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CASE REPORT

Solid Variant of Aneurysmal Bone Cyst (SVABC) of the Left Fibula Bone: A Rare Case Report

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Introduction: Solid variant of aneurysmal bone cyst (SVABC) is a rare subtype of aneurysmal bone cyst (ABC) that presents as a solid, densely sclerotic lesion that can be more difficult to distinguish from other bone tumors and can lead to a wrong diagnosis. The SVABC rarely occurs in the long bones of the lower extremities.

Case Presentation: In this report, we present a rare case of SVABC in a 25-year-old male patient, which was seen in the left fibula bone. The patient had a history of trauma for 7 years. A physical examination showed a non-tender swelling in his left fibula bone. A preoperative frontal radiograph showed a huge expansile lytic lesion with trabeculations in the proximal 2/3 of the left fibula. Magnetic Resonance Imaging (MRI) showed fibula with multiple cystic areas in the lesion, some containing fluid–fluid levels. Excision of the mass was performed. Histopathological examination of the surgical specimen of the left fibula mass confirmed that the lesion was SVABC and showed largely solid proliferation of mildly pleomorphic oval to spindle cells with giant cells. A postoperative frontal radiograph of the leg demonstrated proximal 2/3 of the left fibulectomy with no lesion recurrence.

Conclusion: SVABC of the left fibula bone is a rare condition often misdiagnosed due to overlapping features with other aggressive bone lesions. Accurate diagnosis necessitates a multidisciplinary approach integrating clinical, imaging, and histopathology, with early surgical intervention being the gold standard for favorable outcomes. Surgeons must be cautious of postoperative complications like bleeding and neurological deficits, emphasizing the role of histopathology in preventing unnecessary surgeries. Future studies should focus on long-term follow-up and comparative treatment efficacy studies to enhance understanding and management of SVABC.

Keywords: SVABC, bone, osteoclastic giant cells, radiology, excision

Introduction

SVABC is a rare tumor that typically affects young people and has aggressive features that can result in misdiagnosis.[1] SVABC is a rare subgroup of the aneurysmal bone cysts (ABCs) that accounts for 3.4% to 7.5% of all ABCs.[2] The SVABC was first described by Sanerkin et al and is characterized by variable solid materials.[3] This solid predominant histological feature on histological analysis is an important finding that sets SVABC apart from the more common ABC, which is usually recognized by blood-filled cavities with septations and a blow-out appearance on the radiography.[4]

SVABC is rarely found in long bones and typically affects the axial skeleton and the short bones of the hands and feet.[5] Due to the clinical and histologic similarities between SVABC and other bone lesions, a misdiagnosis could result.[3] An accurate diagnosis of SVABC is reached through a combination of comprehensive clinical, radiological, and pathological findings.[6] The patient typically exhibits swelling and pain in the affected site. Radiologically, the lesions are generally well defined, expansile, and osteolytic. SVABC manifests pathologically as blood-filled masses that contain spindle cells, several multi-nucleated giant cells, and a large number of red blood cells.[7] The differential diagnosis of SVABC includes Langerhans cell histiocytosis, Ewing sarcoma, osteosarcoma, telangiectatic osteosarcoma, and giant cell tumor.[1,8] Langerhans cell histiocytosis is an uncommon condition marked by accumulated Langerhans cells in organs.

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Affected organs include the bones, skin, pituitary gland, liver, bone marrow, spleen, lymph nodes, lungs, and central nervous system.[9] Ewing Sarcoma is a malignant bone tumor that originates from primitive neural tissue and primarily affects adolescents and young adults.[10] Osteosarcoma is a type of bone cancer that affects children and young adults originating from osteoblasts.[11] Telangiectatic osteosarcoma is an uncommon subtype of osteosarcoma. The typical locations for this tumor are the rapidly growing long tubular bones, with the femur being the most commonly affected, followed by the tibia and humerus.[12] A giant cell tumor is a benign neoplasm that exhibits local aggressiveness marked by multi-nucleated giant cells resembling osteoclasts. This tumor typically occurs in the epiphyseal region of long bones.[13] The treatment of SVABC is highly controversial, and therefore the treatment for SVABC involves several treatment options such as curettage with or without bone grafting, total excision, radiation, and intralesional injections of calcitonin and steroids.[14] Curettage refers to the tumor's piecemeal excision where the process is intralesional.[15] Early diagnosis and appropriate surgery are critical to the effective treatment of SVABC.[14] Although treatment often involves surgical intervention, the prognosis is generally favorable with appropriate management. SVABC has a very good prognosis; however, some patients may require additional treatments due to the recurrence of the condition, which is the most common consideration that must be addressed during the management of SVABC.[6] This case involved a challenging diagnosis due to its rarity in long bones and its radiological resemblance to malignant tumors like osteosarcoma. Imaging suggested aggressive pathology, complicating preoperative diagnosis. Definitive diagnosis requires thorough histopathological evaluation to distinguish SVABC from telangiectatic osteosarcoma. Surgical excision of the lesion involved the proximal two-thirds of the fibula while carefully avoiding neurovascular structures. However, postoperatively, the patient encountered a foot drop due to nerve involvement, highlighting surgical risks. After a six-month follow-up, imaging confirmed no residual or recurrent disease, indicating total excision is an effective treatment approach. This study is clinically significant as it emphasizes the importance of multidisciplinary evaluation in diagnosing and treating rare bone lesions, such as SVABC in long bones. Here, we report a rare case of SVABC in the left fibula treated with excision of the proximal 2/3 of the left fibula.

Case Presentation

A 25-year-old male camel keeper patient from a rural area came to Dr. Sumait hospital in Mogadishu, Somalia, in March 2024 with a history of left lateral leg swelling, which had extended the upper and lower end of the leg for almost 7 years with a history of trauma. The swelling was increasing in size gradually and was not associated with pain. There was no history of chronic diseases, smoking, or weight loss.

On physical examination, the patient looked well with normal vital parameters. Systemic examination of the patient was normal. The skin over the swelling was intact with no tenderness and measured 24×10 cm. There was no restriction on the movement of the joints. Neurovascular examination was normal. No regional lymphadenopathy was seen. On X-ray, a huge expansile lytic lesion with trabeculations in the proximal 2/3 of the left fibula was seen (Figure 1). On Magnetic Resonance Imaging (MRI), coronal and axial T2 Fat Saturated (T2 FS MRI) showed the lesion expanding the proximal left fibula with multiple cystic areas in the lesion, some containing fluid–fluid levels (Figures 2 and 3). Imaging features were primarily thought to be telangiectatic osteosarcoma. Giant cell tumors, or ABCs, were considered a differential diagnosis. A long lateral incision of the left leg was made, and an excision of the proximal 2/3 of the left fibula was performed. An excisional biopsy was sent. In the postoperative period, the patient developed bleeding on the excision site, managed conservatively; also, the patient presented postoperatively with a foot drop. The patient was on regular follow-up for six months with no recurrence of the lesion. The postoperative frontal radiograph of the leg demonstrated proximal 2/3 of the left fibulectomy (Figure 4). Macroscopically, the excisional biopsy showed a gray-white solid mass involving the bone with extensive destruction and extending to the soft tissue. There were areas of cystic change and hemorrhage. It was peripherally shelled with thin bony tissue and 1.5 cm from the free bone margin (Figure 5). Microscopically, the excisional biopsy showed largely solid proliferation of mildly pleomorphic oval to spindle cells in fascicles and sheets interspersed with nonuniformly distributed osteoclast-type giant cells and osteoid matrix lined by bland plump osteoblasts and centrally calcified basophilic material with areas of cystic spaces filled with blood and surrounded by multi-nucleated giant cells. Typical mitotic figures were noted. Extension into the soft tissue

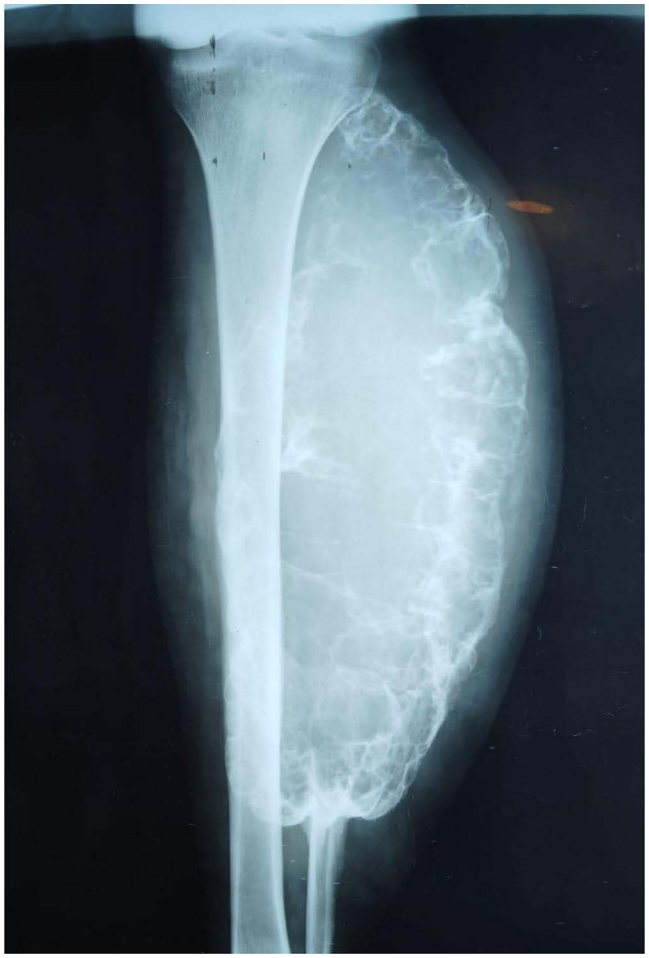

Figure 1 Preoperative frontal radiograph shows a huge expansile lytic lesion with trabeculations in the proximal 2/3 of the left fibula.

and skeletal muscle was noted. No significant atypia, no atypical mitosis, and no necrosis were evident. The peripheral margins were negative (Figure 6). A diagnosis of SVABC was made.

Discussion

SVABC is extremely rare and commonly misdiagnosed.[3] SVABC generally arises from short bones and rarely affects long bones.[5] In the long bones, the most common sites of SVABC are the long bones of the lower extremities.[4] The lower extremities are more susceptible to SVABC, with the femur and tibia being the most often affected regions.[16] In our patient, SVABC was found in the fibula of the left lower extremity of the left leg.

SVABC is extremely difficult to diagnose since its radiological characteristics resemble malignant bone lesions, particularly osteosarcomas. Therefore, the correct diagnosis of SVABC is essential.[1] Radiographically, SVABC typically appears lytic and expansile.[16] In our case, the preoperative frontal radiograph showed a huge expansile lytic lesion with trabeculations in the proximal 2/3 of the fibula (Figure 1). On computed tomography (CT) and MRI, radiographic features significantly demonstrate SVABC.[14] A clear illustration of the extent of the lesion can be achieved with MRI due to its superior contrast resolution. Upon MRI, SVABC appears primarily solid but has fluid–fluid levels in the cystic areas.[16] This is similar to our case, where the coronal and axial T2 FS MR of the patient shows the lesion expanding the proximal fibula with multiple cystic areas in the lesion, some containing fluid–fluid levels (Figures 2 and 3).

Since the appearance of SVABC resembles that of many other bone lesions, a biopsy is an absolute requirement for confirming the diagnosis.[14] Pathologically, SVABC appears as blood-filled masses with plenty of red blood cells, spindle cells, and dispersed multi-nucleated giant cells.[7] In this case, a macroscopic examination of the biopsy showed a solid

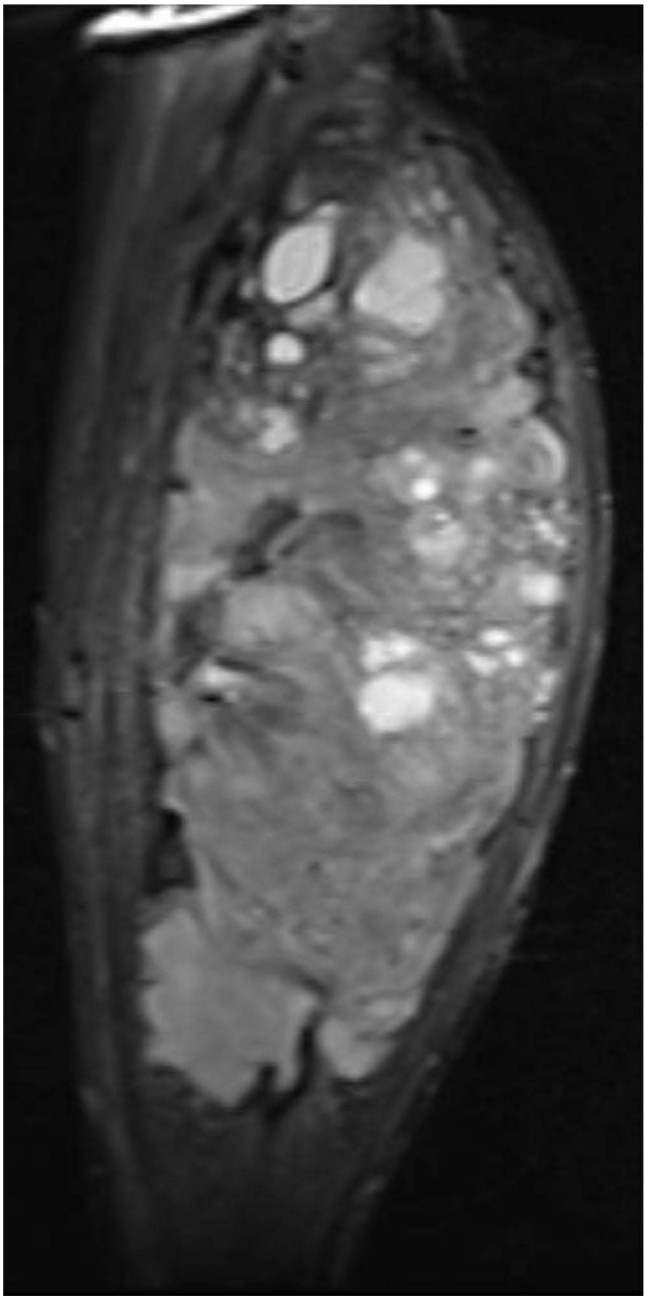

Figure 2 Coronal T2 FS MRI shows the lesion expanding the proximal left fibula with multiple cystic areas in the lesion, some containing fluid-fluid levels.

mass involving the fibula bone with extensive destruction and extending to the soft tissue. There were areas of cystic change and hemorrhage (Figure 5). On microscopic examination, a solid proliferation of mildly pleomorphic oval to spindle cells with osteoclast-type giant cells was seen. There were cystic spaces filled with blood and surrounded by multi-nucleated giant cells (Figure 6). These histopathological features of the lesion are consistent with a previous SVABC case report in which histological sections showed fibrocollagenous tissue with spindle cells and multi-nucleated osteoclast-type giant cells.[6]

Surgical intervention continues to be the cornerstone of contemporary treatment.[7] In SVABC, treatment with surgical excision has a good response, as demonstrated by postoperative radiograph evaluation.[16] Following excision, most patients do not experience a local recurrence.[5] However, as with other orthopedic surgical procedures, complications such as severe bleeding may occur after excision.[7] In our case, the patient developed bleeding on the excision site, managed conservatively,

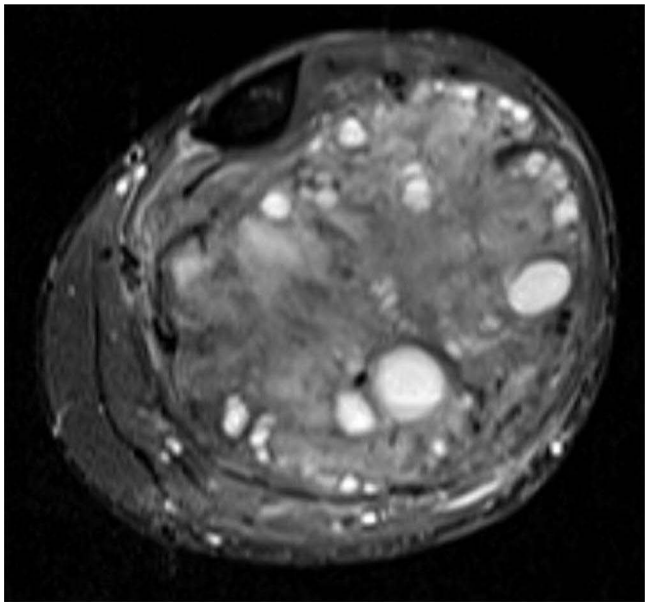

Figure 3 Axial T2 FS MRI shows the lesion expanding the proximal left fibula with multiple cystic areas in the lesion, some containing fluid-fluid levels.

and improved; also, the patient presented postoperatively with a foot drop due to an excision of the proximal 2/3 of the left fibula. After treatment with excision, the patient was on regular follow-up for six months and assessed radiographically. The postoperative frontal radiograph of the left leg demonstrated proximal 2/3 fibulectomy with no evidence of residue or recurrent. Normal alignment of the proximal and distal tibiofibular joints was maintained. The visualized portions of the knee and ankle joints appeared normal. Normal bone density was demonstrated with no bone lesions. The fat planes were preserved, and peri-articular soft tissues were normal (Figure 4). In general, SVABC has been documented in various bones, but its occurrence in the fibula is exceedingly rare, making this case unique. Most previous reports described SVABC in the axial skeleton or the short bones of the hands and feet, while long bone involvement, particularly in the proximal fibula, remains poorly documented in the literature. Furthermore, the diagnostic complexity in this case was heightened due to the lesion's aggressive radiological appearance, mimicking malignancies such as telangiectatic osteosarcoma and giant cell tumors. Unlike many reported cases, where SVABC presents with pain, this patient had an asymptomatic swelling for seven years, further complicating early clinical suspicion. Another distinguishing feature is the postoperative complication of foot drop, which, while a known risk in fibular surgeries, has not been widely reported in SVABC cases. This highlights the importance of careful neurovascular assessment during surgical excision, particularly in weight-bearing bones. Despite the significance of this case, there are some limitations in our case. First, this is an isolated case, and the findings may not be generalizable to all SVABC patients, particularly in different anatomical locations. Future multi-center studies or case series would be valuable in establishing diagnostic and management patterns for SVABC in long bones. Second, our patient was followed up for six months with no recurrence, but long-term recurrence rates remain unknown. Given the risk of SVABC recurrence in some cases, further follow-up over several years may be necessary to assess treatment efficacy fully. Third, surgical excision was successful in this case, but other treatment modalities such as curettage, bone grafting, or sclerotherapy were not explored. Comparative studies on treatment strategies could help optimize management approaches, especially in resource-limited settings. This case has significant clinical significance, particularly in settings where advanced diagnostic tools may not be readily available. In such environments, reliance on X-ray and clinical examination alone could lead to misdiagnosis and overtreatment, such as unnecessary radical resections and referral pathways to specialized centers should be established to avoid misdiagnosing SVABC as a malignant tumor.

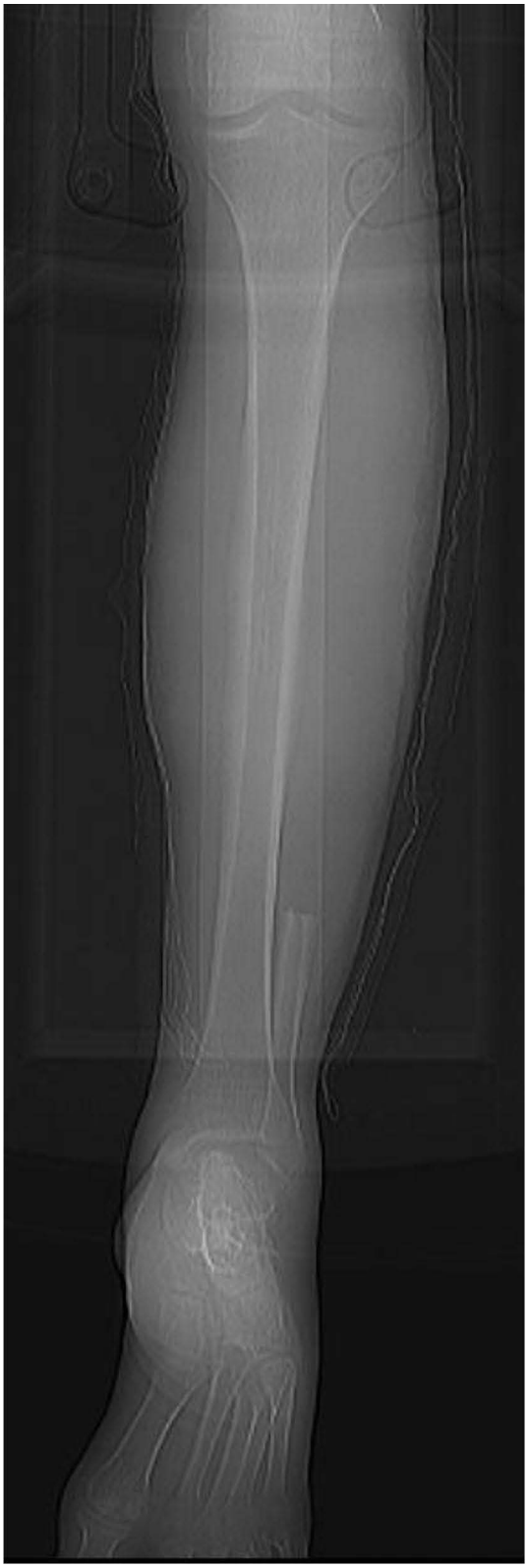

Figure 4 Postoperative frontal radiograph of the leg demonstrates proximal 2/3 of the left fibulectomy.

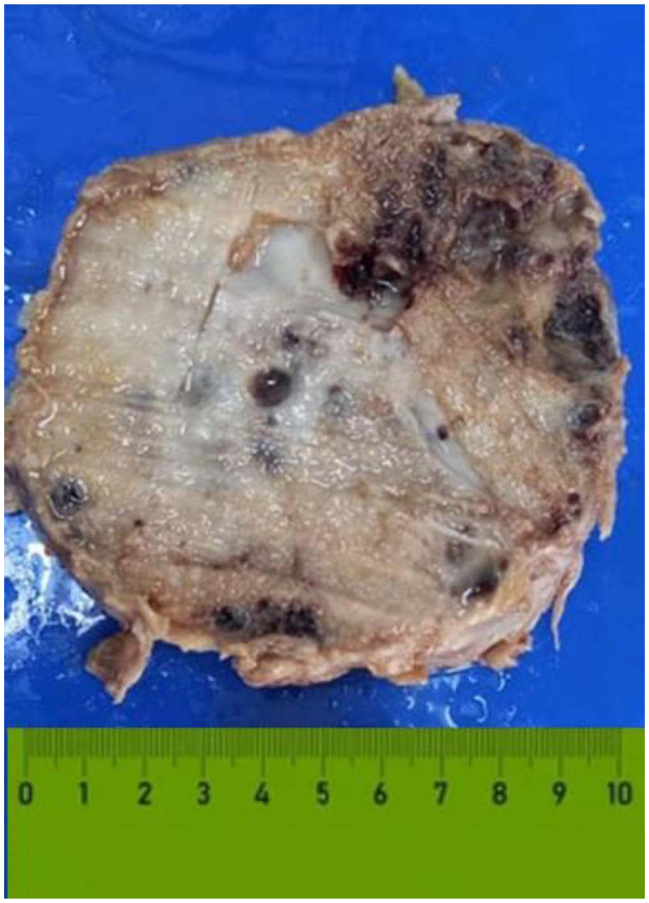

Figure 5 Grossly, the excisional biopsy shows a white solid mass involving the bone with extensive destruction and extending to the soft tissue. There are areas of cystic change and hemorrhage.

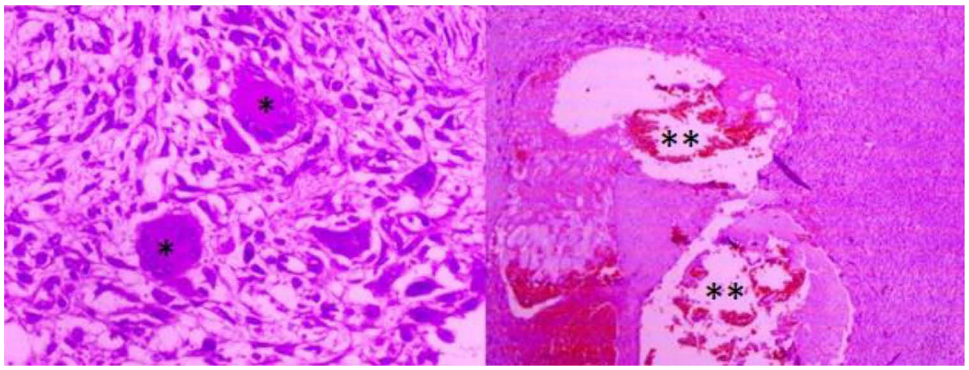

Figure 6 Microscopically, the excisional biopsy shows mostly solid proliferation of mildly pleomorphic oval to spindle cells in fascicles, osteoclast-type giant cells (*), and osteoid matrix lined by osteoblasts, and centrally calcified basophilic material with areas of cystic spaces filled with blood (**), surrounded by multi-nucleated giant cells. *: osteoclast-type giant cells; **: cystic spaces filled with blood. (x40).

Conclusion

SVABC is of great interest to clinicians since it is rare and can be mistaken for other malignant tumors. To minimize misdiagnosis and overtreatment, clinical, radiological, and histological findings should be used to make an accurate confirmational diagnosis of SVABC distinguishable from other malignant bone tumors. Surgical excision remains the gold standard for management, demonstrating excellent outcomes with a low recurrence risk when performed with careful neurovascular consideration. The findings from this case contribute to a broader understanding of SVABC,

particularly in long bones, which are rarely affected by this condition. By documenting its clinical presentation, radiological features, and postoperative outcomes, this study enhances awareness among orthopedic surgeons, radiologists, and pathologists, aiding in refining diagnostic protocols and management strategies. Future studies on long-term follow-up will be essential in determining the recurrence patterns and long-term outcomes of SVABC. While surgical excision was effective, comparative studies on minimally invasive treatments such as curettage, bone grafting, or sclerotherapy could provide less invasive yet effective management options.

Ethics Statement

An institution's ethics committee approval is not required for the case reports.

Informed Consent Statement

Written informed consent was obtained from the patient for the publication of this case report and any accompanying images. The patient was informed about the purpose of this publication and that his identity will be protected.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors declare no conflicts of interest in this work.

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