Sinus Pericranii: Our Experience at The Hospital for Sick Children (Everything You Wanted to Know but Were Afraid to Ask)

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Purpose
Sinus Pericranii is a rare vascular anomaly where there is communication between the intracranial and extracranial venous structures through the skull. We would like to present the findings in six cases seen at the Hospital for Sick Children in Toronto and a brief discussion of this entity.

Materials & Methods
Stromeyer first proposed the term "Sinus Pericranii" in a paper in 1850 and acknowledged the description of a case by Hecker in 1845. The vascular entity was however first described in 1760 by Percival Pott. The etiology is still unknown but many theories have been proposed including traumatic, spontaneous, and congenital. There have been reported associations with other vascular malformations including blue rubber naevus syndrome, subcutaneous hemangioma of scalp, and aneurysmal internal cerebral vein.

It usually presents as a soft, easily compressible, bluish scalp mass which increases in size with valsalva or with putting the head down. Patients are often asymptomatic although headache, pain, and vertigo have been reported. Most cases occur under 30 years old and it is more common in males. Frontal bone involvement is more common than in the parietal or occipital bones and the lesion is rare in the temporal bone. It is usually in the midline communicating with the superior sagittal sinus but has been reported in lateral sites involving the transverse sinus.

Results
Imaging - Plain Film - No specific features but one may see a well-defined skull defect. Ultrasound - Doppler sonography can directly identify blood flow in the communicating channel between the intracranial sinus and the superficial scalp vein. CT - The lesion is slightly hyperdense on noncontrast images and showing venous enhancement with contrast enhancement. The bony defect can be identified. MR imaging - Flow voids will be present in regions of rapid flow and heterogeneous signal may be seen in turbulent flow. The lesion enhances with gadolinium. Direction of blood flow can be determined by using the appropriate sequences. Angiography - Slow flow and contrast accumulation will be seen in the lesion. One also can demonstrate communication between the intracranial and extracranial venous structures. The "True" sinus pericranii is a blood-filled system which can be reduced with compression. The blood flow may be in a closed circuit or centrifugal from the dural sinus. The "pseudo" sinus pericranii will not decompress and is usually an angioma or venous malformation with a connection to the sinus.
Treatment may not be needed for this benign lesion. Reasons for surgery include cosmesis, reducing potential risks of hemorrhage and air embolism, and retrograde infection. Surgery is either radical (craniectomy and cranioplasty) or conservative (excision of extracranial component and closure of venous channel with bone wax). Endovascular therapy has been reported.

**Conclusion**
The differential diagnoses for this lesion includes: leptomeningeal cyst, meningocoele, encephalocoele, epidermoid, eosinophilic granuloma, dermoid, venous malformations and AV fistulas.