JURNAL KEDOKTERAN DIPONEGORO
(*DIPONEGORO MEDICAL JOURNAL*)
Online : http://ejournal3.undip.ac.id/index.php/medico
E-ISSN : 2540-8844
DOI : 10.14710/dmj.v15i6.54353
JKD (DMJ), Volume 15, Number 6, November 2026 : 614-620

ANCIENT SCHWANNOMA OF THE RIGHT AXILLARY REGION MIMICKING BREAST MALIGNANCY: A RARE CASE REPORT

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Keywords:
Ancient schwannoma,
Axillary mass,
Breast tumor,
Peripheral nerve sheath tumor

Received: 21 November 2025
Revised: 30 December 2025
Accepted: 31 December 2025
Available online: 01 November 2026

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ABSTRACT

Background: Ancient schwannoma is a rare benign peripheral nerve sheath tumor characterized by degenerative changes, most commonly found in the head, neck, or extremities. Axillary localization, particularly extending to the mammary tail, is extremely rare and may clinically and radiologically mimic breast malignancy due to features commonly associated with malignancy such as an immobile, painless mass with progressive growth and indistinct borders. **Case Presentation:** A 37-year-old woman presented with a progressively enlarging, firm, immobile right axillary mass accompanied by intermittent paresthesia of the right forearm. Imaging revealed a heterogenous solid mass categorized as BI-RADS IV, raising suspicion for malignancy. Surgical excision was performed, and histopathological examination demonstrated characteristic features of ancient schwannoma, including Antoni A and Antoni B areas with cystic and hemorrhagic degeneration. No malignant transformation was identified. **Conclusion:** Ancient schwannoma in the axillary region is exceedingly rare and may clinically simulate breast carcinoma. High suspicion and histopathological confirmation are critical to avoid overtreatment. Complete surgical excision remains the definitive treatment with favorable prognosis. Thorough clinical examination, appropriate imaging, and histopathological confirmation must be prioritized to avoid misdiagnosis, especially in cases mimicking malignancy.

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BACKGROUND

Schwannomas are benign neoplasms originating from Schwann cells of peripheral nerves[1]. They account for approximately 4.4% of all benign soft tissue tumors[2]. Ancient schwannoma is a rare subtype of schwannoma, first described by Ackerman and Taylor in 1951, and represents less than 1% of all cases. This variant is characterized by its long-standing, slow-growing nature and by degenerative histopathological changes, including cystic degeneration, hemorrhage, calcification, hyalinization, and a relative reduction of Antoni A areas with an increase in hypocellular regions[1,3,4]. The most common sites of occurrence are the flexor surfaces of the extremities, neck, posterior mediastinum, retroperitoneum, posterior spinal roots, and the cerebellopontine angle. Its presence in the axillary region or breast is extremely rare[4–6].

Due to anatomical proximity to breast tissue, schwannomas located in the axillary tail of Spence may clinically and radiologically mimic breast carcinoma[7]. Given their low incidence and overlapping imaging features, accurate diagnosis is often delayed and usually established only after histopathological evaluation.

Herein, we present a rare case of ancient schwannoma in the right axilla with extension to the mammary tail, highlighting the diagnostic challenge it poses and the importance of comprehensive diagnostic methods to avoid misdiagnosis and overtreatment.

CASE PRESENTATION

A 37-year-old female, presented with a progressively enlarging right axillary mass over three months. She reported intermittent tingling sensations localized to the ventral aspect of the right forearm, which were likely due to compression of adjacent

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neural branches, such as the medial cutaneous nerve of the forearm, by the mass. The patient had no significant past medical history of malignancy. Vital signs were within normal limits. On examination, she was noted to be obese (BMI 33, weight 90 kg).

On physical examination, a firm, immobile, non-tender mass was palpable in the right axillary region extending to the tail of the breast (superolateral quadrant), measuring approximately 9 cm in diameter. The overlying skin was normal in color and texture. No regional lymphadenopathy was noted.

Based on the clinical presentation, the differential diagnoses included: (1) tumor of the mammary tail in the right axilla with suspicion of malignancy (T3N0Mx) and (2) soft tissue of the right axilla with suspicion of deep lipoma, with liposarcoma as the main differential consideration.

Ultrasound of the right breast revealed a solid mass with partially circumscribed margins, heterogenous echotexture, and internal vascularization, measuring 6.4 × 7.2 × 7.7 cm (Fig. 1). These sonographic features were considered suspicious, leading to classification of the lesion as BI-RADS IV, which denotes a suspicious abnormality with a significant likelihood of malignancy and for which histopathological confirmation is recommended. No abnormalities were identified in the contralateral breast or axilla. Chest X-ray showed no pulmonary lesions or bone metastases; cardiothoracic ratio was mildly increased (54%) (Fig. 2).

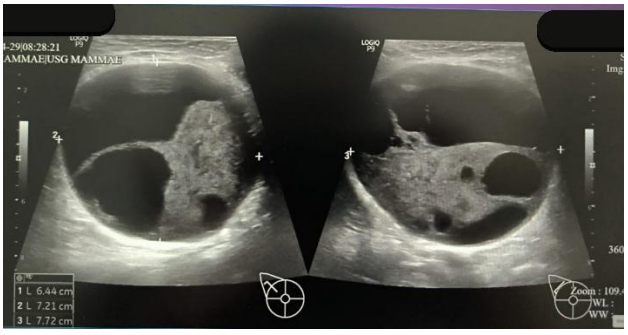


Figure 1. USG Mammae showed a solid mass with partially circumscribed margins, and heterogenous echotexture, measuring 6.4 × 7.2 × 7.7 cm

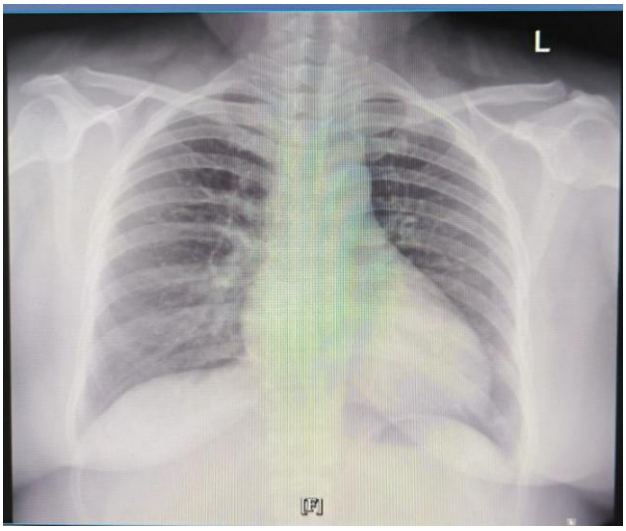


Figure 2. Chest X-ray showed no pulmonary lesions or bone metastases; cardiothoracic ratio mildly increased (54%)

Surgical excision of the mass was performed through an incision over the lesion in the axillary region extending to the superolateral quadrant of the breast, measuring approximately 7 cm in length. The incision was deepened layer by layer through the cutis and subcutis, with cranio-caudal flap elevation until reaching the superficial axillary fascia. A large mass, estimated at 9 cm in size, whitish in color and firm with some cystic areas on palpation, was identified. Careful dissection was carried out along the cranial, caudal, and deep aspects of the mass, with preservation of adjacent nerves and vessels. Complete excision of the mass achieved with ligation of feeding and draining vasculature, followed by hemostasis, irrigation, and layered closure.

Gross examination revealed a well-encapsulated, lobulated mass measuring 7.5 × 5.5 × 3 cm, with a white-tan appearance and cystic, hemorrhagic areas (Fig. 3). Histopathological analysis demonstrated a biphasic pattern with hypercellular Antoni A areas showing nuclear palisading and anuclear zone (Verocay bodies), and hypocellular Antoni B areas with myxoid degeneration (Fig. 4). Cystic degeneration and hemorrhagic spaces were present (Fig. 5). No mitotic figures or nuclear atypia were identified. Immunohistochemistry (IHC) examination was not performed. The final diagnosis was ancient schwannoma.

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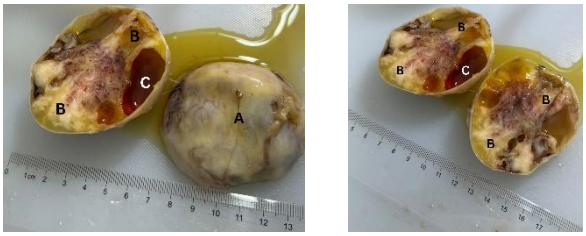
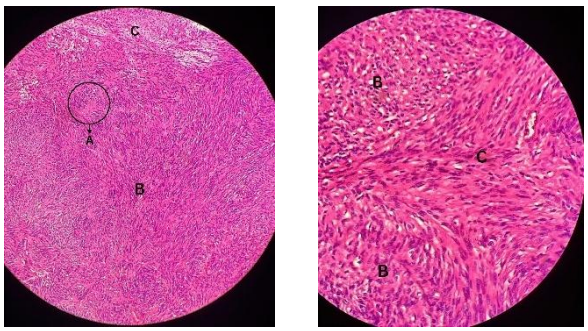
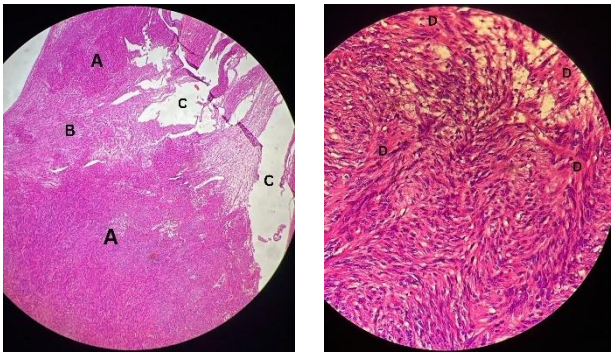


Figure 3. Macroscopic mass
A: Capsule, B: Whitish cystic degeneration, C: Hemorrhagic areas



(a) (b)

Figure 4. Histopathological features showing a biphasic pattern: (a) 100x and (b) 400x
A: Verocay body, B: Antoni A areas, C: Antoni B areas



(a) (b)

Figure 5. Histopathological pictures showing cystic degeneration & hemorrhagic s
paces: (a) 40x and (b) 400x
A: Antoni A areas, B: Antoni B areas, C: Cystic degeneration, D: Hemorrhagic spaces

The patient underwent complete surgical excision of the mass. The first postoperative follow-up, conducted one month after surgery, showed a well-healed surgical site without a palpable mass, pain, or neurological symptoms. The second follow-up, conducted three months after the first evaluation, revealed no signs of recurrence, indicating a favorable short-term outcome. The patient was counseled to return promptly if any signs of recurrence appear, such as local pain, a new mass, numbness or tingling, weakness, or other neurological changes, for further assessment and management.

DISCUSSION

Schwannomas are benign peripheral nerve sheath tumors arising from Schwann cells and are classified as a single tumor entity with several recognized histopathological variants, including conventional, ancient, cellular, plexiform, epithelioid, melanotic, microcystic/reticular, and hybrid forms. These variants differ primarily in their architectural patterns, cellularity, and associated degenerative or phenotypic features, while retaining the fundamental biological behavior of schwannoma[8].

Among these, ancient schwannoma, first described by Ackerman and Taylor in 1951, represents a rare subtype of schwannoma, accounting for approximately 0.8% of all soft tissue tumors[4]. Schwannomas in general are benign tumors of peripheral nerve sheath, and several histological subtypes have been described, including conventional (classic), cellular, plexiform, epithelioid, and ancient variants, among others[9,10]. Ancient schwannoma is characterized by its long-standing, slow-growing nature and by prominent degenerative histopathological changes, including cystic degeneration, hemorrhage, calcification, hyalinization, and nuclear atypia, accompanied by a relative reduction of Antoni A areas with an increase in hypocellular regions. These features differentiate it from other schwannoma subtypes, which usually lack such marked degenerative changes. Despite these atypical features, ancient schwannomas remain benign and slow-growing, with exceptionally low malignancy transformation and rare recurrence following surgical excision[11]. Ancient schwannomas most commonly arise in deep soft tissue, particularly in the retroperitoneum, head, and neck regions, and these degenerative features may pose diagnostic challenges by mimicking malignant peripheral nerve sheath tumors or other soft tissue malignancies[1,3,4,12].

Clinically, the mass appeared suspicious for malignancy, given its painless nature, fixation, progressive enlargement, and ill-defined margins. However, histopathological findings demonstrated the benign character of ancient schwannoma, with Antoni A and B regions and cystic degeneration, without any

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evidence of malignant transformation[1,3,4]. The ultrasound BI-RADS IV category indicates a suspicious abnormality with an intermediate risk of malignancy, but it does not allow reliable distinction between benign and malignant lesions[13]. Radiologic findings alone, such as vascular patterns detected on Color Doppler or AngioPLUS, are insufficient for definitive characterization, since both benign and malignant lesions may exhibit overlapping vascular features[14]. Moreover, vascular imaging cannot adequately define important characteristics such as microvascular architecture (including micro vessel density, vessel orientation, or arteriovenous shunts), internal structural heterogeneity (such as fibrosis, necrosis, or desmoplasia), or tissue stiffness[15,16]. Even when combined with additional techniques such as Shear-Wave Elastography (SWE), which provides quantitative assessment of stiffness, these methods only improve specificity but remain limited, as some benign lesions can appear stiff and some malignant ones relatively soft[17–19]. Similarly, Contrast-Enhanced Ultrasound (CEUS) can improve assessment of perfusion patterns but still lacks sufficient accuracy for definitive diagnosis[19,20]. Therefore, biopsy remains essential in BI-RADS IV lesions to establish whether the mass is malignant or benign[13,19].

Interestingly, although the patient reported a 3-month duration, the extensive degenerative features seen histologically suggest the mass may have been present for a longer period but became symptomatic or noticeable only recently due to accelerated growth. This aligns with the understanding that ancient schwannoma is often a long-standing lesion that becomes symptomatic as it expands or compresses adjacent structures[1].

Histologically, they retain the features of a conventional schwannoma but at the same time they also demonstrate some characteristic degenerative alterations, such as relative loss of Antoni type A areas, cystic degeneration or necrosis, hemorrhage, calcification, perivascular hyalinization, and diffuse stromal hyalinization[12,21]. Nuclear atypia of benign degenerative type tumors is also a hallmark feature of ancient schwannoma, with tumor cells displaying enlarged, hyperchromatic, and multilobulated nuclei that may mimic sarcomatous pleomorphism[21]. Importantly, despite the alarming atypia, mitotic figures are typically absent, and this discordance serves as a crucial diagnostic clue to their benign nature[12]. Additionally, strong and diffuse S-100 protein expression is a hallmark finding in schwannomas; however, in this case immunohistochemistry was not performed as the final histopathological features were sufficient to establish a benign diagnosis despite initial degenerative changes mimicking malignancy[1]. Nonetheless, these atypical histologic features often create diagnostic challenges, as ancient schwannomas may be misinterpreted as malignant neoplasms, particularly soft tissue sarcomas[21]. In this case, the tumor is presented as a large axillary mass with neurologic symptoms (paresthesia), raising suspicion for breast carcinoma or metastatic lymphadenopathy.

Beyond the clinical and histopathological findings, recent research has increasingly emphasized the genetic and molecular background of schwannoma pathogenesis. In particular, inactivating mutations of the NF2 gene and consequent loss of merlin function have been identified as major drivers in sporadic and NF2-related schwannomas, leading to dysregulation of the Hippo/YAP, PI3K/AKT, and Ras/Raf/MEK/ERK pathways, which promote schwann cell proliferation and tumorigenesis. Emerging evidence also suggests that genetic polymorphisms and inter-tumoral heterogeneity may influence clinical behavior, radiological appearance, and even the degree of degenerative changes seen in ancient variants[22–24]. Although molecular profiling was not performed in this case, integrating such approaches in future studies could expand our understanding of schwannoma biology and refine diagnostic accuracy, especially in tumors that closely mimic malignancy.

The mainstay management of ancient schwannoma is complete surgical excision with an emphasis on preserving neurological integrity and reducing postoperative morbidity. This can be accomplished through conventional open surgery or minimally invasive laparoscopic techniques, both of which generally yield good outcomes[1].

This case underlines the importance of accurate and thorough patient history, physical examination, and imaging interpretation, combined with histopathological confirmation. Failure to properly diagnose such benign tumors may result in unnecessary aggressive treatment such as mastectomy

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or axillary clearance, with potentially significant physical and psychological consequences.

CONCLUSION

Ancient schwannoma is an uncommon benign peripheral nerve sheath tumor, and its occurrence in the axillary region extending to the mammary tail is exceedingly rare. Clinically and radiologically, it may mimic breast carcinoma, making histopathological confirmation essential to avoid misdiagnosis and unnecessary radical treatment.

Complete surgical excision remains the treatment of choice, with excellent outcomes and preservation of neurological function. Histopathological examination plays a crucial role, particularly in ancient schwannoma, to confirm the benign nature of the tumor and prevent unnecessary aggressive treatment. Clinicians should always include schwannoma in the differential diagnosis of axillary masses that resemble breast malignancy to ensure accurate management.

RECOMMENDATION

Given the rarity and diagnostic challenge of ancient schwannoma, especially in the axillary region where it may mimic breast carcinoma, we recommend that clinicians maintain a high index of suspicion for peripheral nerve sheath tumors when evaluating axillary masses with atypical features. Preoperative biopsy and thorough histopathological assessment should be prioritized before considering radical surgery or systemic therapy, in order to prevent overtreatment and unnecessary morbidity.

In addition, future investigations integrating omics approaches such as genomic sequencing, transcriptomics, and spatial or single-cell analyses may provide a deeper understanding of the molecular heterogeneity underlying ancient schwannomas. Such integrative studies could help identify potential biomarkers for earlier diagnosis, clarify why certain cases present with extensive degenerative changes mimicking malignancy, and even open avenues for targeted therapeutic strategies in selected patients.

ETHICAL APPROVAL

No ethical committee approval was required for this case report as it did not involve experimental interventions. The patient provided written informed consent for the use of clinical information and images for publication, which was signed by both the patient and the medical practitioner with full understanding of the terms and implications.

CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.

FUNDING

There is no specific funding provided for this article.

AUTHOR CONTRIBUTIONS

Conceptualization, Leonardo Cahyo Nugroho and Ebenezer Devara Yeckopradana; methodology, Loury Priskila; validation, Leonardo Cahyo Nugroho and Lini Sunaryo; investigation, Leonardo Cahyo Nugroho and Lini Sunaryo; resources, Leonardo Cahyo Nugroho and Lini Sunaryo; data curation, Leonardo Cahyo Nugroho; writing—original draft preparation, Ebenezer Devara Yeckopradana; writing—review and editing, Loury Priskila; supervision, Leonardo Cahyo Nugroho; project administration, Leonardo Cahyo Nugroho, Loury Priskila, and Ebenezer Devara Yeckopradana.

ACKNOWLEDGMENTS

This work was supported by Faculty of Medicine, Universitas Kristen Duta Wacana, Yogyakarta.

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