CASE REPORT

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Successful preoperative embolization of a giant residual axillary rhabdomyosarcoma in an adult who declined surgery: a rare case report

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ABSTRACT

Introduction: Rhabdomyosarcoma is a rare malignant tumor of mesenchymal origin, predominantly affecting children. Surgical excision remains the gold standard, but extensive vascularization poses a risk of intraoperative hemorrhage. This case highlights the role of preoperative transarterial embolization in patient with complex situation.

Case Presentation: We present a 47-year-old man with recurrent axillary rhabdomyosarcoma presented with a progressively enlarging mass. He had previously undergone tumor excision but deferred radiotherapy due to the COVID-19 pandemic. Imaging revealed a hypervascular 11×10×17 cm mass. Preoperative transarterial embolization successfully occluded the feeding artery, potentially reducing intraoperative bleeding and facilitating resection. However, the patient declined definitive surgical resection.

Conclusion: Adult-onset axillary rhabdomyosarcoma is rare, and treatment delays may contribute to recurrence. Transarterial embolization represents a valuable therapeutic option in the multidisciplinary management of adult rhabdomyosarcoma. Broader documentation of such cases is essential to further define its role in complex patients with soft tissue sarcomas.

Keywords: Case Report, Embolization, Preoperative, Rhabdomyosarcoma.
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INTRODUCTION

Rhabdomyosarcoma is a rare primitive mesenchymal malignant tumor originating from skeletal muscle. While rhabdomyosarcoma is the most prevalent soft tissue sarcoma in the pediatric population, it remains rare among adults, accounting for only 1% of all adult solid malignancies.[1,2] Incidence of rhabdomyosarcoma is highest in young adults under 20 and decreases along with age. However, patients older than 35 have an increased risk of mortality.[2] Adult rhabdomyosarcoma is associated with a lower survival rate compared to its pediatric counterpart. The underlying reason behind the poor prognosis remains unknown.[3]

Rhabdomyosarcoma may appear in all anatomical locations of the body, especially the urogenital tract, extremities, and orbita.[4] One of the probable reasons for poor prognosis in adult rhabdomyosarcoma is due to marked heterogeneity in anatomical localization.[5] Currently, the gold standard management for rhabdomyosarcoma is surgical excision.[6] Regardless of risk groups, surgical intervention is fundamental for rhabdomyosarcoma. Surgery may be performed preceding the chemotherapy and/or radiotherapy.[5] However, one of the major complications of this management is intraoperative bleeding due to the large vasculature and size of the tumor.[7]

Considering the anatomical location, surgery excision for rhabdomyosarcoma in axilla may be challenging. Surgery may damage the important neurovascular bundles nearby.[8] Increases vascularization may results in significant blood loss during the excision. Therefore, evaluation of tumor vascularization is necessary to maximize surgery while minimizing complications.[7]

Preoperative transarterial embolization has become a minimally invasive adjunct in the management of hypervascular musculoskeletal tumor. It is used to prevent intraoperative bleeding while doing the tumor excision.[7] Embolization may also block the feeding branch of the tumor artery specifically with the help of embolic agent. This may cause the decreased of tumor size due to ischemia.[9] In this case, we report the preoperative management using transarterial embolization to occlude the giant feeding arteries in a residual axillary rhabdomyosarcoma in an adult.

CASE PRESENTATION

A 47-year-old male came to the surgery clinic complaining of a lump in the left armpit. The patient had previously experienced a similar lump and had surgery in 2019. After surgery, the patient was advised for radiotherapy, but it was canceled due to the Corona Virus Disease (COVID-19) pandemic. Based on medical record data, the patient

was histopathologically diagnosed with rhabdomyosarcoma, a tumor very close to the base. Currently, the lump has reappeared and is larger than before. On examination, a large axillary region mass with humped, solid, and fixed characteristics was found as showed in (**Figure 1**). Other physical examinations were found to be within normal limits.

Laboratory examination showed that the patient was within normal limits, except for slightly low hemoglobin and hematocrit levels of 9.7 and 30.7. Radiological examination using Computed Tomography (CT)-Scan showed a solid mass with heterogeneous enhancement or elevation accompanied by a necrotic area in the central, well-circumscribed with macrolobulated edges with clear vascularity measuring 11x10x17cm in the left axilla showed in (**Figure 2**). The mass appeared attached to the axillary vein, and the left subclavian vein appeared dilated. There was no evidence of mediastinal displacement and chest wall invasion. There was also no adenopathy, pleural effusion, and lung involvement.

The patient was then planned for transarterial embolization to facilitate tumor removal as well as prevention of intraoperative blood loss. The procedure began with selective angiography using a 6 Fr Judkins Right catheter through the common femoral artery access. The left axillary artery as the large feeding artery of the unique tumor was embolized using an amplatzer embolization coil. The embolization process was successful. Angiogram showing systemic arterial supply from the left axillary artery and succesfully embolization using polyvinyl alcohol particles and coils showed in (**Figure 3**). On insertion of the amplatzer there was minimal controlled bleeding of 75 cc. The patient was planned to have four rounds of chemotherapy before being scheduled for surgery. Despite the technically successful embolization and surgical readiness, the patient ultimately declined definitive surgical resection.



Figure 1. Clinical photograph showing a mass in the left axillary region.

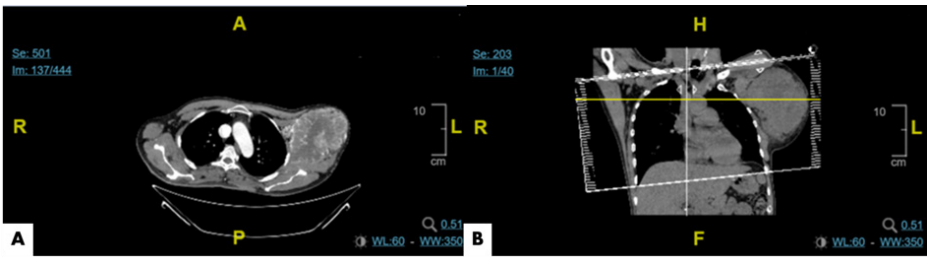


Figure 2. CT scan showing a large tumor with prominent vascularized central necrotic area A) axial view and B) coronal view.

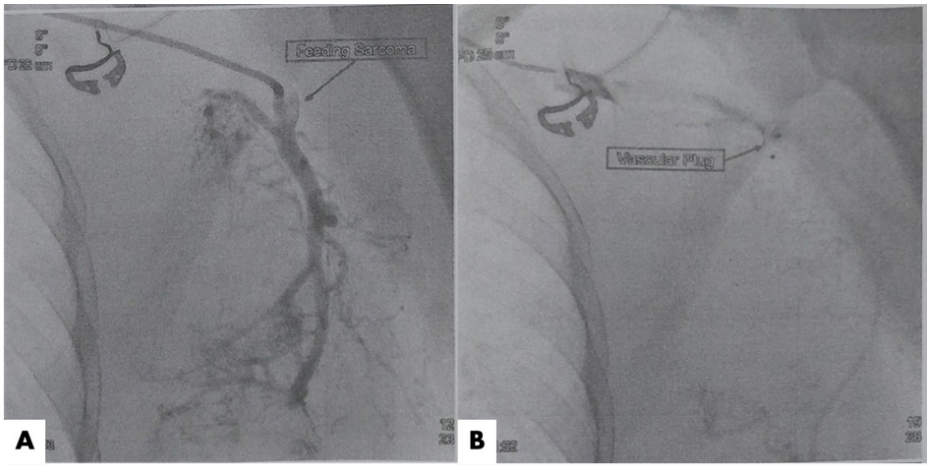


Figure 3. Preoperative embolization of a hypervascularized axillary tumor. A) Angiogram showing systemic arterial supply from the left axillary artery and B) Embolization using polyvinyl alcohol particles and coils successfully eliminated tumor vascularization.

DISCUSSION

Rhabdomyosarcoma (RMS) is a malignant tumor that originates from the mesenchyme of skeletal muscle cells. It is a common soft tissue sarcoma in children[2]. Although common, these tumors are also relatively rare, accounting for only about 3-4% of pediatric cancers.[2] The incidence is particularly high in young adults under the age of 20. As age increases, the incidence rate continuously decreases to a rate of 1% of tumor malignancies in adults.[2] Data from the United States show that 87% of patients with this malignancy are under the age of 15 years.[2] Rhabdomyosarcoma most commonly affects the urogenital tract (24%), extremities (19%), para meningeal (16%), head and neck (10%), orbital (9%), and others.[4] In general, most rhabdomyosarcoma skeletal tumors are malignant, while the benign form of skeletal tumor, rhabdomyoma, is very rare.[2]

At the time of history taking, patients usually have symptoms related to the effect of the mass on the structures around which the tumor develops, age, and the presence of metastases.[4] The head and neck region is generally swollen but painless, and the mass may enlarge. Pain is usually present when rhabdomyosarcoma

affects the extremities, which may be accompanied by erythema of the overlying skin. In the orbit, symptoms may include proptosis and diplopia, while in the urogenital and bladder, symptoms may include obstruction and hematuria.[6] The diagnosis of rhabdomyosarcoma also involves supporting examinations such as radiology and histology. Two radiologic examination techniques are often performed for rhabdomyosarcoma, which include computed tomography (CT) scan and magnetic resonance imaging (MRI). Imaging of all bones and adjacent joints, or even a full body scan and thoracic CT scan, may be considered to make the diagnosis more conclusive while also identifying metastases. Histopathologic examination can be performed as a gold standard diagnosis as well as to determine the type of rhabdomyosarcoma.[10] There are several variants of rhabdomyosarcoma based on histopathology, such as embryonal rhabdomyosarcoma (ERMS), alveolar rhabdomyosarcoma (ARMS), pleomorphic rhabdomyosarcoma (PRMS), and sclerosing/spindle cell rhabdomyosarcoma (SRMS).[10]

The final step in the diagnosis of rhabdomyosarcoma is staging using the Intergroup Rhabdomyosarcoma Study (IRS) TNM classification, both pre-treatment and post-treatment.[11] The management of rhabdomyosarcoma uses a multi-modality approach, including surgery and chemotherapy, either with or without radiotherapy. The surgical approach is the first approach that is prioritized, as well as the gold standard of rhabdomyosarcoma management. There are two main functions of surgery: first, as a primary management that can directly reduce the patient's clinical symptoms, and second, as a pathological diagnosis. [12]

Although complete surgical excisionis the preferred modality for almost all tumors, the local and systemic vascular supply often makes surgical excision difficult. In recent decades, the use of transarterial embolization has become more common as it can be useful for preventing intraoperative bleeding[13]. Another advantage is that embolization can specifically block the feeding branch of the tumor artery with the embolic agent, causing the tumor to shrink due to ischemia. The operator is further assisted as the boundary between the tumor mass and the surrounding tissue becomes clearer.[14]

In this case, we report the preoperative management of a residual giant rhabdomyosarcoma axillaris using transarterial embolization amplatzer. The patient presented with a complaint of a very large lump in his left axilla with a history of a similar lump four years earlier, in 2019. Interestingly, the patient had undergone tumor excision surgery. Previous histopathologic findings supported the diagnosis of alveolar rhabdomyosarcoma. However, the management could have been done holistically due to the COVID-19 pandemic. The patient did not undergo radiotherapy as follow-up management. Now, the tumor has grown back to a larger size than before. We performed a repeat CT scan and found a very large tumor, 11x10x17 cm, with a giant feeding vessel from the left axillary artery. Considering the large size and hypervascularization of the tumor on the patient's radiology, embolization was needed to reduce bleeding as well as shrink the tumor size to facilitate surgery. Gao et al. study showed that embolization of hypervascularized tumors can significantly reduce intraoperative bleeding, transfusion requirements, and operating time compared to those without preoperative embolization.[15] Our patient's low pre-correction and preoperative hemoglobin levels suggest a risk of post-operative anemia. An international consensus explains that low preoperative hemoglobin levels, female gender, and small body surface may increase the risk of post-operative anemia[16]. Therefore, we chose to use the angiography method with embolization to occlude the blood vessels, with a combination of polyvinyl alcohol and gelatin sponge.

To the best of our knowledge, no global data has compiled the profile of the use of embolization in tumor artery feeding as preoperative management. However, various studies, including systematic reviews and meta-analyses, have been conducted to evaluate the efficacy of embolization compared to control groups.[15,17–21] Various tumor-related diseases, both benign and malignant, that received preoperative embolization management showed many expected outcomes.[15,17–21]

Based on recent systematic reviews and meta-analyses, the clinical efficacy of preoperative embolization has been demonstrated across various hypervascular tumors. In the management of carotid body tumors, Kaya et al. (2023) reported that preoperative embolization combined with surgery significantly reduced vascular injury, intraoperative bleeding, and the duration of hospitalization compared to surgical resection alone.[17] Regarding renal cell carcinoma, Rooseno et al. (2023) found a significantly lower reduction in blood loss in the embolization group, although no significant differences were noted in transfusion rates, operative time, or length of stay.[18] Similarly, Shanmugasundaram et al. (2021) observed a substantial reduction in bleeding and a decrease in both major and minor complications during partial nephrectomy.[20]

Studies on intracranial meningiomas have shown mixed results regarding hemorrhage but positive safety profiles. Schartz (2023) indicated that while intraoperative bleeding differences were not significant, the embolization group experienced lower major surgical complications.[19] Jumah et al. (2021) concluded that preoperative embolization is relatively safe, despite finding no significant differences in estimated bleeding or postoperative mortality in their analysis of double-arm studies.[21] Finally, in the context of metastatic spinal tumors, Gao et al. (2021) demonstrated significant benefits for hypervascularized cases, including a marked reduction in intraoperative bleeding (-1171.49 mL), decreased blood transfusion requirements, and shortened operation times.[15]

There are three main points of interest in our case report. Firstly, cases of rhabdomyosarcoma in adults are rare. Its position in the axillary region makes it even rarer. However, a case by Takahashi et al. reported that there was a previous case of embryonal-type rhabdomyosarcoma that received a combination of radiation and chemotherapy.[22] Secondly, our patients are among those affected by the COVID-19 pandemic. During a pandemic, the health system undergoes

massive structural and functional changes, and some services may be disrupted or delayed. Some oncology-related services, such as surgery, chemotherapy, and radiotherapy, are also affected, increasing preventable cancer deaths.[23] This can be a lesson learned and consideration for oncology services, especially for other global emergencies in the future. Third and finally, we used transarterial embolization as a preoperative modality in our rhabdomyosarcoma patient. This method was chosen in the hope of limiting vascular supply, thereby therapeutically shrinking the tumor size while preventing intraoperative bleeding.[6] The main risk of embolization is non-target organ ischemia, but this risk can be reduced if angiography is performed carefully. In addition, the insertion process also needs to be considered to prevent the reflux of embolic agents into functional arteries.[24] Although there is still no consensus on the use of transarterial embolization in musculoskeletal tumors, its application as preoperative management will be beneficial in the present and future.

This study has several limitations. As a single case observation, the findings regarding the efficacy of preoperative transarterial embolization cannot be generalized to the broad population of adult rhabdomyosarcoma patients, especially given the rarity of adult-onset cases. The most significant limitation is the patient's decision to decline definitive surgical resection despite the successful embolization. Consequently, the potential reduction in intraoperative blood loss and the long-term oncological outcomes could not be validated. Therefore, further prospective studies and multicenter clinical trials with larger cohorts are essential to establish standardized protocols for preoperative embolization in adult soft tissue sarcomas.

CONCLUSION

As summary, in conditions where this combination of management is not achieved, such as when therapy is delayed due to the COVID-19 pandemic, recurrent tumor cases may occur. As a gold standard treatment, surgery can lead to complications such as massive intra-operative bleeding due to the large size and hypervascularization of the tumor. Therefore, in our case, a preoperative approach with transarterial embolization was used to help reduce the tumor size while minimizing intraoperative blood loss during surgery. Even though, in the end, the patient refused definitive surgery.

DISCLOSURES

FUNDING

None.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

AUTHOR CONTRIBUTION

Concept and design: NA, SDK. Analysis and interpretation: NA, SDK. Data collection: NA, PAA. Writing the article: NA, MIRR, MZ, RSHB. Critical revision of the article: NA, SDK, MIRR. Final approval of the article: all authors.

ETHICAL STATEMENT

This study has been approved by the Medical and Health Research Ethics Committee of Dr. Soebandi General Hospital, Jember, with the approval number of 420/1497/610/2025. All published data has received informed consent from the patient.

USE OF ARTIFICIAL INTELLIGENCE GENERATED CONTENT

The use Grammarly and ChatGPT was limited to minor language editing and grammar correction only. No figures, data, or scientific content and analysis were generated using AI tools.

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