



Contents lists available at ScienceDirect

# Journal of Oral and Maxillofacial Surgery, Medicine, and Pathology

journal homepage: [www.elsevier.com/locate/jomsmmp](http://www.elsevier.com/locate/jomsmmp)

## Case report

## Intraoperative stroke in the mandibular osteoradionecrosis: A case report

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## ARTICLE INFO

## Article history:

Received 14 May 2013

Received in revised form 31 July 2013

Accepted 22 August 2013

Available online 3 October 2013

## Keywords:

Osteoradionecrosis

Head and neck cancer

Perioperative stroke

Atherothrombotic brain infarction

## ABSTRACT

Although risk factors for perioperative stroke during head and neck surgery are known, the risk of perioperative stroke in osteoradionecrosis (ORN) patients is scarcely known. Sixty-seven-year-old male presented ORN in the mandible after 9 years docetaxel, cisplatin, and 5-fluorouracil (TPF) chemo, and 66 Gy radiation therapies for the oropharynx cancer, which was diagnosed Marx's classification class II. After pre-operative hyperbaric oxygen (HBO) therapy, trans-oral debridement, iliac cancellous bone grafting, and a primary mucosal closure were performed under general anesthesia. Left-hemiplegia, dysarthria, and left facial palsy were observed at a recover room after the surgery. MRI revealed a cerebral infarction on the right middle cerebral artery (MCA) region. CT angiography showed that the severe stenosis of the right internal carotid artery (ICA). Ultrasound of carotid artery also revealed that the degree of the right ICA stenosis was 67%. Holter-monitoring showed no atrial fibrillation, and echocardiogram showed no cardiac source of thromboembolism. Atherothrombotic brain infarction caused by thrombus in the atherosclerosis ICA to MCA was diagnosed in this case. Routine duplex ultrasound carotid-artery screening before surgery for ORN patient was strongly recommended.

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## 1. Introduction

Although risk factors for perioperative stroke during head and neck surgeries are known [1], the risk of perioperative stroke in osteoradionecrosis (ORN) patients is scarcely known [2]. We report a case of intraoperative stroke in 67-year-old ORN patient.

## 2. Case report

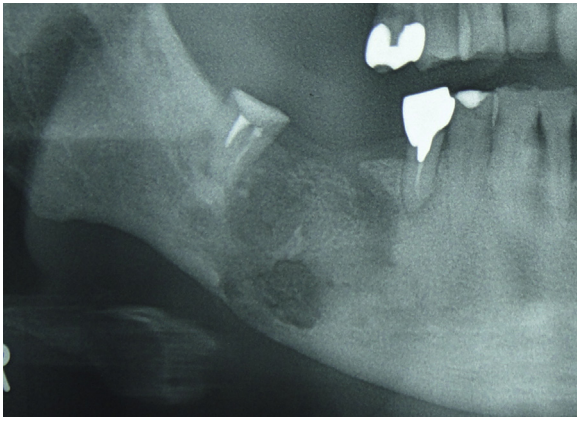
Sixty-seven-year-old male patient with a stage IV oropharynx cancer (T4N0M0) was treated with chemo and radiation therapies for 9 years before surgery. Chemotherapy consisted of the concomitant use of docetaxel, cisplatin, and 5-fluorouracil (TPF) chemotherapy before radiation. Radiation therapy was performed externally at a dose of 66 Gy to the head and neck region with 4 MV X-ray using two lateral fields, 11.5 × 11.5 cm in size (9 × 7 cm in size, more

than 40 Gy) (2 Gy/fraction × 33 fractions). After 7 years and 3 months post-radiation therapy, a mucosal defect was observed in the right mandible. Antibiotic treatment and local irrigation were unable to close the mucosal defect during a 26-month observation, and the bone destruction image of the mandible in panoramic radiography was found to rapidly expand for 6 months. Intraoral examination showed that an approximately 15 × 10-mm mucosal defect with necrotized bone. Panoramic radiography showed an approximately 30 × 30-mm circular transmission image reached to the lower edge in the right mandibular body (Fig. 1). Computed tomography (CT) showed that the mandibular cortex was maintained with no pathological fracture. It was diagnosed ORN and Marx's classification class II [3]. Trans-oral debridement, iliac cancellous bone grafting to the defect, and hyperbaric oxygen (HBO) therapy on 20 dives pre-operatively and 10 dives post-operatively with 400 mg/day clarithromycin were planned [4]. This patient had a habitual smoking of 20 cigarettes per day for 47 years and drinking. Pre-operative examination revealed non-treated hypertension, high triglyceride, no neurological symptoms, and no diabetes. Therefore, amlodipine besylate 5 mg/day was used for hypertension. After the pre-operative HBO therapy, trans-oral debridement, the extraction of right mandibular second molar, iliac cancellous bone grafting, and a primary mucosal closure were performed under general anesthesia. Operation time and total anesthesia time was 4 h and 20 min, and 5 h and 37 min, respectively. General anesthesia was

<sup>☆</sup> AsianAOMS: Asian Association of Oral and Maxillofacial Surgeons; ASOMP: Asian Society of Oral and Maxillofacial Pathology; JSOP: Japanese Society of Oral Pathology; JSOMS: Japanese Society of Oral and Maxillofacial Surgeons; JSOM: Japanese Society of Oral Medicine; JAMI: Japanese Academy of Maxillofacial Implants.

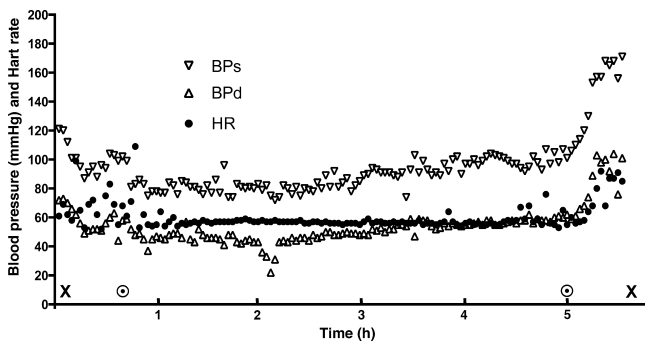
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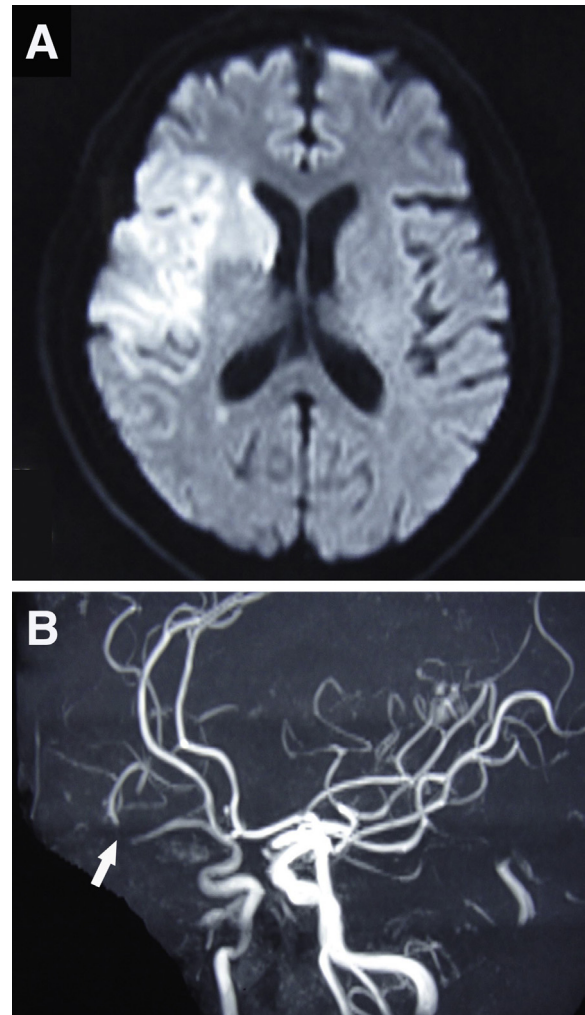


**Fig. 1.** Preoperative panoramic radiography of a 67-year-old patient. Panoramic radiography showed an approximately 30 × 30-mm circular transmission image reaching to the lower edge in the right mandibular body.

performed by total intravenous anesthesia (TIVA) using target controlled infusion (TCI) with propofol and remifentanyl. The patient's blood pressure (BP) was recorded every 2.5 min during surgery. The systolic BP (BPs) was maintained to be around 80 mmHg with sporadic fluctuations around 70 mmHg for approximately 2 h after the start of surgery, including 75–78 mmHg for 12.5 min, and his BPs was maintained to be 90–100 mmHg for next 2 h (preoperative BP was 134/69 mmHg). The patient's heart rate (HR) was maintained to be approximately 57 after the start of surgery (Fig. 2). No electrocardiogram change was observed. His estimated blood loss and transfusion were 36 mL and 1864 mL, respectively. His urine volume was 130 mL (preoperative body weight was 66 kg). After the surgery, left-hemiplegia, dysarthria, and facial palsy were immediately observed at a recovery room. MRI revealed a cerebral infarction on the right middle cerebral artery (MCA) region (Fig. 3A). MR angiography showed the embolus of MCA (Fig. 3B). Because brain infarction caused by thrombus was suspected to move the MCA, heparin 5000 U/day, edaravone 60 mg/day, glycerin/fructose (Glycerin F Injection®) 400 mL/day, and clopidogrel 75 mg/day were initiated. Physiotherapy, occupational, and speech and language therapies were initiated at 6 days after surgery. One month



**Fig. 2.** The record of general anesthesia during surgery in a 67-year-old osteoradionecrosis patient. General anesthesia was performed by total intravenous anesthesia (TIVA) using target controlled infusion (TCI) with propofol and remifentanyl. The patient's blood pressure (BP) was recorded every 2.5 min during surgery. The systolic BP (BPs) was maintained to be around 80 mmHg with sporadic fluctuations in BPs around 70 mmHg for approximately 2 h after the start of surgery, including 75–78 mmHg for 12.5 min, and his BPs was maintained to be 90–100 mmHg for next 2 h (preoperative BP was 134/69 mmHg). The patient's heart rate (HR) was maintained to be approximately 57 after the start of surgery. The marks X and O on the x-axis indicate the start and end of anesthesia and surgery, respectively. Operation time and total anesthesia time was 4 h and 20 min, and 5 h and 37 min, respectively. The diastolic blood pressure (BPd) was also monitored during surgery.



**Fig. 3.** (A) Magnetic resonance imaging (MRI) after surgery. MRI revealed a cerebral infarction on right middle cerebral artery (MCA) region. (B) Magnetic resonance angiography (MRA) after surgery. MRA showed the embolus of the MCA (arrow shows).

after surgery, the patient discharged with mild left-hemiplegia and dysarthria. CT angiography showed that the severe stenosis of the right internal carotid artery (ICA) (Fig. 4). Ultrasound of carotid artery also revealed that the degree of the right ICA stenosis was 67%. Holter-monitoring showed no atrial fibrillation, and echocardiogram showed no cardiac source of thromboembolism. Post-operative laboratory data showed high LDL-cholesterol, and hyperlipidemia. Atherothrombotic brain infarction caused by thrombus in the atherosclerosis ICA to MCA was diagnosed in this case.

### 3. Discussion

Parkikh and Cohen have been reported that 19 patients (0.08%) of 24,641 general and vascular surgical procedures suffer from a perioperative stroke. The significant factors contributing to perioperative stroke include hypertension, smoking, earlier neurological symptoms, and an abnormal rhythm on electrocardiogram. The most common factor for stroke is atrial fibrillation [5]. This patient had hypertension and a smoking habit, but no earlier neurological symptoms and no abnormal rhythm on electrocardiogram, which could be perioperative stroke factors. The incidents mainly appear in postoperative period, and intraoperative stroke is very rare [6]. Although a mechanism of perioperative stroke remains unclear, cardiac embolism, hypotension, and perioperative

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