and monofilament sutures, and these commonly occurred several years after surgery [1,5,6]. In the present case, suture granulomas developed in the radiation field immediately after the completion of adjuvant chemoradiation therapy, as early as 2 months after surgery. Inspection, palpation, CT, and US findings, which are useful for surveillance after neck dissection, led us to suspect tumor recurrence. Nomiya et al. reported two cases of foreign body granulomas that mimicked malignant tumors because of their rapid growth during radiation therapy. In one case, the granuloma developed on the chest wall skin after radiation therapy for esophageal cancer with chest wall metastasis. In the other case, the granuloma developed and enlarged in the surgical site during adjuvant radiation therapy after surgery for axillary lymph node metastasis from lung cancer [7]. Although suture granulomas have been reported to develop several years after surgery, those in the two cases reported by Nomiya et al. developed as early as 9 and 2 months after surgery, respectively. The granuloma in the present case also developed only 9 weeks after surgery. Moreover, in the previous two cases and our case, the lesion developed on the surface of the skin in the radiation field, not in a body cavity [7]. Radiation therapy may influence the devel-



**Fig. 4.** Immunohistochemical analysis of a biopsy specimen obtained from a 64-year-old man with suture granulomas after adjuvant chemoradiation therapy following head and neck surgery for oral squamous cell carcinoma. The absorbable surgical sutures are surrounded by cells positive for CD68, which is a marker of macrophages (A: low magnification, B: high magnification).

opment of these granulomas [7,8]. Yamamoto et al. reported that the development of a foreign body granuloma may be associated with an immunoreaction of macrophages [2]. Immunohistochemical examination in the present case showed several CD68-positive cells surrounding the suture material; this finding supported those of a previous study, where several cells positive for the anti-CD68 antibody were observed to surround the foreign body [9]. Radiation may enhance the immunoreaction of several types of immune cells in the radiation field and promote the formation of granulation tissue in a short period of time. In addition, CDDP, which was concurrently administered with radiation in our case, could have influenced the development of the granuloma.

Suture granulomas have shown increased uptake of <sup>18</sup>F-fluorodeoxyglucose, probably because of the presence of granulation tissue associated with chronic inflammation, during positron emission tomography (PET)/CT examinations in previous studies, thus leading to false-positive results [10–13]. In many previous reports, patients have received unnecessary extended resection or harmful chemotherapy for suspected malignancies. Matsuura et al. reported a suture granuloma in the liver that showed false-positive PET/CT

results in a patient with peritoneal metastasis after colon cancer. In that case, partial resection of both the liver and diaphragm was performed because the liver nodule appeared malignant in PET/CT, CT, US, and tumor marker studies. Moreover, white nodules were detected in the Douglas pouch during surgery, which were diagnosed as adenocarcinoma by frozen section analysis [10]. It is difficult to obtain biopsy specimens from lesions in the body cavities, such as liver metastases from colon cancer, prior to surgery. The nodules in our case were also suspected to be recurrent tumors on the basis of both CT and US examinations. However, the nodules were located on the skin surface, so we were able to biopsy a nodule before PET/CT in our case. If we had only depended on the CT, US, and PET findings, our patient would have received unnecessary chemotherapy.

#### 4. Conclusion

In conclusion, the findings from the present case suggest that foreign body granulomas should be suspected when rapidly growing skin nodules develop during radiation therapy after surgery, even if they develop in the radiation field. Although it is recommended that the culprit foreign bodies should be removed as soon as possible, the granulomas may show spontaneous resolution in some cases [6]. The suture granulomas in the present case also disappeared over time. Biopsy to confirm the diagnosis and careful observation are thus necessary to prevent unnecessary invasive or harmful treatments.

#### Conflicts of interest

There are no conflicts of interest associated with this manuscript.

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This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

#### Ethical approval

According to the rules concerning medical ethics at our institution, a case report does not require ethics committee approval.

#### Consent

The patient gave written informed consent for publication of this case and accompanying images. Patient anonymity has been ensured. The author obtained consent to the publication of information about the patient according to the IJS Publishing Group Author Form.

#### Author contribution

Yukio YOSHIOKA conceived this case presentation and drafted the manuscript. Atsuko HAMADA conducted the immunohistochemical analyses. Hirotaka NAKATAO, Tomoaki HAMANA, Taku KANDA, Koichi KOIZUMI, Shigeaki TORATANI, and Tetsuji

OKAMOTO participated in the treatment of the patient. All authors have read and approved the final manuscript for submission.

#### Registration of research studies

This is not a first-in-man study, so we need not to register this article on a registry of health research.

#### Guarantor

Yukio YOSHIOKA.

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#### Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.ijscr.2018.07.021>.

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