PiPeD Revascularization: A Novel Surgical Technique for Treatment of Posterior Cerebral Territory Ischemia in Pediatric Moyamoya. A Case Series with Long-term Clinical and Radiographic Follow-up

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Introduction

• Isolated posterior cerebral territory ischemia in pediatric moyamoya is rare.
• Surgical treatment is complicated by limited graft choices, with the small number of case series focused on complex, higher-risk operations (omentumal flap transfers, large interhemispheric rotational grafts), direct bypass (often untenable in children due to vessel size) or multiple burr holes (of limited efficacy outside of infants).
• Here we describe a novel approach of Pi al Pe ricranial D ural (PiPeD) revascularization, building on the principles of pial synangiosis but unique in using pericranium and dura as the primary vascular supply and employing a larger craniotomy with arachnoid dissection to provide robust full-territory revascularization in all ages without the attendant risks of more complex procedures.
Methods

• Retrospective single-center series with institutional review board approval. Surgical indications included posterior circulation arteriopathy with evidence of co-localized stroke or slow flow (ivy sign on FLAIR).

• A large craniotomy is prepared, utilizing a pedicled pericranial graft, stellate dural opening and extensive arachnoidal dissection, with subsequent synangiosis using 10-0 nylon.
Results

- A total of 9 operations were performed in 8 patients (age 1-11 years, average 6.5; 5 female/3 male).
- Complications included 1 stroke, with no infections, hemorrhage, seizures or deaths.
- Follow-up was available in 6/8 patients (2 patients lost to follow-up; average 20 months, range 10-38).
- Radiographic engraftment was present in 100% (6/6) and no new strokes were evident on MRI (0%, 6/6) on long term follow-up, despite radiographic progression of disease.
Discussion & Summary Points

• This novel surgical approach is simple, but differs from what is currently described in the pediatric literature in its focus on arachnoidal opening, donor site graft flexibility and ability to revascularize a larger territory with a craniotomy.

• Extensive follow-up demonstrates that it confers durable, long-term radiographic and clinical protection from stroke in pediatric moyamoya patients.