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ORIGINAL ARTICLE

EXCELLENT DEPICTION OF CRISOID ANEURYSM WITH MULTI-DETECTOR COMPUTED TOMOGRAPHY: A RARE CASE OF EXTRACRANIAL ARTERIOVENOUS MALFORMATION OF SCALP

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ABSTRACT: Crisoid aneurysms of scalp are rare extracranial arteriovenous malformation which presents as varicoid scalp swelling which gradually increases in size over time, and has high propensity for massive hemorrhage. Multidetector computed tomography is very useful in its evaluation and treatment planning, particularly when the feeding vessels and draining channels have both intra and extracranial course. We are reporting a case of 22-year-old female patient presented with varicoid pulsatile swelling in parieto-occipital region of the scalp with gradual progression in size.

INTRODUCTION: Crisoid aneurysm is an extracranial arteriovenous malformation of scalp. It is congenital in about 80% of cases and traumatic in about 20% of cases. The congenital variety occurs as a result of faulty differentiation of the primitive vessel complex with persistence of primitive arteriovenous interconnections which are normally replaced by an intervening capillary bed [2, 7].

The feeding arteries and veins of the lesion are the naïve vessels which are massively dilated, because of hemodynamic alteration. These lesions can present as varicoid pulsatile swelling over the scalp which are progressively increasing in size and has propensity to massive hemorrhage.

The lesion mostly supplied by external carotid artery branches, and drains into extracranial veins as well as dural sinuses through emissary veins. They are normally supplied by superficial temporal and occipital artery. The superficial temporal artery is frequently involved in traumatic crisoid aneurysm due to its long unprotected course.

Angiography is gold standard investigation to delineate the lesion and to exclude an intracranial component. However this facility is not available at our institution.

Multidetector computed tomography can be used in non-invasive diagnosis and treatment planning of this complex arteriovenous malformation.

CASE REPORT: A 22-year-old female patient was referred from surgery department with a complaint of scalp swelling in parieto-occipital region from 4 years along with occasional headache. The swelling has been gradually increasing in size and was pulsatile. There was no previous history of trauma or head injury.

On examination, there was a pulsatile swelling over the parieto-occipital scalp extending towards the vertex (Fig-1). Overlying skin was normal. No focal neurological deficit noted. Other systems were within normal limits. Hematological and biochemical parameters were normal.

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On sonological examination, there were multiple dilated tortuous anechoic channels seen on grey-scale study which showed intense color uptake and aliasing on color Doppler study (Fig-2). On pulsed Doppler, monophasic low resistance high velocity flow was noted (Fig-3).

Computed tomography was done on GE 16 Slice Multidetector CT machine which showed soft tissue swelling over the parieto-occipital region of the scalp extending towards the vertex. CT Angiography showed dilated tortuous contrast filled channels within the parieto-occipital scalp swelling which form a racemose baggy network with simultaneous early filling of scalp vein and dural sinuses indicating arteriovenous malformation (Fig-4, 5).

3D shaded surface display (Fig-6) and MIP images (Fig-7) showed the lesion was fed from both occipital and right superficial temporal arteries and was draining into scalp veins and dural sinuses through emissary veins.

Fig. 1: Varicoid swelling over the parieto-occipital region of scalp.

Fig. 1

Fig. 2: Sonographic images showing tortuous dilated channels in scalp with intense color uptake and aliasing on color Doppler study.

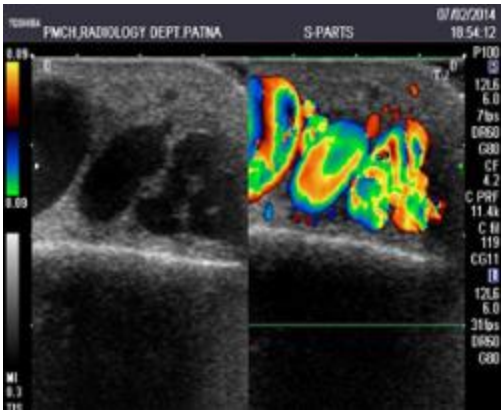

Fig. 2

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Fig. 3: Pulsed Doppler image showing monophasic low resistance high velocity flow.

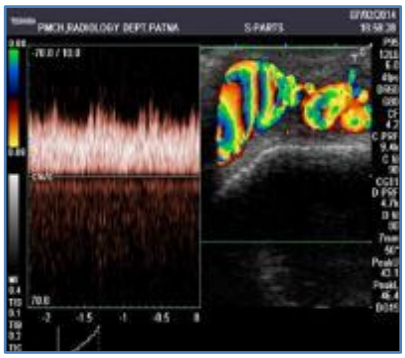

Fig. 3

Fig. 4: Axial CT angiographic images showing dilated tortuous contrast filled vessels within the parieto-occipital swelling with early filling of straight sinus.

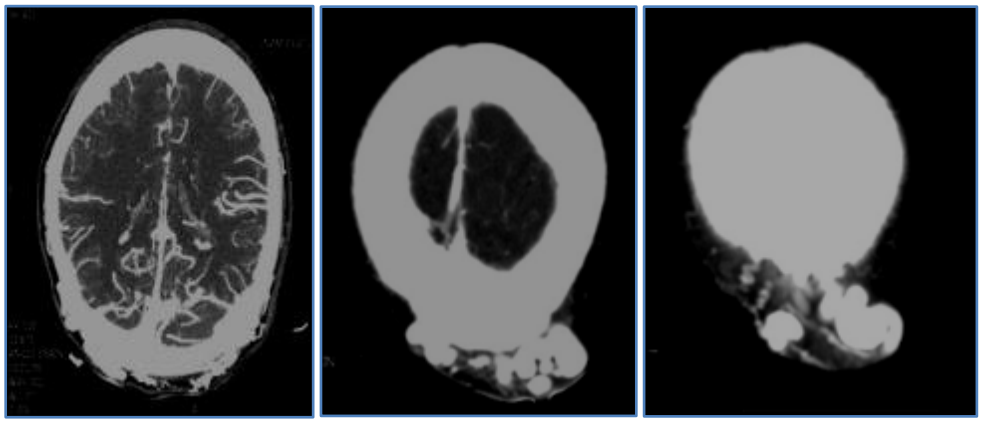

Fig. 4

Fig. 5: Sequential sagittal CT angiographic images showing dilated tortuous arteriovenous malformation over parieto-occipital scalp and early filling of torcula-herophili and straight sinus which appear moderately dilated

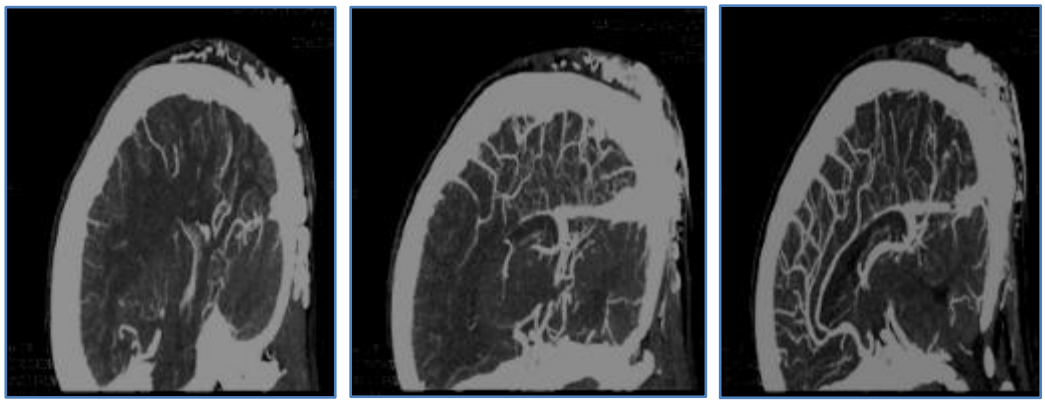

Fig. 5

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Fig. 6: Shaded Surface Display (SSD) images in posterior (a) and right lateral (b) projections showing dilated tortuous bilateral occipital and right superficial temporal arteries with no underlying bony abnormalities.

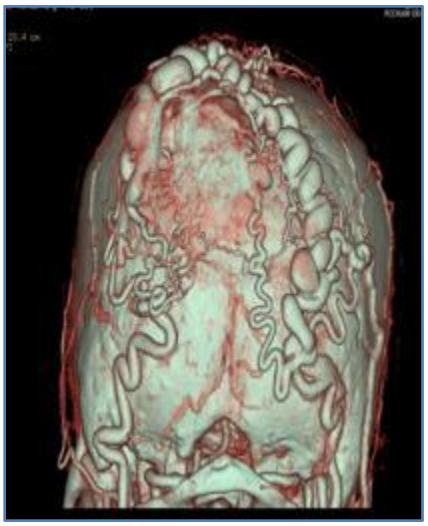

Fig. 6a

Fig. 6b

Fig. 7: 3D CT MIP images in posterior (a) and right lateral projections (b) showing large tortuous dilated arteriovenous malformation feeding from bilateral occipital and right superficial temporal arteries.

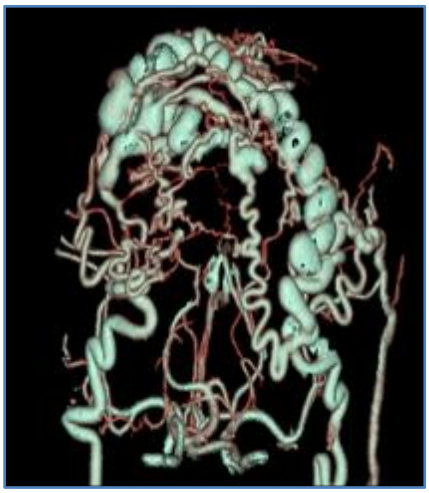

Fig. 7a

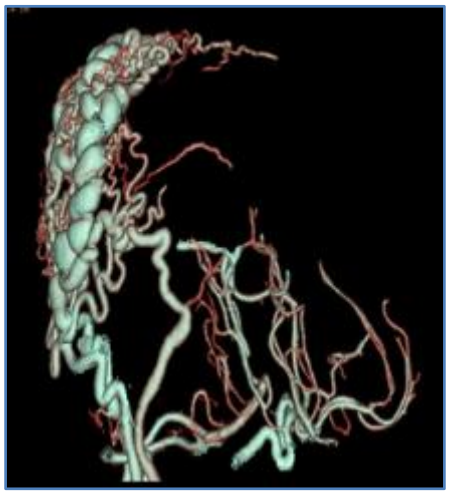

Fig. 7b

DISCUSSION: Crisoid aneurysm of the scalp was first described in 1833 by Brecht [1]. These are rare arteriovenous malformation of the scalp. They are usually congenital in etiology (about 80% cases). However traumatic fistulas have also been described.

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Crisoid aneurysm results from an abnormal fistulous connection between the feeding arteries and draining veins, without an intervening capillary bed within the subcutaneous layer. The draining veins are grossly dilated and tortuous.

In 90% of patients, the superficial temporal artery is the main supply to the fistula with only one dominant feeding artery in 71% of patients [3].

In the remaining cases, there is usually involvement of both superficial temporal and occipital arteries. Untreated patient can develop progressive scalp and facial cosmetic deformity due to markedly dilated tortuous subcutaneous vessels [1, 3].

Krayenbuhl and yasargil in his review of 800 cases of AVMs from literature and their own clinical material found extracranial AVMs to account for only 8.1% of the cases [2, 7].

The face and scalp have a rich arterial network fed by branches of the external carotid artery.

The arterial supply of the AVM is frequently multiple and complex. Facial lesions around the midline have bilateral arterial supply, forehead lesions are usually supplied by supraorbital branch of the ophthalmic artery, as well as by the branch of external carotid artery [7]. The case presented here has bilateral supply from both external carotid arteries.

Surgical excision of the fistula is usually successful. Endovascular and percutaneous occlusion of the fistulas have also been described [7]. Total excision of the extra cranial malformation demands a complete knowledge of the feeding artery and the draining veins. Thus, selective angiographic studies are usually necessary.

Catheter angiography has been the gold standard for diagnosis and treatment planning. However, it is expensive, invasive and associated with a risk of 1.5 to 2% morbidity and mortality.

Recent development of CT scanners with multi slice technology has provided significant improvement in vascular applications allowing non-invasive vascular evaluation.

Advantages of CT angiography (CTA) include shorter acquisition time, retrospective creation of thinner sections from source data, improved 3D rendering with diminished artifacts. It can provide a very high temporal resolution and the visualization of the related adjacent bony structures, which may be important in surgical planning.

CONCLUSION: A 22-year old female patient presented with parieto-occipital scalp swelling which was suspected to be a case of arterio-venous malformation by color Doppler and pulsed Doppler examination and later confirmed by CT angiography. CT angiography revealed excellent non-invasive visualization of arterio venous malformation, along with its feeding arteries, draining veins and related adjacent bony structures. CTA can be used as an alternative to DSA for the diagnosis of extra cranial vascular malformations.

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