



Management of Haemophilic Pseudotumor of Left-Hand in A Paediatric Patient: a Case Report

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ABSTRACT

Hemophilia is a recessively inherited genetic disorder that causes abnormalities in the blood clotting process, which can lead to bleeding that is difficult to stop. One of the rare but significant complications of hemophilia is hemophilia pseudotumor, which occurs in 1-2% of hemophilia A and B patients. This study aims to analyze and evaluate the management of pseudotumor hemophilia. This study aims to analyze and evaluate the management of hemophilia pseudotumor in pediatric patients, focusing on the case of an 8-year-old boy who developed a pseudotumor in the left hand area due to hemophilia A. This case involves a boy with a history of hemophilia A who developed swelling of the left hand after experiencing trauma. Diagnosis was done through clinical examination, radiology (X-ray and MRI), and hematology evaluation. Treatment was factor VIII therapy, tranexamate, and amputation, as well as rFVIIa for bleeding prevention. The patient showed improved function after left hand amputation. Although conservative management can be considered for newly formed pseudotumors, in this case, a surgical approach was necessary due to the significant size and complications. Hemophilic pseudotumors can cause damage to surrounding tissues and require a multidisciplinary approach for management. Hemophilic pseudotumor is a rare but serious complication in people with hemophilia. Appropriate management, including surgical intervention, can improve the functional outcome of patients, despite the significant risks involved. Further research is needed to develop more effective treatment protocols.

Keywords: pseudotumor; hemophilia; amputation

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INTRODUCTION

Hemophilia is a recessively inherited genetic disorder linked to the sex chromosomes, characterized by prolonged bleeding as well as bleeding of the joints and soft tissues. According to Yao et al. (2022), hemophilia is classified into type A, which is caused by factor VIII deficiency, and type B, which is caused by factor IX deficiency. Although hemophilia is treatable, associated complications, such as hemophilic pseudotumor, remain a global challenge.

Hemophilic pseudotumor is a rare complication that occurs in about 1-2% of patients with severe hemophilia types A and B. It forms as a pseudotumor. These pseudotumors form as pseudotumors. This pseudotumor forms as a pseudotumor. These pseudotumors result from recurrent bleeding in the soft tissue and bone, leading to the formation of a mass that can damage the surrounding tissue. These pseudotumors often occur in previously traumatized areas, although they can also form without a history of trauma (Allen et al., 2016). Several previous studies have explored various approaches in the management of hemophilic pseudotumors, both through conservative and surgical therapies. However, the outcomes of these interventions vary, suggesting the need for a deeper understanding of the

factors that influence treatment decisions and patient outcomes (Doyle et al., 2020; Yao et al., 2020).

The urgency of this study is particularly important given the significant impact that hemophilic pseudotumor has on patients' quality of life. Without proper treatment, this complication can lead to impaired function, prolonged pain and risk of amputation, necessitating the exploration of more effective treatment strategies. This study offers a novel approach by focusing on the management of hemophilic pseudotumor through a multidisciplinary approach. This includes clinical experience, the latest surgical techniques, as well as the utilization of new therapies such as rFVIIa to reduce the risk of bleeding during surgical procedures.

The aim of this study was to analyze and evaluate the management of hemophilia pseudotumor in pediatric patients, with an emphasis on the case of an 8-year-old child who developed a pseudotumor of the left hand region due to hemophilia A. This study aimed to identify factors that contribute to the success or failure of therapy. The results of this study are expected to provide new insights for healthcare professionals regarding the management of hemophilia pseudotumor, as well as increase understanding of the importance of a multidisciplinary approach. In addition, this study is expected to contribute to the development of more effective treatment protocols, which in turn can improve the quality of life of hemophilia patients.

CASE REPORT

An 8-years old boy presented with mass on the left hand region after hit the bed 2 weeks ago. The mass was increasing in size gradually, and sometimes he complained of itch and pain. There was no fever, vomit, bleeding gums, or nosebleeds. Previously, the patient had been brought to the hospital in Ponorogo and hospitalized for 3 days. The patient was treated with a factor VIII injection and tranexamic acid injection, there was an improvement in the condition. 2 days after return the hospital, the patient complained of the mass was getting bigger, then he was referred to Dr. Moewardi General Hospital for further treatment.

The patient was diagnosed with Hemophilia A at 2.5 years old and was treated with a factor VIII injection dose of 1000 IU every week at the hospital in Ponorogo. There was no history of Hemophilia in the family.

In the present admission, the patient is fully alert with stable vital signs. On head examination, there are no signs of deformity, wound, anemic conjunctive, or icteric sclera. The thorax showed no bruise or wound and on auscultation, the breathing sounds vesicular and there is no heart sound abnormality. The abdomen presents normal bowel sounds, no muscular defense, no distension, and no bruise visible. All extremity is warm to the touch and has a capillary refill rate of 1 second.

On local examination of the left hand, there is mass with an estimated size of 9 x 8 x 8 cm. There are ecchymoses over the skin, wounds, discharge, and blood (Fig.1). There is warmth, and tenderness on the touch. The range of motion of the left wrist is restricted with flexion of 90 degrees and extension of 60 degrees. Supination and pronation of the forearm are also limited in movement, supination of 50 degrees, and pronation of 60 degrees. The capillary refill ratio for the left hand is less than 2 seconds.

On laboratory examination, the results of routine hematology were obtained: Hemoglobin 10.6g/dl (14.0-17.5g/dl), Hematocrit 32% (33 – 45%), Leukocytes 12.000/ul (4.500-14.500/ul), Platelets 483.000/ul (150.000 – 450.000/ul); Count Type: Neutrophil 76.30% (29-72%), Lymphocyte 19.30 % (33-48%); Coagulation profile: PT 13.6 seconds (10-15), APTT 66.1 seconds (20-40), INR 1.010.

The patient underwent an X-ray examination of the left hand. The X-ray examination shows homogeneous opacity with a rounded shape in the left hand region with increased synovial fluid, erosion of the articular cartilage and subchondral bone layer on the 1st and 2nd left metacarpal with soft tissue surrounding swelling leads to the appearance of a Hemophilia Pseudotumor (Fig.2).

The patient also underwent an MRI examination. The MRI examination shows a solid cystic lesion with a rounded shape with irregular margins in the left manus region with fibrotic appearance, hemorrhagic and necrotic components, septation infiltrating the left intraosseous musculus, left pollicis opponens musculus, left flexor pollicis brevis musculus, left adductor pollicis musculus, left lumbrical musculus, left opponens digiti minimi musculus, left flexor digiti minimi musculus, left abductor digiti minimi musculus, left flexor digitorum profundus musculus, pressing left carpal radiata ligament, left ulnocarpal palmar ligament, left radiocarpal palmar ligament and causes encasement of the left carpal palmar arch, left deep palmar arch, left palmar proper digital artery, causes destruction of the 2nd, 3rd and 4th digits of the left metacarpal bones, phalanx proximal 3rd, 4th digits of left manus, causing cutaneous edema the surrounding subcutaneous leads to a picture of a Hemophilia Pseudotumor (Fig.3).



Figure 1. Pre-operative clinical examination of the left hand

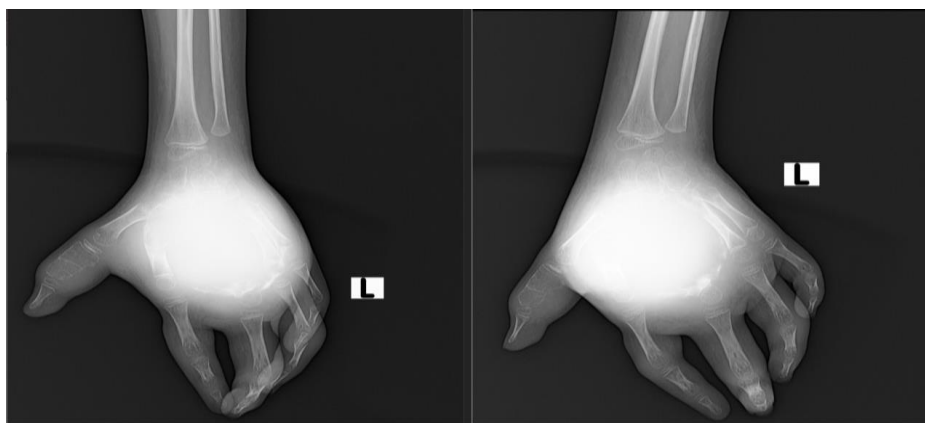


Figure 2. Pre-operative X-ray examination of the left hand

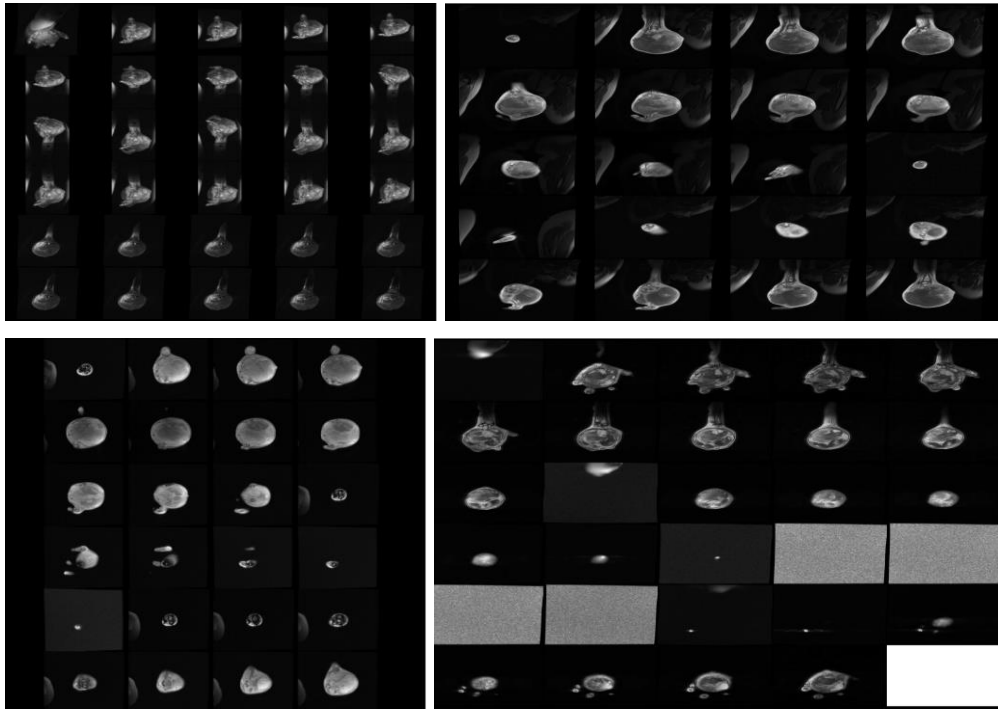


Figure 3. Pre-operative MRI examination of the left hand

In this case, we consulted with Paediatric Haematologist. The patient was managed with prophylactic factor VIII 1000IU/ 12 hours, tranexamic acid injection 300mg/ 8 hours, ampicillin injection 500mg/ 6 hours, and paracetamol injection 300mg/ 8 hours. The patient was checked for factor VIII inhibitors and the result was positive (+). On 1st and 2nd day of treatment at Dr. Moewardi General Hospital, the patient also complain of swelling and discharge from the wound, and there was discoloration on the left hand (Fig.4). On 3rd day of treatment, there was blood on the left hand, and the wound looks wet (Fig.5).



Figure 4. Clinical examination after 1st day of treatment



Figure 5. Clinical examination after 3rd day of treatment

The Orthopaedic surgeon planned amputation of the left hand (Figure 6.). While The Paediatrician, the patient was planned to give intravenous rFVIIa / Niastase combined with intravenous Tranexamic Acid during pre-surgery, intra-surgery, and after-surgery then continue the protocol until 7th day of treatment. This therapy is based on the replacement of factor VIII to haemostatically adequate levels for the prevention or treatment of bleeding.



Figure 6. Clinical Picture during surgery

After surgery, there was sutured wound and minimal bleeding in a drain. The patient is able to move the left forearm and overall has a good functional outcome.



Figure 7. After amputation on the left hand

RESULTS AND DISCUSSION

A pseudotumor is a recurrent, chronic muscle hematoma that mimics the characteristics of a tumor, often developing in individuals with hemophilia. This rare but significant complication arises due to repeated episodes of bleeding into soft tissues or osseous structures, leading to the formation of a mass-like lesion. Over time, persistent bleeding and inadequate resolution of the hematoma result in fibrosis, necrosis, and expansion of the lesion, which can disrupt surrounding tissues and structures. These pseudotumors are more commonly observed in individuals with severe hemophilia, particularly those with inadequate or delayed treatment for bleeding episodes.

When evaluating a suspected pseudotumor in a patient with congenital coagulopathy, such as hemophilia, it is crucial to differentiate it from a true neoplastic tumor. Misdiagnosis can lead to inappropriate management strategies, resulting in either unnecessary delays in treatment or inadequate control of the lesion. The differentiation process begins with a thorough clinical evaluation, including a detailed history of the patient's bleeding episodes, treatment history, and any family history of hemophilia or other coagulopathies. The presence of a localized, progressively enlarging mass in a patient with hemophilia raises suspicion for a pseudotumor but cannot exclude the possibility of a true tumor.

Diagnostic imaging plays a pivotal role in distinguishing pseudotumors from true tumors. Modalities such as X-rays, ultrasound, computed tomography (CT), and magnetic resonance imaging (MRI) provide critical insights into the nature of the lesion. For instance, X-rays may reveal characteristic findings of bone erosion or soft tissue calcification associated with pseudotumors. Ultrasound can detect the presence of a fluid-filled or solid mass and assess vascularity, while MRI offers detailed information on the lesion's internal structure, including hemorrhagic and fibrotic components. MRI is particularly valuable because it can reveal distinct features, such as hemosiderin deposition, that suggest chronic bleeding rather than neoplastic growth. Despite these advanced imaging techniques, overlaps in radiological appearances can sometimes occur, necessitating further investigation.

If diagnostic uncertainty remains after imaging, a biopsy may be required to confirm the diagnosis. The decision to perform a biopsy must be approached cautiously in patients with hemophilia, given their inherent risk of excessive bleeding. Biopsies in these patients should always be conducted under stringent hemostatic control, typically involving pre-procedure administration of factor replacement therapy or bypassing agents to achieve adequate coagulation levels. The biopsy itself should follow strict tumor criteria to minimize the risk of complications and ensure a definitive diagnosis.

Ruling out a true tumor in cases of suspected pseudotumor is essential because the treatment strategies for the two conditions differ markedly. While pseudotumors in hemophilia are primarily managed through a combination of medical therapy (e.g., factor replacement, antifibrinolytics) and surgical intervention if necessary, true tumors may require entirely different approaches, such as chemotherapy, radiotherapy, or oncological surgery (Yao et al., 2020).

Hemophilia pseudotumor was first described in 1918 and has since been recognized as a rare but serious complication of hemophilia. It is estimated to occur in approximately 1–2% of patients with severe hemophilia and can reach up to 10% in those who develop inhibitors to factor replacement therapy. These inhibitors significantly complicate the management of bleeding episodes and increase the risk of pseudotumor formation. The condition often arises following trauma, which acts as a trigger for repeated episodes of bleeding into soft tissues or bone (Zhai et al., 2015).

When the natural process of blood clot resorption is disrupted, the accumulated blood can become encapsulated within a fibrous capsule, forming what is known as a pseudotumor. This process is a hallmark complication in individuals with hemophilia, particularly those with severe forms of the condition or those who have developed inhibitors to factor replacement therapy. These inhibitors prevent the effective management of bleeding episodes, further exacerbating the risk of recurrent bleeding and subsequent pseudotumor formation. Over time, the encapsulated lesion gradually enlarges as recurrent episodes of bleeding into the same area perpetuate a cycle of inflammation, fibrosis, and necrosis in the surrounding tissues.

The growth of a pseudotumor exerts pressure on adjacent structures, such as bones, joints, and soft tissues, leading to significant destruction. As the mass enlarges, it can erode nearby bones, resulting in fractures, deformities, and joint instability (Bocklage et al., 2014; Reigstad, 2014). This erosion is often accompanied by severe pain and functional limitations, including restricted range of motion and reduced strength in the affected area. In advanced cases, the destruction caused by the pseudotumor can extend to critical structures, such as blood vessels or nerves, causing further complications, including neurovascular compromise.

In addition to its mechanical effects, the persistent presence of a pseudotumor creates an environment conducive to infection. The encapsulated lesion may become secondarily infected, leading to abscess formation or systemic infection, both of which can be life-threatening. For example, sepsis or osteomyelitis can develop if the pseudotumor erodes bone or breaches the skin, creating an entry point for pathogens. These complications underscore the importance of timely and appropriate management.

The clinical presentation of a pseudotumor often includes a progressively enlarging, localized mass that may be associated with pain, tenderness, and sometimes skin discoloration over the affected area. The overlying skin may appear taut or inflamed, particularly if the lesion is large or infected. Functional impairment is a common feature, especially when pseudotumors involve weight-bearing joints or regions critical for movement, such as the hands, feet, or spine.

The management of hemophilia pseudotumor requires early recognition and a multidisciplinary approach. Prompt and accurate diagnosis is essential and typically involves advanced imaging studies, such as X-rays, CT scans, or MRI, to assess the lesion's size, extent, and impact on surrounding structures. Laboratory evaluations, including coagulation studies and testing for inhibitors, are also critical for guiding treatment. In cases where the diagnosis remains uncertain, a biopsy may be necessary, performed under stringent hemostatic control to minimize bleeding risks (Favaloro & Lippi, 2015; Lester et al., 2024; Scharf, 2021).

Treatment strategies for pseudotumors are highly individualized, depending on factors such as the lesion's size, location, and impact on the patient's overall health. Medical management, including factor replacement therapy or bypassing agents, aims to control bleeding and stabilize the lesion. Surgical interventions, ranging from drainage to excision or even amputation in severe cases, may be required to remove the pseudotumor and restore function. With timely intervention, the risks of complications can be minimized, improving patient outcomes and quality of life (Tong & Sathar, 2018).

There is no universally agreed-upon protocol for treating hemophilia pseudotumors, as the management depends on multiple factors, including the lesion's size, location, extent, and the patient's overall condition. Treatment options range from conservative approaches to surgical intervention, each with its indications, limitations, and potential complications. Conservative management is generally considered appropriate for superficial pseudotumors that are less than six months old. These lesions, being smaller and less complex, may respond well to factor replacement therapy combined with antifibrinolytic agents and careful monitoring. However, the effectiveness of conservative treatment diminishes significantly for older pseudotumors, those with thick fibrous walls, or those located deep within tissues. Such cases are more likely to be resistant to medical therapy and prone to complications.

Surgical resection remains the definitive and curative option for most pseudotumors, especially those that fail to respond to conservative measures or cause significant symptoms. Surgery offers the advantage of completely removing the lesion and alleviating pressure on surrounding structures. However, the procedure carries substantial risks, including massive, life-threatening hemorrhage due to the patient's inherent coagulopathy. Infection is another significant concern, particularly in cases where the pseudotumor has been chronically

inflamed or secondarily infected. In severe cases, surgical management may necessitate amputation, which, while effective in controlling the disease, poses profound physical and psychological challenges for the patient.

Given the high stakes associated with surgical treatment of hemophilia pseudotumors, the decision to proceed with surgery must be made with great caution. It requires a comprehensive assessment of several factors, including the lesion's size and location, associated symptoms such as pain or functional impairment, its impact on the patient's daily life, and the presence of comorbid conditions that could complicate the procedure. Additionally, the patient's hematological status must be carefully evaluated, with particular attention to inhibitor levels, as these can significantly influence perioperative management and outcomes.

The surgical management of hemophilia pseudotumors is underexplored, with limited studies and variable results. This scarcity of data makes it challenging to establish standardized guidelines, further emphasizing the need for individualized treatment plans. Decisions regarding surgery should not only consider the immediate risks but also the long-term benefits, such as improved quality of life and prevention of complications like infection or progression to life-threatening stages.

A multidisciplinary team approach is essential for optimizing outcomes in these patients. Such a team typically includes hematologists, surgeons, radiologists, anesthesiologists, and rehabilitation specialists, working collaboratively to address the complex needs of the patient (Shaw et al., 2020; von Kodolitsch et al., 2016). Hematologists play a critical role in managing coagulation therapy before, during, and after surgery, ensuring adequate hemostasis while minimizing the risk of thrombotic events. Surgeons and radiologists assess the feasibility and risks of the procedure, while anesthesiologists ensure safe perioperative management tailored to the patient's condition. Ultimately, the management of hemophilia pseudotumors requires a delicate balance between minimizing risks and maximizing benefits. With careful planning and a multidisciplinary approach, even complex cases can achieve favorable outcomes.

Surgical intervention for hemophilia pseudotumors is considered when the lesion becomes large or is rapidly enlarging, causing mass effects such as compression of surrounding structures, or when conservative treatment fails to control the growth or symptoms. Indications for surgery also include complications such as infection, the presence of cysts, or fistulae. These complications can exacerbate the condition and make it more difficult to manage with conservative methods, necessitating surgical resection to remove the pseudotumor. However, surgery carries significant risks due to the coagulopathy associated with hemophilia, and careful planning and preparation are essential for successful outcomes.

Before major surgery to resect a hemophilia pseudotumor, adequate hemostatic support is crucial. This typically involves the administration of factor VIII to normalize the patient's clotting ability. Factor VIII replacement therapy is essential for reducing the risk of bleeding during and after the surgical procedure. However, in patients with inhibitors—antibodies that neutralize the effects of factor VIII—this standard approach becomes ineffective. In such cases, alternative therapies must be used. In the case discussed, the patient had developed inhibitors against factor VIII, which rendered prophylactic factor VIII therapy ineffective. This situation is challenging, as the presence of inhibitors complicates the management of bleeding episodes and the prevention of bleeding during surgery.

In patients with inhibitors, bypassing agents such as recombinant activated factor VII (rFVIIa), known as Niasase, are often used to control bleeding. rFVIIa bypasses the need for factor VIII or IX, directly activating factor X and leading to thrombin generation. This is particularly useful for patients with inhibitors who cannot use traditional factor replacement therapy. In the patient described, rFVIIa was used effectively to treat bleeding episodes and

prevent further hemorrhagic complications. However, rFVIIa is typically used for treating active bleeding rather than as a prophylactic measure. The use of rFVIIa as prophylaxis to prevent bleeding episodes before surgery or in the context of hemophilia pseudotumors remains a debated topic, and there is limited evidence in the literature regarding its efficacy for this purpose.

Regarding the management of inhibitors, immunosuppressive treatment is commonly employed to try and eradicate the antibodies against factor VIII. This typically involves using agents such as corticosteroids, cyclophosphamide, or rituximab to suppress the immune response and promote the development of tolerance to factor VIII. However, the literature on the use of immunosuppressive treatments to eradicate inhibitors in the context of pseudotumor management is sparse, and outcomes can vary greatly from patient to patient. The challenge lies in balancing the need to control bleeding while also addressing the underlying immune response that causes inhibitor formation.

As with other complex cases of hemophilia, managing pseudotumors with inhibitors requires a multidisciplinary approach, with close collaboration between hematologists, surgeons, and other healthcare providers. While bypassing agents like rFVIIa have shown efficacy in controlling bleeding, more research is needed to establish their role in preventing complications and managing hemophilia pseudotumors as a whole. Additionally, the use of immunosuppressive therapy to eradicate inhibitors continues to be an area of active investigation, with varying success rates across individual cases. Thus, treatment strategies for hemophilia pseudotumors in patients with inhibitors should be individualized based on the patient's specific circumstances, including the severity of bleeding, the extent of the pseudotumor, and the patient's immune response.

Hemophilia pseudotumors, which arise from recurrent bleeding into soft tissue or bone, can lead to a variety of serious complications due to the growing mass effect exerted by the encapsulated blood collections. As these lesions expand, they can apply significant pressure on surrounding structures, leading to a range of pathological consequences. Some of the most concerning complications of hemophilia pseudotumors include perforation through the skin or adjacent organs, abscess formation, fistula development, and destruction of bone tissue, leading to pathologic fractures. In extreme cases, the pseudotumor may compress blood vessels and nerves, causing compartment syndromes, which are associated with the potential for vascular compromise and ischemia.

The continuous growth of a pseudotumor can also distort natural anatomy, potentially leading to the displacement of critical structures such as the bowels, ureters, nerves, and blood vessels. This misalignment increases the difficulty of surgical interventions, as these anatomical displacements can cause unexpected injuries during procedures. In particular, the involvement of large blood vessels within or near the pseudotumor can make surgical resection a highly dangerous procedure, as inadvertent injury to these structures may lead to massive hemorrhage and difficult-to-control bleeding. Such blood loss can result in exsanguination, a life-threatening complication that demands immediate medical intervention.

In addition to these risks, erosion of the pseudotumor into an artery or vein can cause catastrophic bleeding. The involvement of large vessels is a well-documented concern in hemophilia pseudotumors, where the expanding lesion can weaken and ultimately breach the vessel wall. This can result in significant blood loss, which is compounded by the inherent coagulopathy in hemophilic patients, who have difficulty forming stable blood clots due to deficiencies in clotting factors such as factor VIII or IX. Furthermore, pseudotumors that continue to grow unchecked may lead to joint contractures, which can cause permanent loss of function in the affected limbs, exacerbating the overall morbidity of the patient.

The unpredictability and potential severity of these complications highlight the importance of early detection and intervention for hemophilia pseudotumors. Timely diagnosis, involving imaging techniques such as X-ray, MRI, or ultrasound, is critical for determining the exact location, size, and extent of the lesion. Early recognition also helps guide decisions about the most appropriate course of treatment, which can range from conservative management to surgical resection, depending on factors such as lesion location, the severity of complications, and the patient's overall health.

Surgical management of hemophilia pseudotumors is often considered when the pseudotumor is large, causing significant symptoms or complications, or when conservative treatment fails. However, surgery is associated with considerable risks, including the potential for massive hemorrhage, infection, and long-term functional impairment. In some cases, surgical resection may require amputation, particularly when the pseudotumor has involved critical structures or if it has caused irreparable damage to bones, joints, or surrounding tissues. The management of hemophilia pseudotumors requires a multidisciplinary approach, with careful consideration of the patient's hematologic status, the extent of the lesion, and the potential risks and benefits of different treatment options (Hermans et al., 2022; Hotea et al., 2021; Lobet et al., 2014; Tong & Sathar, 2018).

CONCLUSION

Hemophilia pseudotumor is a well-recognized but rare complication, affecting about 1 to 2% of people with severe hemophilia A and B. It is caused by episodic and irregular recurrent bleeding into soft tissue or bony areas, leading to abnormal masses and damage to surrounding tissues and structures. The management of hemophilic pseudotumor does not have a universally agreed standard as it depends on the size, location and severity of the lesion. Conservative therapy is feasible for pseudotumors that are on the surface and have been developing for less than 6 months, but its effectiveness decreases if it lasts longer or if there is a thick lesion wall or deep location. Surgical resection can cure most pseudotumors but carries serious risks, such as life-threatening severe bleeding, infection and amputation. In this case, the patient achieved a satisfactory functional outcome after undergoing amputation.

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