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Case Report

Utility of Ultrasound and Colour Doppler in Evaluation of Pediatric Vascular Lesions in the Neck

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Abstract

Vascular lesion is an all-encompassing term used to describe a wide range of conditions consisting of an abnormal number, structure, or position of blood vessels.

Keywords: Ultrasound; Vascular Lesions in Neck; Pediatric Vascular Neck Pathologies

Introduction

Many classifications have been proposed, but to date a very basic classification system has been adopted by the International Society for the Study of Vascular Anomalies (ISSVA) [1]. This classification distinguishes two main types of vascular anomalies:

- Vascular tumors
- Vascular malformations.

ISVA classification for vascular anomalies (Approved at the 20th ISSVA workshop, Melbourne, April 2014, last revision May 2018) [1].

Many vascular anomalies can be diagnosed by history and physical examination, making imaging unnecessary. However, when imaging is used, it is important to choose the modality based on the specific lesion and clinical situation [2].

Ultrasonography (US) and Magnetic resonance imaging (MRI) are the 2 most widely used modalities of choice [2].

Vascular anomalies		
Vascular tumours	**Vascular malformations**	
	Simple	**Combined**
• Benign • Locally aggressive or borderline • Malignant	• Capillary • Lymphatic • Venous • Arteriovenous • Arteriovenous fistula	• Capillary venous • Capillary lymphatic • Lymphovenous • Capillarylymphovenous • Capillary arteriovenous • Capillary lympho arteriovenous

Table

Materials and Methods

All patient selected for this study were in pediatric age group of - 3 months of neonatal life to 7 - 8 years of age. The studies were performed on High end Philips - Affinity 70 system with high frequency linear transducers in range of 3 - 12 Mhz frequency. No sedation was used during these studies

Case Report and Discussion

US is used for initial screening because of its portability, lack of ionizing radiation, and no requirement of sedation in children. It is relatively simple, noninvasive, and yields good results for evaluating small, superficial and/or suspected, solid visceral lesions [2].

Typically, US is able to determine the basic type of lesion, direct initial management, and plan further imaging evaluation. Gray-scale B mode sonography, Color Doppler and spectral Doppler tracings are done to evaluate vascularity and determine types of vessels present [2].

MRI is helpful to further characterize sonographic findings and determine the extent of larger lesions for planning medical, interventional, and/or surgical therapy.

Between the two modalities, ultrasound is most preferred primary modality of choice all over the world.

Case no 1

- 3 months female child
- Mother noticed swelling along the left aspect of the neck
- Bluish discoloration of skin
- Referred by pediatrician for evaluation.

Clinical picture

Figure 1: Clinical picture.

USG images

Figure 2A

Figure 2B

Figure 2C

Figure 2D

Figure 2A-2D: 2A and 2B: B mode images showed echogenic mass situated in the subcutaneous soft tissues of the left neck. The mass showed few hypoechoic areas within it. 2C: On Colour Doppler, there is diffuse vascularity within the lesion suggestive of a vascular mass lesion. 2D: Spectral Doppler shows monophasic low velocity venous signal within it highly suggestive of a venous malformation.

USG diagnosis

Venous vascular malformation.

Discussion

Vascular malformations are true congenital lesions, which by definition are always present at birth, although they are not always detected [3].

Classification: Capillary, lymphatic, arterial, venous, or mixed. Vascular lesions have been categorized further into low- and high-flow types on the basis of the hemodynamic characteristics of the lesions, a distinction that is important in the choice of management strategies.

Clinical characteristics: Bluish, easily compressible, cold, and increase in size with valsalva maneuvers.

Gray-scale US: Hypo echoic, heterogeneous lesions in which phleboliths may be detected (pathognomonic if present), and they display compressibility [3,4].

At Doppler analysis, monophasic, low-velocity venous signal is encountered. The presence of slow arterial flow can suggest a mixed form of vascular malformation [3].

Case no 2

- 5 years female child with swelling along the right parotid region
- Clinical examination
- Painless compressible swelling in the right parotid region.

Ultrasound images

Figure 3A

Figure 3B

Figure 3C

Figure 3D

Figure 3A-3D: 3A and 3B shows normal homogenous appearance of the bilateral submandibular glands. 3C: Shows normal homogenous appearance of the left parotid gland. 3D: Shows heterogenous right parotid gland with hypoechoic spaces within them.

Figure 5: Colour doppler shows diffuse vascularity within the right parotid gland.

Figure 4: Heterogenous right parotid gland with phleboliths within.

Figure 6: Spectral doppler shows arterial flow within the lesion within the right parotid gland.

FI year old female child.

USG diagnosis

Parotid hemangioma.

Discussion

- Hemangiomas are classified into capillary and cavernous type [5].
- The congenital capillary type of hemangioma is the predominant subtype in the first year of life. They represent about 90% of these lesions.
- Cavernous hemangiomas are seen in older children. Capillary hemangiomas, discovered shortly after birth, are unilateral and compressible.

- The normal parotid glands can be easily visualized on USG as homogenous echogenic structures. On USG the echogenicity of a hemangioma is variable and depends on the size of the cystic component. The gland is usually enlarged and appears hypo echoic or more or less iso echoic, but may be echogenic compared to the surrounding cervical soft tissues. They are highly compressible [6].
- Color Doppler study helps to detect the perfusion in the hemangioma and confirm the vascular nature of the lesion and helps to differentiate it from a lymphangioma. Depending on the nature of flow they can be classified into slow flow hemangioma and high flow hemangioma. Spectral Doppler helps us in classifying these Hemangiomas and also helps the surgeon for clinical management [5,6].

Case no 3

- 4 months female child
- History of rapidly increasing swelling along the right parotid region. The parents noticed a swelling a month ago which rapidly increased to present size.

Ultrasound images

Figure 7A

Figure 7B

Figure 7C

Figure 7D

Figure 7A-7D: 7A-7C B mode USG images - Enlarged bulky right parotid gland. The gland appeared hypoechoic, heterogenous in echotexture with hyperechoic areas within it. 7D: Shows normal homogenous left parotid gland.

Figure 8A

Figure 8B

Figure 8A and 8B: Colour doppler shows increased vascularity within the heterogenous areas with chaotic vascularity pattern.

USG diagnosis

With above ultrasound appearance and history of rapid increase in the parotid swelling a diagnosis of parotid hemangioendothelioma was proposed. The pediatric surgeon excised the lesion and the histopathological diagnosis turned out the same.

Discussion

- Hemangioendothelioma of the parotid gland is the most common parotid tumor of childhood [7].
- The median age at presentation is about 4 months, and the diagnosis is rarely made after 16 months. Girls are more commonly affected than boys, by a ratio of about 3:1 [7,8].
- Because of the benign nature of this lesion, accurate clinical and radiologic diagnosis is important so that unnecessary biopsy may be avoided. Any large, rapidly growing parotid mass in an infant, particularly if it is small or unnoticed at birth, is most likely to be hemangioendothelioma [7,8].
- USG shows a homogeneous mass enlarging and replacing most of the parotid gland, a lobular structure with fine echogenic internal septations and numerous large intratumoral vessels [7].

Case no 4

- 7 year old female child
- History of progressively increasing swelling inferior to the angle of right mandible
- On C/E - the swelling was compressible and soft.

Ultrasound images

Figure 9A

Figure 9B

Figure 9C

Figure 9D

Figure 9A-9D: 9A and 9B: B mode ultrasound images showing normal homogenous appearance of the right and left parotid glands. 9C: Heterogenous lesion with few anechoic areas within seen at the angle of right mandible. The right submandibular gland was not seen separately from this lesion. 9D: B mode ultrasound image of left submandibular gland showing normal homogenous appearance.

Figure 10A

Figure 10B

Figure 10C

Figure 10D

Figure 10A-10D: 10A and 10B: Mode ultrasound image of the lesion at the angle of right mandible showing branching pattern of hypo/anechoic areas within. 10C and 10D: Colour doppler images of the lesion showing both arterial and venous signals within the lesion.

Figure 11A

Figure 11B

Figure 11C

Figure 11D

Figure 11A-11D: 11A and 11B: Spectral colour doppler shows arterialized flow in the veins with velocity at 240 CM/SEC. 11C: Monophasic low velocity venous flow in some part of the lesion. 11D: Feeding artery to the lesion.

USG diagnosis

Right submandibular arteriovenous malformation. Digital subtraction angiography confirmed our diagnosis with successful endovascular embolization done by the interventional radiologist.

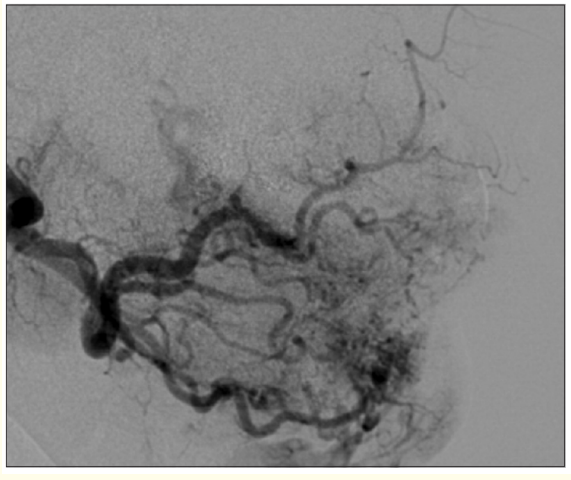

Figure 12: DSA of the lesion confirmed arterio- venous malformation of the right submandibular gland.

DSA of the lesion confirmed arterio- venous malformation of the right submandibular gland.

Discussion

- Arteriovenous malformations (AVMs) are high-flow lesions of intercommunicating veins and arteries formed by abnormal vessel morphogenesis [9].
- Most of the AVMs discussed in previous review articles are congenital lesions that became clinically apparent later in life, whereas acquired AVMs are rare and usually form post traumatically.
- The 2 types differ in that congenital AVMs often have multiple communications between arteries and veins, whereas acquired lesions may be solitary arteriovenous communications [9,10].
- Most AVMs are found in the extremities, lungs, and head and neck region, with head and neck lesions approaching 51% of all AVMs.
- Furthermore, only 8 cases of submandibular AVMs have been cited in the literature [9,10]. We report this rare 9th case.

Conclusion

These cases highlight the fact that high frequency linear transducers have revolutionized the imaging of lesions in the neck. Ultrasound is a great tool to evaluate pediatric lesions in the neck as it is widely available, no ionizing radiation, quick evaluation at bed side and no patient preparation required. Ultrasound is also a great tool in follow up of vascular lesions in the neck as many of them are treated with local steroids. MRI is another great tool due to its multiplanar capability and to assess the deeper extent of the lesions however it is time consuming and requires sedation in pediatric age group, hence ultrasound a preferred modality.

Bibliography

1. Arnold C Merrow., *et al.* "Adams 2014 Revised Classification of Vascular Lesions from the International Society for the Study of Vascular Anomalies: Radiologic-Pathologic Update (2014).

2. Harriett J Paltel., *et al.* "Soft tissue vascular anomalies: Utility of US for diagnosis". *Radiology 2000* (2014): 747-754.

3. Isabelle Trop., *et al.* "Soft-Tissue Venous Malformations in Pediatric and Young Adult Patients: Diagnosis with Doppler US". *Radiographics* 212.3 (1999).

4. Ramya Kollipara., *et al.* "Pediatric Imaging Current Classification and Terminology of Pediatric Vascular Anomalies 20.5 (2013).

5. Lisa H Lowe., *et al.* "Swelling at the Angle of the Mandible: Imaging of the Pediatric Parotid Gland and Periparotid Region". *Radiographics* 21.5 (2001).

6. Bhatt C J and Jagrit NN. "Congenital hemangioma of parotid gland: A case report". *IJRI Year* 13 (2003): 15-16.

7. Derek J Roebucka and Anil T Ahuja. "Hemangioendothelioma of the Parotid Gland in Infants: Sonography and Correlative MR Imaging". *American Journal of Neuroradiology* 21 (2000): 219-223.

8. Infantile Hemangioendothelioma of the Parotid Gland: A Sonographic Diagnosis". *Journal of Diagnostic Medical Sonography* 27 (2011): 131-134.

9. Heather M Stocks., *et al.* "First documented case of a submandibular arteriovenous malformation in a male patient". *American Journal of Otolaryngology–Head and Neck Medicine and Surgery* 28 (2007): 275-276.

10. James C Burns., *et al.* "Arteriovenous malformation of the submandibular gland". *Journal of Oral and Maxillofacial Surgery* 43.4 (1985): 294-296.