"Recurrence or Transformation? Spindle Cell Carcinoma After Oral Squamous Cell Carcinoma Treatment- A Case Report"

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ABSTRACT

Background: Spindle Cell Carcinoma (SpCC) is a rare and aggressive variant of Squamous Cell Carcinoma (SCC) that can arise following the treatment of the original SCC. Its distinct histopathological features, such as spindle-shaped cells, complicate diagnosis, as they can resemble mesenchymal tumours. SpCC is characterized by rapid growth and a high potential for metastasis, posing significant clinical challenges.

Case Presentation: A 45-year-old male with a history of SCC on the right lateral border of the tongue underwent surgical resection and radiation therapy. One year later, a rapidly enlarging mass appeared at the tonsilo-lingual sulcus. Histopathology revealed spindle-shaped cells with both epithelial and mesenchymal features, confirming Spindle Cell Carcinoma.

Discussion: The transformation of SCC into SpCC after radiation or surgery may result from radiation-induced mutations in residual SCC cells. (1) Diagnosis is challenging due to the spindle morphology of SpCC, which can mimic mesenchymal tumours such as fibrosarcoma or malignant fibrous histiocytoma. (2) Immunohistochemistry plays a crucial role in distinguishing SpCC from other spindle cell neoplasms by detecting the co-expression of keratin and vimentin. (3)

Management and Conclusion: The patient was treated with wide surgical resection and radiation therapy for recurrent SpCC. Given its aggressive nature, SpCC requires close follow-up for recurrence and metastasis. SpCC after SCC treatment generally has a poor prognosis due to its high risk of recurrence and metastasis. (4) Early detection and aggressive treatment are critical for improving outcomes in these complex cases.

INTRODUCTION:

Squamous Cell Carcinoma (SCC) is the most common malignant tumour of the oral cavity, accounting for approximately 90% of all oral cancers. It is strongly associated with risk factors such as tobacco use, alcohol consumption, and human papillomavirus (HPV) infection. The primary treatment for SCC is surgical resection, depending on the stage of the disease which may be followed by radiation or chemotherapy or chemoradiation or no adjuvant treatment.

Despite the success of these treatments in many cases, recurrence and the development of secondary malignancies can complicate patient management. One such rare and aggressive transformation is the emergence of **Spindle Cell Carcinoma (SpCC)**, a variant of SCC that can arise after treatment, particularly following surgery or radiation therapy. (1)

Spindle Cell Carcinoma is characterized by the presence of both epithelial and mesenchymal components, with spindle-shaped cells typically arranged in fascicular or herringbone patterns. This transformation is believed to occur due to radiation-induced mutations or the effects of surgical manipulation of the primary tumour. (3) The development of SpCC in the same location as a previously treated SCC can present significant diagnostic challenges due to the similar presentation of both tumours, despite their distinct histological characteristics. Immunohistochemistry, showing co-expression of epithelial markers like cytokeratin and mesenchymal markers like vimentin, is critical in making the correct diagnosis. (4)

The prognosis for Spindle Cell Carcinoma following SCC treatment is generally poor due to its high potential for local recurrence, metastasis, and resistance to conventional therapies such as radiation and chemotherapy. (2) The presence of SpCC following SCC treatment suggests an aggressive biological behaviour and emphasizes the need for vigilant post-treatment surveillance. This case report highlights the development of Spindle Cell Carcinoma after the surgical resection of oral Squamous Cell Carcinoma, illustrating the clinical, histopathological, and therapeutic challenges of this rare occurrence.
This article is reported on a case of a spindle cell carcinoma of the right Tonsilo-Lingual Sulcus; at the different site than the previously operated squamous cell carcinoma lesion, which was detected during follow-up.

CASE REPORT:

A 45 years old male patient reported to the Department of Oral and Maxillofacial Surgery in October 2023 with a complain of pain and burning sensation on the tongue for 1 month. Patient also mentioned that the lesion had gradually increased in size over the course of that month. A history of cigarette smoking for 10 years 4-5 times a day was established.
On clinical examination, mouth opening was reduced to approximately 2 and half fingers, no palpable lymph nodes were present.
Intraorally, a reddish ulcerative lesion present on the right lateral border of the tongue almost involving the midline was seen. Tongue movements were normal, floor of mouth and base of tongue were free. On palpation, the lesion did not cross the midline. (Fig.1)

A punch biopsy of the lesion was done which was suggestive of non-keratinising squamous cell carcinoma of the right lateral border of tongue.
Patient also underwent a whole-body PET-CT scan which stated increased FDG uptake in the enhancing lesion involving the right lateral border of the tongue measuring 1.8 x 0.8 cm (SUVmax 31.95). A low grade FDG uptake was seen in bilateral level II and right level III nodes with fatty hilum (SUVmax 7.13). There was no presence of metabolically active disease anywhere else in the body.
Patient was counselled about the same and a surgical intervention was considered. Patient underwent wide local excision with right modified neck dissection and left supra-omohyoid neck dissection with tracheostomy and the defect was closed primarily.
The final histopathology report suggested a pT2N0 lesion with all margins free of tumor. (Fig.2)
Based on the report, patient underwent 30 fractions of radiation therapy (PORT).

Patient reported back to the department in October 2024 with a poorly demarcated, soft, pedunculated lesion on the tonsilo-lingual sulcus area. (Fig.3)
A recurrence of the lesion was considered and a repeat punch biopsy and whole-body PET-CT scan was done. The scan showed increased metabolic activity in the above-mentioned area. An immunohistochemical evaluation of the tumour cell was done as well which came positive for pan cytokeratin and vimentin and was suggestive of spindle cell carcinoma (carcinosarcoma). (Fig.4)

DISCUSSION:

The occurrence of **Spindle Cell Carcinoma (SpCC)** following the surgical treatment of **Squamous Cell Carcinoma (SCC)** in the oral cavity is a rare and challenging clinical entity that poses significant diagnostic and management difficulties. This phenomenon is considered a transformation of the previously treated SCC or a second malignancy that develops in the same location. Spindle Cell Carcinoma is a rare, aggressive subtype of SCC, which may present in the oral cavity as a more poorly differentiated variant. The relationship between SCC and SpCC, particularly the latter's emergence post-SCC treatment, is a topic of clinical importance due to the aggressive behaviour and the increased potential for recurrence and metastasis.

Squamous cell carcinoma and its treatment

Squamous Cell Carcinoma (SCC) is the most common malignancy in the oral cavity, often linked to risk factors such as tobacco use, alcohol consumption, and human papillomavirus (HPV) infection. Surgical excision is the primary treatment for SCC, followed by adjuvant therapies like radiation or chemotherapy or chemoradiation, depending on the tumour stage and location. While SCC generally has a favourable prognosis if diagnosed early and treated adequately, recurrence or transformation into a more aggressive form after treatment is a known but rare complication. [(1)]

Spindle cell carcinoma: An Aggressive Variant

Spindle Cell Carcinoma (SpCC) is considered a rare, highly aggressive form of SCC that exhibits a more mesenchymal phenotype with spindle-shaped tumour cells. This type of carcinoma may arise from an existing SCC, either due to genetic mutations triggered by radiation therapy, surgical manipulation, or other environmental factors, or as a secondary malignancy following the treatment of SCC. SpCC has a poorer prognosis compared to typical SCC, due to its aggressive local invasion and metastasis potential. [(4)]
Histologically, SpCC features a mixture of epithelial and mesenchymal components. The spindle-shaped cells lack keratinization and are arranged in a fascicular pattern. These features help differentiate SpCC from other forms of oral malignancies, but due to the spindle-shaped morphology, it can sometimes be misdiagnosed as a sarcoma or another mesenchymal tumour. Immunohistochemical analysis is essential for confirming the diagnosis, typically showing positive staining for cytokeratin and vimentin. [(3)]

Spindle Cell Carcinoma After Treatment of SCC

Spindle Cell Carcinoma can develop after the treatment of SCC, particularly in patients who have undergone radiation therapy, which has been implicated in triggering transformation in the tumour cells. Radiation-induced genetic mutations and tumour progression may lead to the development of SpCC in previously treated areas, which presents as a more aggressive tumour with different histological and clinical features. SpCC may also arise as a secondary malignancy at the surgical site following incomplete resection of SCC or due to recurrence. [(5)]

In a patient who underwent surgery for SCC, the presence of SpCC in the same region may be indicative of a recurrence, but with the added complication of a transformation to a more aggressive form. The newly formed SpCC is more likely to be resistant to the treatments that initially worked for SCC, including surgery, radiation, and chemotherapy. Thus, early detection of SpCC following SCC treatment is crucial for better prognosis and management.

Clinical Presentation and Diagnosis

The clinical presentation of SpCC following SCC treatment often includes rapid recurrence of the lesion, with the development of new ulcerations, induration, and pain in the previously treated area. This recurrence is typically more aggressive, with rapid growth and possible involvement of surrounding tissues and lymph nodes. Patients may also present with symptoms of local invasion or distant metastasis, making the early identification of SpCC critical to managing the disease.

Histopathologically, SpCC displays distinct features, including elongated spindle-shaped cells arranged in a herringbone or fascicular pattern. Unlike conventional SCC, SpCC shows limited or absent keratinization, which complicates the diagnosis. Immunohistochemical staining for cytokeratin (e.g., CK-8, CK-18) and mesenchymal markers like vimentin can confirm the presence of both epithelial and mesenchymal components, aiding in the diagnosis of SpCC. [(2)]

The differential diagnosis includes other spindle cell lesions, such as malignant fibrous histiocytomas, fibrosarcomas, or even metastatic sarcomas. However, the co-expression of epithelial markers (keratin) and mesenchymal markers (vimentin) is characteristic of SpCC and helps distinguish it from other similar-looking tumours. [(6)]

Management and Prognosis

The management of Spindle Cell Carcinoma after the treatment of SCC requires an aggressive approach due to the tumour's high recurrence and metastatic potential. Surgical resection with wide margins remains the primary treatment modality, as SpCC tends to be locally invasive and requires complete removal to reduce the likelihood of recurrence. Adjuvant therapies, including radiation or chemotherapy, may be considered depending on the extent of disease and the patient's clinical presentation. However, SpCC's resistance to radiation and chemotherapy makes the role of these therapies less predictable compared to typical SCC. [(7)]

The prognosis for patients with SpCC after SCC treatment is generally poor due to the aggressive nature of the tumour and the higher likelihood of metastasis. The development of SpCC after SCC treatment suggests a more complicated clinical course, with a higher risk of recurrence and poorer outcomes. As such, patients should undergo close follow-up and monitoring for recurrence or metastasis after treatment.

Challenges in Clinical Management

Managing SpCC following SCC treatment presents several challenges. First, distinguishing between recurrence of the original SCC and the development of SpCC can be difficult, as both tumours share some clinical and histological features. Second, the emergence of SpCC indicates a more aggressive form of cancer that is often resistant to conventional treatments, complicating therapeutic decision-making. A multidisciplinary approach involving surgical oncologists, pathologists, and radiation oncologists is essential to tailor the treatment plan and provide optimal care. [(5)]

Conclusion

Spindle Cell Carcinoma developing after the treatment of Squamous Cell Carcinoma in the oral cavity represents a rare and challenging clinical scenario. The transformation of SCC into SpCC, possibly induced by radiation or surgical trauma, leads to a more aggressive tumour

with poor prognosis. Early diagnosis, extensive histopathological evaluation, and aggressive treatment strategies, including wide surgical resection, are critical for improving patient outcomes. This case highlights the importance of considering SpCC in the differential diagnosis when a patient presents with a recurrence or new growth in the treated area, ensuring timely intervention and optimal management.

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Conflict of Interest: The authors have no conflict of interest to disclose

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FIGURES:

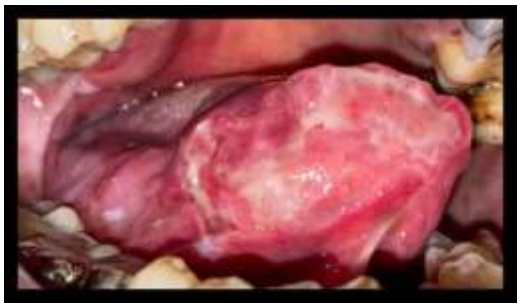

Fig 1. First preoperative clinical photo (tongue lesion)

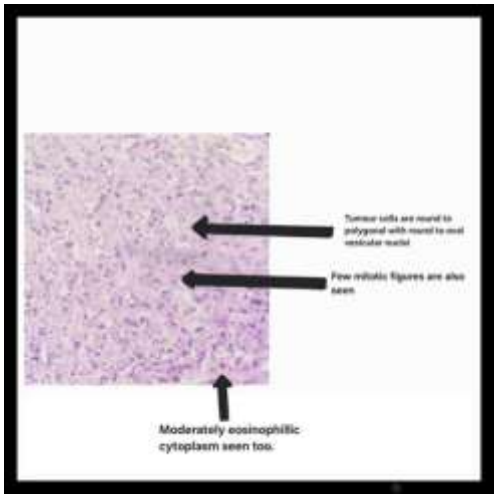

Fig 2. H/E showing squamous cell components (H & E stain ;40x)

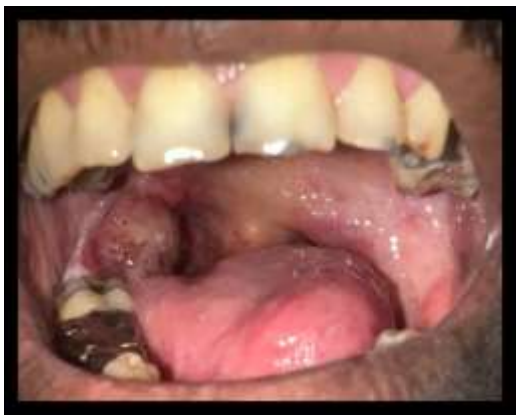
Fig 3. Second preoperative clinical photo (RMT lesion)

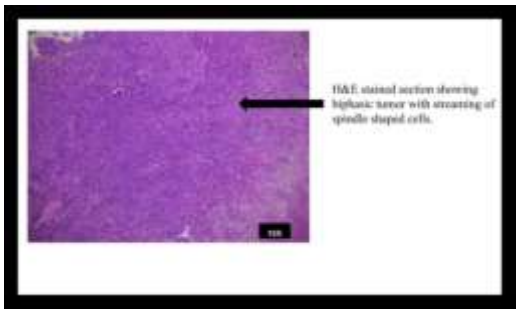
Fig 4. M/E showing spindle cell component (H & E stain; 10x)