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Facial nerve paralysis after super-selective intra-arterial chemotherapy for oral cancer

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Abstract. Facial nerve paralysis (FNP) after super-selective intra-arterial chemotherapy (SSIAC) is a relatively rare local side effect of SSIAC to the maxillary artery (MA) or the middle meningeal artery (MMA). The incidence and prognosis of FNP after SSIAC in 381 patients with oral cancer (133 with catheterization of the MA, 248 without) was investigated retrospectively. Only three patients (two male and one female) had FNP, for an incidence of 0.8%. All patients with FNP had undergone catheterization of the MA, and the incidence of FNP in this group was 2.3% (3/133). One of the three patients with FNP had paralysis of the third branch of the trigeminal nerve. FNP occurred a mean of 8.7 days (range 5–11 days) after initial SSIAC, and the mean total dose of cisplatin was 55.8 mg (range 42.5–67.2 mg) and of docetaxel was 25.4 mg (range 17.0–33.6 mg). FNP resolved completely a mean of 12.7 months (range 6–19 months) after onset. Because the administration of anticancer agents via the MA or MMA carries a risk of FNP, this information will be useful when obtaining informed consent from patients before treatment.

Key words: facial nerve paralysis; intra-arterial chemotherapy; super-selective intra-arterial chemotherapy; oral cancer; complication.

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Intra-arterial chemotherapy (IAC) has been used to treat head and neck cancer since the 1950s[1–3]; however, the efficacy of early IAC was unproven.[1] Recently, progress in vascular radiological techniques has led to the development of super-selective IAC (SSIAC), which has the advantage of delivering a higher concentration of anticancer agents to the tumour bed than IAC; SSIAC has been applied to head and neck cancers, including oral cancers.[1–8] However, the infusion of tumour-feeding arteries with highly concentrated anticancer agents may induce local side effects in vital tissues or organs that receive a blood supply from those arteries. Cranial nerve damage, in particular facial nerve paralysis (FNP), is a relatively rare local side effect of IAC or SSIAC to the maxillary artery (MA) or middle meningeal artery (MMA).[3,7] The purpose of this study was to investigate the incidence and prognosis of FNP after SSIAC.

Materials and methods

This study included 381 patients with oral cancer who underwent retrograde SSIAC and daily concurrent radiotherapy at the authors' institution between June 2006 and May 2016. Of the 381 patients, 133 underwent catheterization of the MA and 248 underwent catheterization of arteries other than the MA. The incidence of FNP after SSIAC with respect to sex, age, primary tumour site, catheter tip position, anticancer agent, and additional cranial

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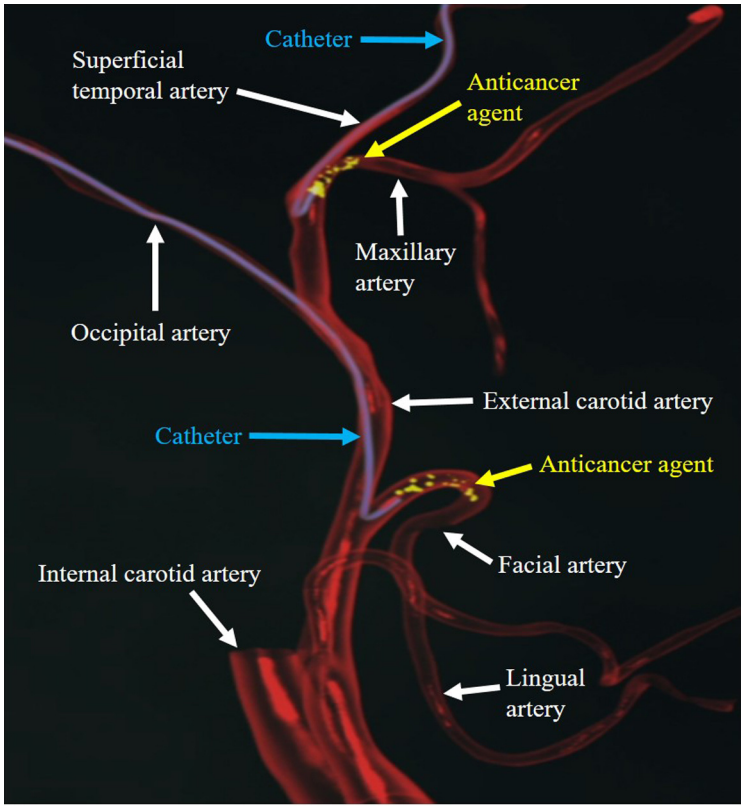

Fig. 1. Super-selective intra-arterial catheterization via the superficial temporal artery and occipital artery.

nerve paralysis, as well as the onset and recovery of FNP after SSIAC, was investigated retrospectively.

Retrograde super-selective intra-arterial chemoradiotherapy

Catheterization via the superficial temporal artery was performed according to the method described by Tohnai et al.[6] and catheterization via the occipital artery was performed according to the method of Iwai et al.[9] (Fig. 1). A hook-shaped catheter (Medikit Co., Ltd, Tokyo, Japan) was super-selectively inserted into the target artery and fixed to the skin. When catheterization using a hook-shaped catheter was not stable, the guide wire exchange method was used to replace it with a Anthron P-U catheter (Toray Medical Co., Ltd, Tokyo, Japan). Heparinized saline (100 units/ml) with 10 mg prednisolone was administered continuously into the catheter via an infusion pump (Baxter Infusor, 7-day type; Baxter, Chicago, IL, USA). The anticancer agents were injected for 1 h in a bolus through the intra-arterial catheter when radiotherapy was performed. The dose of cisplatin was 5 mg/m^2/day and of docetaxel was 10 mg/m^2/week, and SSIAC was performed for 4–7 weeks. Sodium thiosulphate (1 g/m^2) was administered intravenously to provide effective neutralization after cisplatin administration. Conventional radiotherapy was performed at 4 or 6 MV and the total dose delivered to the primary tumour was 40–70 Gy (2 Gy/fraction/day).

Results

Among 381 patients with oral cancer who underwent SSIAC, only three (two male and one female) had FNP (Table 1), for an incidence of 0.8%. All patients with FNP had undergone catheterization of the MA, and the incidence of FNP in this group was 2.3% (3/133). There were no patients with FNP among the 248 with catheterization of arteries other than the MA. One of the three patients with FNP had paralysis of the third branch of the trigeminal nerve. FNP occurred a mean of 8.7 days (range 5–11 days) after initial SSIAC, and the mean total dose of cisplatin was 55.8 mg (range 42.5–67.2 mg) and of docetaxel was 25.4 mg (range 17.0–33.6 mg). All patients with FNP were treated immediately with an intravenous administration of steroid, and the FNP had resolved completely at a mean of 12.7 months (range 6–19 months) after onset.

Discussion

Although FNP after IAC for head and neck cancer is relatively rare,[2,3,7,10–13] the blood supply of the facial nerve (FN) is

Table 1. Reported cases of facial nerve paralysis after (super-selective) intra-arterial chemotherapy.

Case No. (Ref.)	Sex/ age	Primary tumour site	Catheter tip position	Anticancer agent (total dose)	Onset after initial infusion	Additional paralysis	Recovery (month)
1 (10)	NA	NA	ECA	CDDP (100 mg/m^2 × 1)	3 days	None	CR (0.5)
2 (2)	70/F	Nasopharynx	ECA	CDDP (20 mg/day × 8)[a]	10 days	None	None (NA)
3 (8)	63/F	Parotid gland	PAA	CDDP (100 mg/m^2/week × 6)	NA	None	None (60)
4 (3)	60/M	Maxillary sinus	MMA	CDDP (100 mg/m^2 × 1)	3 days	V2	None (12)
5 (3)	71/M	Maxillary sinus	MMA	CDDP (100 mg/m^2 × 1)	5 days	None	CR (6)
6 (7)	NA	Maxillary sinus	MA	CDDP (20–50 mg/m^2 × 3)	2 weeks	None	CR (30)
7 (Present study)	62/M	Upper gingiva	MA	CDDP (5 mg/m^2/day × 5) DOC (10 mg/m^2/week × 1)	5 days	V3	CR (6)
8 (Present study)	78/F	Upper gingiva	MA	CDDP (5 mg/m^2/day × 9) DOC (10 mg/m^2/week × 2)	11 days	None	CR (13)
9 (Present study)	82/M	Buccal mucosa	MA	CDDP (5 mg/m^2/day × 8) DOC (10 mg/m^2/week × 2)	10 days	None	CR (19)

CDDP, cisplatin; CR, complete recovery; DOC, docetaxel; ECA, external carotid artery; F, female; M, male; MA, maxillary artery; MMA, middle meningeal artery; NA, not available; PAA, posterior auricular; V2, second branch of the trigeminal nerve; V3, third branch of the trigeminal nerve.
[a] Continuous infusion.