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Review

Vascular anomalies and wounds

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KEYWORDS
Vascular anomaly;
Vascular tumour;
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Ulcer;
Necrosis

Abstract Vascular anomalies comprise vascular tumours and vascular malformations. Some vascular anomalies result in ulcerations and necrosis. In vascular tumours, infantile haemangiomas are predominant and ulceration is demonstrated in up to 16%. In vascular malformations, arteriovenous malformations predominate and frequently demonstrate either primary ulceration or skin necrosis after diagnostic and therapeutic procedures. Various diagnostic and therapeutic imaging methods, such as X-ray, computed tomography (CT), magnetic resonance imaging (MRI), duplex Doppler ultrasound, and angiography, are used to visualize vascular anomalies; angiograms are required when embolization is attempted and blood flow needs to be further investigated. Duplex Doppler ultrasound is useful for routine check-ups as a therapeutic tool; however, it has limited in precision and accuracy. The aim of the present review is to give an overview of wounds related to vascular anomalies, detailing the diagnostic imaging and treatment options.
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Introduction

Vascular anomalies comprise two distinct main types: vascular tumours and vascular malformations. Vascular malformations include capillary malformation (CM), venous malformation (VM), lymphatic malformation (LM), and arteriovenous malformation (AVM) [1], and are distinct from vascular tumours regarding clinical appearance, imaging, and histopathological characteristics [2]. Vascular tumours mainly comprise infantile haemangioma (IH) and other related rare vascular tumours, such as congenital haemangiomas (rapidly involuting congenital haemangioma, RICH or non-involuting congenital haemangioma, NICH), kaposiform haemangioendothelioma, tufted angioma, pyogenic granuloma, and haemangiopericytoma in children and in adults.

Various imaging methods, such as ultrasound, magnetic resonance imaging (MRI), computed tomography (CT), and angiography, are employed in the diagnosis of vascular tumours and vascular malformations. The selection of these techniques is based on the clinical findings and the aim of imaging, i.e., diagnostic, pre- and intra-treatment assessment, or follow-up.

The present review reflects the authors' experience with from January 2006 to March 2012, in which 231 cases of vascular anomalies (201 cases

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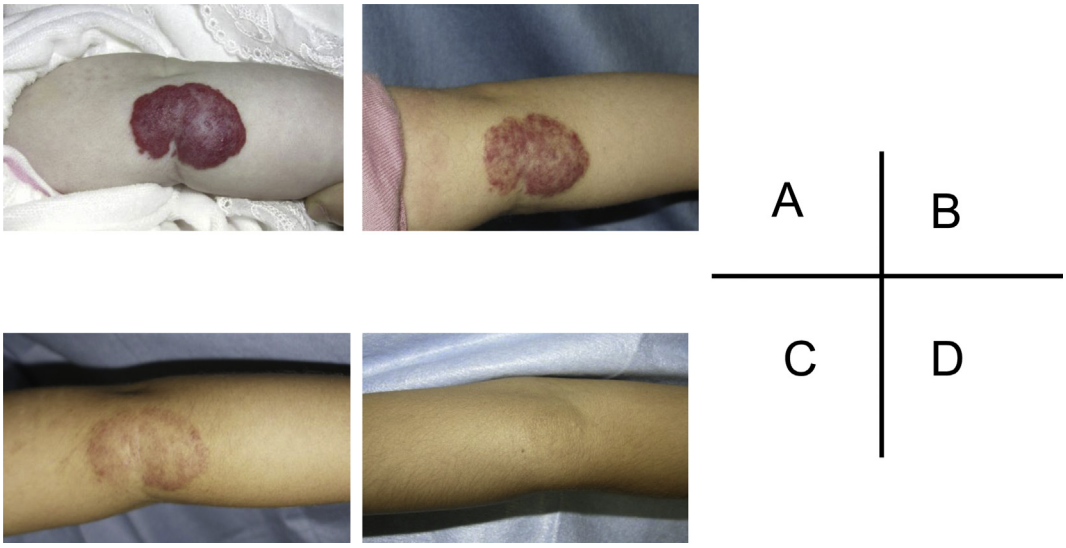

Figure 1 Typical IH in the elbow. A: At 4 months old, appearance of the lesion at the first visit. B: At 1.5 years of age, the redness has decreased. C: At 2.5 years of age, the colour has become much fainter. D: At 6 years of age, the colour has completely regressed and the skin shows some anetoderma. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

were vascular malformations and 30 cases were haemangiomas) were treated in the Department of Plastic and Reconstructive Surgery, Nagasaki University Hospital. Among the cases of vascular malformations, the number of patients with VMs, AVMs, LMs, lymphatico-venous malformations (LVMs), capillary malformations (CMs), capillary-venous malformations (CVMs), arteriovenous-lymphatic malformation (AVLMs) was 114, 43, 17, 9, 9, 5, and 4, respectively. Of the haemangiomas, 28 cases were IHs and two were congenital haemangiomas (mean age: 32.6 $\pm$ 22.76; range; 3 months to 88 years). There were seven cases of primary ulceration in 201 vascular malformations and two in 30 cases of haemangiomas. All treatments in this clinical series were approved by the Internal Review Board of Nagasaki University (approved number 10032690) and informed consent was obtained.

IH

The majority of IHs are small and not hazardous, may recede spontaneously with proliferation, involution, and involuted phases. IH can be alarming if they occur at life- and function-threatening locations, such as the eyelid, orbit,

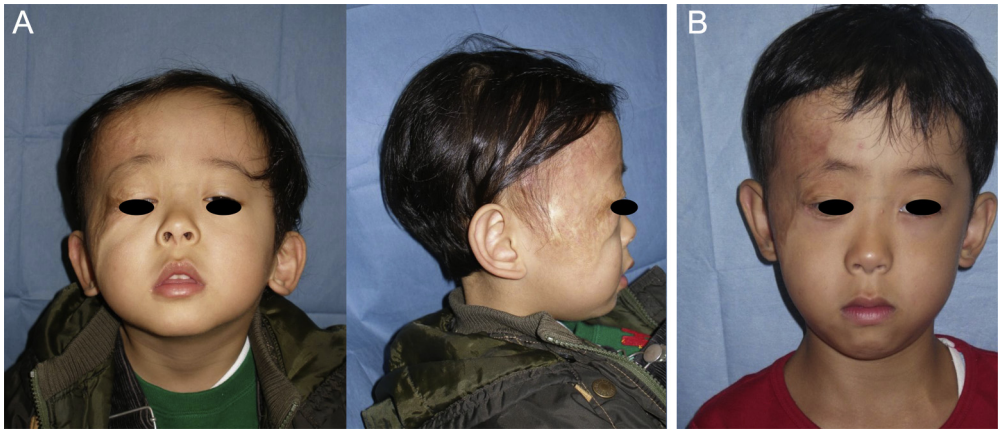

Figure 2 Healed IH. A: Photograph of a 2-year-old child with IH in the right eyelid, temporal area, and cheek, which shows laxity and shrinkage of the skin overhanging the eye at first visit. B: At 6 years after surgical removal of the lax skin and anetoderma.

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