

Piezosurgery for Intraosseous Venous Malformation of the Mandible

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Abstract

Intraosseous venous malformation of the mandible is rare. A 59-year-old woman was referred to our hospital for evaluation of a radiolucent lesion in the left body of the mandible that had been detected on a routine radiologic dental checkup. The patient wished for follow-up rather than operation. After 2 years' follow-up, the radiolucent lesion had slowly grown, and the patient decided to have an operation. The lesion was removed surgically using the piezosurgery system, and conservation of the inferior alveolar nerve was achieved under general anesthesia. After operation, she reported an initial change in sensation (paresthesia). The sensitivity was recovered after 6 months. Patient prognosis has been good to date, with no symptoms indicating recurrence. We used to treat intraosseous venous malformations using the piezosurgery system. The present report describes a patient with intraosseous venous malformation of the mandible by complete excision and conservation of the nerve. It was useful to use piezosurgery for conservation of inferior alveolar nerve.

Keywords: Intraosseous venous malformation, mandible, piezosurgery

INTRODUCTION

Vascular malformations can be classified as slow-flow (capillary, venous, and lymphatic) or fast-flow (arteriovenous) malformations according to their vascular components.^[1] Vascular malformations of the jaw are potentially dangerous lesions due to the risk of severe bleeding, which may occur spontaneously or during surgical manipulation.^[2] Intraosseous venous malformations are infrequent benign tumors comprising 0.5%–1% of all osseous lesions.^[3] Intraosseous venous malformations are rarely found in the mandible.

The piezosurgery system cuts mineralized tissue precisely and smoothly. It however does not injure soft tissues, in particular, nerves, muscles, or vessels. It has been used to conserve the inferior alveolar nerve.^[4-7]

The present report describes a case of intraosseous venous malformation of the mandible treated by lesional excision and conservation of the inferior alveolar nerve using the piezosurgery system. To the authors' knowledge, this is the first described treatment of an intraosseous venous malformation using piezosurgery.

CASE REPORT

A 59-year-old woman was referred to the Department of Oral and Maxillofacial Surgery at Osaka University Dental Hospital with the chief complaint of a radiolucent lesion in the left body of the mandible, detected on a routine radiologic dental checkup [Figure 1a]. On clinical examination, there was no evidence of buccal swelling or bony expansion. Mobility of the teeth in the region was not observed. Further diagnostic studies included computed tomography (CT) and magnetic resonance imaging (MRI). Preoperative diagnosis was strongly suggestive of a benign tumor of the nerve or vascular origin and probably schwannoma, neurofibroma, or hemangioma located in the left body of the mandible. The patient wished for follow-up rather than operation. After 2 years' follow-up, the radiolucent lesion had slowly grown [Figure 1b]. Preoperative CT scan revealed the lesion in the left body of the mandible [Figure 1c]. The

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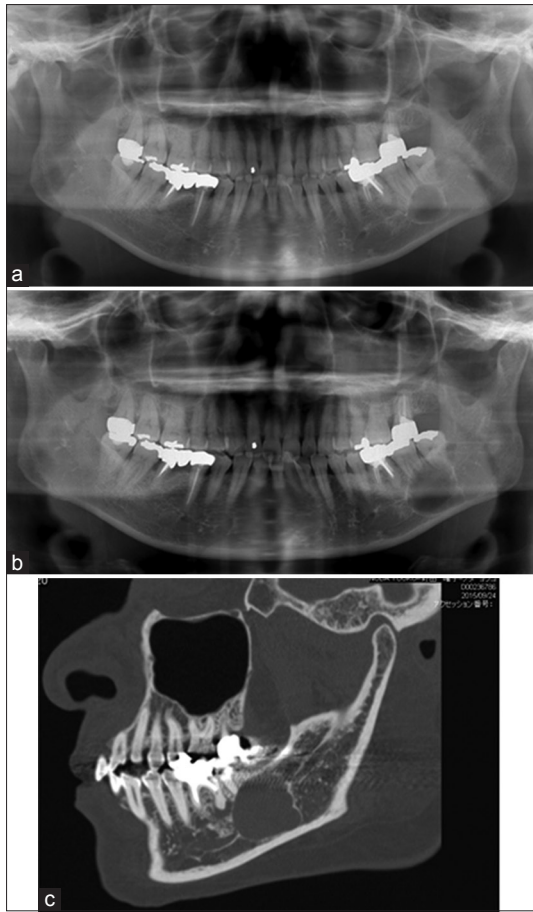


Figure 1: (a) Panoramic radiograph taken at the initial visit revealed the radiolucent lesion in the left body of the mandible. (b) Panoramic radiograph after 2-year follow-up. (c) Preoperative computed tomography scan. Sagittal section showed the lesion in the left body of the mandible

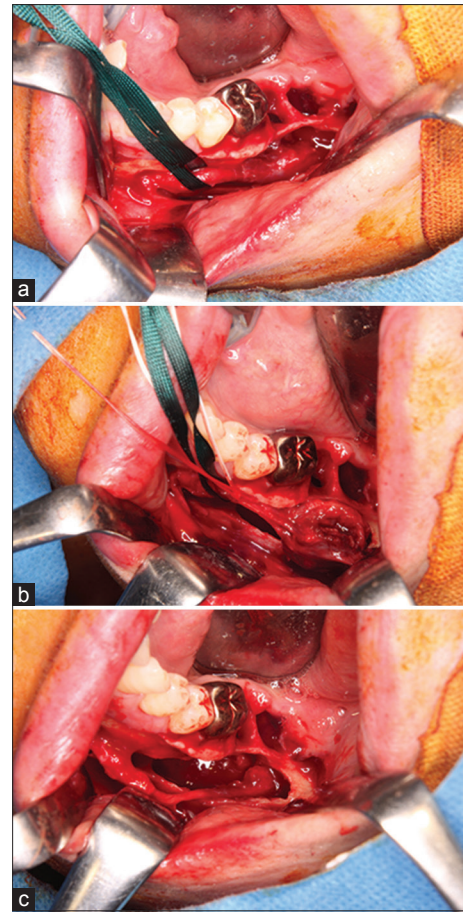


Figure 2: (a) Intraoperative appearance of the mental nerve. (b) Intraoperative appearance of the lesion. (c) Intraoperative appearance after removal of the tumor

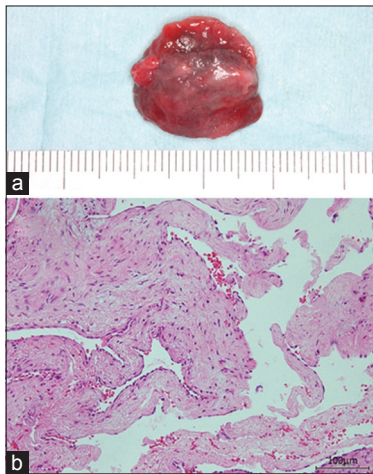


Figure 3: (a) Excised surgical specimen showing the tumor mass. (b) Histological examination of the specimen showing irregularly sized vascular spaces surrounded by dense connective tissue (stained with H and E, $\times 200$)

patient decided to have an operation on the lesion. Since the lesion was suspected to be schwannoma, neurofibroma, or

hemangioma, a preoperative biopsy was performed, leading to a diagnosis of venous malformation from histopathological analysis. Under general anesthesia, the lesion was approached with a submarginal incision from the lower left second premolar tooth to the lower left third molar tooth. The lower left second and third molar teeth were extracted. As we were considering conservation of the inferior alveolar nerve or digital nerve reconstruction of the inferior alveolar nerve with a biodegradable conduit, the mental nerve was identified, and the inferior alveolar nerve was freely separated from the surrounding mandibular bone between the mental foramen and the lesion using the piezosurgery system [Figure 2a and b]. The lesion was removed surgically with no significant bleeding, and the nerve could be conserved [Figure 2c]. The nerve was returned to its original place. The surgical specimen revealed a red tumorous mass of the lesion [Figure 3a]. Histopathological findings showed irregularly sized vascular spaces surrounded by dense connective tissue, which led to a diagnosis of venous malformation [Figure 3b]. After operation, she reported an initial change in sensation (paresthesia). To evaluate sensation, the Semmes–Weinstein mechanical esthesiometer is usually used.^[8] The sensitivity recovered from 3.61 to 2.36 after 6 months evaluated by Touch Test® Sensory Evaluators. At

the time of writing, the course of the patient has been good, with no symptoms of recurrence [Figure 4a and b].

DISCUSSION

The International Society for the Study of Vascular Anomalies (ISSVA) published the binary classification in 1996, based on clinical appearance and radiological and pathological characteristics.^[1] The World Health Organization classification is no longer considered appropriate to describe vascular malformations and should be replaced by the ISSVA classification.^[1] Vascular malformations can be classified as slow-flow (capillary, venous, and lymphatic) or fast-flow (arteriovenous) malformations according to their vascular components by the ISSVA classification.

Venous malformations commonly develop in vascular deformities of the soft tissues of the head and neck region. They tend to occur in muscle groups (masseter, temporalis, and tongue musculature) and can also involve skin, oral, and upper respiratory system mucosae. Involvement of the facial skeleton is uncommon. Intraosseous venous malformation of the mandible seems to be a rare entity.^[9]

Since the lesion was strongly suggestive of a benign tumor of the nerve or vascular origin and probably schwannoma, neurofibroma, or hemangioma, a preoperative biopsy was performed, leading to a diagnosis of venous malformation from histopathological analysis. In the literature, no biopsy was performed in fatal cases of hemangioma.^[10] In our case,

CT and MRI revealed root resorption and a well-defined lesion leading to a benign tumor. The lesion was thought to originate in the mandibular canal because of the connection between the mandibular canal and the lesion. Therefore, preoperative diagnosis was more strongly suggestive of a benign tumor of nerve origin such as schwannoma or neurofibroma than of a benign tumor of vascular origin such as hemangioma. We decide to make a preoperative diagnosis by histopathological analysis.

Recently, digital nerve reconstruction with a biodegradable conduit has been used instead of an autologous nerve transplant. There was a risk of cutting inferior alveolar nerve. When an autologous nerve transplant is performed, the auricular nerve has usually been used. However, this requires an incision in the face. For this reason, we prepared for digital nerve reconstruction with a biodegradable conduit.

With preparations in advance as described above, we considered conservation of the inferior alveolar nerve when removing the lesion surgically. Piezosurgery is a new system for cutting bone with ultrasound. The device cuts mineralized tissue precisely and smoothly, but it does not injure soft tissues, in particular, nerves, muscles, or vessels [Table 1].^[4-7] The mental nerve was identified, and the inferior alveolar nerve was freely separated from the surrounding mandibular bone between the mental foramen and the lesion using the piezosurgery system. Fortunately, the lesion could be removed surgically without significant bleeding, and the nerve could be conserved. Nerve reconstruction was not necessary, and postoperative complications were reduced.

CONCLUSION

The present report describes a patient with intraosseous venous malformation of the mandible by complete excision and conservation of the nerve. The patient wished for follow-up rather than operation. After 2 years' follow-up, the radiolucent lesion had grown slowly, and the patient decided to have an operation on the lesion. It was useful to use piezosurgery for conservation of inferior alveolar nerve.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that their name and initial will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Table 1: Advantages of piezosurgery

- Easy to control even on anatomically difficult sites (nerves, muscles or vessels)
- Flexible bone design
- Reduction of bone loss
- Reduction of bleeding
- Reduction of soft tissue damage

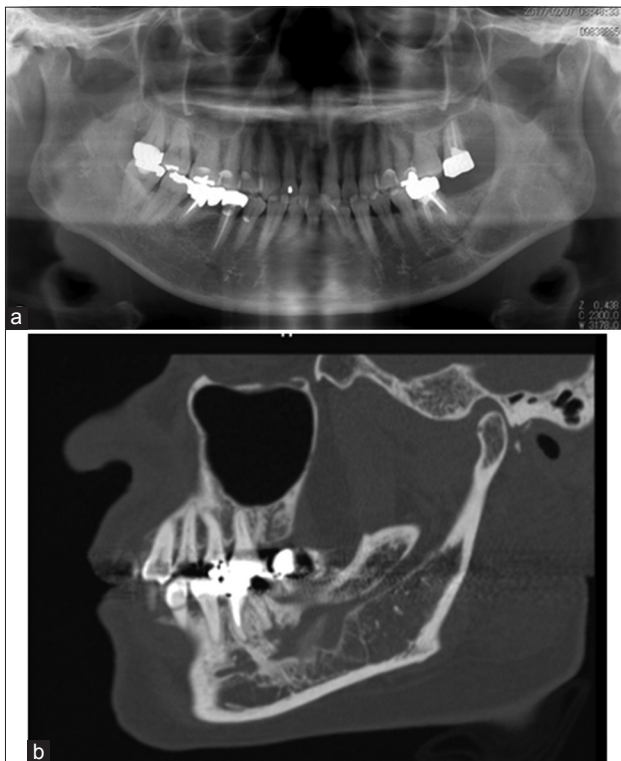


Figure 4: Postoperative panoramic radiograph (a) and computed tomography (b) 1 year after removing the tumor

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Conflicts of interest

There are no conflicts of interest.

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