Transcatheter Arterial Chemo Infusion (TACI) for Squamous Cell Carcinoma of the Tongue: A Case Report

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INTRODUCTION

Cancers of the lip and oral cavity ranked as the 16th most common cancers worldwide in 2020, with more than 377,700 cases and over 177,700 deaths worldwide in 2020. Ninety percent of these oral neoplasms are squamous cell carcinomas (SCC). The main treatments for oral cancers are surgery, radiotherapy, and chemotherapy, either combined or as stand-alone therapies. Transcatheter Arterial Chemo Infusion (TACI) is considered the definitive treatment for locoregionally advanced squamous cell carcinoma of the oral cavity, aiming to preserve function after surgery while maintaining or improving locoregional control and survival rates. This case report presents the qualitative result of TACI on SCC of the tongue. The aim of this case report is to demonstrate the potency of TACI as an alternative palliative therapy for SCC of the tongue.

Case Presentation: A 37-year-old man with SCC of the tongue was diagnosed and treated at Dr. Sardjito General Hospital, Yogyakarta in 2021. The patient underwent TACI procedure and subsequent radiotherapy sessions subsequently. The therapeutic response was evaluated by observing the clinical morphology of the lesions.

Conclusions: TACI is a minimally invasive technique used in the management of SCC. TACI has shown its potency as an efficient and effective alternative palliative therapy.
limited. Therefore, it is important to demonstrate the potency of TACI using a combination of Doxorubicin and Carboplatin as an alternative therapy after the surgery for squamous cell carcinomas (SCC) of the tongue.

CASE PRESENTATION

A 37-year-old man presented with complaints of lumps and sores on the tongue that had been present for the past 6 months. He also reported experiencing pain around the neck, difficulty swallowing, and shortness of breath. The patient noticed a lump in his right neck area with a solid consistency, accompanied by redness and swelling (Figure 1). His medical history revealed that he had been an active smoker for five years, consuming approximately two packs a day, and frequently consumed alcoholic drinks. He quit smoking in 2010 and had a family history of his mother’s death from neck cancer.

In October 2021, the patient underwent a lump removal surgery from his neck at Tegalyoso Hospital, Klaten. However, one month later, the lump regrew. The patient was advised to undergo a second surgery, but he refused. He was then referred to Dr. Sardjito Hospital in Yogyakarta for further treatment. Subsequently, he underwent head MSCT scan examination and the result showed a rounded hypodense mass on the base of the right tongue region with enhancement post-contrast administration, accompanied by multiple lymphadenopathies in the bilateral neck region (Figure 2).

Figure 1. A 37-year-old man with a lump on the neck with redness and swelling. (A) and (B): A lump on the right neck area grew back after lump removal surgery, with redness. (C): Another lump appeared on the left neck; a biopsy was performed with cytology resulting in metastatic squamous cell carcinoma.

Figure 2. The head MSCT scan of the patient. (A) A rounded hypodense mass on the base of the right tongue region before TACI treatment (arrow); (B) Measuring 3.2 cm x 1.5 cm x 0.7 cm with enhancement post-contrast administration; (C) There were also multiple lymphadenopathies (arrow) in the bilateral neck region with the largest short-axis size of 1.7 cm in the left neck.

Figure 3. The pathology anatomy result shows connective tissue fragments with tumors arranged in solid nests, infiltrating the surrounding connective tissue stroma with keratin pearls. The tumor cells are polymorphic, medium to large with few to moderate cytoplasm, eosinophilic, and partially intercellular bridged. The nucleus is round, and partially oval with an irregular nuclear membrane, coarse chromatin, and visible daughter nuclei. Connective tissue stroma with necrosis.
A tissue sample was taken from the front part of the right tongue and a lump on his right neck region. The anatomical pathology examination results revealed a well-differentiated conventional SCC (Figure 3). Furthermore, biopsy from the lump on the left neck showed metastatic squamous cell carcinoma.

The patient subsequently underwent a TACI, with the administration of 300 mg of Carboplatin and 20 mg of Doxorubicin in total through the feeding artery which was the right submandibular artery and left submandibular artery. Subsequently, radiotherapy was performed 18 times using the Intensity-Modulated Radiation Therapy (IMRT) technique at a dose of 70 Gy in 33 fractions. The evaluation showed that the tumor size had decreased after TACI and radiation therapy.

TACI was performed with local anesthesia which was 2% lidocaine (10 cc) in the right inguinal region. Premedication with 4 mg of dexamethasone and 8 mg of ondansetron was administered intravenously. A needle puncture was performed on the right femoral artery with an 18G abbocath. Subsequently, a guidewire was inserted which was then replaced by a 5 Fr introducer sheath (Radifocus; Terumo®). Then, a 5 Fr vertebral angiography catheter (Radifocus; Terumo®) was inserted through the attached sheath until it reached the right external carotid artery. On contrast administration, a hypervascular mass appeared with relatively extensive staining in the right sublingual region.

Next, a Progreat 2.7 Fr (Terumo®) microcatheter was inserted through a 5 Fr vertebral angiography catheter (Radifocus; Terumo®) into the tumor feeding artery branch of the left submandibular artery to administer 20 cc of Carboplatin and 10 cc of Doxorubicin.

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Doxorubicin (30 mg) was inserted into the right feeding artery tumor separately (Figure 4).

The catheter was transferred to the left external carotid artery toward the feeding artery for tumor metastases in the left neck, to be given the remaining 20 cc of Carboplatin mixture and 10 cc of Doxorubicin mixture, resulting in a total dose of 300 mg Carboplatin and 20 mg Doxorubicin for both primary and metastatic tumors (Figure 5).

Arteriography of the tongue SCC tumor was performed on the left side of the neck, revealing that the tumor staining was relatively extensive and was followed with TACI. Two weeks after Transcatheter Arterial Chemo Infusion (TACI), the upper neck and surgical scars were swollen, with ulcers on the postoperative wounds and linguectasis on the anterior part of the right basal part of the tongue. Furthermore, three weeks after TACI was performed, there was tumor necrosis resulting in a relatively exposed suture site (Figure 6).

One month after the patient underwent the TACI procedure, the patient was scheduled for locoregional radiotherapy using the IMRT (Intensity-Modulated Radiation Therapy) technique at a dose of 70 Gy in 33 fractions (Figure 7). The patient subsequently received radiotherapy 18 times according to the 33-fractionation plan. After TACI and 12 sessions of radiation therapy, ulceration, and cicatrix appeared in the right neck region. The ulceration began to close, with hyperpigmentation of the skin surface of the right neck region becoming evident after 18 sessions of radiation therapy (Figure 8).

After the 18th radiation therapy session, the patient was sent home with a relatively closed wound, but the colorization was rather necrotic. The patient experienced shortness of breath and was readmitted to Tegalyoso Hospital in the High Care Unit (HCU). The patient was fed via a gastric tube. During four days of hospitalization, the wound had become necrotic and became infected with maggots. The patient’s condition deteriorated, leading to sepsis, and later, the patient passed away.

DISCUSSION

The tongue’s epithelium is squamous and has stratified keratin. The onset of invasive tongue cancer is characterized by several epithelial abnormalities, including the appearance of mitoses, pleomorphism, aberrant organization, and expansion of these, which progress to mild to severe dysplasia or carcinoma in situ. Leukoplakia and erythroplakia eventually develop on the tongue in place of the early cancerous lesions. Compared to erythroplakia, which is a reddish plaque that increases the risk of cancer, leukoplakia is a whitish plaque on the surface of the tongue that does not erode [9].

Figure 7. Radiation therapy planning process and radiation dose calculation.

Figure 8. (A) After TACI and 12 sessions of radiation therapy, ulceration, and cicatrix were observed in the right neck region; (B) After TACI and 18 sessions of radiation therapy, the ulceration had begun to close, with hyperpigmentation of the skin surface of the right neck region.
SCC is a relatively common type of head and neck cancer, most frequently found in the nasal-oral cavity, on the front and back of the tongue's split surface. Both radiotherapy-based and surgery-based systemic therapies are equally recommended as first-line treatment, while a chemotherapy-based strategy is applied for advanced diseases. The confined operating field in the oral cavity makes the procedure very challenging. Early detection is essential for surgical intervention while the tumor is still small and manageable. However, the prognosis of oropharyngeal SCC patients remains poor due to late diagnosis, high rates of primary-site recurrence, and lymphatic metastasis [10].

Several lines of evidence support the existence of at least two genetically different types of head and neck SCC, one virus-related and the other alcohol and/or tobacco-related, characterized by both clinical and biological opposite features [11]. It is well established that HPV infection contributes to tongue cancer; moreover, HPV-associated tongue cancer improves survival when compared to its HPV-negative counterpart. It may improve survival in this situation [1]. HPV-positive cancers in the oropharynx and base of the tongue respond well to chemoradiation [12]. Although it is unknown if the patient had HPV, it was noted that he had a history of smoking for nearly 11 years during his teenage years and occasionally overindulged in alcohol, which tends to affect more men than women. In a different study, Marur hypothesized that by the end of the decade, both oral and tongue-base SCC would become more common, particularly in women and young patients who had never smoked or consumed alcohol [13].

On the right front border of the patient's tongue, a whitish lump was observed, primarily due to keratinization of the epithelium. An anatomical pathology examination revealed solid nests invading the surrounding connective tissue stroma with keratin pearls. The tumor cells displayed eosinophilic features, were polymorphic, medium to large, and exhibited some intercellular bridges. They also contained varying amounts of cytoplasm. The nuclear membrane appeared uneven, the chromatin coarse, and daughter nuclei were visible in the circular, somewhat oval nucleus, with the presence of necrotic connective tissue stroma [9].

Squamous cell carcinoma most commonly involves the oral cavity. In advanced SCC cases, the long-term prognosis for the patient is typically very poor, with approximately a 50% survival rate over 5 years [2]. Imaging examinations are essential for assessing the nature of the tumor, staging the disease, and evaluating its relation to surrounding structures. The draining lymph nodes of the neck are also radiologically assessed, as a locoregional spread of tumor via the lymphatics often occurs, specifically to the submandibular and jugulodigastric chains [13,14].

Treatment plans are typically tailored to each patient. In general, surgery is the initial step, followed by chemoradiation. The goal of surgery is a complete cure, with an emphasis on restoring function [1]. Surgical resection of the oral tongue can impair major functions such as articulation, chewing, and swallowing. In cases of partial glossectomy or glossectomy, the objective is to reconstruct the tongue without compromising the function of the remaining portion. In a total or subtotal resection, the aim is to minimize the space between the reconstructed tongue and palate to restore articulation and swallowing function. Surgery is the preferred treatment for recurrent cancer when the tumor is resectable due to its more favorable prognosis than other treatments [15].

TACI is a valuable treatment for neoplastic lesions, effectively inhibiting tumor growth. It holds the potential to facilitate systemic drug treatment and improve the overall prognosis. TACI leverages intra-arterial access to deliver chemotherapy drugs directly to tumor cells, achieving higher concentrations than those in the surrounding normal tissue. This reduces damage to normal cells and minimizes systemic side effects while promoting tumor cell destruction. Additionally, the first-pass elimination effect helps attenuate systemic chemotherapy side effects. TACI offers advantages such as reduced trauma and high success rates. However, there is no exact success rate for TACI as palliative therapy for SCC of the tongue.

The precision of delivering chemotherapy drugs can reduce tumor volume, enhance local structural changes, support local functional recovery, and enable a comprehensive evaluation of the patient's condition, facilitating the development of personalized treatment plans and lowering the risk of complications and mortality [16].

Following early discharge after TACI and radiation therapy, the patient was in a relatively stable condition. However, a week after discharge, the patient noticed the regrowth and swelling of the lump on their neck. The patient was readmitted to Tegalsyo Hospital and placed in the High Care Unit (HCU). On palpation, the lump displayed characteristics of a cystic lesion with undulations, indicating an abscess loculation. Unfortunately, four days after readmission, the patient died due to sepsis.

CONCLUSIONS

Transcatheter arterial infusion chemotherapy (TACI) has demonstrated its potency as an efficient and effective alternative palliative therapy. While TACI is not the primary method for managing SCC of the tongue, it is certainly worth considering, especially in cases of unresectable tumors. The management of SCC patients
should involve a collaborative, multidisciplinary team comprising diagnostic doctors, interventionists, oncologists, dentists, nutritionists, and psychiatrists.

DECLARATIONS

Competing interest
The authors declare no competing interest in this study.

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