



# Scalp metastasis from an adenocarcinoma of the lung mimicking a cystic mass: case report and literature review

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A 67-year-old man visited our plastic surgery clinic complaining of a palpable protruding mass (2.0×2.5 cm) in the right occipital region. To establish an appropriate treatment plan for the cystic mass, brain magnetic resonance imaging was performed. A 2.2 cm nodular lesion with peripheral enhancement in the right occipital region of the scalp was confirmed. In addition, two rim-enhancing nodular lesions up to 9 mm with marked perilesional edema in the right frontal lobe were confirmed. The findings suggested metastasis from cancer. After further evaluations, a mass in the right lower lung field was identified as adenocarcinoma of the lung. Histological examination characterized the excised lesion as a cutaneous metastasis from lung adenocarcinoma. This case report shows that a cystic mass, which commonly occurs in the scalp, may indicate lung cancer. In particular, if a cystic mass of the scalp is identified in a person at high risk for lung cancer, appropriate evaluation and urgent treatment should be performed.

**Keywords:** Adenocarcinoma of lung / Case reports / Neoplasm metastasis / Scalp

## INTRODUCTION

Lung cancer is a malignant disease with high mortality rates [1]. In lung cancer, skin and cutaneous metastases are less common than metastases involving other organs. To date, the incidence of skin and cutaneous metastasis is approximately 1% to 12% [2]. In general, skin and cutaneous metastases develop after an initial diagnosis of a primary internal malignancy. However, in rare cases, it may occur as an initial presentation prior to the detection of primary cancer [1]. The clinical features of skin

and cutaneous metastases from lung cancer include round or oval nodules, which may be mobile or fixed, and the skin color is at times red, dark red, or black. Usually, skin and cutaneous metastases are painless. However, occasionally, they may ulcerate [1,3,4].

In this brief report, we describe a case of scalp cutaneous metastasis from lung adenocarcinoma that mimicked a cystic mass. This mass was detected without skin lesions such as ulcerations or red color. Additionally, we describe the approach we employed to treat this condition.

## CASE REPORT

A 67-year-old man visited our plastic surgery clinic complaining of a palpable protruding mass (size, 2.0×2.5 cm) in the right occipital region. This mass had appeared 3 months prior to his visit (Fig. 1A). The mass was round, showed mild fluctuation upon palpation, and was painless. No other skin lesions

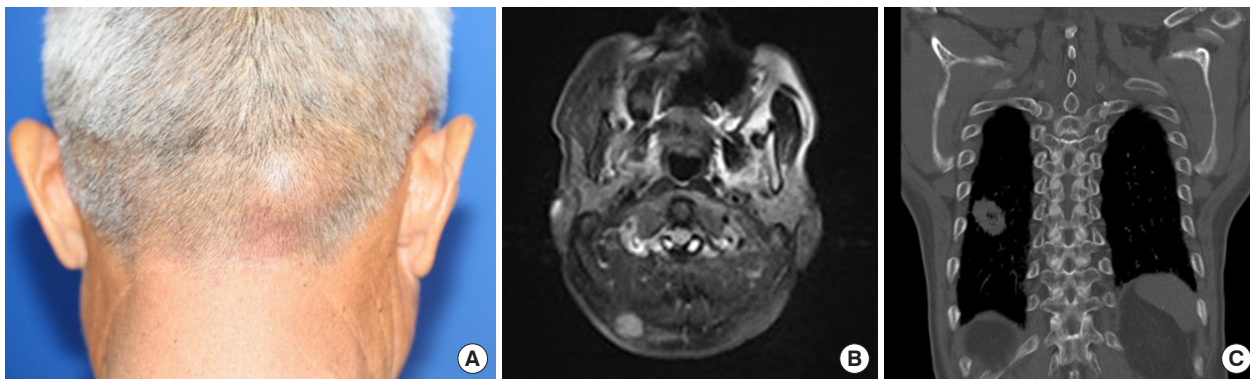
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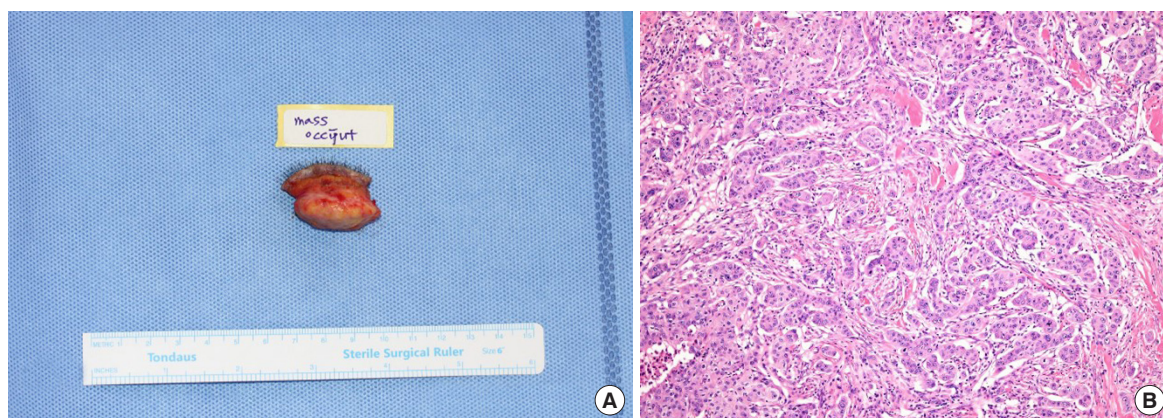
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**Fig. 1.** Preoperative findings. (A) Grossly finding: 2.0×2.5 cm sized protruding mass in the right occipital region. (B) Brain magnetic resonance imaging finding: a 2.2 cm nodular lesion with peripheral enhancement in the right occipital region of the scalp was confirmed. (C) Chest computed tomography finding: 3.8 cm sized suggesting a lung cancer like mass was identified in the right lower lung field.



**Fig. 2.** Postoperative findings. (A) Resected scalp mass mimicking a cystic mass. (B) Histological examination demonstrates solid pattern features. The atypical tumor cells and fibrotic stroma composed of nests without acini, tubules with mucin production (H&E stain, ×100).

were identified. To establish an appropriate treatment plan for the cystic mass, brain magnetic resonance imaging was performed in the right occipital region. This diagnostic method is also used for masses such as epidermal cysts and abscesses.

Following an examination, a 2.2 cm nodular lesion with peripheral enhancement in the right occipital region of the scalp was confirmed. Most of the mass was primarily located in the subcutaneous fat layer. Involvement of the adjacent posterior neck muscle was suspected (Fig. 1B). In addition, two rim-enhancing nodular lesions up to 9 mm with marked perilesional edema in the right frontal lobe were confirmed. The findings suggested metastasis from cancer. To add to the cancer workup, chest computed tomography, abdominal computed tomography, and  $^{18}\text{F}$  FDG Torso PET-CT (fluorine-18-fluorodeoxyglucose positron emission tomography/computed tomography) were also performed. On chest computed tomography, a 3.8-cm-sized mass was identified in the right lower lung field. The necrotic portion was part of the mass, suggesting lung cancer (Fig. 1C). In addition, enlarged lymph nodes were con-

firmed in the subcarinal, right hilar, and interlobar areas. There was a focal osteolytic lesion in the posterior arch of the left ninth rib. This lesion was diagnosed as bone metastasis. A guided biopsy of the lung tumor was performed for accurate diagnosis. The diagnosis confirmed that the mass in the right lower lung field was adenocarcinoma of the lung. The patient did not show any other symptoms such as fever, general weakness, or weight loss. However, the patient had a history of smoking 40 packs of cigarettes per year.

Total excision and biopsy were planned to differentiate between scalp cutaneous metastasis from lung adenocarcinoma and a cystic mass in the right occipital region. The cystic mass was excised under local anesthesia (Fig. 2A). During dissection, fibrous tissues adhered to the cystic mass. After mass resection, the wound bed was found to be a muscle layer. A biopsy was performed on the resected mass. Histological examination characterized the excised lesion as a cutaneous metastasis from lung adenocarcinoma (Fig. 2B). As the resection margin was clear, additional treatment was not performed.

A literature review was conducted to examine the available diagnostic data and treatment options for patients with metastatic lung adenocarcinoma involving the scalp. Ryu et al. [5] and Yang and Kang [6] reported that advanced gastric cancer and renal cell carcinoma rarely metastasize to the skin and cutaneous tissues such as the scalp. In addition, lung cancer metastasis to the skin and cutaneous tissues is rare. According to a retrospective study, 2.8% of non-small cell lung carcinoma cases showed cutaneous metastasis as the initial presentation. Among skin and cutaneous metastases, metastasis to the scalp is unusual in primary lung cancer [7]. In a previous meta-analysis by Karthen, scalp metastasis accounted for 6.9% of all skin and cutaneous metastases [8].

Kim et al. [9] described some diagnostic imaging methods for neoplasms of the scalp. Several imaging methods have been used to determine the exact type and location of masses developed in the scalp. Ultrasound is one of the primary screening methods used to characterize cystic or hemangioma lesions. Computed tomography is useful for the identification of calcified lesions, tissue discrimination, spatial resolution, and mass effects. Magnetic resonance imaging is a high-level examination method that assists in distinguishing tumors from normal tissues. It is important to determine which of several available imaging tests is the most reasonable in terms of diagnosis and cost. Malhotra et al. [10] reported the risk factors for lung cancer, including family history, smoking history, pulmonary tuberculosis, and occupational exposure to asbestos/siliceous/chromium compounds. These factors may influence the choice of the imaging modality. If a palpable scalp mass is confirmed in a person with the risk factors for lung cancer, it is necessary to thoroughly evaluate the possibility of malignancy. Therefore, for patients presented with risk factors for lung cancer, magnetic resonance imaging may be more appropriate than computed tomography or ultrasonography examination.

In general, the treatment of a single, solitary skin metastasis includes surgery alone or combined with chemotherapy. Treatment may also be combined with radiation if needed. However, patients with skin metastases from lung cancer have been found to have poor outcomes despite treatment with a combination of these methods. Ambrogi et al. [11] reported two studies of skin metastases of the scalp. In one study, two patients were treated with surgical resection combined with chemotherapy. One remained alive at 74 months of follow-up, and the other only survived until 8 months. In another study, four patients were treated with surgical resection combined with chemotherapy, and two patients underwent surgical resection in addition to chemotherapy and radiation. The mean survival time was 12.5 months after diagnosis.

If multiple cutaneous lesions exist, resection is not possible. In such a case, chemotherapy is the primary treatment option. Specific agents such as cisplatin, cyclophosphamide, adriamycin, mitomycin, interferon-B, etoposide, cinesine, and carboplatin are used for chemotherapy. However, according to a study by Coslett and Katlic [12], eight patients treated with chemotherapy alone expired only 6.5 months after diagnosis. Radiation is usually not effective for patients with skin metastases of lung cancer. Coslett and Katlic [12] and Hidaka et al. [2] reported the treatment of three patients with radiation alone, and the survival time ranged from 1.8 months to 1 year, which is significantly shorter than that following surgical treatment or chemotherapy.

## DISCUSSION

In this case report, a cystic mass in the right occipital area was the initial presentation of lung adenocarcinoma. In addition, skin and cutaneous metastases may have been the first sign of clinically silent visceral malignancies. There are several types of cystic masses in the scalp, including epidermal cysts and sebaceous cysts [9,13]. The appearance of the cystic mass confirmed in this case was similar to an epidermal cyst of the scalp. There were fibrous tissues around the cystic mass. In cases of skin and cutaneous metastases, it is rare to observe a cystic mass surrounded by fibrous tissues. This was thought to be caused by repeated inflammatory reactions during cutaneous metastasis [14]. Because cystic masses of the scalp are often benign, a biopsy is usually not performed on excised cystic masses. However, even in patients with a clinically silent visceral malignancy without specific respiratory symptoms, a cystic mass may form in the scalp as the initial presentation. Therefore, biopsy should be performed on an excised mass.

The scalp mass was removed en bloc after preparing an elliptical design in the same way as for the removal of a benign cystic mass [13]. In contrast to the resection of a benign cystic mass, fibrous tissues around the scalp mass were removed until fresh tissue was obtained when removing the mass en bloc. The margin was cleared by removing the mass using the aforementioned method. This case report shows that a cystic mass, which commonly occurs in the scalp, may be an initial presentation of lung cancer. It may also be a valuable marker for internal malignancy. In particular, if a cystic mass of the scalp is identified in a person at high risk for lung cancer, appropriate evaluation and urgent treatment should be performed. The findings of this case report may be used as a reference for the removal of a cystic mass suspected as a malignancy of the scalp.

## NOTES

### Conflict of interest

No potential conflict of interest relevant to this article was reported.

### Ethical approval

The study was approved by the Institutional Review Board of Chung-Ang University Hospital (IRB No. 2202-002-19404).

### Patient consent

The patient provided written informed consent for the publication and the use of his images.

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Conceptualization: Han Koo Kim, Seung Hyun Kang, Woo Seob Kim, Woo Ju Kim, Hyeon Seok Kim, Tae Hui Bae. Data curation: Han Koo Kim, Shin Hyuk Kang, Woo Seob Kim, Woo Ju Kim, Hyeon Seok Kim. Formal analysis: Shin Hyuk Kang. Writing - original draft: Seung Hyun Kang. Writing - review & editing: Tae Hui Bae. Supervision: Tae Hui Bae.

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