
الجامعة الأردنية
ويعلمهم الكتاب والحكمة
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INTRODUCTION

- Vascular lesions, including vascular neoplasms and vascular malformations, are common in newborns .
- Although the majority of these lesions are benign and self-limited conditions, some may be part of complex syndromes or systemic disorders or may be associated with complications.

This pathology might affect any organ

Size varies from small isolated lesions to complex lesions with secondary effect that can cause signifncant morbidity and mortality

Regarding to diagnosis , based on clinical features and special investigations like doppler US , contrast enhanced MRI , AND histology if unrecognizable , rarely : angiography , it takes the form of treatment rather than for diagnosis

CLASSIFICATION OF VASCULAR ANOMALIES

2 ✓

- Vascular anomalies were classified by Mulliken and Glowacki in 1982 into infantile haemangiomas and vascular malformations, based on clinical and histological characteristics.

- The International Society for the Study of Vascular Anomalies (ISSVA) modified the terms to tumours and malformations in 1996, and this simple structure is applicable to in excess of 90% of lesions [this classification was broader including tumors]

Difficulty in treatment means that much managament is usually supportive rather than cure in some sitiuations

ISSVA 2014

The 2014 ISSVA classification for vascular anomalies

Vascular anomalies

Vascular tumours

Benign
Infantile haemangioma
Congenital haemangioma
- Rapidly involuting (RICH)
- Non-involuting (NICH)
- Partially involuting (PICH)

Tufted angioma
Others

Locally aggressive or borderline
Kaposiform haemangioendothelioma
Kaposi sarcoma
Others

Malignant
Angiosarcoma
Others

Associated with other lesions
PHACES syndrome[a]

Vascular malformations

Simple
Slow Flow
Capillary malformations (CM)
Venous malformations (VM)
Lymphatic malformations (LM)
High Flow
Arteriovenous malformations (AVM)
Arteriovenous fistula (AVF)

Combined
Combined channel malformations e.g. CVM, CLM, LVM, CAVM
Others

Associated with other anomalies (<5% of cases)

Klippel-Trenaunay syndrome: CM + VM +/- LM + limb overgrowth
Parkes Weber syndrome: CM + AVF + limb overgrowth G
Servelle-Martorell syndrome: limb VM + bone undergrowth
Sturge-Weber syndrome: facial + leptomeningeal CM + eye anomalies +/- bone and/or soft tissue overgrowth G
Limb CM + congenital non-progressive limb hypertrophy
Maffucci syndrome: VM +/- spindle-cell hemangioma + enchondroma
Macrocephaly - CM (M-CM / MCAP) G
Microcephaly - CM (MICCAP) G
CLOVES syndrome: LM + VM + CM +/- AVM + lipomatous overgrowth G
Proteus syndrome: CM, VM and/or LM + asymmetrical somatic overgrowth G
Bannayan-Riley-Ruvalcaba sd: AVM + VM +macrocephaly, lipomatous overgrowth G

Of major named vessels
Affect lymphatics, veins, arteries
Anomalies of origin [course, number, length, diameter (aplasia, hypoplasia, stenosis, ectasia / aneurysm), valves]
Communication (AVF) persistence (of embryonal vessel)

[a] Posterior fossa malformations, Haemangioma, Arterial anomalies, Cardiovascular anomalies, Eye anomalies, Sternal clefting and/or Supraumbilical raphe.

Modified from Dasgupta & Fishman, 2014[2]

ISSVA 2014

ISSVA Classification for vascular anomalies

Vascular anomalies				
Vascular tumors	Vascular malformations			
	Simple	Combined *	of major named vessels	associated with other anomalies
Benign Locally aggressive or borderline Malignant	Capillary malformations Lymphatic malformations Venous malformations Arteriovenous malformations* Arteriovenous fistula*	CVM, CLM LVM, CLVM CAVM* CLAVM* others	See details	See list

° defined as two or more vascular malformations found in one lesion

* high-flow lesions

Vascular tumours

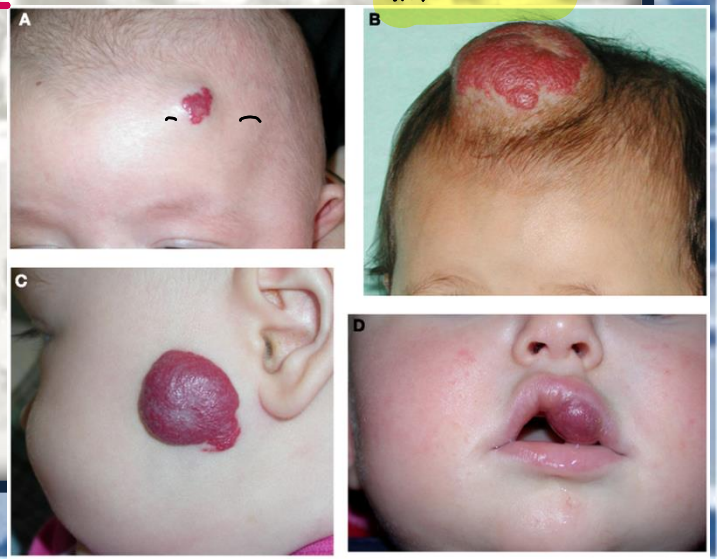
- The majority of vascular tumours are benign and 95% are infantile haemangiomas.

Infantile haemangiomas

- Benign (strawberry naevae)
- 10% of full term vs 20% of premature babies
- F:M 2:1
- Predilection for the head and neck
- Presentation
  - usually appear after 2 weeks of life
  - undergo 3 stages then characteristic features appear

usually not present at birth

Although some subtle minority have: Herald Patch



Infantile haemangiomas

- Stage 1:
  - A rapid proliferating phase during the first 5-8 months of life is characterized by rapid, distressing and potentially disfiguring growth of the haemangioma.
  - These are soft and warm, with a prominent Doppler signal. : when we put doppler US : high flow lesion
  - When situated on the skin surface they appear bright red (hence the term 'strawberry naevus')

if they were deeper in subcutaneous tissue : bluish or even no color

Infantile haemangiomas

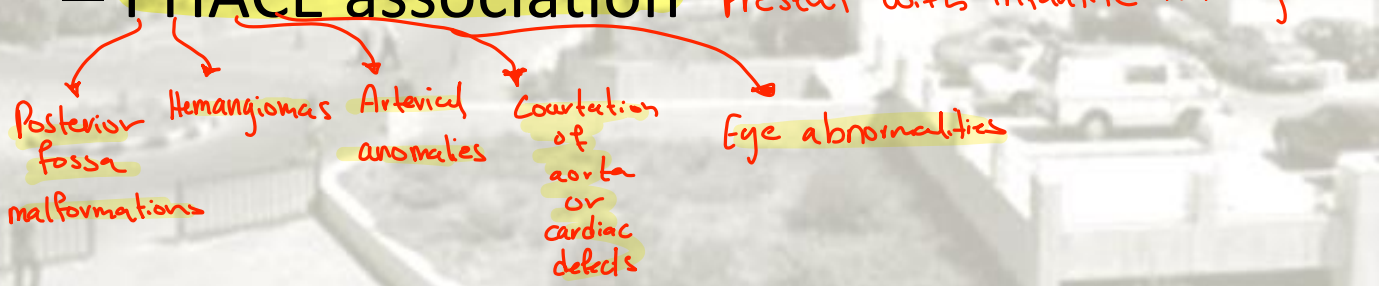
- Stage 2.
  - A prolonged involuting phase lasts until the age of 7-9 years.
  - During this phase the lesions initially become darker with a grey hue, slowly lose their color and have fine capillary telangiectasia. + increase in flow of mast cells and fibroblasts

Infantile haemangiomas

- Stage 3.
  - A final involution phase is characterized by the presence of a soft lump that is visible in the case of superficial lesions and less so in deeper lesions.
  - The lesion regresses by the age of 7 years in 70% of cases, and by 9 years in 90%. unlikely to regress after the age of 11
  - Histologically, the cellular parenchyma has been substituted almost completely with a fibro-fatty residue.

Infantile haemangiomas

- Features:
  - Localized / diffused
  - Histologically share features of placental tissue
  - Expression of glucose transporter protein GLUT-1
  - PHACE association



Management

- Treatment is mostly expectant
- Rarely biopsy : → if diagnosis is uncertain
  → differential diagnosis with malignant lesion
- CBC : to rule out thrombocytopenia
- MRI/ US : to look for internal lesions [specially lesions > 8]
  in order to rule out possibility of internal involvement that might explain high output cardiac failure

Management

- ***Active intervention is necessary in the presence of complications such as***:
  - large size or disfigurement (disturbance of normal growth)
  - multiple lesions causing high-output cardiac failure
  - obstruction of vital structures (vision, airway)
    - in subglottal space
  - persistent ulceration. /infection

Treatment

- Propranolol :
  - 1st line
  - Cause vasoconstriction
  - 1-2mg/kg/day

Steroids

- Second line
- Intra-lesional
  - 2mg/kg every 4-6 weeks

- Systemic therapy
  - Rebound growth!!
    - if you stop steroids suddenly → will cause rapid growth
    - we need to titrate the dose gradually.

Embolization

- Is useful in high-output cardiac failure and for treating troublesome, bleeding lesions.

Surgery

- Excision

detected only for the remenant or fibrous tissue

- Tracheostomy : for obstructing airway lesions

* Lazy Eye Syndrome [amlyopia] :

if the vision is obstructed during critical period of growth ; the brain will ignore that eye [even if the vision is repaired after that period ⇝ brain will ignore it]

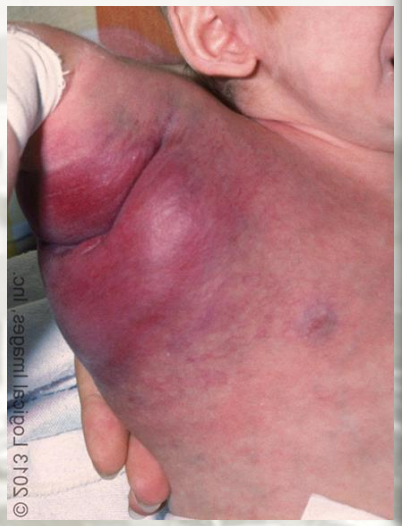
* sites for early surgical excisions that are accepted : eye, nose, lip

Pulsed-dye laser

- There is no evidence that laser treatment alters the natural history of haemangioma.
- It is useful for surface residual telangiectasia (after the age of 10 years). (Remaining type that doesn't regress after age of 4)
- It was used to help coagulate the surface of ulcerated lesions, but dressings are the principal form of wound care.

Kaposiform haemangioendotheliomas

- Locally aggressive
  - rapid growth + extension before the final regression
  - Pink or purple bulging masses
  - sometimes: Painful
  - Complicated by:
    ① dangerous thrombocytopenia
    ② systemic bleeding
- Appear early infancy
- Presentation
  - Kasabach-Merritt phenomenon KMP
- Treatment
  - MTOR +ve : Sirolimus
    - chemotherapeutic agents or embolization
    - steroid resistant

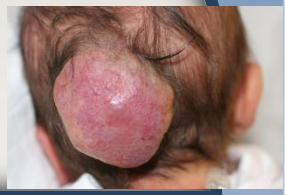


Diagnosis:
Histopathology

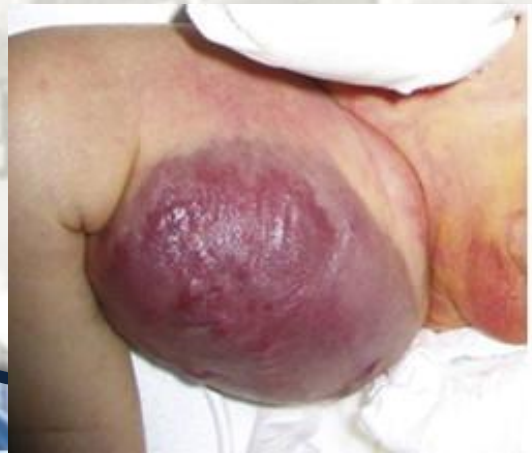
Congenital haemangioma

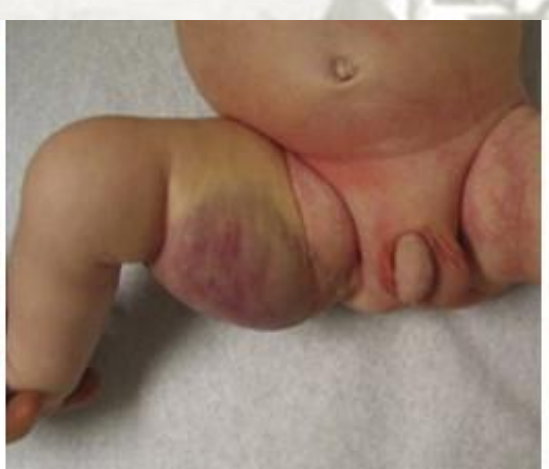
- As the name suggests these are fully developed at birth and three subtypes have been recognized so far.
- They are negative for GLUT-1.

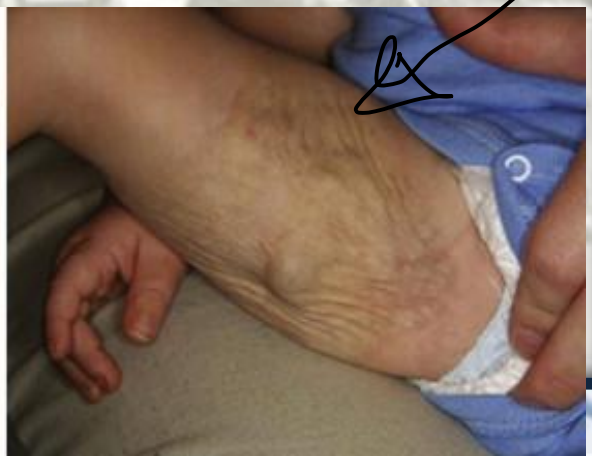
Rapidly involuting congenital haemangiomas



- These are un- common entities that, unlike infantile haemangiomas exhibit a much faster involution with full regression by 1 year of age.
- They present as large masses, often on the legs. They are firmer than infantile haemangiomas, with or without telangiectatic changes. They leave a plaque-like residuum, which may regress further to leave an atrophic patch of skin







RICH

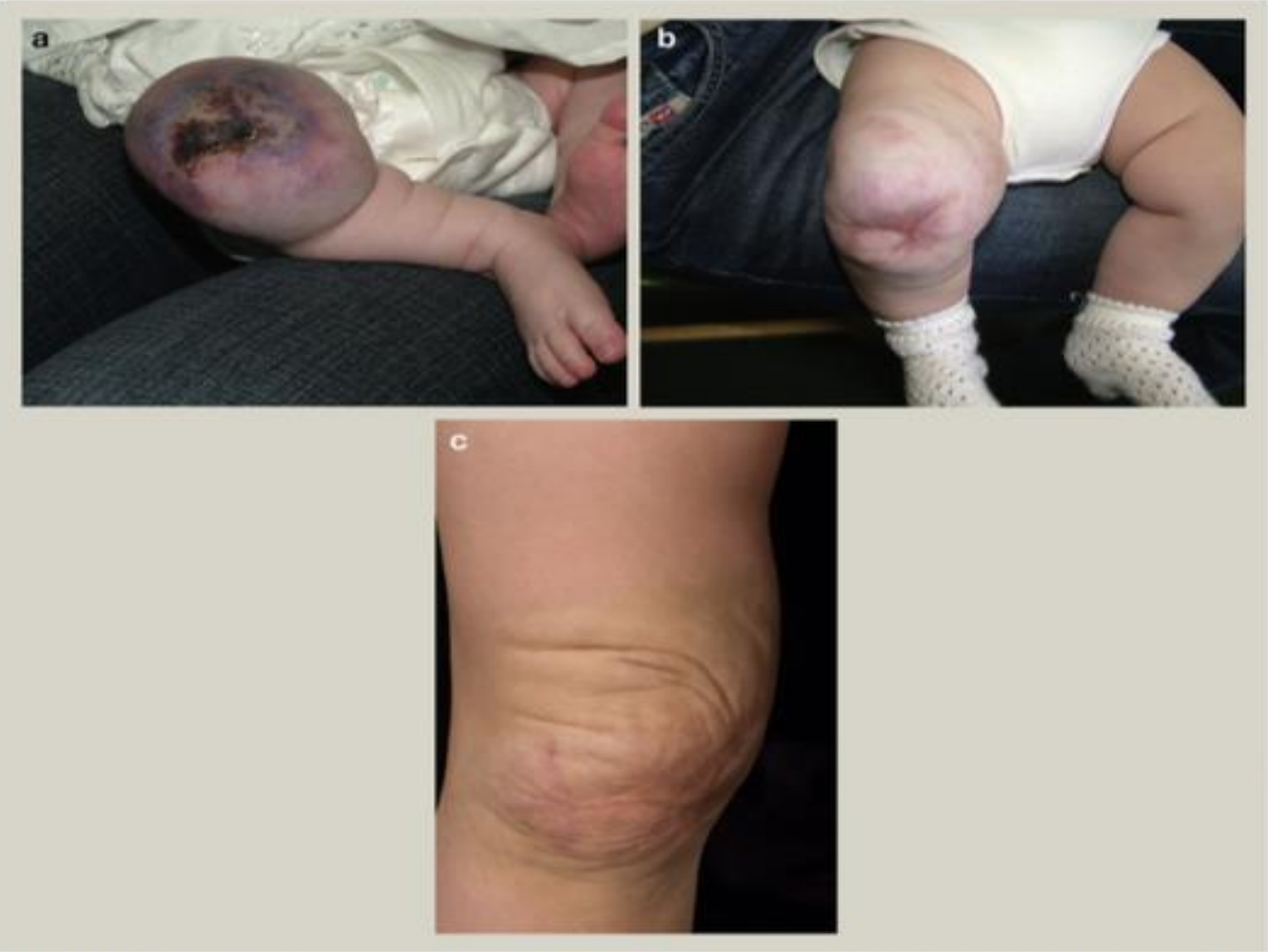
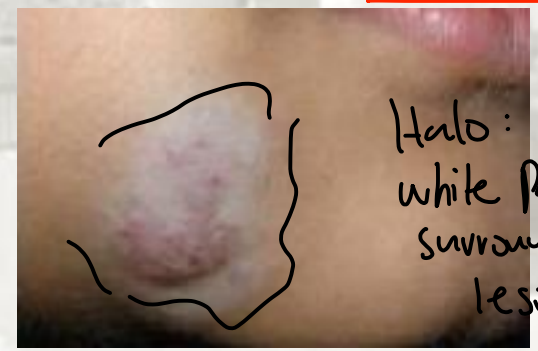
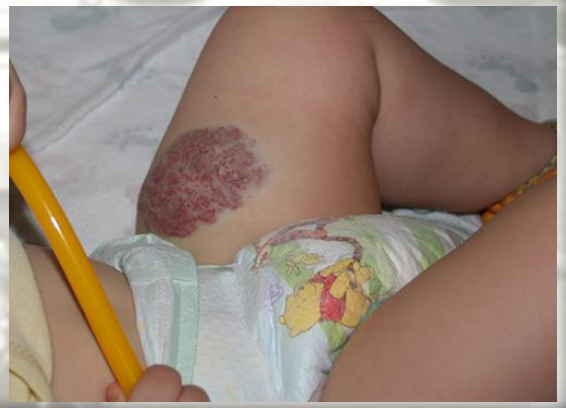


Figure 5 Rapidly involuting congenital haemangioma (RICH) that was fully grown at birth and regressed spontaneously, shown at (**a**) 2 weeks; (**b**) 2 months; and (**c**) 2½ years of age.

Non-involuting congenital haemangiomas

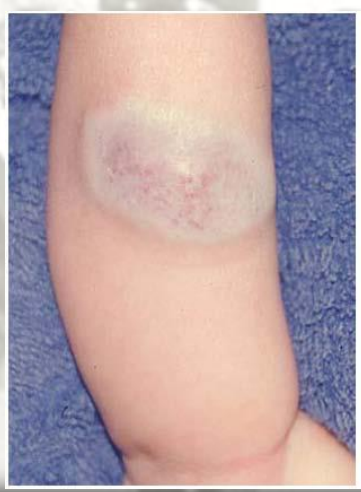
- These are rare tumours that mimic infantile haemangiomas and are of similar texture.
- They are present as round or oval masses, with flat shape or moderately bossed and accompanying telangiectasia, and may have a halo.
- They do not exhibit further growth and do not regress.
- Treatment is by surgical excision.

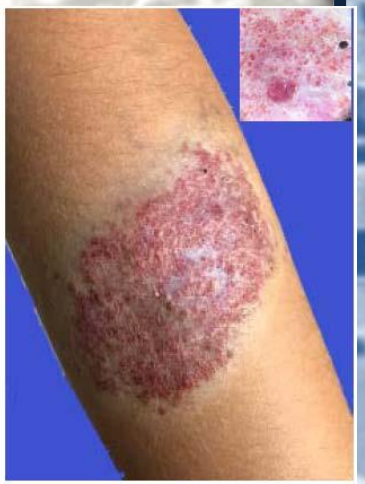




Partially involuting congenital haemangioma:

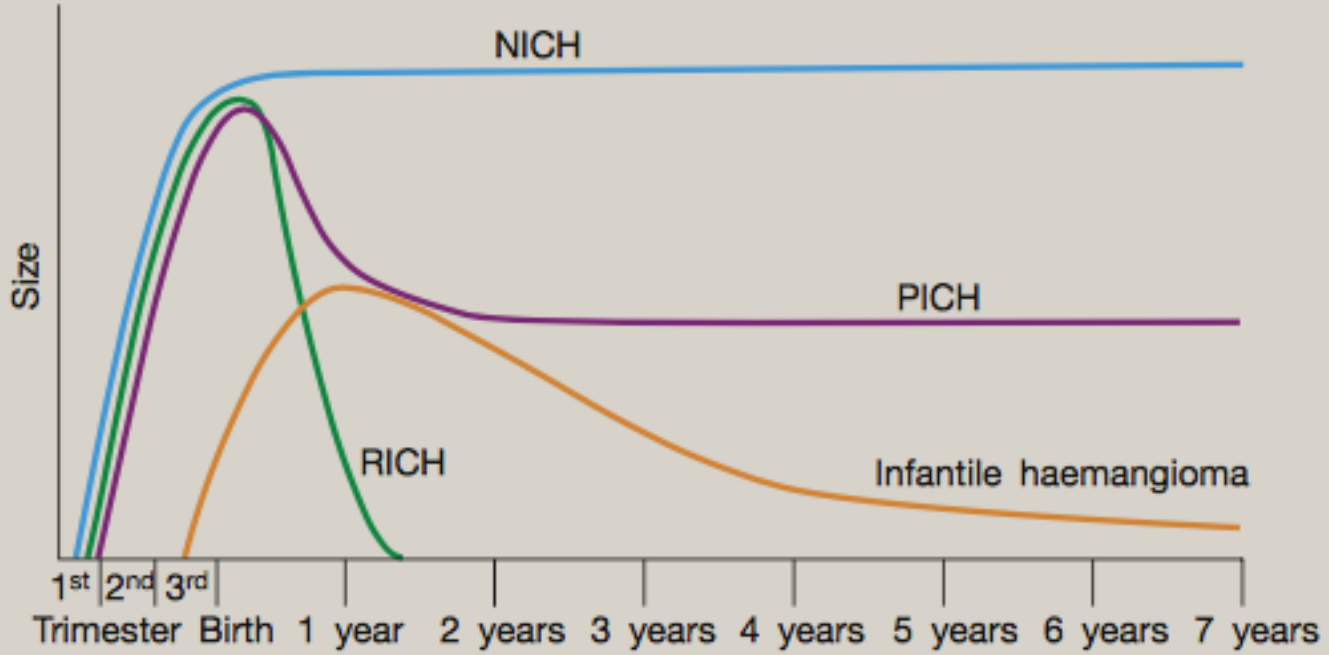
- This is a recently described variant which looks like a NICH but slowly regresses by age 10





Congenital Haemangioma

A diagrammatic representation of growth patterns of the various types of haemangioma



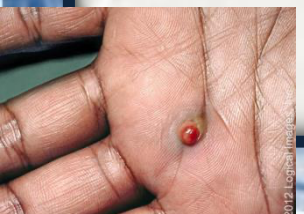
NICH, non-involuting congenital haemangioma;
PICH, partially involuting congenital heamangioma;
RICH, rapidly involuting congenital haemangioma

Adapted from Mulliken & Enjolras 2004

occur at any age but more often in children

Pyogenic granuloma (PG)

- lobular capillary hemangioma
  - benign vascular tumor of the skin or mucous membranes characterized by rapid growth and friable surface.
  - starts as a small red papule that grows rapidly over weeks to months and then stabilizes
  - bleeds profusely after minor trauma and may become ulcerated. Bleeding is difficult to control and often recurrent.



Vascular malformations

- Presentation → in contrast to hemangiomas, occurs at birth
- Regression → Do not regress
- Endothelial cell mitotic rate : shown normal unless in few situations

* main Problem is : abnormal vascular morphology

Vascular malformations

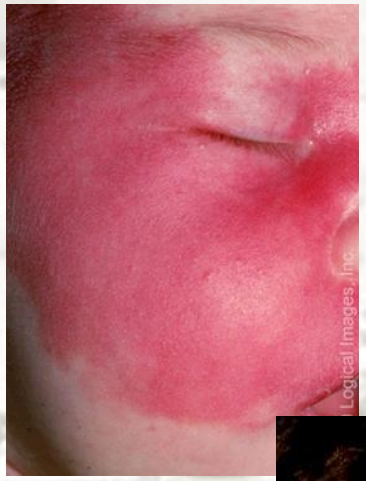
- Types:
  - Flow characteristics
  - Vessel type:
    - capillary, venous, lymphatic and arterial components, or a combination [stimulated during hormonal changes as seen during Pregnancy, Puberty

- Symptoms :- long term soft tissue / skeletal hypertrophy
  - space occupying lesion
  - in the form of 2° effect as infection can be presented with bleeding

Capillary malformations

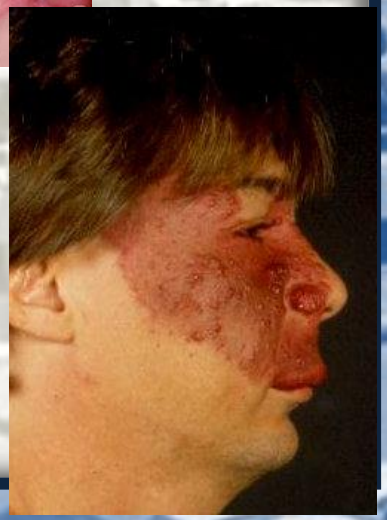
another name:

- Port wine stain — Most common type
  - affect skin

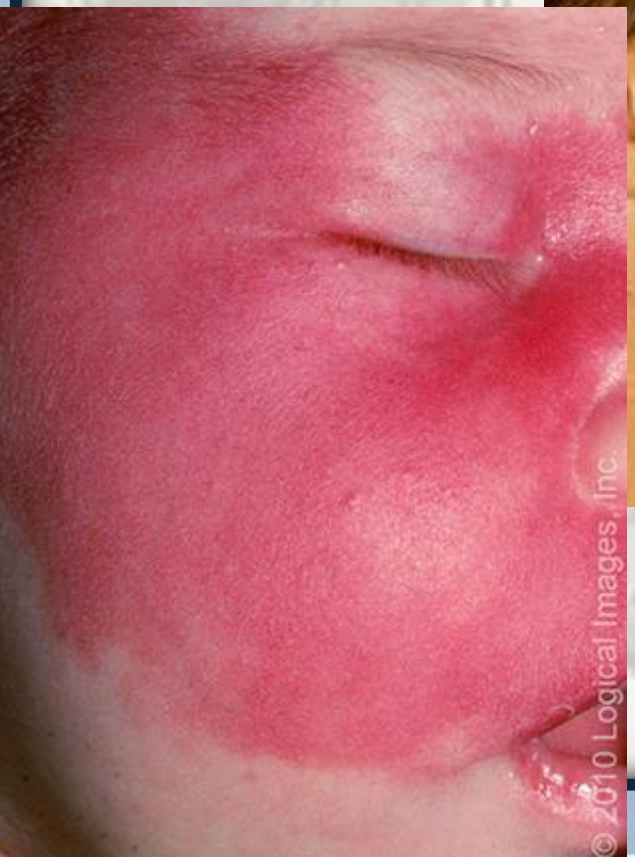


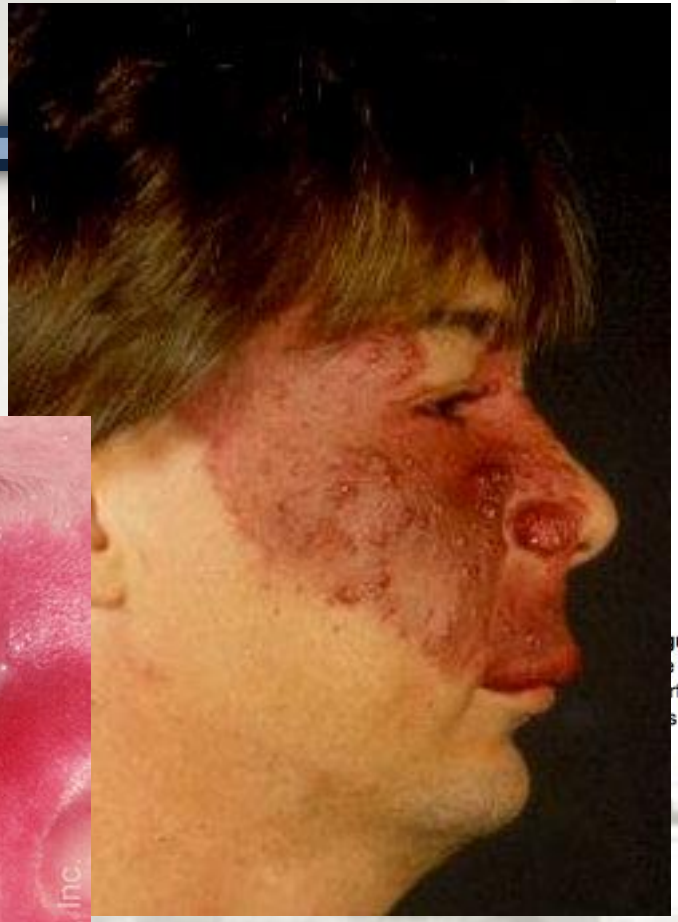
- 0.3% of newborns
  - Present as macular patch, that is Pink firstly later on they turn to red

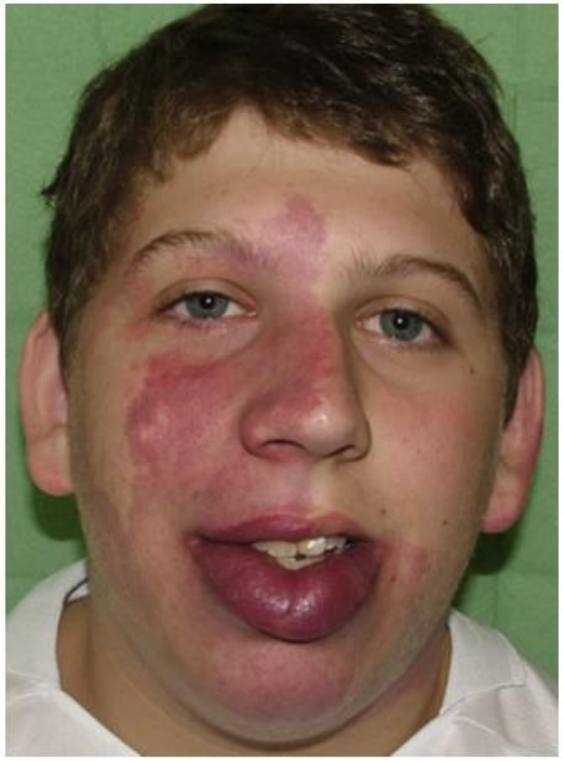
- Presentation
  - normal skin temperature
  - normal doppler signals
  - tissue hypertrophy / nodules
  - ↑ incidence of Pyogenic granuloma



- Associated syndromes
  - Klippel-Trenaunay-Weber syndrome, Parkes Weber syndrome







ure 6 A capillary malformation (port-wine stain) of the right side of face on a 19-year-old boy. Note the skeletal and soft tissue hy-trophy of the affected area. He had two operations to reduce the s in early teenage and a further procedure is planned.

Tissue hypertrophy of the affected side

Management:

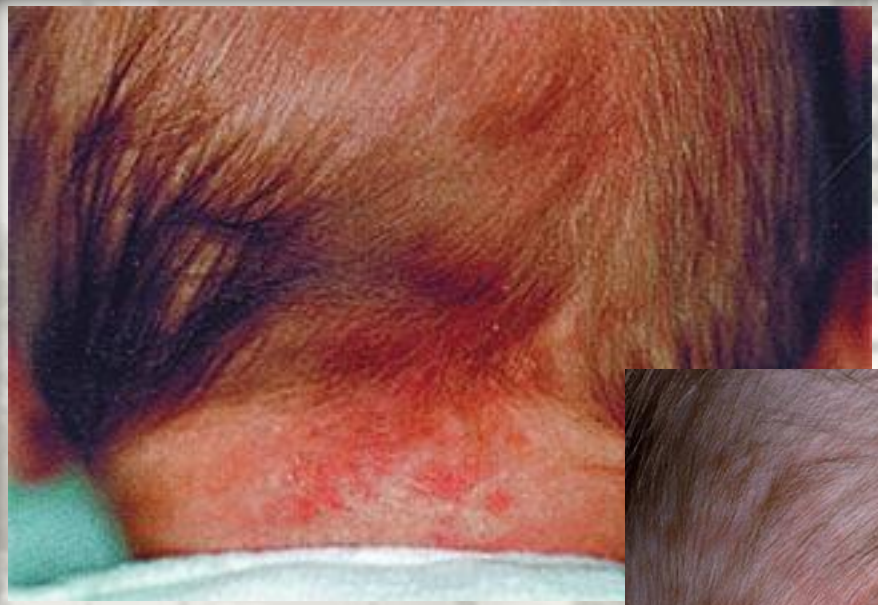
- the colour deformity may cause psychological concern and impair normal social interaction.
  - In teenager and adults tissue hypertrophy may cause further concern.

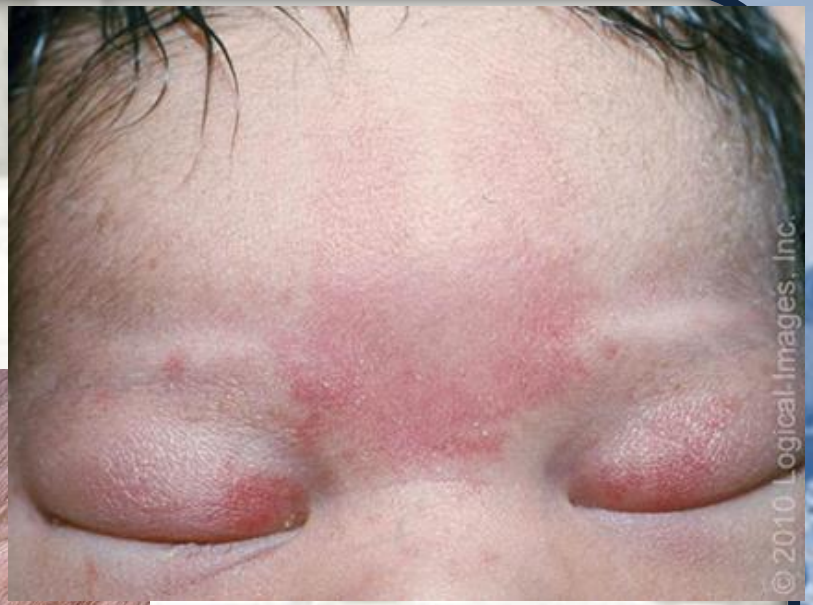
- Management is a combination of supportive with involvement of a clinical psychologist, with camouflage and the use of pulse dye laser therapy.
  - Which can lighten the colour for a number of years.
  - Surgery may be useful for reducing hypertrophied areas the lower lip.

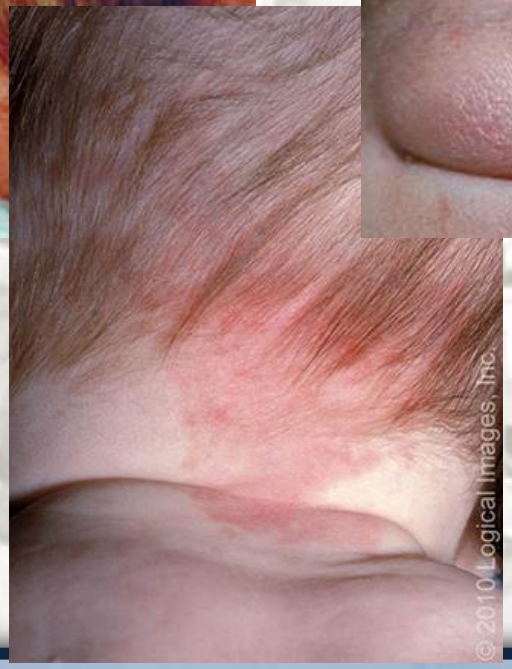
Capillary malformations

- **Nevus simplex (macular stain)** —
  - (macular stain, salmon patch, stork bite, or angel kiss) presents as single or multiple blanchable, pink-red patches in newborn infants.
  - These lesions occur in 40 to 60 % of infants, most commonly on the eyelid, glabella, and midline of the nape of the neck. Less common sites of involvement include the scalp, nose, lip, and back.
  - Nevus simplex generally fades within one to two years, although lesions on the back of the neck may persist unchanged with little consequence

Nevus simplex







Venous malformations

- These low-flow lesions are blue, compressible soft tissue masses that empty on elevation. They can affect most tissues
- Presentation
  - Disfigurement
  - Pain : aching pain from release of mediators from formation / dissolution of clots
  - Coagulopathy
    - D-dimer/ fibrinogen

diagnosed by:

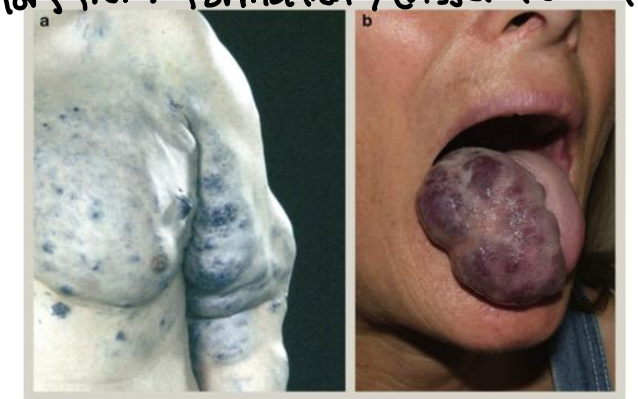
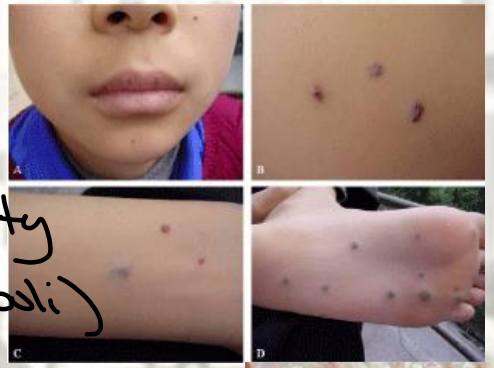


Figure 7 (a) In extensive venous malformations, as on the trunk of this man, there may be consumptive intravascular coagulopathy. (b) A woman with a venous malformation of the right side of the tongue, which had been treated once with sclerotherapy.

Venous malformations

- 5% genetic abnormalities & Rare
  - Krit-1, TIE-2 and Glomulin genes
  - Blue rubber bleb syndrome

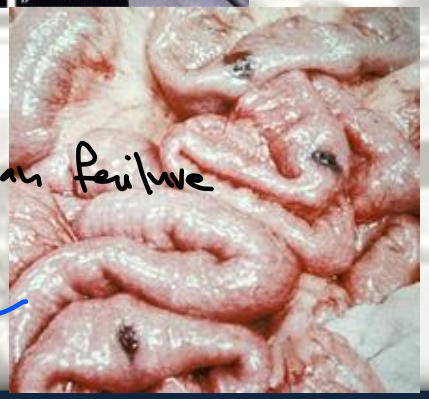


In extensive lesions:

associated with → increased mortality (from thrombi/emboli)

→ internal bleeding

→ might end up with extensive DIC → multi-organ failure



G

- BRB syndrome: mut in TIE-2
* multiple lesions in GIT + skin

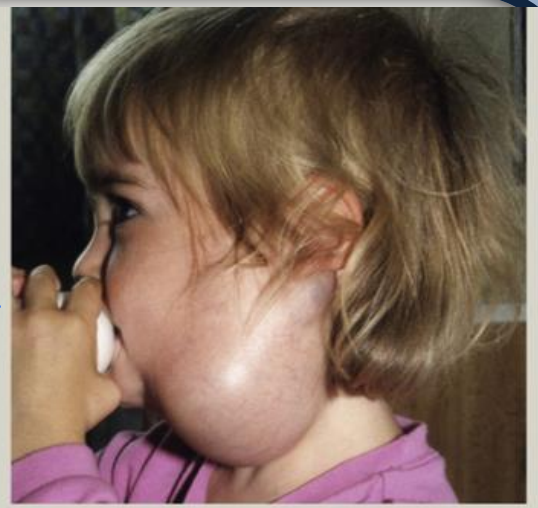
very difficult to eradicate

Management

- Compression garments
- Non-steroidal anti- inflammatory drugs NSAIDS
- Sclerotherapy → for more symptomatic situations (radiology)
- Surgery → ↑ risk of hemorrhage (due to DIC)
  → Poor wound healing

Lymphatic malformations

- Microcystic lymphangioma circumscriptum
  - small raised cutaneus vesicle full of lymphatic fluid
- Macrocystic : classical neck lesions: cystic hydroma
  - larger soft subcutaneus swelling that easily transluminate



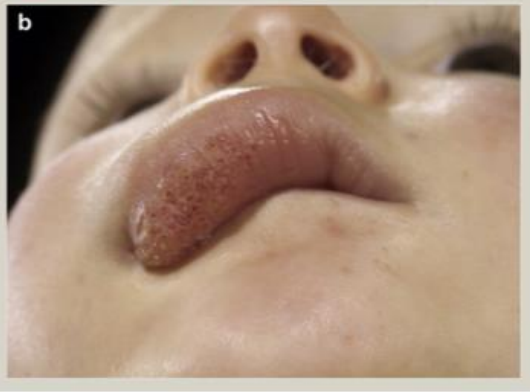


Figure 8 Lymphatic malformations: (**a**) macrocystic, of the neck that responded well to sclerotherapy; (**b**) microcystic lesions of the lip that bled and caused infection, leading to excision of the area.

Management

- Sclerotherapy : for treating macrocystic lesions
  - OK-432
- Surgery
  - Seroma
  - Infection

} Postoperative complications

- long term Antibiotics

Arteriovenous malformations (AVM)

- They are high-flow malformations that have a characteristic nidus with arterial feeders, arteriovenous fistulas and enlarged veins

- presentation & most aggressive type
  - Progressive deformity.
  - triggered rapid growth by ← Puberty, Pregnancy, trauma
  - loud dopplar Signals
  - throbbing Pain, ulceration
  - Can cause cardiac failure

in later stage:
might present with
Pulsatile masses with bruit
. Purple discoloration

AVM Schobinger classification

Schobinger clinical classification for arteriovenous malformations

Stage	Description
I (Quiescence)	Pink/blue stain, warmth, and arteriovascular shunting
II (Expansion)	Stage I plus enlargement, pulsations, thrills and bruit
III (Destruction)	Stage II plus either dystrophic skin changes, ulceration, bleeding, pain or tissue necrosis
IV (Decompensation)	Stage III plus high-output cardiac failure

Adapted from Schobinger, Hansen, Probaz et al., 1998

Management:

- the symptomatic stages (III and IV) may warrant treatment with a combination of interventional radiology, excisional surgery and reconstruction. Some lesions can be controlled with repeated embolization.
- Embolic agents include
  - ethanol, cyanoacrylate (glue), coils, polyvinyl particles and onyx, a liquid ethylene vinyl alcohol copolymer.

due to rapid reccurance

Combined lesions

- There are several patients with vascular malformations where lesions have a mixed vessel type.
- These lesions occur either isolated or associated with overgrowth disorders such as Klippel- Trenaunay and Proteus syndrome.
- Patients often have significant morbidity with heavy, painful areas especially when involving a limb.
- They are also troubled by episodes of infection and wound breakdown. These patients require life-long care.

Molecular mechanisms

- The mammalian target of rapamin (MTOR) pathway22 is an intra- cellular signalling pathway which results in cell growth and survival

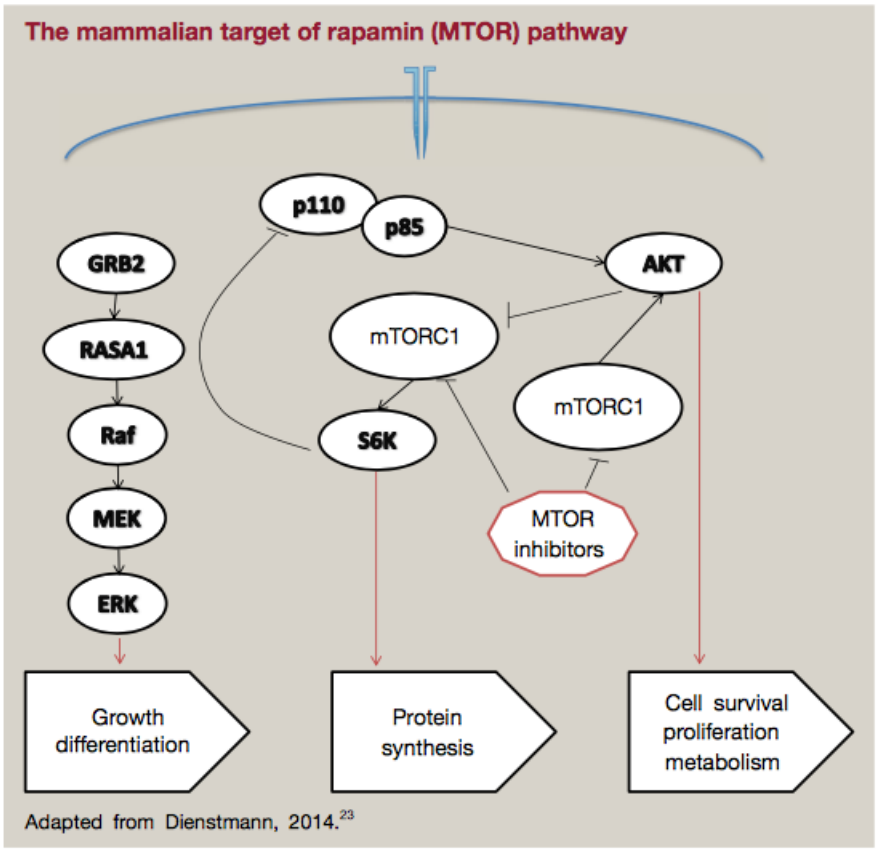


Figure 10 The mammalian target of rapamin (MTOR) pathway Adapted from Dienstmann, 2014.[22]

Conclusion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