Congenital vascular syndromes: diagnostic role of a multidisciplinary clinic

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I have no conflicts of interest or relevant financial relationships to discuss.
Objectives
At the end of this talk, audience members should be able to:
- Identify PHACE and Sturge-Weber syndrome based on their clinical characteristics
- Recognize associated features
- Initiate an appropriate workup
Case 1

• A 2-week-old girl presents to clinic with the following lesion:
• What are the most important components of a workup?
Case 2

• A 2-week-old girl presents to clinic with the following lesion:

• What are the most important components of a workup?

Photo courtesy of A. Yasmine Kirkorian MD
Case 3

• A 2-week-old girl presents to clinic with the following lesion:

• What are the most important components of a workup?

Photo courtesy of A. Yasmine Kirkorian MD
ISSVA

• International Society for the Study of Vascular Anomalies
• Organizes biennial workshops
• Classification scheme
  – Vascular malformations
    • Capillary malformations
    • Venous malformations
    • Lymphatic malformations
    • Arteriovenous malformations
  – Hemangiomas
## Appendix 2-a

**causal genes of vascular anomalies**

<table>
<thead>
<tr>
<th>Capillary malformations (CM)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutaneous and/or mucosal CM (aka “port-wine” stain)</td>
<td>GNAQ</td>
</tr>
<tr>
<td>CM with bone and/or soft tissue hyperplasia</td>
<td></td>
</tr>
<tr>
<td>CM with CNS and/or ocular anomalies (Sturge-Weber syndrome)</td>
<td>GNAQ</td>
</tr>
<tr>
<td>CM of CM-AVM</td>
<td>RASA1</td>
</tr>
</tbody>
</table>

### Telangiectasia

- Hereditary hemorrhagic telangiectasia (HHT)
  - HHT1                                                                                   | ENG |
  - HHT2                                                                                   | ACVRL1 |
  - HHT3                                                                                   |  |
  - JPHT (juvenile polyposis hemorrhagic telangiectasia)                                    | SMAD4 |

### Others

- Cutis marmorata telangiectatica congenita (CMTC)
- Nevus simplex / Salmon patch
- Others
Sturge Weber Syndrome

- Syndromic capillary malformation with CNS and/or ocular abnormalities
- Unilateral facial CM; usually involves forehead and upper eyelid, may be bilateral
Sturge Weber Syndrome

• Syndromic capillary malformation with CNS and/or ocular abnormalities
• Unilateral facial CM; usually involves forehead and upper eyelid, may be bilateral
• If both upper and mid face involved, ocular involvement more likely
  – Congenital glaucoma
  – Choroidal vascular malformation
Sturge Weber Syndrome

• Syndromic capillary malformation with CNS and/or ocular abnormalities
• Unilateral facial CM; usually involves forehead and upper eyelid, may be bilateral
• If both upper and mid face involved, ocular involvement more likely
  – Congenital glaucoma
  – Choroidal vascular malformation
• CNS involvement: due to leptomeningeal vascular malformations
  – Seizures (typically develop in first year of life)
  – Less commonly, hemiparesis/hemiplegia, developmental delays, emotional/behavioral
Workup for Sturge-Weber Syndrome

• Pediatric Ophthalmology evaluation at birth
  – Follow up regularly, as glaucoma may not become evident until childhood

• Pediatric Neurology referral
  – MRI if symptomatic
## ISSVA Classification

### Appendix 3

*infantile hemangioma*

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Different types</th>
</tr>
</thead>
<tbody>
<tr>
<td>- focal</td>
<td>- superficial</td>
</tr>
<tr>
<td>- multifocal</td>
<td>- deep</td>
</tr>
<tr>
<td>- segmental</td>
<td>- mixed (superficial + deep)</td>
</tr>
<tr>
<td>- indeterminate</td>
<td>- reticular / abortive / minimal growth</td>
</tr>
<tr>
<td></td>
<td>- others</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Association with other lesions</th>
<th>Posterior fossa malformations, Hemangioma, Arterial anomalies, Cardiovascular anomalies, Eye anomalies, sternal clefting and/or supraumbilical raphe</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHACE association / syndrome</td>
<td>Lower body hemangioma, Urogenital anomalies, Ulceration, Myelopathy, Bony deformities, Anorectal malformations, Arterial anomalies, and Renal anomalies</td>
</tr>
<tr>
<td>LUMBAR (SACRAL, PELVIS)</td>
<td></td>
</tr>
<tr>
<td>association / syndrome</td>
<td></td>
</tr>
</tbody>
</table>
Case 2

• A 2-week-old girl presents to clinic with the following lesion:

• What are the most important components of a workup?
PHACE(S) Syndrome

- **P**osterior fossa malformations
- **H**emangioma (segmental)
- **A**rterial anomalies
- **C**ardiac anomalies/Coarctation of aorta
- **E**ye anomalies
- (Supraumbilical raphe/Sternal clefting)


PHACE syndrome. The association of posterior fossa brain malformations, hemangiomas, arterial anomalies, coarctation of the aorta and cardiac defects, and eye abnormalities.

Frieden IJ, Reese V, Cohen D.
PHACE(S) Syndrome

- **P**osterior fossa malformations
  - Dandy-Walker malformation
- **H**emangioma (segmental)
- **A**rterial anomalies
  - Head and neck: stenosis, tortuosity, aberrance
- **C**ardiac anomalies/C**oarctation of aorta
  - PDA, ASD, VSD, Tetralogy of Fallot
- **E**ye anomalies
  - Horner syndrome, retinal vascular anomalies
- **(S)**upraumbilical raphe/ **S**ternal clefting)
  - Ventral midline developmental defects
Workup for PHACE

- Neuroimaging
  - MRI/MRA with TRICKS protocol
- Echocardiogram
- Ophthalmologic evaluation
## Appendix 2-e

*causal genes of vascular anomalies*

<table>
<thead>
<tr>
<th>Vascular malformations associated with other anomalies</th>
<th>Genes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klippel-Trenaunay syndrome</td>
<td></td>
</tr>
<tr>
<td>Parkes Weber syndrome</td>
<td>RASA1</td>
</tr>
<tr>
<td>Servelle-Martorell syndrome</td>
<td></td>
</tr>
<tr>
<td>Sturge-Weber syndrome</td>
<td>GNAQ</td>
</tr>
<tr>
<td>Limb CM + congenital non-progressive limb overgrowth</td>
<td></td>
</tr>
<tr>
<td>Maffucci syndrome</td>
<td></td>
</tr>
<tr>
<td>Macrocephaly - CM (M-CM or MCAP)</td>
<td>PIK3CA</td>
</tr>
<tr>
<td>Microcephaly - CM (MICCAP)</td>
<td>STAMBP</td>
</tr>
<tr>
<td>CLOVES syndrome</td>
<td>PIK3CA</td>
</tr>
<tr>
<td>Proteus syndrome</td>
<td>AKT1</td>
</tr>
<tr>
<td>Bannayan-Riley-Ruvalcaba syndrome</td>
<td>PTEN</td>
</tr>
</tbody>
</table>
Photo courtesy of A. Yasmine Kirkorian, MD
LUMBAR syndrome

- **L**ower body congenital infantile hemangiomas and other skin defects
- **U**rogenital anomalies and ulceration
- **M**yelopathy
- **B**ony deformities
- **A**norectal malformations/Arterial anomalies
- **R**ectal anomalies
Workup for LUMBAR

• At < 3 months
  – Spinal ultrasound
  – Ultrasound with doppler- abdomen and pelvis

• 3-6 months
  – If midline lesion or abnormal ultrasound, MRI of spine
  – If abnormal pelvic/renal ultrasound, urologic evaluation
  – Monitor for limb length discrepancy with Orthopedics
Thank you!!!!

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