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Scalp Arteriovenous Malformation. Percutaneous Multistage Ligature Under Ultrasound Guidance: Palliative Technique To Be Considered: Case Report

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Abstract:
Background: Scalp arteriovenous malformations (AVMs) are fast-flow malformations characterized by the presence of arteriovenous shunting without an intervening capillary bed within the subcutaneous layer.
Aim: To report a case of AVMs managed by percutaneous multistage ligature under ultrasound guidance.
Case report: A 68-year-old patient with a AVMs was managed by percutaneous multistage ligature under ultrasound guidance with acceptable cosmetic and functional results.
Conclusion: Some patients with bad health conditions and a high risk of anesthesia with comorbidities can benefit from multistage transcutaneous ligation of the principal arterial pedicular under ultrasound guidance. This simple and palliative technique must be considered in some cases.

Introduction:
Scalp arteriovenous malformations (AVMs) are also called aneurysm cirsoide, aneurysma serpentinum, or plexiform angioma. AVMs are lesions that arise due to a pathological fistulous connection between scalp arterial feeders and draining veins without an intervening capillary bed within the subcutaneous layer [1–4]. AVMs usually present with troublesome symptoms and cosmetic disfigurement, which can cause functional, cosmetic, and psychological problems. AVMs account for 8% of all arteriovenous malformations [5, 6].
A case of AVMs treated by two-stage percutaneous ligation under ultrasound guidance is reported.
Case report: A 68-year-old patient with unbalanced diabete, arterial hypertension and renal insufficiency with chronic hemodialysis, presented a pulsatile bilateral parietal mass for three years, accompanied by mild frequent headaches. One year ago, he presented rebellious headaches and rebellious whistles. Local examination shows ecstatic and tortuous temporoparietal venous dilatations crossing the midline. These venous dilatations are depressible. There was no history of trauma or infection before. The mass progressively enlarged in two years. The patient had normal motor and sensory functions, and the cranial nerve examination was unremarkable. The somatic examination was unremarkable. Cranial angio-MRI showed tortuous dilated signal vessels in the scalp temporo-parietal region crossing the midline (**Figure 1**).
Given the poor state of health, surgery was not considered. A transcutaneous ligation was proposed. Multistage direct ligature under ultrasound guidance of an arterial feeder was done under local anesthesia. The left temporal pedicular was ligated first. After ligature, the size of the mass instantly decreased, and

the pulsation was reduced. A second right temporal pedicular was ligated under ultrasound detection one week later. The veinous tortuously was reduced, and symptoms were reduced with acceptable cosmetic results. The rebellious whistles were reduced. At a 1-year follow-up, no procedure-related complications were observed. The patient is doing well and satisfied. No necessary surgery was necessary (**Figure 2**).

Discussion:

Scalp AVMs are rare vascular malformations reported only in small case series. AVMs were first described by Brecht in 1833. The most common locations of AVMs were the parieto-occipital (30%) and temporoparietal (30%) areas [4,5].

Scalp AVMs are uncommon extracranial vascular abnormalities that neurosurgeons hardly ever see. AVMs can occur at any age and have an incidence of 8.1% out of all AVM. Most cases are congenital and present in the 2nd or 3rd decade. It is believed to be congenital; however, few reports were secondary to trauma [2, 3, 4]. Most AVMs (46%) have a single feeding artery, and dual arterial supply is found in 30% of the cases. In contrast, three or more feeders are extremely rare [6,7].

Most AVMs are located in the frontal, temporal, and occipital regions, and their feeding arteries often arise from the superficial temporal or occipital artery and then drain into the extracranial venous system [4].

Generally, clinically, the presence of a compressible soft tissue mass, visible expansile pulsations, and the presence of bruit make clinical diagnosis easy. The disease progression of scalp AVMs not only makes the swelling bigger but also presents a wide array of clinical manifestations. Physical disfigurement, throbbing sensations, tinnitus, and headaches are mostly associated with the early stages. Persistent pain, scalp necrosis, and bone erosion. Pediatric AVMs can present with life-threatening hemorrhage, cardiovascular failure, cerebral steal phenomenon, and seizures, which are symptoms of late destructive and decompensated lesions [9].

The disease's advancement and presentation are appropriately taken into account in Schobinger's classification of AVMs. The Schobinger clinical classification is important to assess patient evolution and indicate intervention. Schobinger classified AVM into four stages, as follows: stage I (quiescence) features warm and discolored skin; stage II (expansion) features bruit, pulsation, and swelling; stage III (destruction) features pain, ulceration, and bleeding; and stage IV (decompression) features cardiac failure [3].

The diagnosis of AMVs is confirmed with Doppler ultrasound guidance, which shows high flow patterns [2]. The diagnosis is proven by CT, angiography, and MRI-angiography. MR angiography helps in the in the estimation of the form and extent of the lesion, and also any intracranial extension. MR-angiography helps plan the incisions before surgery, so that uninvolved major scalp vessels can be preserved. Catheter angiography has been the gold standard for diagnosis. Angiography can also provide a very high imaging resolution and the observation of related bony structures, which may be important for surgical planning. Cerebral angiography can reveal a rare co-occurrence of intracranial vascular abnormalities and intracranial communication of AVMs [6, 8].

The therapeutic modalities, include surgical excision, vessel ligation, transarterial or transvenous embolization, sclerosant injection and electrothrombosis. A combined approach with preoperative embolization followed by surgical excision has been described with excellent results. Percutaneous direct puncture coil embolization of AVMs is a safe and effective procedure [7,8,9].

In some rare cases of poor conditions where the surgery cannot be done, other local procedures must be considered. Such vessel ligation, sclerosant injection into the nidus, and electrothrombosis treatment strategies have been documented to be case-dependent. Multistage transcutaneous ligation of the principal arterial pedicular under ultrasound guidance is an alternative and palliative technique to be considered.

Conclusion:

scalp AVMs are lesions that arise due to a pathological fistulous connection between scalp arterial feeders and draining veins without an intervening capillary bed within the subcutaneous layer. Treatment strategies have been documented to be case-dependent, including surgical excision, ligation, or endovascular embolization. Some patients with a high risk of anesthesia and comorbidities can benefit from multistage transcutaneous ligation of the principal arterial pedicular under ultrasound guidance. This palliative technic is safe, rapid, and effective for specific AVMs, with good cosmetic and functional results. This palliative technique must be considered in some cases.

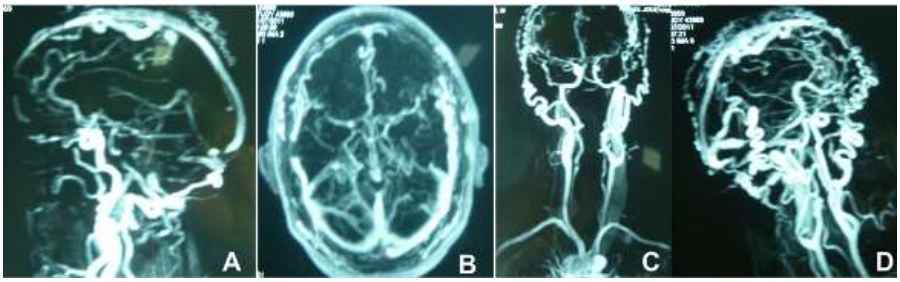

Figure 1: (A) Lateral, superior (B) antero-posterior and oblique view (C) angio-MRI showing tortuous dilated signal vessels in the scalp temporo-parietal region crossing the midline.

Figure 2: Scalp arteriovenous malformation after right percutaneous temporal ligature under ultrasound guidance. Note the significative reduction in right tortuosity. Scalp arteriovenous malformations.

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