Journal of Society Medicine
Research & Review Articles on Diseases
Journal of Society Medicine. 2026; 5 (10)

A Diagnostic Dilemma Between Brain Metastasis and Intracranial Tuberculoma in a 60-Year-Old Man with Metastatic Carcinoma of Unidentified Primary and Sputum-Positive Pulmonary Tuberculosis: A Case Report

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ARTICLE INFO

Article history:
Received
25 July 2026

Revised
26 September 2026

Accepted
31 October 2026

Manuscript ID:
JSOCMED-25072026-510-5

Checked for Plagiarism: Yes

Language Editor:
Rebecca

Editor-Chief:
Prof. Aznan Lelo, PhD

ABSTRACT

Introduction: Intracranial tuberculoma and brain metastasis present with overlapping clinical and neuroimaging features. This distinction is critical because their diagnostic pathways and treatments differ fundamentally, and the dilemma is amplified when metastatic carcinoma and active tuberculosis coexist in the same patient.

Case Description: A 60-year-old Indonesian man presented with decreased consciousness, a one-year history of chronic headache, right hemiparesis, abducens and facial nerve palsies, fever, weight loss, and long-standing left cervical and supraclavicular lymphadenopathy. Histopathology of a cervical lymph node demonstrated metastatic carcinoma without an identified primary site. Head computed tomography revealed multiple hypodense lesions with vasogenic edema, initially suggestive of metastases, whereas contrast-enhanced neck magnetic resonance imaging incidentally showed multiple enhancing intracranial lesions, including a 12.4 × 10.6 × 11.3 mm left temporal lesion, interpreted as favoring tuberculoma. Sputum examination was positive for tuberculosis despite an unremarkable chest radiograph. Antituberculosis therapy with corticosteroids and supportive neurological management was initiated, and the Glasgow Coma Scale improved from 12 to 15. Intracranial biopsy and lumbar puncture were not available. The patient was discharged on day 7 but died at home 5 days later, leaving the intracranial diagnosis unconfirmed.

Conclusion: Coexisting metastatic carcinoma and sputum-positive tuberculosis create genuinely competing etiologies for enhancing brain lesions. Neither extracranial cytology nor sputum positivity can establish the nature of an intracranial lesion. Tissue or microbiological confirmation, a systematic primary-tumor workup, and multidisciplinary interpretation should be pursued whenever feasible to avoid premature diagnostic closure.

Keywords

Brain Metastasis, Intracranial Tuberculoma, Metastatic Carcinoma, Pulmonary Tuberculosis, Diagnostic Dilemma

How to cite: Nasution ANZ. A Diagnostic Dilemma Between Brain Metastasis and Intracranial Tuberculoma in a 60-Year-Old Man with Metastatic Carcinoma of Unidentified Primary and Sputum-Positive Pulmonary Tuberculosis: A Case Report. *Journal of Society Medicine*. 2026; 5 (10): 424-430. **DOI: https://doi.org/10.71197/jsocmed.v5i10.317**

INTRODUCTION

Brain metastases are the most common intracranial neoplasms in adults and represent a major neurological complication of systemic malignancies. Current European guidelines recommend contrast-enhanced magnetic resonance imaging (MRI) as the imaging modality of choice and emphasize histopathological confirmation whenever the diagnosis is uncertain and the results would alter management [1]. In patients with cytologically or histologically proven metastatic carcinoma, newly detected intracranial lesions are frequently presumed to be metastatic. This assumption is particularly tempting in patients whose primary tumor remains unidentified,

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a scenario that requires a systematic diagnostic evaluation before the label of cancer of unknown primary can be formally applied [2].

However, infectious and inflammatory conditions can closely mimic intracranial neoplasms, and diagnostic anchoring may lead to inappropriate disease-specific therapies [1]. Intracranial tuberculomas may appear as solitary or multiple enhancing lesions with variable signal characteristics, perilesional edema, and a mass effect. Their radiological appearance depends on the stage of granuloma formation, presence or absence of caseation, and central liquefaction; consequently, conventional MRI findings may overlap with those of metastases, primary brain tumors, abscesses, and other granulomatous diseases [3,4]. Multiple ring-enhancing lesions of the brain have a broad differential diagnosis encompassing neoplastic, infectious, inflammatory, and vascular disorders [5]. Central nervous system (CNS) tuberculosis is a severe form of extrapulmonary tuberculosis, resulting from hematogenous dissemination of Mycobacterium tuberculosis and carrying high morbidity and mortality, particularly in tuberculosis-endemic countries such as Indonesia [6]. We report the case of a 60-year-old man with a lymph node biopsy demonstrating metastatic carcinoma and a positive sputum examination for pulmonary tuberculosis, in whom head computed tomography (CT) suggested brain metastases, whereas contrast-enhanced neck magnetic resonance imaging (MRI) was interpreted as favoring intracranial tuberculoma. The absence of a pulmonary mass or typical tuberculosis-related abnormalities on chest radiography further complicated the diagnosis. This case was reported in accordance with the CARE (CAse REport) guidelines [7].

CASE DESCRIPTION

A 60-year-old Indonesian man was admitted to Grand Medistra Hospital, Lubuk Pakam, with decreased consciousness that developed two days before admission. He had experienced chronic headaches for approximately one year. Associated symptoms included focal weakness, speech disturbance, visual disturbance, fever, weight loss, night sweats, and cough. He had also noticed painless, stable enlargement of the left cervical and left supraclavicular lymph nodes for approximately one year. He had no documented history of tuberculosis, no known primary malignancy, and no other relevant comorbidities. He had a smoking history of approximately 20 years. Human immunodeficiency virus (HIV) testing was negative.

On admission, the patient was drowsy, with a Glasgow Coma Scale (GCS) score of 12 (E3V4M5). His blood pressure was 130/79 mmHg, heart rate 82 beats/min, respiratory rate 20 breaths/min, body temperature 38 °C, and peripheral oxygen saturation 99% on room air. Neurological examination revealed pupils of normal size, symmetry, and light reflex; abducens (cranial nerve VI) and facial (cranial nerve VII) nerve palsies; right hemiparesis with normal muscle tone and deep tendon reflexes; and a positive Babinski sign. More than ten enlarged lymph nodes were palpable in the cervical, supraclavicular, and axillary regions. Respiratory examination was unremarkable, and no clinically apparent primary tumor was identified. Initial laboratory investigations revealed leukocytosis with neutrophilia and relative lymphopenia, together with mild anemia, whereas electrolytes and renal function were within normal limits (Table 1).

Table 1. Initial laboratory findings

Investigation	Result	Reference range
Hemoglobin	12.6 g/dL	13–18 g/dL
Leukocyte count	19.32 × 10^3/μL	4–11 × 10^3/μL
Neutrophils	81.4%	50–70%
Lymphocytes	6.7%	20–40%
Platelet count	200 × 10^3/μL	150–450 × 10^3/μL
Serum sodium	138.4 mmol/L	135–145 mmol/L
Serum potassium	3.7 mmol/L	3.5–5.5 mmol/L
Serum creatinine	1.09 mg/dL	0.6–1.1 mg/dL
HIV test	Negative	Negative

HIV, human immunodeficiency virus.

Sputum examination for pulmonary tuberculosis was positive. The diagnosis was based on sputum culture, which was repeated in June 2026 and yielded a positive result. Chest radiography revealed no

pulmonary mass, cavitary lesion, infiltrate, miliary nodules, or other typical radiographic features of active pulmonary tuberculosis; the discordance between the non-suggestive chest radiograph and the positive sputum result was noted. Histopathological examination of the tissue from the enlarged left cervical lymph node showed infiltration by a tumor arranged in solid, compact, tightly packed nests separated by thin fibrous septa. The tumor cells had enlarged, round-to-oval, pleomorphic nuclei with predominantly dense to coarse chromatin and eosinophilic cytoplasm with focal knobbing; in other areas, the cells appeared columnar with basally located nuclei. Residual lymphoid follicles were compressed and displaced by the tumor. The conclusion was metastatic carcinoma involving the left cervical lymph node. The pathologist noted that morphology alone was insufficient to determine the tumor origin and recommended immunohistochemistry together with further clinical and radiological evaluation to identify the primary site. Non-contrast head CT performed in June 2026 demonstrated multiple hypodense lesions in the left temporo-occipital, frontal, and right temporal lobes associated with vasogenic edema (Figure 1). In the context of metastatic carcinoma in a lymph node, these findings were initially interpreted as suspicious for brain metastases.

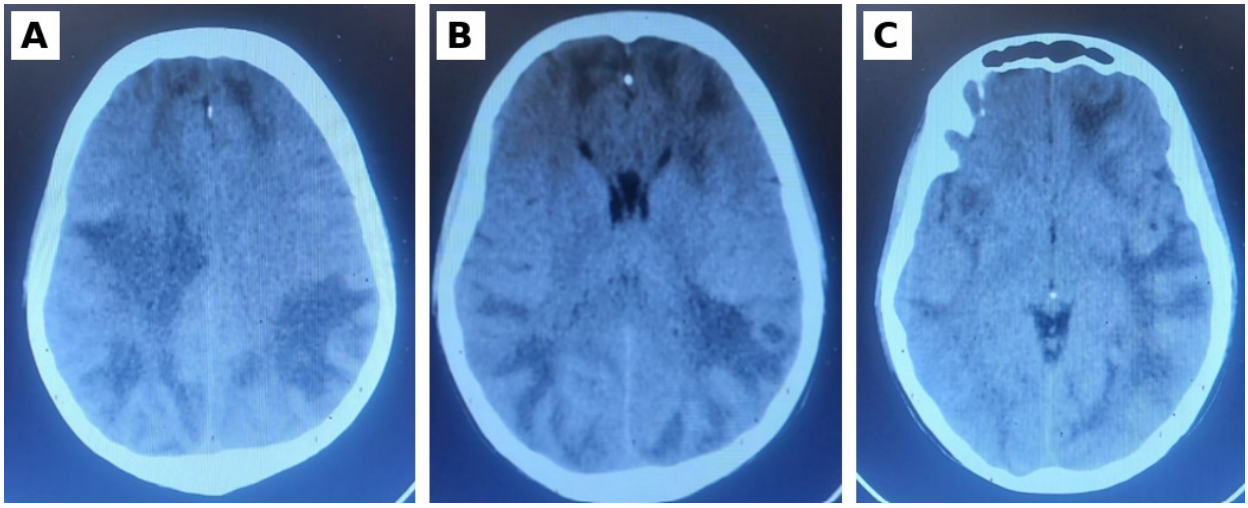


Figure 1. Axial non-contrast head computed tomography images (A–C) demonstrating multiple hypodense lesions with surrounding vasogenic edema in the bilateral temporo-occipital and frontal regions, initially interpreted as suspicious for brain metastases.

Contrast-enhanced MRI of the nasopharynx and neck demonstrated a soft-tissue mass at the posterior aspect of the left vocal cord infiltrating the left pyriform fossa, measuring approximately 23.6 mm in length, together with multiple enlarged, conglomerated, and enhancing lymph nodes in the left cervical, left supraclavicular, and left intrathoracic regions; the largest node, located in the left cervical region, measured approximately 19.7 mm in diameter (Figure 2).

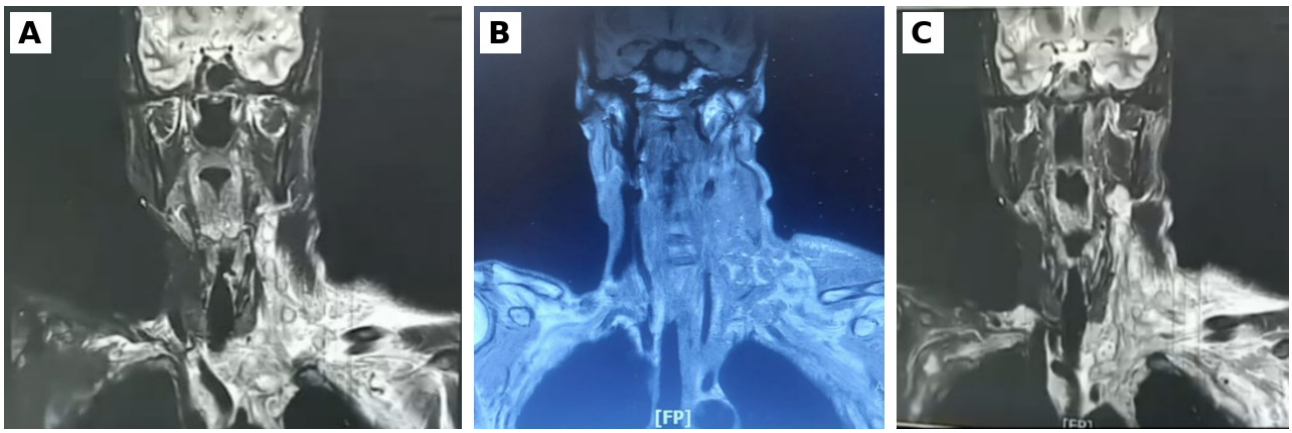


Figure 2. Coronal contrast-enhanced magnetic resonance images of the neck (A–C) showing multiple enlarged, conglomerated, and enhanced lymph nodes in the left cervical and supraclavicular regions.

Within the imaged field, multiple enhancing intracranial lesions were incidentally visualized, the largest of which was a solid lesion in the left temporal lobe measuring approximately 12.4 × 10.6 × 11.3 mm with extensive perifocal edema (Figure 3). The radiologist interpreted the intracranial lesions as more suggestive of tuberculoma, with intracranial metastasis and abscess as differential diagnoses, and recommended a dedicated brain MRI.

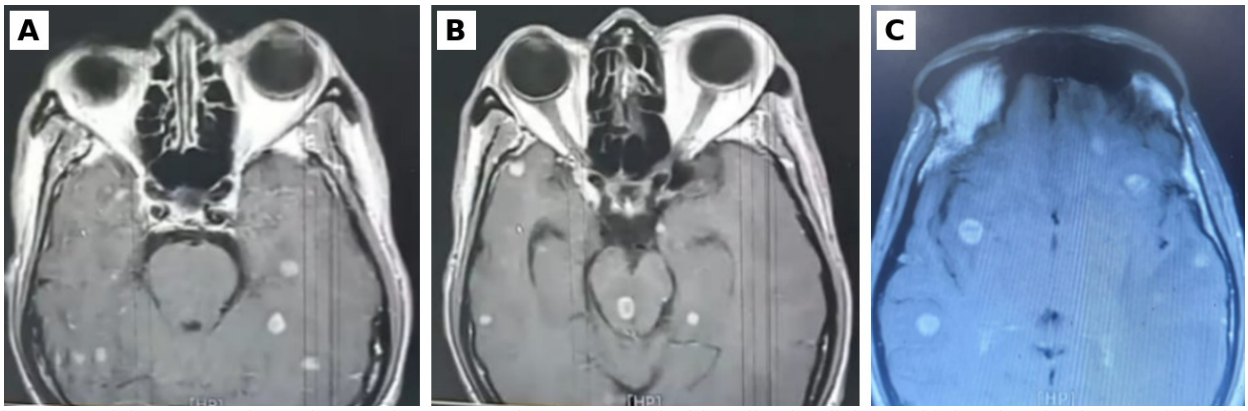


Figure 3. Axial contrast-enhanced magnetic resonance images (A–C) incidentally visualizing multiple enhancing intracranial lesions with perilesional edema, including a left temporal lesion measuring approximately 12.4 × 10.6 × 11.3 mm, interpreted by the radiologist as more suggestive of tuberculoma.

The principal differential diagnoses for intracranial lesions were (i) brain metastases from metastatic carcinoma with an unidentified primary site; (ii) intracranial tuberculoma in a patient with sputum-positive pulmonary tuberculosis; (iii) primary CNS neoplasm; and (iv) pyogenic, fungal, or other granulomatous lesions. The lymph node histopathology increased the pre-test probability of metastatic disease, whereas the positive sputum examination and MRI pattern increased the probability of tuberculoma (Table 2). However, the histology of the brain lesions could not be determined. Dedicated brain MRI was scheduled, but stereotactic biopsy and lumbar puncture were not available at our institution, and the patient died before further investigations could be performed.

Table 2. Clinical evidence supporting each principal differential diagnosis of intracranial lesions

Brain metastasis	Intracranial tuberculoma	Limitations of the available evidence
Lymph node histopathology confirmed metastatic carcinoma	Sputum examination positive for tuberculosis (repeated)	No intracranial biopsy or autopsy
Multiple lesions with vasogenic edema on head CT	Fever, weight loss, night sweats, and cough	No cerebrospinal fluid analysis
Left vocal cord/pyriform fossa mass on neck MRI	Radiological interpretation favoring tuberculoma on MRI	Intracranial lesions seen only incidentally on neck MRI
Age 60 years and 20-year smoking history	Residence in a tuberculosis-endemic country	Clinical improvement confounded by concomitant dexamethasone

CT, computed tomography; MRI, magnetic resonance imaging.

Neurological and supportive management consisted of dexamethasone, an antiepileptic drug, analgesics, antiemetics, osmotherapy, oxygen therapy, empirical antimicrobial therapy, and other supportive measures. Antituberculosis therapy was initiated on the second day of admission, together with corticosteroid co-therapy and pyridoxine supplementation. Oncological treatment was not initiated because the primary tumor was not identified. During hospitalization, the patient's neurological condition improved, with the GCS increasing from 12 to 15. He was discharged on day 7 with a plan for outpatient follow-up, including neuroimaging. However, five days after discharge, he experienced recurrent deterioration of consciousness at home and died before emergency medical care could be obtained. Because no intracranial biopsy, autopsy, or CNS microbiological confirmation was obtained, it remained uncertain whether the intracranial lesions represented metastatic carcinoma, tuberculoma, or another pathology. The clinical timeline is summarized in Table 3.

Table 3. Timeline of clinical events

Time point	Event
Approximately 1 year before admission	Onset of chronic headache; painless left cervical and supraclavicular lymphadenopathy
2 days before admission	Onset of decreased consciousness
Day 1 (admission)	GCS 12 (E3V4M5); right hemiparesis, cranial nerve VI and VII palsies; supportive and neurological management including dexamethasone
During admission	Lymph node histopathology: metastatic carcinoma; sputum positive for tuberculosis; head CT and neck MRI performed
Day 2	Antituberculosis therapy, corticosteroid co-therapy, and pyridoxine initiated
Day 7	GCS 15; discharged with planned outpatient follow-up and neuroimaging
5 days after discharge	Recurrent deterioration of consciousness at home; death before emergency care

Note: GCS, Glasgow Coma Scale; CT, computed tomography; MRI, magnetic resonance imaging.

DISCUSSION

This case illustrates a clinically important conflict between the evidence supporting two simultaneous systemic diseases. Lymph node histopathology confirmed metastatic carcinoma, and sputum examination confirmed active pulmonary tuberculosis. Therefore, intracranial lesions may arise in a patient with two plausible, competing etiologies rather than a single established disease process. CNS tuberculosis generally results from the hematogenous dissemination of M. tuberculosis, with the formation of small parenchymal or meningeal foci that may enlarge into tuberculomas [8]. Bacteriologically confirmed pulmonary tuberculosis provides biological plausibility for, but not proof of, an intracranial tuberculoma.

The identification of metastatic carcinoma in a lymph node substantially increased the probability that the intracranial lesions were metastatic. Brain metastases typically occur at the gray–white matter junction, are frequently multiple, demonstrate nodular or ring enhancement, and produce disproportionate vasogenic edema. However, ring-enhancing lesions have a broad differential diagnosis, and no single conventional imaging feature is sufficiently specific in every patient [5]. Contemporary guidelines therefore emphasize MRI and histopathological confirmation when the diagnosis is uncertain and the result would change management [1]. Conversely, a positive sputum examination increased the plausibility of intracranial tuberculosis. Importantly, a normal or non-suggestive chest radiograph does not negate a positive bacteriological result; the World Health Organization prioritizes validated bacteriological and molecular testing over chest radiography alone for the diagnosis of pulmonary tuberculosis [9]. Nevertheless, pulmonary tuberculosis does not automatically establish CNS involvement, and guidelines recommend seeking direct tissue or microbiological evidence from neural or accessible extraneural sites whenever feasible [10]. Brain lesions therefore require independent diagnostic assessment.

Intracranial tuberculomas have heterogeneous MRI appearances. Non-caseating lesions are commonly T2 hyperintense with homogeneous enhancement, whereas solid caseating granulomas may be T2 hypointense with ring or nodular enhancement; lesions with central liquefaction may become T2 hyperintense and demonstrate restricted diffusion. Magnetic resonance spectroscopy may reveal a prominent lipid peak, and susceptibility-weighted imaging may show a complete or incomplete hypointense rim. Large imaging series and contemporary reviews confirm that lesion number, location, signal intensity, enhancement pattern, edema, calcification, and mass effect are highly variable [11,12]. These advanced features may increase diagnostic confidence but cannot consistently distinguish tuberculoma from metastasis [5]. In the present case, intracranial lesions were visualized only incidentally on a neck MRI protocol without dedicated brain sequences such as diffusion-weighted imaging, spectroscopy, or susceptibility-weighted imaging, which further limited radiological discrimination. This case also highlights the distinction between metastatic carcinoma with an unidentified primary site and formally established cancer of unknown primary. The latter requires histopathological confirmation of malignancy and a systematic diagnostic evaluation, including immunohistochemistry and cross-sectional imaging, that fails to identify the primary site [2]. Notably, neck MRI in this patient demonstrated a soft-tissue mass at the posterior aspect of the left vocal cord infiltrating the left pyriform fossa, ipsilateral to the dominant cervical and supraclavicular lymphadenopathy. Combined with a 20-year smoking history, this finding raises the possibility of a laryngeal or hypopharyngeal primary

carcinoma, which could have been evaluated by laryngoscopy and targeted biopsy. Accordingly, the term "metastatic carcinoma of unidentified primary" is used in this report rather than "cancer of unknown primary."

The most definitive approach would be a stereotactic biopsy or surgical sampling of an intracranial lesion, provided that the diagnostic benefit outweighs the procedural risk. Published reviews and CNS tuberculosis guidelines support obtaining histopathological and mycobacterial confirmation whenever possible, particularly when malignancy remains a competing diagnosis [8]. Other useful steps would have included immunohistochemical characterization of the lymph node specimen, contrast-enhanced CT of the chest, abdomen, and pelvis, endoscopic evaluation of the upper aerodigestive tract, cerebrospinal fluid analysis, drug-susceptibility testing, and dedicated brain MRI with advanced sequences. When tissue sampling is not feasible, serial imaging after appropriately selected treatment may provide supportive evidence, although therapeutic response may be confounded by corticosteroid effects and the natural history of both diseases. In this patient, early neurological improvement occurred with combined dexamethasone and antituberculosis therapy; therefore, it could not be confidently attributed to either diagnosis.

The educational value of this report lies in the coexistence of histologically proven metastatic carcinoma and sputum-positive pulmonary tuberculosis, discordant neuroimaging interpretations, and the risk of premature diagnostic closure. Its main limitation is the absence of histological or microbiological confirmation of intracranial lesions. Additional limitations include an incomplete primary-tumor workup, lack of dedicated and serial brain MRI, absence of cerebrospinal fluid analysis, and short follow-up. Accordingly, intracranial lesions are not described in this report as proven tuberculomas or metastases.

CONCLUSION

Intracranial tuberculoma and brain metastasis have overlapping neuroimaging appearances. In this case, lymph node histopathology showed metastatic carcinoma, while sputum was positive for pulmonary tuberculosis, supporting competing etiologies for lesions. The sputum result increased tuberculoma probability but did not confirm CNS tuberculosis, just as extracranial carcinoma did not prove brain metastasis. Investigations, multidisciplinary interpretation, and tissue or microbiological confirmation should be pursued whenever feasible. The final diagnosis remains unresolved.

DECLARATIONS

None

CONSENT FOR PUBLICATION

The Authors agree to be published in the Journal of Society Medicine.

FUNDING

None

COMPETING INTERESTS

The authors declare no conflicts of interest in this case report.

AUTHORS' CONTRIBUTIONS

A.N.Z.N. was responsible for the clinical management of the patient, conceptualization of the case report, acquisition and interpretation of clinical, laboratory, and imaging data, literature review, and drafting and critical revision of the manuscript. The author has read and approved the final version of the manuscript and agrees to be accountable for all aspects of the work presented.

ACKNOWLEDGMENTS

The author gratefully acknowledges the patient's family for their consent to share this case for educational purposes. The author also thanks the Departments of Neurology, Radiology, Anatomical Pathology, and

Pulmonology, as well as the nursing staff of Grand Medistra Hospital, Lubuk Pakam, for their support in the diagnostic evaluation and care of the patient.

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