G. Hemangiomas and vascular malformations

Classification of vascular anomalies is still confusing and changing

Vascular anomalies described in this textbook are categorized on conventional, descriptive terms or histopathologic terms. However, it is a confusing classification, because “hemangioma” simplex is not tumorous but a malformation of normal capillaries. In 1982, Mulliken and Glowacki proposed a novel classification system for vascular anomalies based on cellular features and natural history. Now classification proposed by International Society for the Study of Vascular Anomalies (ISSVA) has been updated and used. According to the classification, cutaneous vascular anomalies described in this textbook could be classified as follows. Note that some syndromes demonstrate various types of hemangiomas and vascular malformations, such as Klippel-Trenaunay-Weber syndrome and Maffucci syndrome.

Classifications of vascular anomalies.

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1. Hemangioma simplex

Synonyms: Capillary malformations, Port wine stain, Nevus flammeus

Clinical features

A flat, sharply margined red patch results from capillary
telangiectasia in the shallow dermal layer. It is present at birth (Figs. 21.33-1 and 21.33-2). The skin lesion remains through life, deepening in color slightly with age. When the face is involved, it may thicken after puberty and multiple nodular elevations may occur (hypertrophic port wine stain).

A light pink patch may be caused on the midline region of the face in a specific type of hemangioma simplex called medial nevus. Hemangioma on the forehead and eyelids, called salmon patch, disappears spontaneously by age 2; hemangioma on the neck, called nevus Unna, does not disappear spontaneously.

**Complications**

Hemangioma simplex may occur as a symptom of Sturge-Weber syndrome or Klippel-Trenaunay-Weber syndrome.

**Pathogenesis, Pathology**

Dilation and increase of capillaries are found in the upper dermal layer (Figs. 21.34 and 21.35).

**Treatment**

Dye laser therapy is the first-line treatment. Concealing cosmetics are useful.
2. Strawberry mark

Synonyms: Congenital/infantile hemangiomas.

Outline

- A bright red, elevated lesion results from proliferation of premature capillaries. It appears 3 to 4 weeks after birth, enlarging until the age of 6 to 7 months.
- The face and arms are often involved. It heals spontaneously with soft scarring in several years.
- Dye laser irradiation is the main treatment. Follow-up without treatment may be chosen.

Clinical features

Shortly after birth, telangiectatic erythema occurs on the face or arm, expanding gradually to form an elevated red tumor by the age of 3 to 6 months. A strawberry mark, a soft tumor, is seen in 1% of newborns; it resembles a halved strawberry stuck on the skin (Figs. 21.36-1 and 21.36-2). The color disappears by diascopy. A tumor may develop on the lesion. After its peak, the strawberry mark subsides at the stationary phase, in most cases disappearing with light scarring by later childhood.

Pathogenesis, Pathology

The primary lesion is proliferation of vascular endothelial cells. The tumor is bright red and composed of the proliferation of premature vessels. Strawberry mark is vascular dysplasia caused by an angioblast mass; it does not differentiate into normal capillary tissue (Fig. 21.34).

Treatment

Doctors used to take a wait-and-see policy of observation with regard to strawberry mark. However, in recent years, laser therapy...
has been performed for cosmetic purposes even at infancy, because scarring may remain after spontaneous healing. The earlier the laser therapy begins, the more effective it is. Systemic administration of steroids may be necessary in cases in which the lesion continues to enlarge 6 months after birth or when eyelid involvement may cause visual disturbance.

3. Cherry angioma

Synonym: Senile angioma

Multiple, punctate, glossy, bright red papules occur on the trunk. The onset is after the second decade of life, and the papules become more numerous with age. The pathogenesis is thought to be reactive vascular proliferation. Localized capillary proliferation is histopathologically found in the lower papillary dermis (Fig. 21.37).

4. Glomeruloid hemangioma

This is vascular proliferation. Hemangioma of 1 cm or less in diameter occurs in about half of patients with POEMS syndrome (MEMO) (Fig. 21.38). There is secretion of vascular proliferation factors and elevated levels of estrogen in the blood. Although glomeruloid hemangioma clinically resembles senile angioma, it appears suddenly on the trunk, extremities, and head.

**POEMS syndrome**

Synonyms: Crow-Fukase syndrome, Takatsuki disease

POEMS is an initialism for polyneuropathy, organomegaly of liver, spleen or lymph nodes, endocrinopathy, monoclonal gammopathy and skin changes. Various skin lesions, such as glomeruloid hemangioma, pigmentation, trichosis, scleroderma, diffuse sclerosis, livedo reticularis and Raynaud’s disease, and clubbed fingers are caused by POEMS syndrome.
and neck region of persons in their second third decade of life. Dome-shaped nodules that are too firm to be displaced by digital pressure and whose color is lighter pink than those in senile angioma appear.

### 5. Venous lake

A small, slightly elevated, dark blue nodule occurs mainly on the face, or lips of the elderly (Fig. 21.39). Histopathologically, the underlying disease is telangiectasia.

### 6. Spider angioma

**Synonyms:** Nevus araneus, Vascular spider

Capillaries extending radially from a red papule of several millimeters in diameter give the appearance of a spider spreading its legs (Fig. 21.40). The face, neck, shoulders, chest and upper arms are frequently involved. It is most common in pregnancy or hepatopathy, when estrogen levels are elevated, although it may appear even under normal conditions. The eruptions fade by diascopy. Dye laser therapy and electrocauterization are the main treatments. Spider angioma in children disappears spontaneously.

### 7. Angiokeratoma

**Synonym:** Capillary-lymphatic malformation

Angiokeratoma is caused by proliferation of capillaries in the dermal papillae. The epidermis that proliferates around the capillaries becomes hyperkeratotic, leading to verrucous surface (Figs. 21.41, 21.42 and 21.43). Histopathologically, there is capillary telangiectasia immediately below the epidermis. Angiokeratoma is classified into five subtypes. Various factors are associated with the occurrence of angiokeratomas, which are classified into five subtypes.

1. **Solitary angiokeratoma**
   - It results from injury.
2. **Angiokeratoma of Mibelli**
   - Chilblains present as a prodrome. The hands and legs are frequently affected. It is autosomal dominant.
3. **Angiokeratoma scroti (Fordyce)**
   - It is an angioma that occurs in large numbers.
4. **Angiokeratoma circumscriptum naeviforme**
   - Verrucous vascular papules arrange themselves linearly on the unilateral extremities and trunk at birth. Crusting is present.
5. **Angiokeratoma corporis diffusum**
   - Small, multiple, papular angiomas occur on the trunk of patients with lysosomal storage diseases such as Fabry’s disease and Kanzaki disease (Chapter 17).
8. Cavernous hemangioma

Synonym: Venous malformation

Outline

- Malformed veins proliferate in the deep dermal layer.
- A soft, subcutaneous tumor of normal skin color or light purplish-pink occurs in early childhood.
- Strawberry mark may occur on the surface of the lesion.
- It is surgically removed.

Clinical features

Small, mature, malformed vessels (mainly veins) proliferate in the deep dermal layer (Figs. 21.44 and 21.34). Cavernous hemangioma is present at birth as a large, soft, subcutaneous tumor. The color is in the range of normal skin color to light blue or reddish purple. Small erythematous are dispersed on the surface of the tumor. The surface may have strawberry mark. Bleeding may result from platelet consumption (Kasabach-Merritt syndrome). Tenderness is not present. Cavernous hemangioma does not heal spontaneously.

Complications

Cavernous hemangioma is usually solitary. When it occurs multiply, blue rubber-bleb-nevus syndrome and neurocutaneous syndromes such as Maffucci’s syndrome are suspected.

Treatment

It is surgically removed. Intratumor coagulation (sclerotherapy) may be performed. Radiation therapy is ineffective.

9. Kasabach-Merritt syndrome

Outline

- Platelet consumption occurs from large angioma, leading to thrombocytopenia and disseminated intravascular coagulation (DIC).
- Subcutaneous induration appears in the first 3 months of life. It enlarges relatively rapidly to form a giant angioma that is dark red to purple.
- Radiation therapy, oral steroids and treatments for DIC are the main treatments.

Clinical features

Angioma occurs most frequently on the extremities and the head and neck region. Extremely firm, light pink subcutaneous induration first occurs in the first 3 months of life (Fig. 21.45). It is followed by intratumor bleeding and edematous enlargement, resulting in the formation of a giant, dark purple, tense tumor. Purpura is easily caused by thrombocytopenia. Persistent
coagulopathy and thrombocytopenia result in DIC.

**Pathogenesis**

Intratumor bleeding is caused by rapid enlargement of a large angioma in newborns, leading to platelet consumption. Cutaneous angioma resembles strawberry mark. Premature cutaneous angioma is thought to result in congestion, platelet consumption and coagulation-factor consumption. Histopathologically, most cutaneous angiomas causing Kasabach-Merritt syndrome resemble Kaposi's sarcoma, which is called kaposiform hemangioendothelioma.

**Treatment**

DIC is symptomatically treated. The treatment for Kasabach-Merritt syndrome is the same as for angioma. Radiation therapy is effective, because the angioma in Kasabach-Merritt syndrome is highly sensitive to radiation. Oral steroids are also useful.

**10. Cutaneous arteriovenous malformation**

Congenital vascular deformity and several embryonic arteriovenous fistulae are the underlying condition. The skin lesion may appear hemangioma-simplex-like or indistinct. It begins to enlarge at a certain point, and swelling accompanied by heat sensation on the surface of the lesion occurs. Pulsation and tremor are present. When the extremities are involved, the lesion enlarges and may cause Klippel-Trenaunay-Weber syndrome.

**11. Tufted angioma**

**Synonym**: Angioblastoma of Nakagawa

It begins as erythema that gradually enlarges to form a flatly elevated, infiltrating plaque. Tufted angioma is a vascular tumor in which immature endothelial cells and pericytes proliferate. The color ranges from light pink to dark purplish-red. The pathogenesis is unknown.

**12. Spindle-cell hemangioendothelioma**

A bluish subcutaneous tumor occurs, most frequently in the distal areas of the extremities in young persons. Histopathologically, it is composed of dilated vascular lumens and portions of proliferated spindle cells. Multiple tumors are caused in localized areas; however, it is benign and does not metastasize.

**13. Glomus tumor**

- It is a benign tumor that is derived from glomus cells in

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Clinical images are available in hardcopy only.

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**Fig. 21.46-1 Glomus tumor formed under the nail.**

Deformity of nail and severe tenderness occurred.
the neuromyoarterial glomus of skin on the distal fingers.

- A firm, dark red to bluish-brown tumor forms in the finger or toe, often under the nail plate. Intense tenderness is present.
- Paroxysmal pain intensifies at night or with exposure to extreme cold.

**Clinical features**

Glomus tumors are either solitary or multiple, with most being solitary. A solitary glomus tumor occurs most frequently under the nail plate of individuals older than age 20. A firm, painful nodule of 1 cm or less in diameter and ranging in color from dark red to purplish red occurs (Figs. 21.46-1 and 21.46-2). Glomus tumors are characterized by extreme pain from pressure or exposure to cold water. In multiple glomus tumors, the tumors are autosomally dominantly inherited and can occur in persons of any age. Asymptomatic, disseminated, soft tumors of normal skin color to blue and about 1 cm in diameter appear on the whole body. They may appear in linear pattern in rare cases.

**Pathogenesis**

A glomus tumor is a hamartoma caused by proliferation of glomus cells.

**Pathology**

Glomus cells surround blood vessels. Pericyte-originated smooth muscle cells proliferate, and the luminal structure is surrounded by single-layered endothelium in the tumor (Fig. 21.47). Glomus cells stain in desmin and myosin. A solitary glomus tumor is covered by a richly enervated membrane. In multiple glomus tumors, vascular lumens extend in a spongiform pattern.

**Differential diagnosis**

Multiple glomus tumors are differentiated from cavernous hemangioma and blue rubber-bleb-nevus syndrome. Glomus tumors underneath the nail plate should be differentiated from subungual exostosis.

**Treatment**

The tumor is excised.

**14. Hemangiopericytoma**

A firm, elastic, relatively sharply margined nodule occurs in the lower leg, the thigh in particular. Histopathologically, round or spindled cells that resemble pericytes proliferate around the capillary lumens, which are covered by a single-layered endothelium.
15. Lymphangioma

Synonym: Lymphatic malformation

Outline

- It is a benign lesion caused by lymphangial hyperplasia and dilation resulting from dysplasia of lymph vessels.
- Vesicles of 1 mm to 2 mm in diameter aggregate. Bleeding in the vesicles may result in papules whose color ranges from red to black.
- It is surgically removed.
- Postoperative lymphangioma in the axillary fossae or groin after breast cancer or uterus cancer is called lymphangiectasis (acquired lymphangioma).

Classification, Clinical features, Pathology

Lymphangiomas are classified into the three types.

Lymphangioma circumscriptum: Transparent vesicles of several millimeters in diameter aggregate to form irregularly shaped plaques. The vesicles appear reddish from bleeding. The thickened epidermis may appear verrucous. Histopathologically, lymphangiectasia is found in the dermal papillary layer.

Lymphangioma cavernosum: This is a large, deep-seated, subcutaneous tumor. The color ranges from light pink to bluish purple. The tumor pulsates. Lymph fluid is discharged from the tumor by puncture. The tongue, face and genitalia are frequently involved. Histopathologically, irregular lymphangiectasia occurs in the subcutaneous and deep dermal layers.

Lymphangioma cysticum: The lateral region of the head is most commonly affected (Fig. 21.47). Lymphangiactasia is histologically observed in the deep dermal layer.

Laboratory findings

The depth and three-dimensional structure of the tumor are clearly shown by MRI and CT diagnostic imaging.

Treatment

Surgical removal and sclerotherapy are the main treatments.

16. Pyogenic granuloma

Synonym: Telangiectatic granuloma

Clinical features

An angioma whose main symptoms are proliferation of capillaries and dilation of vascular lumens is induced by injury. The tumor is soft and pedunculated, ranging in color from bright red to dark red. It is elevated in a dome shape, with a diameter of 5 mm to 20 mm (Fig. 21.49). Bleeding is easily caused by injury, leading to ulceration. The face of children and the trunk and extremities of adults are most commonly involved. The skin
lesion appears suddenly, forms erosion and bleeds. Pyogenic granuloma should be differentiated from amelanotic melanoma.

**Pathology**

Pathologically, there is an angioma accompanied by secondary inflammatory granuloma, or there is granuloma that is non-angiomatus in structure.

**Treatment**

Excision, cryotherapy and laser therapy are conducted; there may be recurrence in cases of incomplete treatment.

## 17. Intravascular papillary endothelial hyperplasia

The blood vessels proliferate as a result of thrombotic recanalization in the dilated venulae. It is a reactive change of thrombotic vessels often seen in adults. A purplish-red nodule occurs, most frequently in the veins of the palmar surfaces of fingers. Thrombus formation may cause pain.

### H. Fibrous tumors

#### 1. Soft fibroma

**Synonyms:** Fibroma pendulans, Acrochordon, Skin tag

**Clinical features**

A soft, dome-shaped or pedunculated tumor with wrinkles on the surface and a color of normal skin or light brown occurs on the neck, axillary fossae or groin (Fig. 21.50). Small, multiple, threadlike tumors 2 mm to 3 mm long on the neck and axillary fossae are called acrochordon. A solitary, relatively large tumor of about 1 cm on the trunk is called soft fibroma. An enlarged soft fibroma hanging from the skin is called a soft fibroma pendulum. Soft fibroma tends to occur in obese persons and women; it is thought to relate to skin aging.

**Pathology**

The primary condition of soft fibroma is proliferation of collagen bundles with few fibroblasts. In soft fibroma, fat cells are contained in tumors in many cases.

**Treatment**

The peduncle of the soft fibroma may be excised and the site treated by cryotherapy.