CHAPTER 111
HAEMANGIOMAS

N. Marathovouniotis

Introduction

Haemangiomas are benign tumours of vascular endothelium. Larger haemangiomas, especially those appearing on the face, could cause anxiety and psychological distress for both parents and child, a factor that has to be considered in treatment. Complications such as ulceration and infection, and sometimes bleeding, can occur. Haemangiomas are vascular tumours, different than vascular malformations (see Table 111.1).

Table 111.1.: Classification of vascular tumours and vascular malformations.

Vascular Tumours	Haemangioma Haemangioendothelioma Tufted angioma Glomangioma Pyogenic granuloma
Vascular Malformations	Capillary vascular malformation Venous malformations Arteriovenous Lymphatic malformations Combined vascular malformations

Demographics

Haemangiomas are the most common tumours at infancy. They are present in 1.1–2.6% of newborns. They appear even more frequently among premature babies. The female-to-male ratio is 3:1.

Aetiology/Classification

The cause of haemangiomas has not been determined. The parents should not feel guilty for the occurrence or appearance of one of these vascular birthmarks. They show a dynamic growth and a dynamic regression. Angiogenic factors appear to play an important role in the growth and involution of haemangiomas.

According to a new classification, the most common haemangiomas are the focal haemangiomas, which progress from a central focus to a round vascular tumour. Less common are segmental haemangiomas, which spread within a body growing segment. These lesions are difficult to treat and show a number of complications. The type of haemangioma needs to be considered when deciding the timing and modality of therapy. Those haemangiomas that cannot be classified in one or the other group are called nondetermined haemangiomas.

Haemangiomas can appear within 1 to 4 weeks of age (30% of all haemangiomas), or they are visible immediately after birth as a small red macula (70% of all haemangiomas). These vascular tumours develop a rapid proliferation in the first 6 months of life and undergo a slow involution after the first year of life. The rapid proliferative phase can last even longer, and the involution is variable and may be incomplete years later. How large these lesions will grow in the proliferative phase is not known. Certain sites show a regression less frequently than other sites. The involution is complete in only 50–60% of all the haemangiomas, which means that about 50% of these tumours would need treatment due to partial involution and a remaining disturbing part such as a remaining scar or teleangiectasy.

Clinical Presentation

The common sites of haemangiomas are:

- 60% at the head and neck;
- 25% at the trunk; and
- 15% at the extremities.

Critical sites are the face, especially the eyelids, the lips, and the anogenital area.

Problems and Complications

Large haemangiomas, especially those appearing on the face, could cause anxiety and psychological distress.

Complications such as ulceration and infection are quite common. The risk of bleeding is usually overestimated. However, a special form of haemangioma, pyogenic granuloma, is the only type that could be termed an emergency due to acute bleeding. Periorbital haemangiomas can cause astigmatism, ptosis, strabismus, amblyopia, or even blindness.

Lip haemangiomas could destroy a part of the soft tissue, so that suckling or drinking is impaired. Ear or nose haemangiomas could destroy a part of the cartilage or cause a deviation. Haemangiomas at the airways could cause airway obstruction.

Ulceration occurs more frequently at the anogenital area than at other parts of the body.

Huge haemangiomas can cause cardiac problems. Platelet trapping can cause coagulopathy (the Kasabach-Merritt syndrome) or disseminated intravascular coagulations.

The appearance of more than five cutaneous haemangiomas is called haemangiomatosis. Ultrasound (US) examination of the abdominal organs to exclude other vascular tumours in the liver, spleen, or pancreas should be performed.

Focal haemangiomas at the body trunk, at the hairy part of the head, or at the extremeties cause few complications.

Investigations

Physical examination and US with colour Doppler for the assessment of the haemangioma dimensions, especially for subcutaneous haemangiomas, are standard for diagnosis. MRI should be considered for haemangiomas in the deeper soft tissue layers, or when vascular tumours are suspected in the chest or in the skull. Biopsy is indicated only in rare cases when the clinical signs indicate a possible malignancy.

Treatment

The aim of treatment is to stop the progression of the haemangioma with minimal side effects and to induce involution. A complete involution in the first 2 years of life is not the main goal of the treatment. If the haemangioma shows regression after initial therapy, further natural involution after the 12th month of life could be expected.

Intervention may be required for lesions that interfere with a vital structure or function. These include:

- lesions in the airway, liver, or gastrointestinal tract;
- lesions in the periorbital region;

- lesions of the nose, lip, or ear;
- large segmental haemangiomas on the face; and
- lesions complicated by ulceration.

The cosmetic result for progressive haemangiomas are generally better the sooner initial therapy begins. Haemangiomas at critical sites, such as the lips, eyelids, nose, ears, or anogenital area, should be treated as soon as possible (4–8 weeks of age).

Focal haemangiomas at the body trunk, upper or lower limbs, or even the hairy part of the head hardly cause any cosmetic or functional problems. Active nonintervention should be suggested for these uncomplicated haemangiomas; this means observation with serial photography and measurement of the lesion to monitor the clinical course. In these cases, waiting for spontaneous involution is suggested. The cosmetic result after spontaneous involution is sometimes better than after surgical interventions.

The choice of treatment depends on factors such as:

- type (flat, voluminous, subcutaneous, focal, or segmental);
- size;
- rate of growth and involution;
- location (e.g., face or body trunk); and
- age of the child.

Treatment modalities include:

- cryotherapy;
- laser treatment;
- surgery;
- intralesional steroids;
- systemic steroid treatment;
- systemic B-blocker treatment;
- intralesional bleomycin; and
- intralesional fibrin glue.

Cryotherapy

The freezing process of cryotherapy damages the endothelial cells of the haemangioma and stops the proliferation of the haemangioma. This is the most suitable treatment for small focal superficial haemangiomas (Figure 111.1). Treatment is possible with liquid nitrogen; the metal probe is frozen at –180°C, and is held on the surface of the haemangioma for 10 seconds. New electrical devices enable cryotherapy at a constant temperature of –32°C with a contact time of 20 seconds. The electrical devices cause fewer complications such as ulcerations and discolouration of the skin. This makes cryotherapy advisable even for flat, small haemangiomas on the face.

The great advantage of cryotherapy is using local anaesthetics (eutectic mixture of local anaesthetics, or EMLA) instead of general anaesthetics, which is usually necessary for laser treatment. EMLA cream should be applied in small quantities and on small surfaces. EMLA contains prilocaine hydrochloride, which has been associated with infantile methemoglobinemia.

Figure 111.1:Focal haemangioma at the back of the neck.

In cases of incomplete regression of the haemangioma after cryotherapy, repeating the treatment in 6 weeks time should be recommended.

If the haemangioma has a height of more than 2 mm, cryotherapy would manage a reduction of the redness or even an ulceration, but not a regression.

Laser Treatment

The neodymium:yttrium aluminium garnet (Nd:YAG) laser (1060 nm) is the most common laser device for the treatment of haemangioma because it penetrates deeper in the tissue and is not readily absorbed by haemoglobin or water. Through selective thermolysis, the laser beam destroys the haemangioma vessels.

Laser treatment is suitable for haemangiomas that have a large surface and large volume and are superficial (flat and reddish) or deep (beneath the skin surface and bluish).

The Nd:YAG laser beam could be applied over an ice cube, with the special handpiece through the skin (transcutaneous). The ice cube cools the skin surface and avoids blistering. The heat reaches a depth of about 8 mm under the skin surface.

Another option is an intralesional application with the bare laser fibres. In this modality, the light reaches the vascular tumour without any absorption, reflexion, or refraction. Thermolysis is much more effective than the transcutaneous application, but the side effects are more obvious.

Treatment with the Nd:YAG laser is painful, so general anaesthesia is necessary. During this treatment, the eyes of the child have to be closed and protected.

The laser treatment has to be repeated in intervals of 6 to 8 weeks; haemangioma on the face, lip, or eyelid needs 3–5 laser sessions (Figure 111.2).

The pulsed dye laser (PDL; 585 nm) penetrates no deeper than 1–2 mm and is mainly used for reducing the redness of a haemangioma. It could be used in certain devices as a combination with a Nd:YAG laser for the treatment of large haemangiomas.

PDL alone is mainly used for the treatment of a "port-wine stain", or nevus flameus, a vascular malformation of the capillaries.

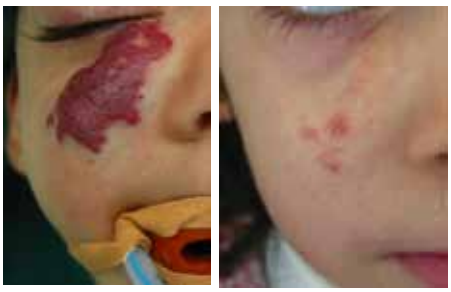

Figure 111.2: Haemangioma of the face before (left) and after (right) five Nd:YAG laser treatments.

Surgical Treatment

Surgical treatment is mainly performed after laser treatment or after an incomplete spontaneous regression when a haemangioma rest causes a cosmetic problem. Large haemangiomas at the neck or trunk, especially those under the skin, usually undergo surgical treatment. The incision lies in the skin tension lines, the skin closure causes no problem, and the result is very satisfactory. Some authors advocate circular excision and insertion of a purse-string suture, which can be performed serially.

Bulky haemangiomas at the hairy part of the head can be removed surgically if they cause cosmetic problems. The wound closure will leave a thin scar, which would be covered by the hair. The surgical removal of haemangiomas at the extremities is limited due to the difficult skin-defect cover. Operation of a haemangioma in childhood

requires a general anaesthetic. The advantage of the surgical procedure is the definite complete removal of this vascular tumour in most cases in one session of general anaesthetics. The results are very satisfactory if the size and location of the haemangioma are considered. The remaining scar should be discussed with the parents before surgery.

Injury of other structures, such as nerves and important vessels, can be avoided through meticulous operative technique and loupe magnification.

Systemic or Intralesional Steroid Treatment

The positive effect of systemic steroids in the treatment of haemangiomas is well known, especially in rapid progressive haemangiomas on the face or other critical locations. The side effects of systemic steroids (e.g., weight gain, growth arrest, cataracts, and cardiomyopathy) are also well known. These side effects are usually reversible. The recommended systemic steroid treatment is 3–5 mg/kg per day. This dosage should be taken for no less than 6 weeks and for as long as 12 weeks.

The use of intralesional steroids with success is mainly reported in ophthalmic cases of periorbital haemangiomas. The use of a mixture of triamcinolone acetonide (cristalloid) and betamethesone acetate is related to severe complications, such as vascular occlusion of the retina and eyelid necrosis. Therefore, this method is mainly used only by experienced ophthalmologists.

Systemic Beta-Blocker Treatment

In 2008, successful treatment of complicated haemangiomas with the systemic beta-blocker propranolol was reported. Propranolol should be given, after cardiological examination with US and electrocardiogram (ECG), under blood-pressure monitoring in the hospital at a dose of 2 mg/kg per day in 3 daily divided doses. Severe side effects are not reported. The results are very encouraging, so propranolol could substitute for systemic steroid application in the treatment of complicated haemangiomas (Figure 111.3).

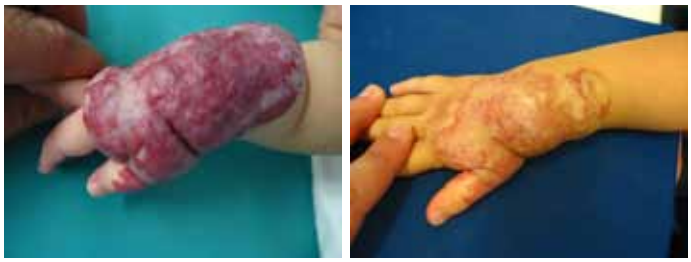

Figure 111.3:Before (left) and after (right) beta-blocker systemic therapy

Intralesional Bleomycin

Intralesional bleomycin has been reported for the treatment of large complicated haemangiomas. Bleomycin is a sclerosant and an antineoplastic agent that has an apoptotic effect on rapidly growing immature cells. This method requires multiple general anaesthetics in children. Scarring with overlapping hyperpigmentation is a common side effect.

Intralesional Fibrin Glue Treatment

The use of fibrin glue injections in vascular tumours and vascular malformations is occasionally reported with encouraging results.

Systemic Interferon Alpha Treatment

Interferon alpha therapy is reserved for life-threatening haemangiomas due to its severe side effects (e.g., fever, leucopaenia, nephritis, nephrotic syndrome, and autoimmune diseases such as thyroiditis and spastic paresis).

Evidence-Based Research

To date, no studies compare the different treatment modalities, considering the wide range of vascular tumours and vascular malformations.

Key Summary Points

1. Haemangiomas are the most common benign tumours in infancy.
2. Sixty percent of haemangiomas appear at the head and neck.
3. The standard for diagnosis of haemangiomas is a physical examination, using ultrasound with colour Doppler for the assessment of tumour dimensions.
4. The choice of treatment depends on factors such as type, size, rate of growth, location of haemangioma, and age of the child.
5. The usual treatment modalities are cryotherapy, laser treatment, surgery, systemic treatment with steroids, and beta blockers.

Suggested Reading

Cremer H, Hämangiome (vaskuläre Tumoren)- neue Klassifizierung [Hemangiomas (vascular tumours) new classification]. Kinder und Jugendartz 2008; 39(9).

Höger P. Vaskuläre Tumoren und Malformationen. In: Höger P. Kinderdermatologie. Schattauer, 2005, Pp. 247–280.

Pienaar C, Graham R, Geldenhuys S, Hudson DA. Intralesional bleomycin for the treatment of hemangiomas. Plast Reconstr Surg 2006;117(1):221–226.

Stringel G. Hemangiomas and lymphangiomas, In: Ashcroft KW, Pediatric Surgery, 3rd ed. Saunders, 2000, Chap 71, Pp 965–986.

Wiese K, Kirchhoff L, Merten H-A, Orofaziale Hämangiome und Lymphangiome [Orofacial hemangiomas and lymphangiomas]. CHAZ 2006; 7(10):428–438.