



## Case report

## Pulmonary pleomorphic carcinoma metastasizing to the anterior mandibular gingiva: A case report and literature review

Tomonari Kajita<sup>a,\*</sup>, Hitoshi Miyashita<sup>a</sup>, Jun Kitamura<sup>a</sup>, Atsumu Kouketsu<sup>a</sup>, Hiroyuki Kumamoto<sup>b</sup>, Tetsu Takahashi<sup>a</sup><sup>a</sup> Division of Oral and Maxillofacial Surgery, Department of Disease Management Dentistry, Tohoku University Graduate School of Dentistry, 4-1 Seiryomachi, Aoba-ku, Sendai 980-8575, Japan<sup>b</sup> Division of Oral Pathology, Department of Disease Management Dentistry, Tohoku University Graduate School of Dentistry, 4-1 Seiryomachi, Aoba-ku, Sendai 980-8575, Japan

## ARTICLE INFO

## Keywords:

Pulmonary pleomorphic carcinoma (PPC)  
Metastatic tumor in oral region  
Mandibular gingiva  
Case report

## ABSTRACT

**Introduction and importance:** Pulmonary pleomorphic carcinoma (PPC) is a rare subtype of non-small cell lung cancer. No standard therapy has been established for advanced disease, which results in poor prognosis. Some cases of PPC metastasizing to mandibular gingiva have been reported, and the involved site in these reports is all unilateral mandible.**Case presentation:** We report a case of PPC metastasizing to the anterior mandibular gingiva in a 68-year-old man. The patient was referred to our hospital with tumor bleeding and difficulty with intake. One month before, he had been diagnosed as PPC. The size of oral tumor was 28 × 25 mm, and we performed surgical resection. Although there was no recurrence of oral lesion, he died of systemic metastases after 3 months since the surgery.**Clinical discussion:** The prognosis of patients with metastatic tumor in oral region is poor. Radical treatment for oral lesion is often difficult due to the existence of other metastasis or the refractory, in particular cases with high grade malignancies such as PPC. On the other hand, because of the development of cancer treatment and the arrival of super-aging society, the number of patients with metastatic tumor in oral region has been expected to increase in future.**Conclusion:** PPC metastasizing to the gingiva of mandibular symphysis is extremely rare.

If there are possibilities to improve the prognosis or quality of life, radical or palliative treatment for metastatic tumor in oral region should be performed.

## 1. Introduction

Pulmonary pleomorphic carcinoma (PPC) is a rare and highly malignant tumor. Because of the refractory cancer, the median survival time is 8–19 months and 5-year survival rate is about 10% [1–3]. Some cases of metastasis of PPC to the oral region have been reported in Japan. According to these reports, the gingiva was the most common metastatic site in the oral cavity similar to Hirshberg's paper. Metastases to the oral region are representing nearly 1–3% of all oral malignancies [2]. The lung is the most common primary site for tumors metastasizing to the oral soft tissues [4]. The period from gingival metastasis of PPC to death was about a few months [5]. Here we show a rare case of PPC metastasizing to the anterior mandibular gingiva with some literature

considerations. Pulmonary pleomorphic carcinoma (PPC) is one of the histological subtype of pulmonary carcinoma and extremely rare, 0.1–0.4% of all pulmonary carcinoma. PPC is highly malignant, with an intermediate survival time of 10–12 months and a 5-year survival rate of about 10%. Moreover, only a few cases of metastases to oral cavity from PPC have been reported so far [5–13]. Although, clinical symptoms of tumor metastases to the oral cavity include pain and tumor, bleeding due to ulceration, it is often diagnosed periodontal diseases or mucosal diseases. Therefore, when metastasis to the oral cavity is diagnosed, the metastasis has already occurred and prognosis is very poor. Here, we present the case of PPC metastasizing to the mandibular gingiva with some literature considerations based on surgical case report (SCARE) 2020 guideline [14].

\* Corresponding author.

E-mail addresses: [kajinho0624@yahoo.co.jp](mailto:kajinho0624@yahoo.co.jp) (T. Kajita), [miyashita@dent.tohoku.ac.jp](mailto:miyashita@dent.tohoku.ac.jp) (H. Miyashita), [kouketsu\\_atsumu@dent.tohoku.ac.jp](mailto:kouketsu_atsumu@dent.tohoku.ac.jp) (A. Kouketsu), [hiroyuki.kumamoto.b7@tohoku.ac.jp](mailto:hiroyuki.kumamoto.b7@tohoku.ac.jp) (H. Kumamoto), [tetsu@dent.tohoku.ac.jp](mailto:tetsu@dent.tohoku.ac.jp) (T. Takahashi).<https://doi.org/10.1016/j.ijscr.2022.107499>

Received 31 May 2022; Received in revised form 5 August 2022; Accepted 6 August 2022

Available online 11 August 2022

2210-2612/© 2022 The Authors. Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## 2. Presentation of case

A 68-year-old man visited Tohoku university hospital because of the bleeding from the mass in his mandibular symphysis and difficulty intake. He was referred by his dentist to our hospital with a suspected neoplasm of mandibular gingiva. Other past medical history was hypertension, diabetes mellitus, gallbladder lithiasis, and gastro esophageal reflux disease. There was no specific family history of malignancy and psychosocial history. He had a smoking history adding up to 48 years and still smokes about 10 cigarettes per day and no drinking history. The performance status was bad. His drug history was analgesic, antihypertensive drug, hypoglycemic drug and antibiotics. The clinical progress up to our consultation was as follows. He coughed and blood sputum that continued for approximately 1 month. After that, he presented the department of respiratory in the neighbor hospital. The chest enhanced computed tomography and a tissue biopsy, which was performed by bronchoscopy suggested the diagnosis of sarcomatous carcinoma. The stage of pulmonary carcinoma was pT4N0M1 (stage IVA). The results of examination indicated that operation and chemoradiotherapy was not adapted. The patient was given the best supportive care, mainly pain control due to his poor general condition. Intraoral examination revealed that significant growth of the tumor, that measured 28 mm × 25 mm in diameter, was in the alveolar gingiva around mandibular incisors, as well as partially necrotic with hemorrhaging and bad smell [Fig. 1]. At admission, serum level of squamous cell carcinoma (SCC) and carcinoembryonic antigen (CEA) was elevated (SCC: 9.2 ng/mL, CEA: 1.5 ng/mL). A panoramic X-ray and computed tomography revealed no clear bone resorption of the alveolar jawbone [Figs. 2, 3]. 18-Fluorodeoxyglucose positron emission tomography-computed tomography (PET-CT) showed the accumulation of FDG not only in the right lung (SUVmax, 12.2) but also in the anterior mandible (SUVmax, 11.9). A tissue biopsy was done for the histopathological examination [Fig. 4].

The resected specimen revealed the finding of diffuse proliferation of undifferentiated atypical cells containing some spindle and giant cells, similarly to the lung tumor. The immunohistochemistry revealed that the pleomorphic cells were positive for cytokeratin and vimentin. About 70 % of carcinoma cells were labeled with Ki-67 [Fig. 5]. These findings disclosed that the tumor of the mandibular symphysis was histopathologically identical to that of the pulmonary lesion. Based on the results, the oral tumor was diagnosed as metastasis of PPC to the anterior mandibular gingiva.

Preoperatively, analgesics were used to control pain due to tumor growth and surgical splints were made for tumor bleeding. A tumor resection combined with marginal resection of mandibular bone for pain relief and hemostasis was performed by our surgical team under local anesthesia with intravenous sedation with propofol. After that, patient was able to be discharged three weeks after good post-operative course, and to intake. Moreover, there had been no recurrence. However, after 3 months since the surgery, he died 3 of multiple organ failure caused by systemic metastases.



Fig. 1. Intraoral photography taken on pre-operation.

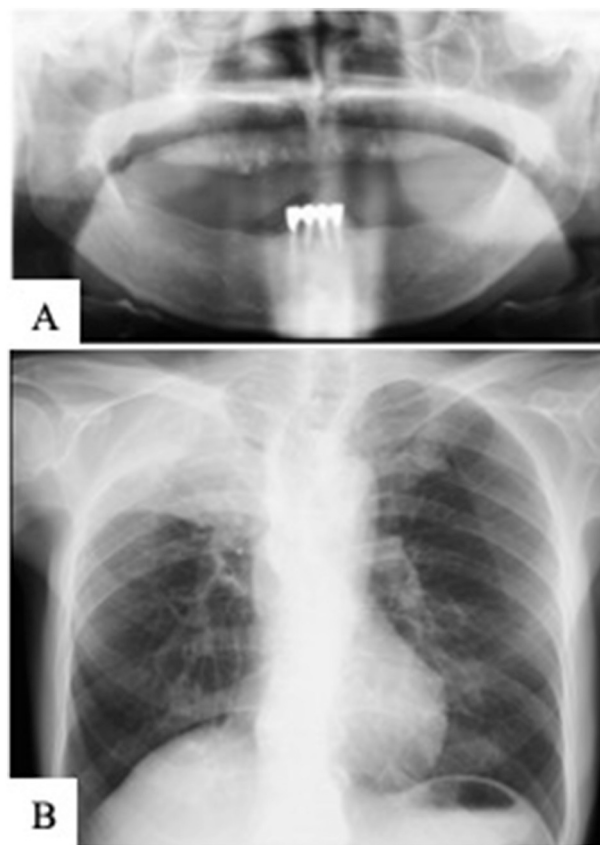


Fig. 2. A panoramic X-ray (A) and a chest X-ray (B) taken on initial presentation.

## 3. Discussion

PPC is a new histocytological type of lung cancer and a poorly differentiated NSCC, namely a squamous cell carcinoma, adenocarcinoma, or undifferentiated NSCC that contains >10 % spindle and/or giant cells or carcinoma consisting only of spindle or giant cells [3,15,16]. It is necessary to discriminate PPC from sarcoma or carcinosarcoma, because PPC is consisted of epithelial tumor components histologically. Primary PPC is a rare neoplasm, which accounting for 0.1–0.3 % of all lung cancer and said to be with an average age of 65 at initial diagnosis [2,3].

The prognosis of metastasis oral tumor is very poor, which is observed end of period of primary tumor. Asoda et al. reported that multiple metastases to all body accounted for 79.6 % of patient metastases to oral cavity [4]. As for metastatic oral tumor, metastatic lesions of PPC tend to be detected before the primary tumor has been identified. Also, a previous study reported that the discovery of tumor in advanced stages more often than in early stages because the clinical symptoms of metastatic tumor in oral cavity, for example, pain, bleeding, dysfunction, neuropathy, eating disorder, bad smell, and airway stenosis are present with the increase of the growth of tumor [6]. Furthermore, metastasis in oral cavity is not found in many cases because patients are died owing to tumor before clinical symptoms are present. In the present case, the growing mass with bleeding on mandibular gingiva was recognized at the first presentation after primary tumor was diagnosed.

Since progression of metastatic oral tumor leads to impair patient's quality of life (QOL), it is important for examination of oral cavity, which is one of the detections of all body. Not only oral care but also examination of oral cavity regularly for patient received chemotherapy or radiotherapy against primary tumor in all body, not just the lungs contribute to early detection of metastasis to oral cavity. In the future,

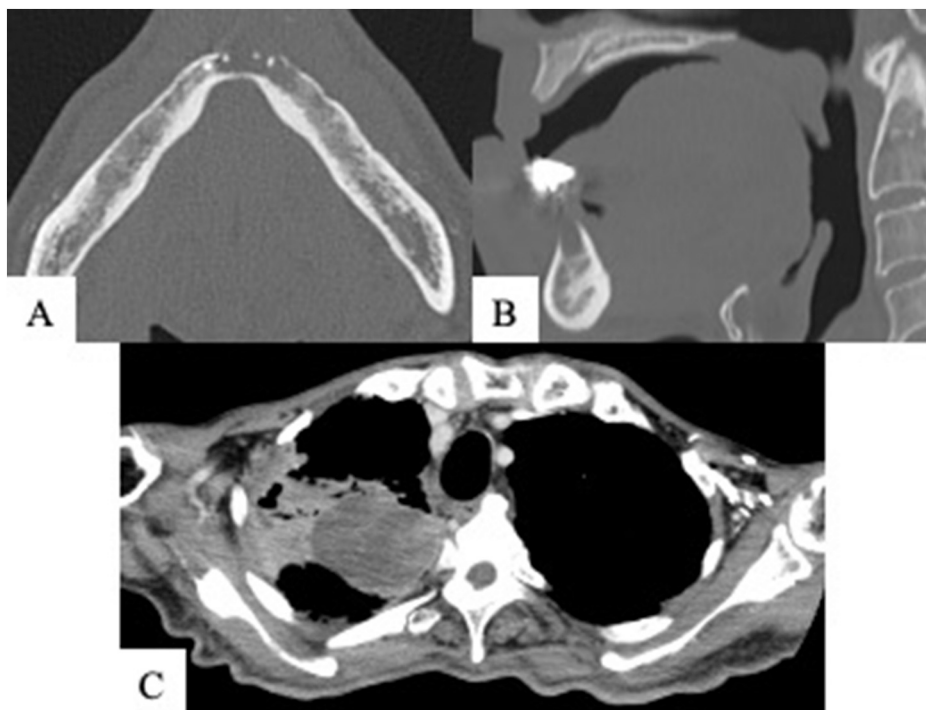


Fig. 3. Axial (A) and sagittal (B) computed tomography slices taken on pre-operation. Initial chest computed tomography (C).

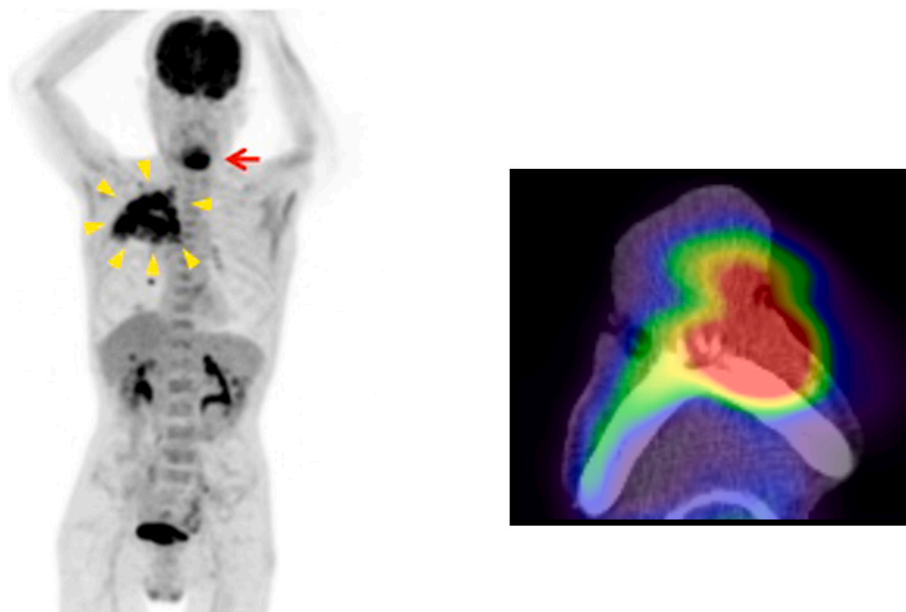
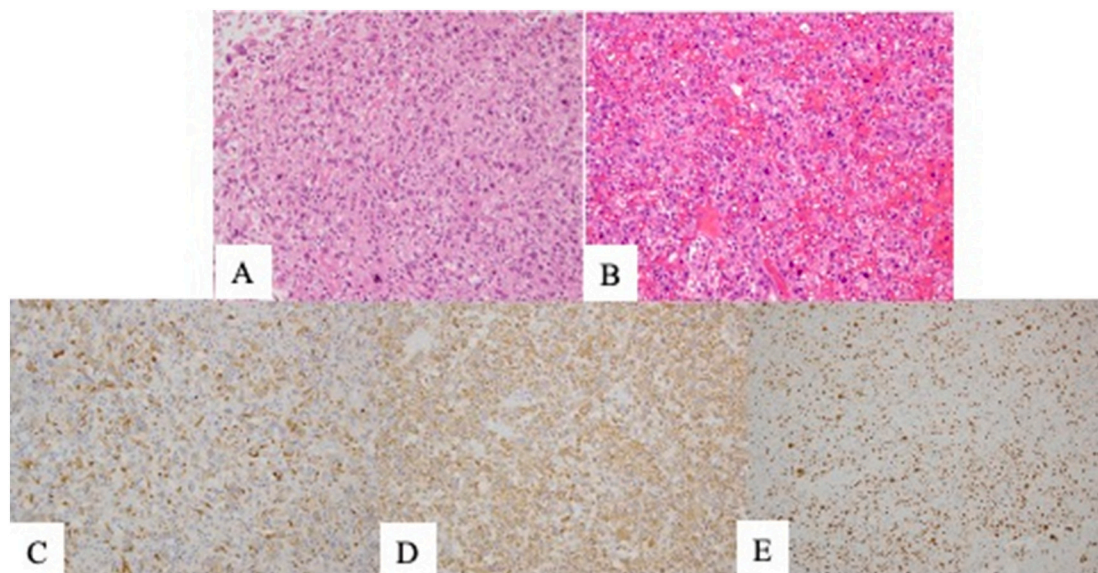


Fig. 4. 18-F FDG positron emission tomography revealed the metastatic lesion in oral cavity and primary lung tumor with intense FDG uptake (yellow arrowhead and red arrow.) (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

the cooperation with medical and dental will be more important.

Regarding with treatment, chemotherapy and radiotherapy is not effective for cancer and at the moment, complete resection of tumor is the first choice [17]. On the other hands, another study has reported that surgery in early stage operable PPC and chemotherapy after operation has proven to be the greatest overall survival benefit [18]. For example, gemcitabine plus cisplatin (GP) and gemcitabine plus carboplatin (GC) therapies are effective in the treatment of PPC [19]. The treatment of metastatic tumor in oral cavity is often focused on improvement of patient's QOL, instead of aim of curing the tumor. Previous reports

demonstrated that radiotherapy for metastatic tumor in oral cavity is complete response [6]. There are some adaptations to surgical treatment for metastatic tumor in oral cavity. One of the adaptations to surgical treatment is the difficulty of oral ingestion. In the present case, the patient couldn't take a meal through the oral cavity due to the growth of metastatic tumor. We performed the tumor resection in order to enable to be patient's oral ingestion, not to complete cure of metastatic tumor in oral cavity. Before treatment of oral cavity, it is necessary to consider patient's general condition and whether primary tumor is under the good control or not. Physician should keep in mind that dissemination of



**Fig. 5.** Histology of the lung (A) and gingival (B-E) tumors. (A, B) Hematoxylin and Eosin (H&E), (C) cytokeratin, (D) vimentin, (E) Ki-67.

tumor cells because of tumor resection is some possibility of bringing about worsening of medical condition.

To the best of our knowledge, all cases of metastasis of PPC in oral cavity reported between 1999 and 2014 were from Japan, totaling 10 cases including the present case (Table 1) [5–13]. These cases show this disease is common in men (8/10 cases), and the metastasis site in oral cavity was posterior teeth gingiva except for the present case. Any one treatment of operation, chemotherapy, radiotherapy was conducted in the primary pulmonary tumor in almost all cases, on the other hand the metastasis site in oral cavity were often untreated. In the future, the number of cases, which is diagnosed PPC is expected to increase with recent changes in WHO classification. Accordingly, the number of cases related to the metastasis site in oral cavity will be increase. The existence of metastasis in oral cavity is rarely found in the period of treating the primary tumor. The clinical symptoms of metastatic tumor in oral cavity appear in advanced stages. The physician should check the symptoms of oral cavity, one of the clinical examinations and detailed screening at the first presentation.

**4. Conclusion**

PPC is a rare neoplasm of all lung cancer. Moreover, the existence of metastasis in oral cavity, especially in anterior teeth gingiva is rarely found in the period of treating the primary tumor. The clinical symptoms of metastatic tumor in oral cavity appear in advanced stages. Early detection of metastasis in oral cavity leads the appropriate treatment

**Table 1**

List of reported cases of pulmonary pleomorphic carcinoma metastasizing to the mandibular gingiva in Japan.

Author	Year	Age (y)	Gender	Location	Time to death (m)	Symptom	Treatment		Metastatic sites other than gingiva
							Oral	Lung	
Tanaka et al.	1999	71	M	Rt	2	Mass	R	R	Brain, adrenal gland
Minami et al.	2002	51	F	Lt	3	Swelling	S, C	R	None
Ishibashi et al.	2005	71	M	Rt	1.5	Mass	None	S	Stomach, ileum
Tachibana et al.	2005	66	M	Lt	1	Ulcer	None	S, C, R	None
Sakamoto et al.	2007	54	M	Rt	3	Mass	None	S, C	Brain, pancreas, skin, muscle
Tomita et al.	2011	68	M	Rt	–	Mass	None	C	None
Sudo et al.	2013	60's	M	Rt	12	Mass	S	S	Small intestine, duodenum
Nagata et al.	2013	83	F	Rt	2	Mass	C, R	S, R	Adrenal gland, liver, small intestine
Present case	2015	68	M	Ant	3	Mass	S	None	Right adrenal gland, liver, small intestine

(Rt) Right, (Lt) Left, (Ant) Anterior, (R) Radiation, (C) Chemotherapy, (S) Surgery.

and the improvement of patient's QOL.

**Source of funding**

Nothing particular.

**Ethical approval**

The report of current case is reviewed and approved by the Ethical Committee at our hospital.

**Consent**

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

**Author contribution**

**TK:** Data analysis, Manuscript Writing.

**HM:** Corresponding author, main surgeon of the patient and Manuscript Writing.

**JK:** Data analysis, Patient's follow-up.

**AK, HK:** Pathological analysis of data.

**TT:** Data analysis, Manuscript Writing.

## Registration of research studies

This case report was written in accordance to Helsinki guidelines.

## Guarantor

Tomonari Kajita, PhD, DDS.  
Hitoshi Miyashita, PhD, DDS.

## Declaration of competing interest

No declaration of interest.

## Acknowledgement

Nothing particular.

## Provenance and peer review

Not commissioned, externally peer-reviewed.

## References

- [1] G. Rossi, A. Cavazza, N. Sturm, M. Migaldi, D. Ph, N. Facciolo, L. Longo, A. Maiorana, E. Brambilla, Pulmonary carcinomas with pleomorphic, sarcomatoid, or sarcomatous, *Elements* 27 (2003) 311–324.
- [2] A. Hirshberg, A. Buchner, Metastatic tumours to the oral region. An overview, *Eur. J. Cancer. Part B Oral Oncol.* 31 (1995) 355–360, [https://doi.org/10.1016/0964-1955\(95\)00031-3](https://doi.org/10.1016/0964-1955(95)00031-3).
- [3] N.F. Fishback, W.D. Travis, C.A. Moran, D.G. Guinee, W.F. McCarthy, M.N. Koss, Pleomorphic (spindle/giant cell) carcinoma of the lung. A clinicopathologic correlation of 78 cases, *Cancer* 73 (1994) 2936–2945, [https://doi.org/10.1002/1097-0142\(19940615\)73:12<2936::AID-CNCR2820731210>3.0.CO;2-U](https://doi.org/10.1002/1097-0142(19940615)73:12<2936::AID-CNCR2820731210>3.0.CO;2-U).
- [4] S. Asoda, K. Takamori, K. Uchiyama, H. Iwabuchi, K. Sugiyama, H. Kizu, K. Tsunoda, W. Muraoka, S. Asanami, T. Nakagawa, H. Kawana, Metastatic tumors in the oral and maxillofacial region : analysis of 13 cases with a review of Japanese literature, *J. Jpn. Soc. Oral Tumors.* 21 (2009) 255–264. <http://ci.nii.ac.jp/naid/10026399747>.
- [5] K. Nagata, J. Nomura, H. Morita, T. Tagawa, A case of pulmonary pleomorphic carcinoma with gingival metastasis and a review of the literature, *J. Oral Maxillofac. Surgery, Med. Pathol.* 27 (2015) 209–212, <https://doi.org/10.1016/j.ajoms.2013.09.012>.
- [6] H. Ideguchi, E. Yamaguchi, S. Saeki, K. Kojima, H. Ichiyasu, H. Kohroggi, Gingival metastasis of pulmonary pleomorphic carcinoma successfully treated with radiotherapy, *Japanese J. OfLungCancer* 54 (2014) 969–973.
- [7] R. Tanaka, M. Sawada, N. Inase, M. Ichioka, U. Usui, Y. Yoshizawa, Cases of gingival metastasis from lung cancer and a review of the literature, *Japanese J Lung Cancer* 39 (1999) 323–329.
- [8] S. Minami, K. Komuta, M. Tsujimoto, M. Asai, in: A Case of Gingival Metastasis of Pulmonary Anaplastic Carcinoma 42, 2002, pp. 595–599.
- [9] H. Ishibashi, H. Akamatsu, M. Sunamori, Gingival metastasis of pulmonary pleomorphic carcinoma; Report of a case, *Jpn. J. Thorac. Surger.* 58 (2005) 410–414.
- [10] E. Tachibana, Y. Yamaguchi, T. Tachibana, in: A Case of Pulmonary Pleomorphic Carcinoma Metastasizing to the Mandibular Gingiva 61, 2015, pp. 458–462.
- [11] J. Sakamoto, T. Sekine, Pulmonary pleomorphic carcinoma with rapid and peculiar metastasis: Report of a case, *Jpn. J. Thorac. Surger.* 60 (2007) 253–257.
- [12] Y. Tomita, T. Asano, M. Nakano, T. Suzuki, Y. Iwamoto, M. Miyazaki, T. Oguri, S. Sato, Two cases of granulocyte colony-stimulating factor-producing pulmonary pleomorphic carcinoma, *J. Jpn. Soc. Respir. Endosc.* 33 (2011) 21–27.
- [13] S. Suto, N. Sakihama, H. Umeki, S. Kondo, E. Takashita, F. Kunishima, M. Tanaka, A case of gingival metastasis of lung cancer, *J. Otolaryngol. Japan.* 85 (2013) 719–723.
- [14] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, A. Kerwan, A. Thoma, A.J. Beamish, A. Noureldin, A. Rao, B. Vasudevan, B. Challacombe, B. Perakath, B. Kirshtein, B. Ekser, C.S. Pramesh, D.M. Laskin, D. Machado-Aranda, D. Miguel, D. Pagano, F. H. Millham, G. Roy, H. Kadioglu, L.J. Nixon, I. Mukhejee, J.A. McCaul, J. Chi-Yong Ngu, J. Albrecht, J.G. Rivas, K. Raveendran, L. Derbyshire, M.H. Ather, M. A. Thorat, M. Valmasoni, M. Bashashati, M. Chalkoo, N.Z. Teo, N. Raison, O. J. Muensterer, P.J. Bradley, P. Goel, P.S. Pai, R.Y. Afifi, R.D. Rosin, R. Coppola, R. Klappenbach, R. Wynn, R.L. De Wilde, S. Surani, S. Giordano, S. Massarut, S. G. Raja, S. Basu, S.A. Enam, T.G. Manning, T. Cross, V.K. Karanth, V. Kasivisvanathan, Z. Mei, S.C.A.R.E. The, Guideline: updating consensus surgical CAsE REport (SCARE) guidelines, *Int. J. Surg.* 84 (2020) (2020) 226–230, <https://doi.org/10.1016/j.ijso.2020.10.034>.
- [15] W.D. Travis, E. Brambilla, A.G. Nicholson, Y. Yatabe, J.H.M. Austin, M.B. Beasley, L.R. Chirieac, S. Dacic, E. Duhig, D.B. Flieder, K. Geisinger, F.R. Hirsch, Y. Ishikawa, K.M. Kerr, M. Noguchi, G. Pelosi, C.A. Powell, M.S. Tsao, I. Wistuba, The 2015 World Health Organization classification of lung tumors: impact of genetic, clinical and radiologic advances since the 2004 classification, *J. Thorac. Oncol.* 10 (2015) 1243–1260, <https://doi.org/10.1097/JTO.0000000000000630>.
- [16] E. Brambilla, W.D. Travis, T.V. Colby, B. Corrin, Y. Shimosato, The new World Health Organization classification of lung tumours, *Eur. Respir. J.* 18 (2001) 1059–1068, <https://doi.org/10.1183/09031936.01.00275301>.
- [17] H. Choshi, M. Watanabe, H. Ujiike, Y. Sato, T. Morito, R. Sugimoto, K. Kataoka, Resected case of stage IV pleomorphic carcinoma of the lung with long-term survival, *Surg. Case Rep.* 6 (2020) 4–8, <https://doi.org/10.1186/s40792-020-00868-z>.
- [18] N.A. Karim, J. Schuster, I. Eldessouki, O. Gaber, T. Namad, J. Wang, C. Xie, J. C. Morris, Pulmonary sarcomatoid carcinoma: University of Cincinnati experience, *Oncotarget* 9 (2018) 4102–4108, <https://doi.org/10.18632/oncotarget.23468>.
- [19] J. Yong, H.Æ. Moon, K. Choi, Æ.J. Eun, U.Æ. Min, J. Park, in: The role of palliative chemotherapy for advanced pulmonary pleomorphic carcinoma, 2009, pp. 287–291, <https://doi.org/10.1007/s12032-008-9117-4>.