



Case report

Continuous-selective intra-arterial injection of antibiotics for osteoradionecrosis of the mandible

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ABSTRACT

Objective: This study was performed to evaluate the usefulness of continuous-selective intra-arterial injection of antibiotics via the superior thyroid artery for osteoradionecrosis of the mandible.

Patients and methods: Three osteoradionecrosis cases were treated with this innovative drug delivery system. Totals of 7200 mg, 7810 mg and 6960 mg of clindamycin (CLDM) were administered in cases 1, 2 and 3, respectively. Patients also received conventional intravenous ceftazidime (CAZ) or moxifloxacin (MFLX) and hyperbaric oxygen therapy (HBO).

Results: Both clinical findings and laboratory data improved immediately after these treatments in these cases.

Conclusion: The present study indicates that continuous-selective antibiotic injection via the superior thyroid artery might be an additional treatment option if performed in combination with conventional approaches in the refractory cases.

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1. Introduction

In addition to surgery and chemotherapy, radiotherapy is an important treatment option for head and neck malignancies. However, it sometimes induces osteoradionecrosis, a serious complication that is particularly likely when the mandible is irradiated [1]. The blood supply of the mandible is thought to be relatively poor due to its vascular anatomic features; this lack of perfusion coupled with the presence of teeth make the mandible more sensitive to irradiation than other bones [2]. Once dental infection occurs in the irradiated mandible, osteoradionecrosis can easily develop. Marx demonstrated the following primary causes of osteoradionecrosis: irradiation-elicited intraosseous ischemia, multiple embolization, and extensive tissue hypoxia [3]. They also demonstrated that the hypocellular condition, particularly of osteoblasts and osteoclasts, was induced by damage to the bone marrow and periosteum. Other investigators have suggested that osteoradionecrosis of the mandible is an ischemic necrosis due to radiation-induced obliteration of the inferior alveolar artery [4].

These factors are likely to explain why treatment of mandibular osteoradionecrosis is difficult by conventional approaches. Focusing on the hypovascular condition of the osteoradionecrotic area, we hypothesized that the optimal dosage of antibiotics could not be attained because of destruction of the vascular environment. We therefore employed a new method, continuous-selective intra-arterial antibiotic injection, to give an adequate dosage of antibiotics in the tissues surrounding osteoradionecrotic sites. The current report presents the usefulness of the new method as an option to intensify the effect of conventional treatments.

2. New method for the mandibular osteoradionecrosis

We innovated new method to deliver antibiotics via the intra-arterial route, using continuous-selective intra-arterial injection, for the treatment of the mandibular osteoradionecrosis. In this approach, catheterization is performed via the superior thyroid artery under local anesthesia. After the neck skin and underlying platysma is incised, the sternocleidomastoid (SCM) is exposed. The superior thyroid artery is cannulated with a 1.35-mm diameter microcatheterization tube, after identifying its division from the carotid artery. The cannula is advanced until its tip reached the external carotid artery (Fig. 1A). Through this cannula, medication can be delivered into the external carotid artery, from which both

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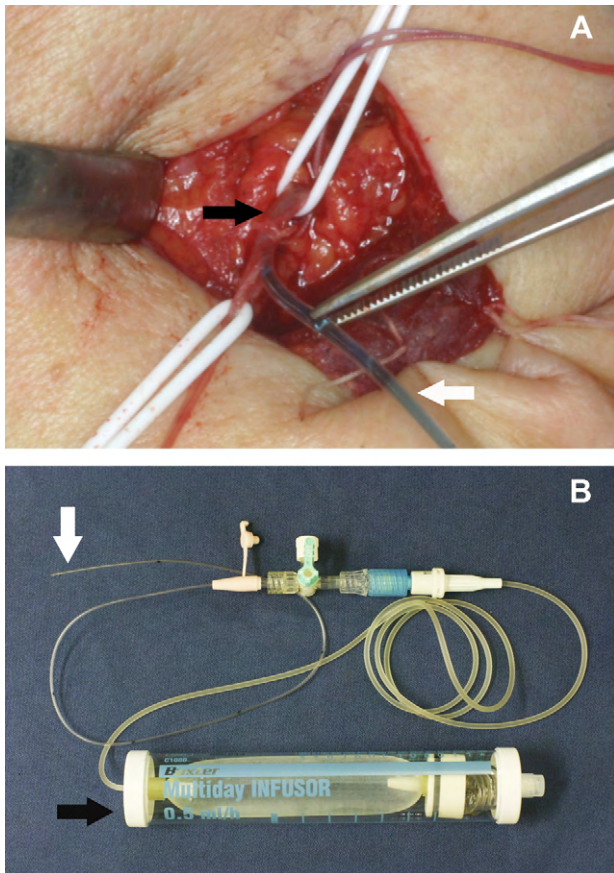


Fig. 1. A photograph during the operation (A). The superior thyroid artery (white arrow) was cannulated with a microcatheterization tube (black arrow). The injection pump (white arrow) and cannula (black arrow) used in the present case (B).

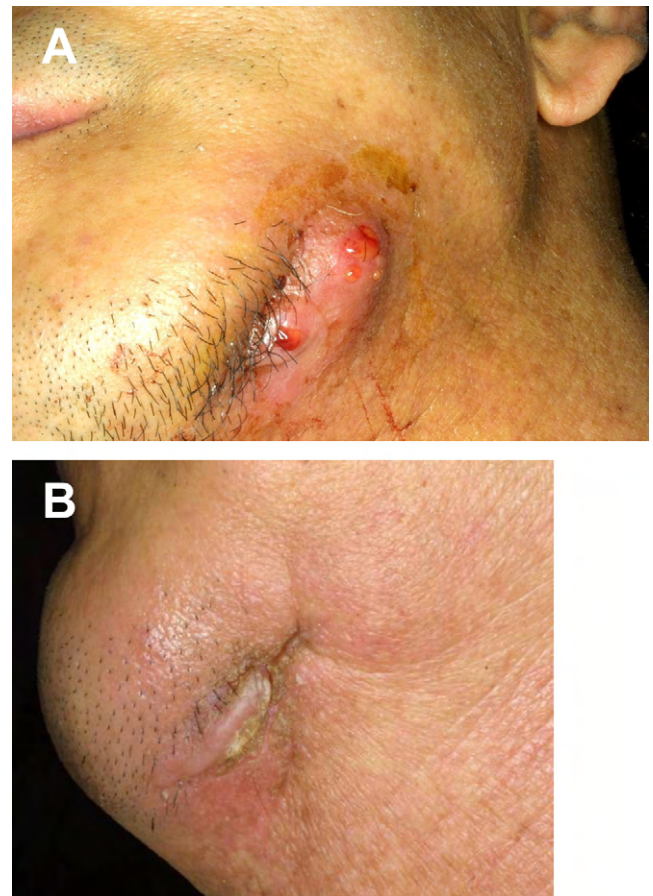


Fig. 2. The mandibular region exhibited swelling, redness, and fistula at the time of hospitalization (A). The fistula closed after continuous-selective intra-arterial injection of antibiotic (B).

the maxillary artery and facial artery divide. Immediately after the cannulation, antibiotics are administered using an injection pump (INFUSOR®, Baxter, Deerfield, IL, USA) that is specially designed for slow and continuous administration (Fig. 1B). We performed continuous-selective intra-arterial antibiotic injection for 3 cases of osteoradionecrosis in which morbidity was not improved by

routine treatment. Distinct improvement of clinical findings and laboratory data was observed in all of 3 cases after the treatment by continuous-selective intra-arterial antibiotic injection. Table 1 summarizes these cases, and case 1 is described hereinafter as a representative case.

Table 1
Summary of 3 cases of osteoradionecrosis in the mandible.

Case	Age/gender	Carcinoma (irradiation)	I-A ^a		Before I-A ^a	
			Antibiotics	Concurrent treatment	Antibiotics	Duration
(1)	45/Male	Mesopharynx (70 Gy)	CLDM 240 mg/day × 30 days	HBO CZOP (IV injection) 2 g/day × 24 days	CFSL FRPM LVFX CEZ	9 months
(2)	51/Female	Mesopharynx (60 Gy)	CLDM 355 mg/day × 22 days	HBO CAZ (IV injection) 2 g/day × 25 days	CTX MINO CFDN CLDM IPM CAZ ABPC CEZ AMPC AZM	12 months
(3)	74/Female	Upper gingiva (60 Gy)	CLDM 240 mg/day × 29 days	HBO MFLX (Peroral) 400 mg/day × 5 days	CTR CLDM LVFX CFPN-PI	3 months

^a I-A: Continuous-selective intra-arterial injection of antibiotics.

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