

## ADENOCARCINOMA TUMOR IN THE CEREBELLUM AS METASTASIS FROM LUNG CANCER WITH KLEBSIELLA OXYTOCA WITHIN THE TUMOR: A CASE REPORT

Alfred Sutrisno Sim<sup>1\*</sup>, Herlina Uinarni<sup>2</sup>, Edwin Destra<sup>3</sup>

*Department of Neurosurgery, Faculty of Medicine, Tarumanagara University<sup>1</sup>*

*Department of Radiology, Pantai Indah Kapuk Hospital<sup>2</sup>*

*School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia<sup>3</sup>*

\*Corresponding Author : alfred@fk.untar.ac.id

### ABSTRAK

Laporan kasus ini merinci kejadian langka metastasis serebelar akibat kanker paru-paru, yang dipersulit oleh infeksi intratumoral *Klebsiella oxytoca* pada pria berusia 57 tahun dengan riwayat perokok berat. Pasien awalnya mengalami vertigo persisten, tidak responsif terhadap pengobatan standar. Pemindaian MRI menunjukkan massa serebelar dengan peningkatan kontras, disertai massa paru multipel. Tes darah menunjukkan leukositosis, anemia, dan peningkatan jumlah neutrofil, menunjukkan adanya infeksi aktif. Evaluasi patologis selanjutnya pada tumor serebelar memastikan adanya adenokarsinoma metastatik, dengan temuan tambahan infeksi *Klebsiella oxytoca* di dalam jaringan tumor. Mengingat diagnosis ganda adenokarsinoma metastatik dan infeksi bakteri sekunder, pasien menjalani operasi trepanasi darurat untuk mengurangi tekanan dan mengangkat tumor. Terapi antibiotik yang ditargetkan dimulai untuk mengatasi infeksi, diikuti dengan pemantauan pasca operasi yang berkelanjutan. Strategi pengobatan komprehensif ini menghasilkan perbaikan signifikan pada gejala pasien, khususnya resolusi vertigo, dan peningkatan kualitas hidup secara keseluruhan. Kasus ini menyoroti pentingnya pemeriksaan diagnostik menyeluruh dan pendekatan multidisiplin ketika menangani kasus kompleks yang melibatkan tumor otak metastatik dengan komplikasi infeksi sekunder. Identifikasi dini agen infeksi, bersama dengan intervensi bedah yang cepat dan terapi yang ditargetkan, sangat penting untuk mengoptimalkan hasil pasien dan meningkatkan prognosis jangka panjang dalam skenario klinis yang jarang dan menantang.

**Kata kunci** : adenokarsinoma metastatik, kanker paru, *klebsiella oxytoca*, laporan kasus, metastasis serebelar

### ABSTRACT

*This case report details a rare occurrence of cerebellar metastasis from lung cancer, complicated by an intratumoral infection with *Klebsiella oxytoca* in a 57-year-old male with a history of heavy smoking. The patient initially presented with persistent vertigo, unresponsive to standard treatment. An MRI scan revealed a cerebellar mass with contrast enhancement, accompanied by multiple pulmonary masses. Blood tests indicated leukocytosis, anemia, and elevated neutrophil count, suggesting an active infection. Subsequent pathological evaluation of the cerebellar tumor confirmed the presence of metastatic adenocarcinoma, with an additional finding of *Klebsiella oxytoca* infection within the tumor tissue. Given the dual diagnosis of metastatic adenocarcinoma and secondary bacterial infection, the patient underwent an urgent trepanation surgery to relieve pressure and remove the tumor. Targeted antibiotic therapy was initiated to address the infection, followed by continuous postoperative monitoring. This comprehensive treatment strategy led to significant improvements in the patient's symptoms, particularly the resolution of vertigo, and overall enhancement in quality of life. This case highlights the importance of a thorough diagnostic workup and a multidisciplinary approach when managing complex cases involving metastatic brain tumors complicated by secondary infections. Early identification of the infectious agent, along with prompt surgical intervention and targeted therapy, is crucial for optimizing patient outcomes and improving long-term prognosis in such rare and challenging clinical scenarios.*

**Keywords** : metastatic adenocarcinoma, cerebellar metastasis, lung cancer, *klebsiella oxytoca*, case report

## INTRODUCTION

Adenocarcinoma in the cerebellum, resulting from metastasis of lung cancer, is a condition where cancerous cells originating from a lung adenocarcinoma spread to the cerebellum, a part of the brain responsible for motor control and coordination. Adenocarcinoma, a type of cancer that develops from glandular epithelial cells, is known for its ability to metastasize to distant organs. When this type of lung cancer metastasizes to the cerebellum, patients may present with a range of non-specific neurological symptoms such as headaches, dizziness, or ataxia. Although brain metastases are more frequently observed in the cerebral hemispheres, cerebellar metastases, though less common, are clinically significant due to their potential to cause severe complications and require intricate management strategies. (Gambirasio, 2023; Sun et al., 2021; Tafe & Tsongalis, 2015)

In the reported case, an additional complication was observed in the form of an intratumoral infection with *Klebsiella oxytoca*. *Klebsiella oxytoca* is a gram-negative, opportunistic pathogen typically found in the human gastrointestinal tract and the environment. The occurrence of this bacterium within a brain tumor is rare but can arise in immunocompromised patients, such as those with advanced cancer. The presence of *Klebsiella oxytoca* within the tumor adds complexity to the patient's clinical condition, as it increases the risk of severe complications and poses significant challenges for treatment. The identification of this infection is usually achieved through microbiological culture of the affected tumor tissue, and its management requires a combination of effective antibiotic therapy and, in some cases, surgical intervention to reduce the tumor burden and control the infection. (Herzog et al., 2014; Moradigaravand et al., 2017; Sugeçti et al., 2021)

This case underscores the necessity for comprehensive evaluation in patients presenting with non-specific neurological symptoms, particularly in those with a history of malignancy. Furthermore, it highlights the critical importance of a multidisciplinary approach in managing cerebellar metastasis complicated by infection, as well as the essential role of histopathological examination and microbiological culture in establishing a definitive diagnosis and guiding the development of an appropriate treatment plan. (Botz, 2021; Chen et al., 2019; Patnayak et al., 2013)

## CASE REPORT

A 57-year-old male with a significant smoking history presented with a three-day history of vertigo. Initial treatment with anti-vertigo medication was ineffective. An MRI performed a week later revealed a left cerebellopontine angle mass with contrast enhancement and multiple solid masses in the right lung. Routine blood tests indicated leukocytosis (19.33 Th/uL), anemia (Hb 12.4 g/dL), and an increased neutrophil count (17.26 Th/uL). Chemistry tests showed slightly elevated blood glucose (161 mg/dL) and normal kidney function (eGFR > 100 ml/min/1.73m<sup>2</sup>).

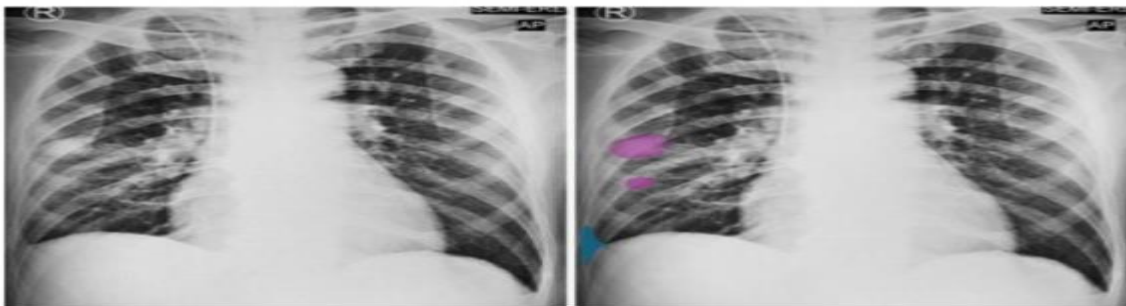


Figure 1. Normal Heart Size, Right Lung Nodules In Middle and Lower Fields And The Right Costophrenic Sinus Appears Blunted, Which May Indicate Pleural Reaction/Pleural Effusion

On the first day, the patient experienced persistent vertigo that did not respond to adequate treatment; by the seventh day, an MRI detected masses in the cerebellum and lungs, prompting surgery to be scheduled and carried out on the tenth day. The MRI revealed a heterogeneous, cystic mass in the left cerebellum measuring about 2.4 x 2.6 x 2.2 cm, causing perifocal edema and compressing the fourth ventricle, with contrast enhancement showing high tumor activity.

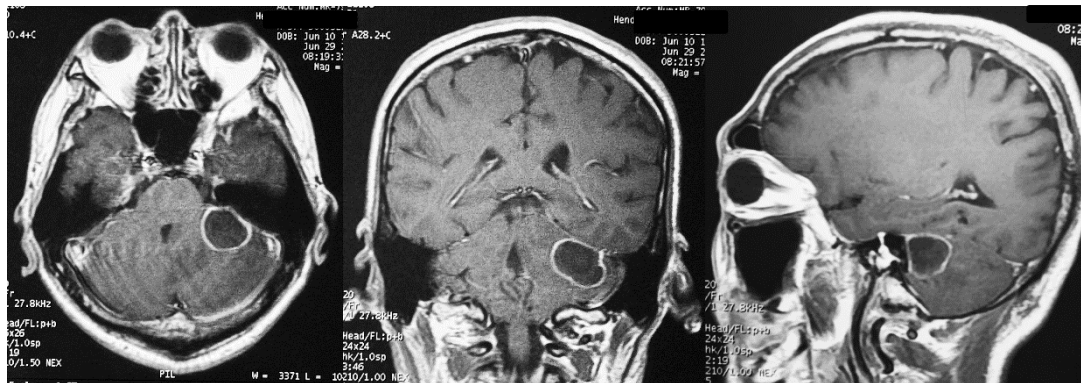


Figure 2. Cystic Left Cerebellar Lesion With Edema, IV Ventricle Compression, Abscess Suspicion

During trepanation surgery the tumor was punctured and released 4 cc of thick yellow fluid. A culture of this fluid grew *Klebsiella oxytoca* identified as an ESBL producer sensitive to several antibiotics including amikacin and ciprofloxacin but resistant to ampicillin and cefotaxime. Histopathological examination confirmed poorly differentiated adenocarcinoma. Post-operative management involved targeted antibiotic therapy based on culture sensitivity and continuous monitoring of neurological and systemic status. The patient's progress and response to treatment were closely observed with follow-up imaging and laboratory tests planned to assess therapeutic outcomes and detect any recurrence or complications.

## DISCUSSION

This case is complex due to the metastasis from a lung tumor to the cerebellopontine angle, compounded by a *Klebsiella oxytoca* infection, especially in the absence of specific symptoms indicating the disease. Such cases highlight the importance of thorough diagnostic evaluations, which are critical in the context of cerebellopontine angle tumors. Cerebellopontine angle tumors represent 5% to 10% of all brain tumors, with vestibular schwannomas being the most prevalent, making up 80% to 94% of these cases. Meningiomas are the second most common, accounting for 3% to 10% of cerebellopontine angle tumors, followed by epidermoid tumors, which constitute 2% to 4%. With non-specific symptoms, this case demonstrates the complexity and underscores the necessity for a multidisciplinary approach. (Gambirasio, 2023; Petteerwood et al., 2013; Xia et al., 2022)

Metastatic brain tumors originating from lung cancer present a significant clinical challenge, often associated with poor prognosis due to the aggressive nature of the disease and the complexities involved in treating brain metastases. These tumors, particularly when they affect critical areas such as the cerebellum, require comprehensive diagnostic approaches to ensure both accurate diagnosis and the formulation of effective treatment strategies. The case discussed illustrates this need, as it involved a rare complication of a bacterial infection within the tumor, which further complicated the patient's clinical presentation. The identification of such infections, although uncommon, is crucial, as they necessitate prompt and targeted antimicrobial therapy to prevent further complications, including potential neurological deterioration or systemic infection. (Sun et al., 2021; Weng, 2024; Yamada et al., 2022). In this particular case, the discovery of *Klebsiella oxytoca* as a secondary infection within the

cerebellar metastatic tumor was instrumental in guiding the patient's treatment. The presence of this pathogen required an immediate response, including the administration of antibiotics specifically tailored to combat the infection, in conjunction with surgical intervention to remove the infected tumor tissue. This combined approach was vital in controlling the infection, reducing the tumor burden, and leading to a significant improvement in the patient's neurological symptoms. The success of this strategy highlights the importance of including microbiological assessments in the diagnostic workup for patients with metastatic brain tumors, especially when there are indications of an underlying infection that could complicate the clinical course. (Hassan et al., 2018; Meier et al., 2020; Taniguchi et al., 2011) Following the targeted treatment and surgical intervention, the patient experienced marked improvement in his symptoms, including relief from persistent headaches and improved motor coordination. This case underscores the critical importance of a patient-centered, multidisciplinary approach in managing complex cases of metastatic brain tumors, where thorough evaluation and timely intervention are key to achieving positive clinical outcomes.

## CONCLUSION

This case highlights that metastatic brain tumors originating from lung cancer generally have a poor prognosis, and the occurrence of bacterial infections within these tumors, though rare, can further complicate clinical outcomes. The detection of bacteria such as *Klebsiella oxytoca* indicates secondary infections that necessitate swift and targeted treatment to avoid additional complications. This case illustrates the complexity and underscores the need for a multidisciplinary approach.

## ACKNOWLEDGMENT

The researcher would like to express his gratitude for the support, inspiration and assistance to all parties in helping the researcher complete this research, including the participants who were willing to participate in the research until it was completed.

## REFERENCES

- Botz, B. (2021). *Cerebellar Metastasis of Pulmonary Adenocarcinoma, Cavernous Venous Malformation, and Developmental Venous Anomaly*. <https://doi.org/10.53347/rid-85827>
- Chen, Q., Ren, J., Xu, J.-X., Yang, X., & Guo, Z. (2019). Concurrent Bronchial Artery and Posterior Inferior Cerebellar Artery Microcatheter Interventional Chemotherapy for Adenocarcinoma of the Lung With Solitary Cerebellar Metastasis. *Medical Science Monitor*. <https://doi.org/10.12659/msm.915470>
- Gambirasio, B. G. (2023). *Brain Metastases From Lung Adenocarcinoma With Dramatic Response to Anti-Egfr Therapy – Case Report*. <https://doi.org/10.5327/1516-3180.141s1.781>
- Hassan, S. M., Mubarik, A., Muddassir, S., & Haq, F. (2018). Brain Metastasis in Colorectal Cancer Presenting as Refractory Hypertension. *Journal of Community Hospital Internal Medicine Perspectives*. <https://doi.org/10.1080/20009666.2018.1490138>
- Herzog, K., Schneditz, G., Leitner, E., Feierl, G., Hoffmann, K. M., Zollner-Schwetz, I., Krause, R., Gorkiewicz, G., Zechner, E. L., & Högenauer, C. (2014). Genotypes of *Klebsiella Oxytoca* Isolates From Patients With Nosocomial Pneumonia Are Distinct From Those of Isolates From Patients With Antibiotic-Associated Hemorrhagic Colitis. *Journal of Clinical Microbiology*. <https://doi.org/10.1128/jcm.03373-13>
- Meier, R., de Mortanges, A. P., Wiest, R., & Knecht, U. (2020). Exploratory Analysis of

- Qualitative MR Imaging Features for the Differentiation of Glioblastoma and Brain Metastases. *Frontiers in Oncology*. <https://doi.org/10.3389/fonc.2020.581037>
- Moradigaravand, D., Martin, V., Peacock, S. J., & Parkhill, J. (2017). Population Structure of Multidrug-Resistant *Klebsiella Oxytoca* Within Hospitals Across the United Kingdom and Ireland Identifies Sharing of Virulence and Resistance Genes With *K. Pneumoniae*. *Genome Biology and Evolution*. <https://doi.org/10.1093/gbe/evx019>
- Patnayak, R., Jena, A., Vijaylaxmi, B., Lakshmi, A. Y., M. Prasad, B. C., Chowhan, A. K., Rukmangadha, N., Phaneendra, B. V., & Reddy, M. (2013). Metastasis in Central Nervous System: Clinicopathological Study With Review of Literature in a Tertiary Care Center in South India. *South Asian Journal of Cancer*. <https://doi.org/10.4103/2278-330x.119885>
- Petterwood, J., Lim, K., Gonzalvo, A., & Y. Quan, G. M. (2013). Intradural Extramedullary Colorectal Adenocarcinoma Metastasis to the Cervical Spine. *Australian and New Zealand Journal of Surgery*. <https://doi.org/10.1111/ans.12452>
- Sugeçti, S., Çelik, C., Büyükgüzel, E., & Büyükgüzel, K. (2021). Physiological and Biochemical Effects of *Klebsiella Oxytoca* Infection on Model Organism *Galleria Mellonella* L. *Gazi Entomolojik Arastirmalar Dernegi*. <https://doi.org/10.51963/jers.v23i3.2069>
- Sun, M.-G., Kim, I.-Y., Kim, Y., Jung, T., Moon, K., Jung, S., Oh, I.-J., Kim, Y., & Choi, Y. (2021). Lorlatinib Therapy for Rapid and Dramatic Control of Brain and Spinal Leptomeningeal Metastases From ALK-Positive Lung Adenocarcinoma. *Brain Tumor Research and Treatment*. <https://doi.org/10.14791/btrt.2021.9.e19>
- Tafe, L. J., & Tsongalis, G. J. (2015). A 78-Year-Old Woman With Brain Metastases. *Clinical Chemistry*. <https://doi.org/10.1373/clinchem.2014.229864>
- Taniguchi, A., Yuichiro, Kobayashi, H., Maeda, M., & Tomimoto, H. (2011). Bilateral Abducens Nerve Palsy by Compression From Bilateral Anterior Inferior Cerebellar Artery. *Journal of Neurology*. <https://doi.org/10.1007/s00415-011-6081-2>
- Weng, Z.-Y. (2024). Role of Savolitinib in Advanced Gastric Adenocarcinoma With Meningeal Carcinomatosis and Cerebellar Metastasis: A Case Report. *World Journal of Clinical Cases*. <https://doi.org/10.12998/wjcc.v12.i15.2636>
- Xia, H., Liang, B., Liu, G., Qi, Y., & Li, M. (2022). Effective Treatment in Lung Adenocarcinoma Patient With Brain Metastases Harboring Novel CLHC1/RNT4 Intergenic Region- ALK Fusion. *Medicine*. <https://doi.org/10.1097/md.00000000000029134>
- Yamada, G., Toyoda, T., Katada, E., & Matsukawa, N. (2022). Bilateral Vocal Cord Paralysis Associated With Meningeal Carcinomatosis From Lung Adenocarcinoma. *Case Reports in Neurology*. <https://doi.org/10.1159/000524323>