Treatment of Recurrence Oral Osteosarcoma in a Dog by Surgery, Metronomic Chemotherapy and Photodynamic Therapy: A Case Report

P. Sirithammawilai 1,*, A. Rungsipipat 2, C. Kalpravidh 3

1Diploma student, Department of Veterinary Surgery, 2Department of Pathology, 3Department of Veterinary Surgery, Faculty of Veterinary Science, Chulalongkorn University, Bangkok 10330, Thailand
*Corresponding author: piyawut.s@student.chula.ac.th

Keywords: Oral osteosarcoma, Metronomic chemotherapy, Photodynamic therapy, Partial mandibulectomy

Introduction

Osteosarcoma is a mesenchymal tumor characterized by osteoid production from malignant osteoblasts (2). This could be from any bone in the body, including skull, legs, or pelvis. Oral osteosarcoma in dogs is relatively uncommon, compared to osteosarcoma in other locations. Besides, oral osteosarcoma showed lower tendency to metastasize than other axial subtypes. Oral osteosarcoma affected patient is reported to die due to the local interference more than the metastatic condition (3). The typical treatment for oral osteosarcoma is surgical resection. In addition, chemotherapy and photodynamic therapy can also be helpful for treating this type of cancer

Photodynamic therapy (PDT) is considered as an ablative procedure directed mainly at tumor targets and their vascular supply. After administration of the photosensitizers (PS), appropriate light energy is delivered to activate the PS and create the oxygen dependent Type II photodynamic reaction (PDR), which is cytotoxic and vasculotoxic (4).

The purpose of this case report was to describe adjuvant therapy including partial mandibulectomy, metronomic chemotherapy and photodynamic therapy and follow up outcomes of canine oral osteosarcoma

Materials and Methods

Case History

A 9-years-old, 10.0-kg BW, intact male Pug was presented to the private animal hospital due to chief complain of oral mass at the right lower mandibular area with unknown onset. The mass size was 2 x 2.5 cm, multilobulated, pink color and firm consistency without bleeding (Fig. 1).

Clinical Diagnosis

At first, hematologic (CBC) and serum chemistry (ALT, ALP, BUN, Creatinine) were performed and the result were within normal range. Oral and skull radiographs revealed bone reaction at mandibular area with increased soft tissue opacity of right lower 4th premolar area (Fig 2). Incisional biopsy was performed and histopathological diagnosed was osteosarcoma. An oral mass was rapidly growth within 2 weeks. Subsequent computed tomographic scan was done to estimate tumor invasiveness and the results revealed that the bone reaction of the tumor was detected at the right caudal mandibular arcade (Fig. 3).

Surgical treatment was performed by partial mandibulectomy (segmental mandibulectomy with preservation of the mandibular canal and ventral margin) and lymphadenectomy technique.

Histopathological diagnosis was osteoblastic osteosarcoma revealed invasive osteoblasts and bony matrix formation in mucosal and submucosal layer of oral epithelium with diffuse mandibular bone destruction (Fig. 4).

Adjuvant therapy was performed at oncology clinic, The Small Animal Teaching Hospital, CU by metronomic chemotherapy combined with photodynamic therapy (Fig. 5). Metronomic chemotherapy was given for 3 months interval using Cyclophosphamide 0.8 mg/kg PO (Endoxan), Firocoxib 5 mg/kg, PO (Previcox, Merial) orally and Doxycycline 10 mg/kg (Vibramycin, Pfizer) PO, once daily. Photodynamic therapy was performed by the administration of Chlorine E6 2 mg/kg IV as a photosensitizer and followed by treatment with the low level, intravenously interstitial laser with 4 different colors (red, green, yellow, blue) for 20 minutes each and follow by 500 mW red laser for 20 mitinutes. PDT was performed two times, every 2 months. Treatment follow up data was noted.

Results and Discussion

After the partial mandibulectomy with histological tumor-free margins, the affected dog was good clinical sign and the no recurrence of oral mass was found. Disease free interval time was 5 months – 1 year whereas survival time of this dog was 5 months. Thus, closed monitoring should be processed.

Osteosarcoma originately in oral cavity tends to have a better prognosis than osteosarcomas arisen in other areas.
Figure 1. Oral mass at the right lower mandibular area (a) and normal oral mucosa after treatment(b).

Figure 2. Right lateral radiograph of the skull showed the bone reaction at the dorsal area of the caudal mandibular ramus (arrow).

Figure 3. Volume rendering computed tomographic image of the skull showed that the bone reaction of the tumor (at level of 4th premolar teeth, arrow) was detected at the right caudal mandibular arcade.

Although oral osteosarcoma has less aggressiveness, it might metastases to other organs, particularly lung. Therefore, periodic follow up is necessary to monitor the disease progression of this cancer. In this patient, metronomic chemotherapy and photodynamic therapy were applied as alternative treatments that distinct advantage by reducing the recurrence of this cancer was found in this patient. At present, PDT is considered investigational in veterinary medicine and has the potential to become a useful treatment for malignant soft tissue sarcoma and canine osseous tumor.

Figure 4. Histopathology of oral tumor demonstrated osteoblastic differentiation and bony matrix formation in submucosa(a). Tumor cells were pleomorphic and present numerous and atypical mitotic figures (b).

Figure 5. Photodynamic therapy was performed by intravenously interstitial laser.

Acknowledgements
Staffs of Surgery unit and oncology clinic, the Small Animal Teaching Hospital, Faculty of Veterinary Science, CU, Thonglor Pet Hospital and Att-pong Animal Hospital.

References
1. L.E. Selmic et al., 2014. JAVMA 245: 931-938
3. N. Farcas et al., 2012. Vet Comp Oncol, 169-180
4. R. Ron et al., 2010. Oncologic photodynamic therapy photosensitizers, Photodiagnosis & Photodynamic Therapy, Elsevier BV: 61-75