

## High flow type of peripheral arteriovenous malformation causing severe cosmetic deformity

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**Section:** Musculoskeletal system

**Area of Interest:** Extremities Arteries / Aorta

**Procedure:** Education

**Imaging Technique:** RIS

**Imaging Technique:** Ultrasound

**Imaging Technique:** Ultrasound-Power Doppler

**Imaging Technique:** Ultrasound-Spectral Doppler

**Imaging Technique:** MR

**Special Focus:** Arteriovenous malformations Case Type:

Clinical Cases

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**Patient:** 45 years, male

### Clinical History:

A 45-year-old male patient presented with swelling in the left hand for 20 years. The swelling was initially small in size which gradually progressed in dimension over the years. The swelling was multi-nodular, soft, compressible and pulsatile with audible bruit. Dystrophic skin changes with ulceration and necrosis were present in the overlying skin.

### Imaging Findings:

On ultrasound evaluation, multiple tortuous anechoic tubular channels were seen with dilatation at few sites. On power Doppler application, complete colour filling of the tubular channels was seen with high velocity pulsatile arterial wave form and spectral broadening. This led to the provisional diagnosis of high flow arteriovenous type of peripheral vascular malformation (PVM). Arterial supply of the PVM was from ulnar and radial arteries with venous drainage into cephalic and basilic veins. Doppler tracing in the basilic and cephalic veins showed arterialisation of the venous channels. On MRI evaluation, the PVM was seen infiltrating into the musculature of the hand with aneurysmal dilatation at few sites. Thenar/hypothenar and small muscles of the hand were poorly identified with evidence of atrophy.

### Discussion:

- Background: PVMs include a wide array of lesions and can present with a spectrum of clinical features. PVMs are quite common in extremities and are generally confined to skin, subcutaneous tissue and muscles. Taking detailed clinical history and physical examination are a prerequisite for making the diagnosis, however, to exactly

characterise the lesion imaging modalities are required. Radiologists are playing an increasingly important role not only in making the diagnosis of the PVMs but also for interventional management. The management of complex PVMs should be done in dedicated vascular centers. [1]

- Clinical perspective: High flow vascular malformation includes AVM and AVF and constitutes approximately 10 % of PVMs in the extremities. AVMs are generally congenital whereas AVFs are frequently acquired.
- Imaging perspective: Imaging evaluation should begin with ultrasound examination with color Doppler. This examination will allow immediate distinction between high and slow flow lesions without any doubt in most of the typical malformations. AVMs will reveal localised arterial and venous hypertrophy with high systolic flow, shunting and spectral broadening. Radiography plays a limited role in classifying the lesion. Information which can be obtained from a plain radiograph includes presence/absence of phlebolith, and presence of any osseous deformity with or without joint involvement. MRI has become by far the most valuable modality in the confirmation, and characterisation of PVMs. On spin echo sequences, high flow PVMs will show large flow voids with early enhancement of enlarged feeding arteries and nidus with shunting to draining veins. Infiltration of tissue planes with muscular atrophy can also be seen [2].
- Computed tomography angiography (CTA) is advised in only selected cases with equivocal ultrasound and MRI. Catheter-based angiography on the other hand offers advantages of CTA with the chance of on table interventional management. Radiological interventions are now widely accepted as first line treatment for PVMs. With exception of the capillary-based lesions which require a conservative approach, the rest of all types of PVMs can be considered for interventional treatment [2].
- Outcome: Most slow flow malformations respond well to the intralesional percutaneous sclerotherapy, whereas transarterial embolotherapy is needed for fast flow AVMs and AVFs [3].
- Take home message: Our case outlines the need for radiological imaging work up of cases with provisional diagnosis of PVMs as well as classification and proper interventional therapy for the same. Development in imaging and interventional treatment techniques has helped to improve management of such patients.

Written informed patient consent for publication has been obtained.

**Differential Diagnosis List:** High flow type of peripheral arteriovenous malformation of hand, Arteriovenous fistula, Haemangioma

**Final Diagnosis:** High flow type of peripheral arteriovenous malformation of hand

#### References:

- Legiehn GM, Heran MK. (2006) Classification, diagnosis, and interventional radiologic management of vascular malformations. *Orthop Clin North Am* 37: 435–74. (PMID: [16846771](#))
- Hyodoh H, Hori M, Akiba H, Tamakawa M, Hyodoh K, Hareyama M. (2005) Peripheral vascular malformations: imaging, treatment approaches, and therapeutic issues. *Radiographics* 25:S159–S171. (PMID: [16227489](#))
- Mishra M, Singh G, Gaur A, Tandon S, Singh A. (2017) Role of sclerotherapy in management of vascular malformation in the maxillofacial region: Our experience. *Natl J Maxillofac Surg* Jan-Jun; 8(1): 64–69. (PMID: [28761279](#))

**Figure 1**

**a**



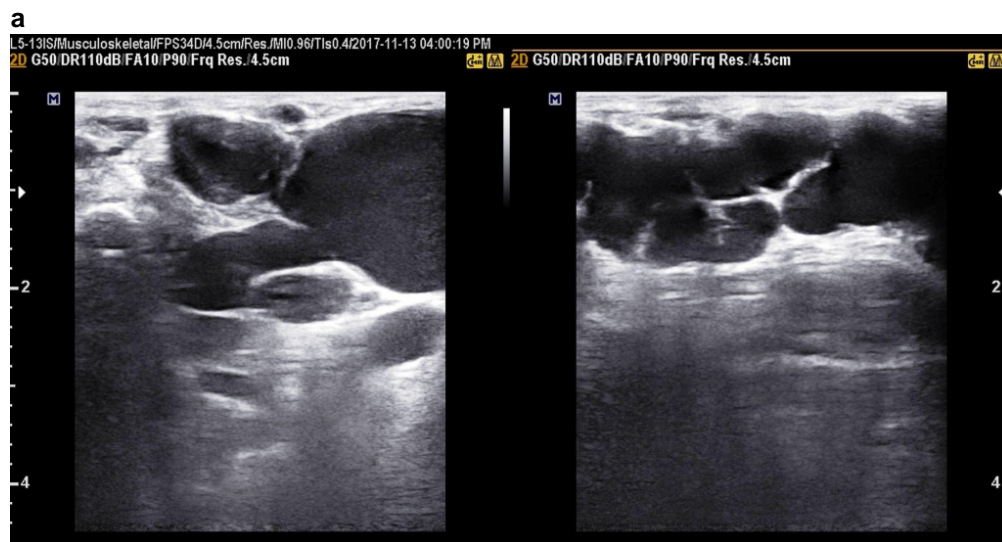
**Description:** The multi-nodular swelling in left hand of the patient with flexor contracture and skin changes. **Origin:** Subharti Medical college, Meerut, India

**b**



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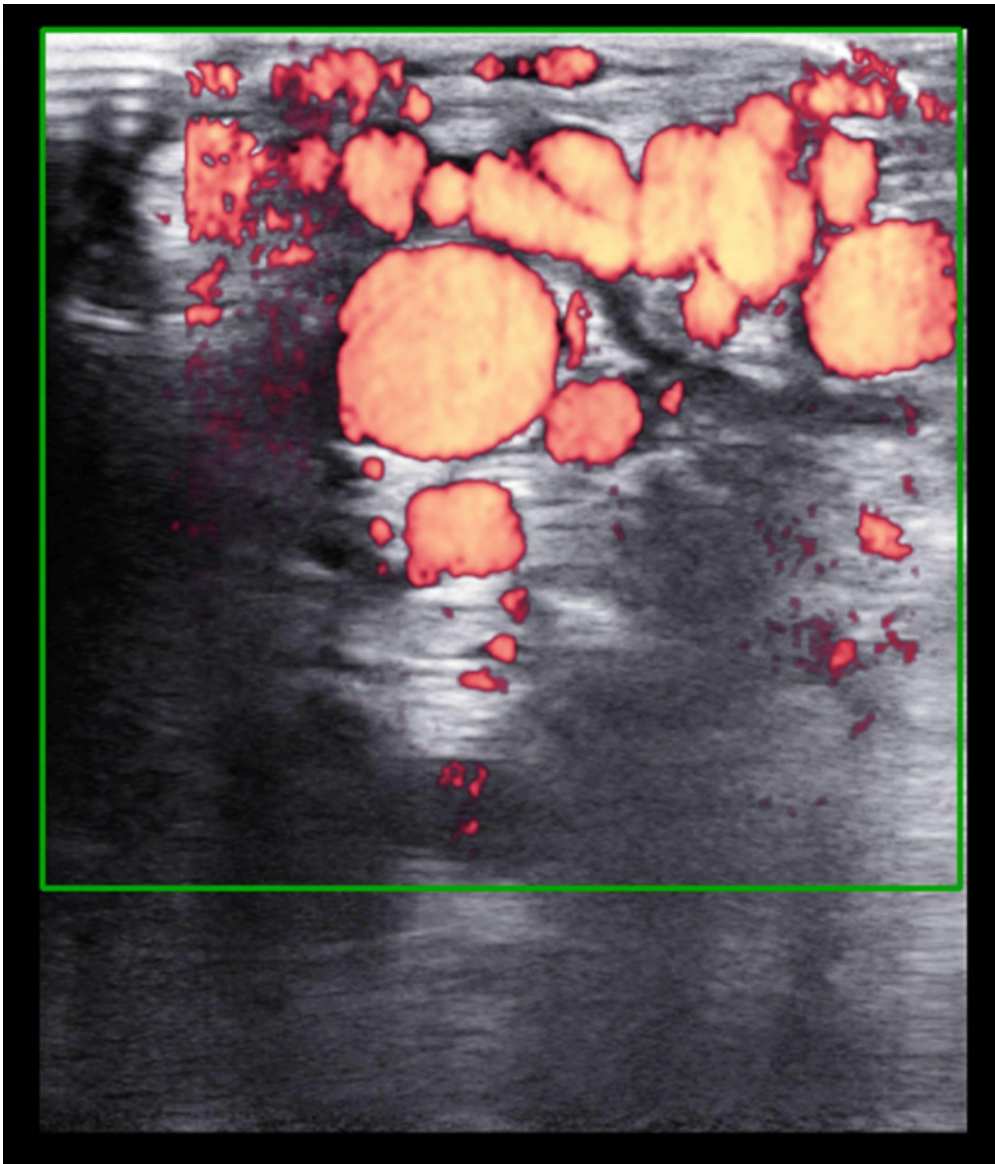
**Figure 2**



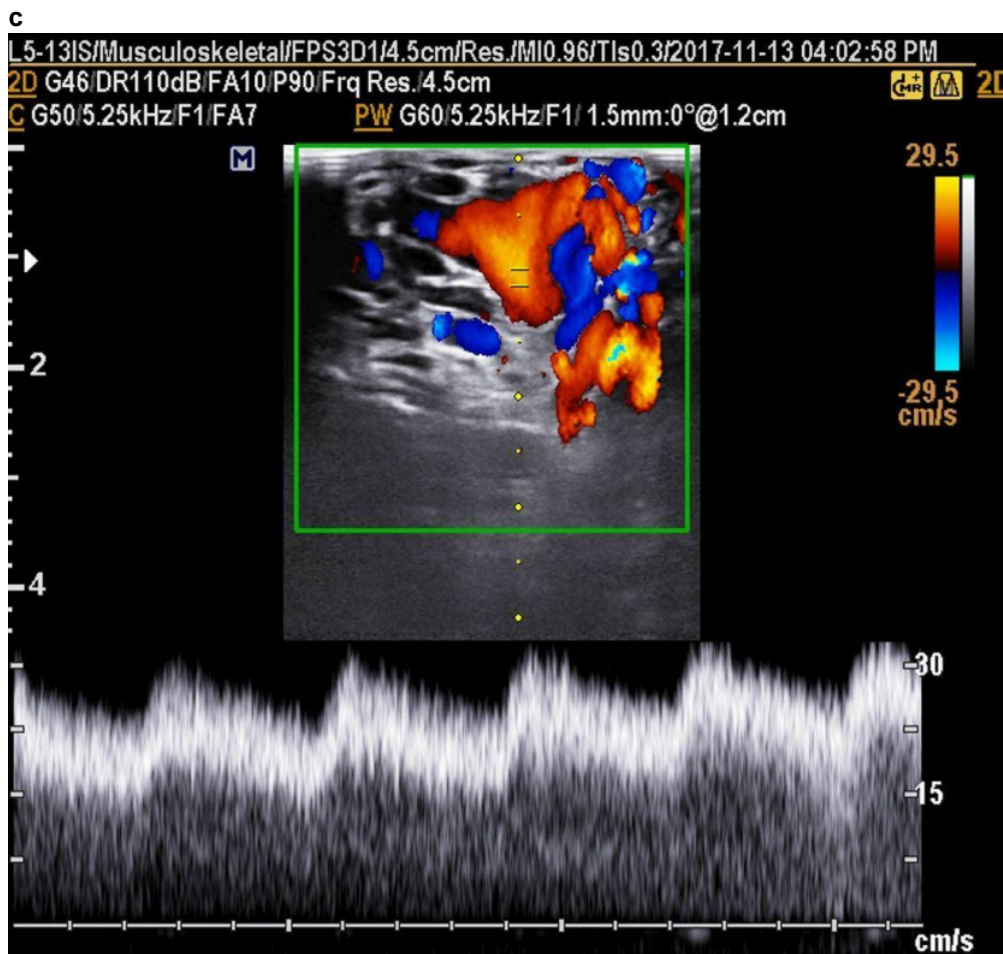
**Description:** Multiple tortuous anechoic tubular channels are seen with dilatation at few sites. **Origin:** Subharti medical college, Meerut India.



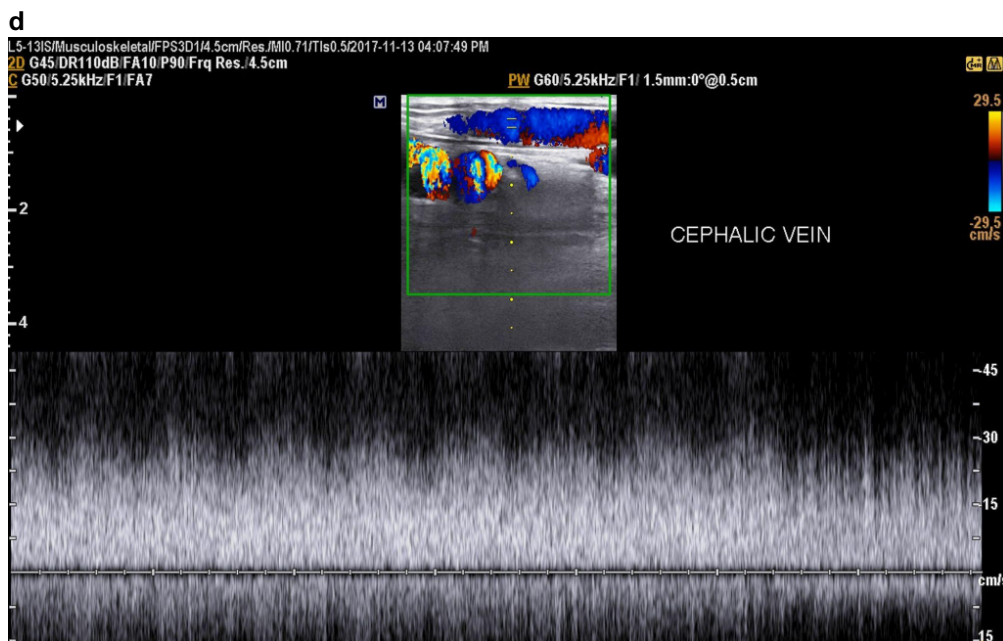
**b**



**Description:** Multiple tortuous anechoic tubular channels are seen with dilatation at few sites and complete colour filling on power Doppler application. **Origin:** Subharti medical college, Meerut India.



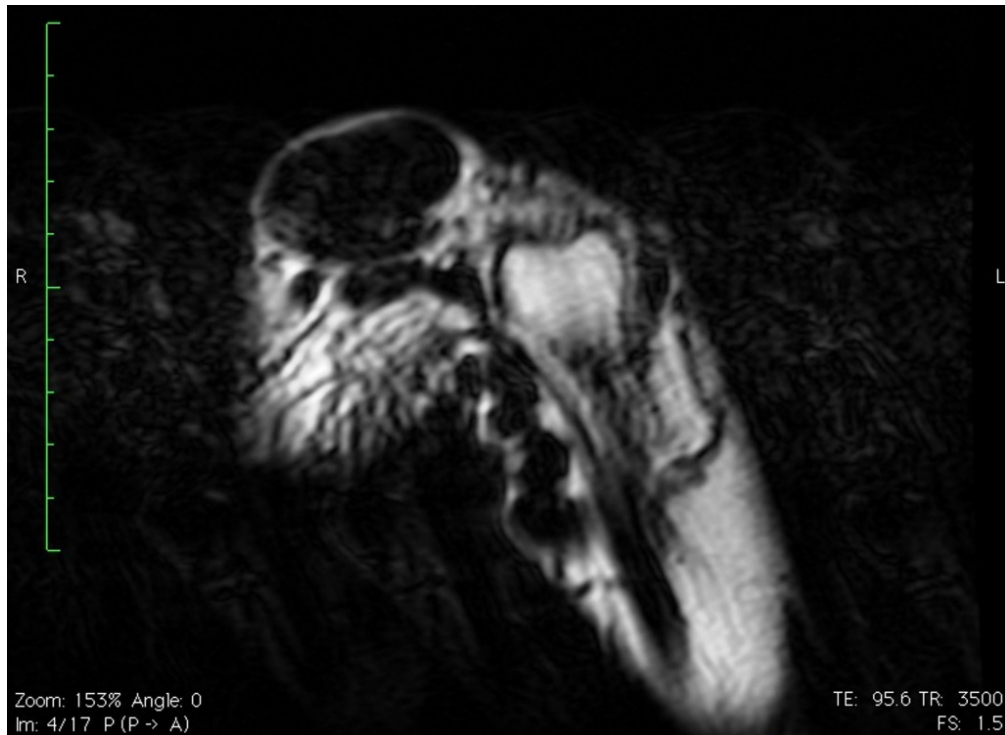
**Description:** Pulse wave Doppler evaluation identified pulsatile arterial wave form in the channels with spectral broadening. **Origin:** Subharti medical college, Meerut India.



**Description:** Doppler tracing in the cephalic vein showing pulsatile arterial waveform with arterialisation of the venous channels. **Origin:** Subharti medical college, Meerut India.

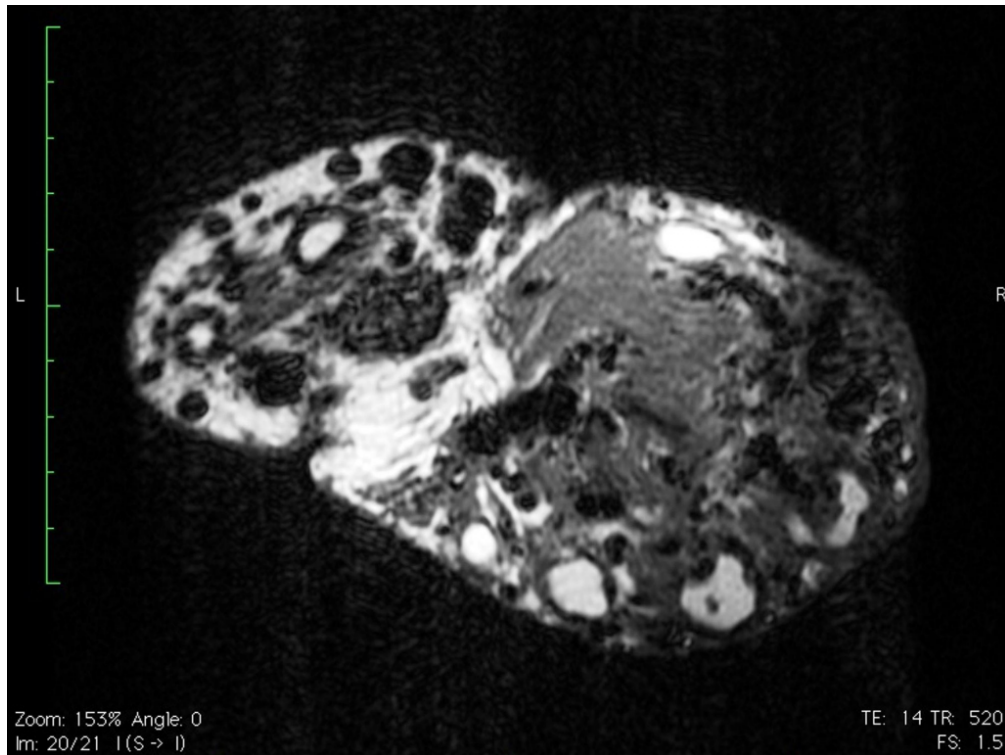
**Figure 3**

a



**Description:** MRI evaluation of the affected hand showing multiple tortuous tubular channels with flow void on spin echo sequence and aneurysmal dilatation. **Origin:** Subharti Medical College, Meerut, India

b



**Description:** The tortuous tubular channels are seen infiltrating into musculature of hand with atrophy. **Origin:** Subharti Medical College, Meerut, India