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Embolisation of AVM in A Teenager – A Rare Case Report

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Abstract:
Introduction:
To report a rare case of multicentric arteriovenous malformations (AVMs) of left upper extremity and chest wall in a pediatric patient.
Case details:
A 12-year-old female presented with a gradually progressive, painless swelling over the left wrist since the age of 5 years. It later extended distally to the hand and proximally to the chest wall. Additional swellings were also seen on the upper sternum and the medial aspect of the right foot. Examination showed diffuse swelling of the left forearm and hand with visible veins, bruit, and restricted wrist and thumb movements. Imaging studies like MRI and CT angiogram showed high-flow AVMs in the thenar eminence, forearm, and chest wall, and slow-flow malformations and skeletal involvement.
Under general anesthesia, selective embolization was done through transfemoral catheterization using glue and lipiodol. The angiogram post-embolization showed significant reduction in feeder vessels with normalization of flow. The procedure was successfully completed with good clinical improvement. Post-procedure edema was managed conservatively. The patient was monitored and discharged in stable condition. There were no immediate complications.
Conclusion:
Embolization is a safe and effective minimally invasive approach for treating AVMs in pediatric patients, especially when surgery is not feasible. This case shows the importance of early recognition, multidisciplinary evaluation, and appropriate intervention in complex high-flow AVMs of the upper extremity in children.
Keywords: *AVM – Arteriovenous Malformation; Embolization; Pediatric; Upper Extremity; Vascular Malformation.*

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I. INTRODUCTION

Upper extremity vascular malformations are uncommon entities. They are seen in around 2–6% of all soft tissue masses in the upper extremities. Hand is as 2nd most common site, after the head and neck. But, arteriovenous malformations (AVMs) are seen in the forearm are quite uncommon.[1,2]

• Vascular abnormalities are congenital but may not be apparent until later in life. Low-flow malformations are more common in youngsters than in high-flow lesions, which do not cause symptoms until teenage years.[3]

• Though the principles of sclerotherapy and embolization are consistent between adult and pediatric medicine. There are differences in the approach when it comes to children. This includes consideration of long-term management of chronic conditions and their effects on developing children.[4]

II. CASE REPORT DETAILS

A 12-year-old female patient came to our tertiary care center. She had a swelling on the left wrist since the age of 5 years. The onset of this swelling was insidious and gradually extended distally to involve the thumb and hand. Later, the swelling progressed proximally within 3 years. The patient had intermittent dull aching pain. Initially, there was an absence of pain associated with the swelling;but, as it increased in size, the patient reported occasional mild pain of a dull aching nature without any specific aggravating or relieving factors. She also identified a swelling in the upper sternum for the past year, which started insidiously and gradually increased in size, without any associated pain. There was a history of a similar swelling on the medial aspect of the right foot, along with a loss of movement at the wrist joint.

• Upon examination, the patient was conscious and oriented.

• Pulse, 98bpm; BP, 110/70 mm of Hg SPO_2, 98.5% in room air.

• Local examination of the left forearm and hand: Diffuse swelling with bony surface and visible veins extending from the left upper limb to the anterior chest wall. It was accompanied by redness, paleness on arm elevation, and

restricted movement of the thumb and wrist joint. There is local rise in temperature and tenderness, with irregular surface, variable consistency, non-compressibility, and no fluctuation. An audible bruit is present over the dorsum of the hand.

• Local examination of the anterior aspect of the chest: The swelling over the anterior upper part of the chest is spherical, smooth, with normal skin, well-defined edge, firm consistency, freely mobile in all directions, not attached to underlying structures, and with no visible pulsations, fluctuations, thrills, or transillumination, confirming all findings on palpation.

INVESTIGATIONS

• Routine Blood Investigations: Within Normal Limits.

• USG Abdomen/Pelvis: No sonological abnormalities.

• MRI scan: A large single-intensity lesion with vascular channels extending from the chest wall to the left arm, forearm, and hand, predominantly involving the distal forearm and hand with sparing of certain digits. The lesion appeared isointense on T1W and heterogeneously hyperintense on T2/PDFS/STIR, with multiple tubular hypointensities and flow voids along with some phleboliths observed in the hand.

- Ct angiogram of the left upper limb and thoracic wall

1. Clumps of tortuous enhancing vessels with early draining veins within the thenar eminence, distal forearm and infraspinatus muscles. The findings indicate multicentric arterio-venous malformations (high flow vascular malformations).
2. Large ill-defined heterogenously enhancing soft tissue lesion with prominent vessels involving muscles/intermuscular plane in volar and dorsal compartments of distal forearm.
3. Small branches from interosseous artery seen supplying the lesion with focal vessel dilatation. Mild scalloping/ sclerosis of adjacent cortices of radius and ulna with hypoplastic / deformed distal end of ulna.
4. Multiple tortuous hypodensities with mild delayed enhancement along left cardiac border, adjacent superior mediastinum, left side of the neck and axilla. Small well-defined hypodense area with minimal enhancement in the subcutaneous compartment of midline anterior chest wall at the level of lower manubrium and upper sternal body.
5. The findings of point 2,3,4 indicate slow flow malformations.

PROCEDURE

• Under general anesthesia, the procedure was done to access a 5 French vascular catheter from the right common femoral artery, leading to the left subclavian artery, where an angiogram revealed hypertrophied arteries and a large AVM in the hand.

• The arteries were treated by selectively injecting glue/lipodol under fluoroscopic guidance, resulting in a significant reduction in the AVM feeder and normalization of the arterial flow, with only a small abnormal vascular feeder detected in the left axilla.

• Catheterization and vascularization were resumed and hemostasis was achieved at the puncture site.

III. DISCUSSION

Most AVM patients show no symptoms or only present with minor symptoms that require clinical surveillance. In this instance, the patient had vascular mass in her left forearm that had consistently increased in size over 8 years.

•Without treatment, AVM could have resulted in severe hemorrhage, tissue death in distant areas, formation of skin ulcers, or possibly heart failure.

General anesthesia is necessary to prevent pain due to intravascular ethanol and potential complications during embolization due to patient movement. Postoperatively, the patient was awakened from anesthesia and monitored in the recovery room before being transferred to a hospital floor for further care.

Decadron was used to manage post-procedure swelling from acute thrombosisand the patient was discharged the next morning. But in some patients, complications may necessitate extended observation and management.

Endovascular embolization in children, while technically challenging due to small vessel size and the need for precise nidus targeting, has shown good safety and efficacy with improved lesion control.[5]

Newer embolic agents help to achieve durable occlusion apart from preserving surrounding tissue and function.[6]

Careful pre-procedural imaging using MRI and CT angiography plays main role in planning the embolization strategy, especially in high-flow lesions.[7,8]

Multidisciplinary follow-up with interventional radiology, pediatric surgery, and rehabilitation is key for monitoring recurrence, functional outcomes, and growth-related concerns in pediatric AVM patients.[9,10]

IV. CONCLUSION

Embolization is a minimally invasive, effective alternative to surgical excision in the management of pediatric arteriovenous malformations (AVMs) Due its ability to reduce nidus size, reduce symptoms, and risk of hemorrhage with low morbidity, endovascular embolization should be strongly considered as a first-line or adjunctive therapy.

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