Effect of Revascularization on Headache Associated with Moyamoya Disease in Pediatric Patients

Manoj Bohara MD, PhD; Sei Sugata; Tetsuya Nagayama; Prasanna Karki MD, PhD; Hiroshi Tokimura MD; Kazunori Arita MD PhD

Department of Neurosurgery, Nepalgunj Medical College & Teaching Hospital, Nepalgunj, Nepal

Department of Neurosurgery, Graduate School of Medical and Dental Sciences, Kagoshima University, Kagoshima, Japan

CNS 2017 ANNUAL MEETING
BOSTON, MASSACHUSETTS
OCTOBER 7-11, 2017

Introduction

Episodic headache is common in childhood moyamoya disease (MMD). The onset, mechanism, cause of headache and the effect of revascularization surgery on headache are not yet clear. We studied the outcome of revascularization on headache in children with MMD.

Methods

- From 2009 to 2013, 10 patients (7 boys and 3 girls) younger than 18 years with MMD were treated at Kagoshima University Hospital. They underwent neurological examination, CT or/and MRI, MRA, DSA and IMP-SPECT before surgery.
- Direct revascularization (STA-MCA bypass) combined with indirect (EDAMS or EDAMPS) was performed in 5 cases and indirect revascularization alone was performed in 5 cases.
- Follow-up MRA was performed to check the development of collaterals and IMP-SPECT was obtained to evaluate the change in cerebral hemodynamics.
- We observed the effect of revascularization on headache postoperatively.

Results

- Patients' ages ranged from 0 to 15 years at onset and 2 to 17 years at the time of surgery; mean age being 6.7 and 8.0 years respectively.
- 9 of 10 patients presented with ischemic symptoms and 8 had headache.
- 5 patients underwent indirect bypass and 5 underwent combined direct and indirect bypass.
- Cerebral blood flow improvement was obtained in 14 of the 15 cerebral hemispheres revascularized.
- The mean follow-up duration was 32.9 months. All the patients had good outcomes with improvement of ischemic neurological deficits.
- Headache improved in 7 (87.5%) of 8 patients.

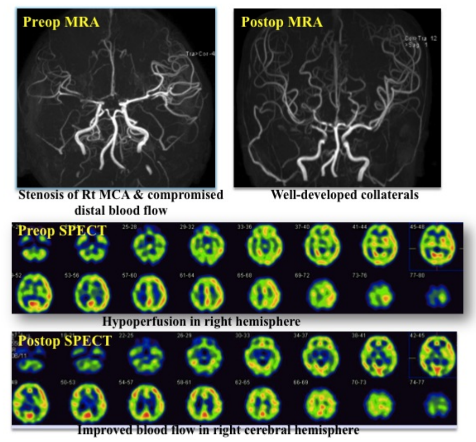
Postoperative outcome

Case	Initial age	Age at surgery	Preop headache	Revascularization procedure	Improvement on postop SPECT	Improved headache postop
1	0	2	(−)	Lt EDAMPS	(+)	N/A
2	2	3	(−)	Lt EDAMPS	(+)	N/A
3	4	4	(+)	Rt STA-MCA bypass & EDAMPS	(+)	(+)
4	4	6	(+)	Rt STA-MCA bypass & EDAMPS Lt STA-MCA byapss & EDAMPS	(+)	(+)
5	6	7	(+)	Lt EDAMPS Rt EDAMPS	(+)	(+)
6	8	8	(+)	Rt EDAMS	No improvement	Persistent monthly headache
7	6	8	(+)	Rt STA-MCA bypass & EDAMS	(+)	(+)
8	10	11	(+)	Rt STA-MCA bypass & EDAMS	(+)	(+)
9	12	14	(+)	Lt EDAMS	(+)	(+)
10	15	17	(+)	Rt STA-MCA bypass & EDAMS Lt STA-MCA bypass & EDAMS	(+)	(+)

Postoperative outcomes of the pediatric patients with moyamoya disease, who underwent revascularization procedures.

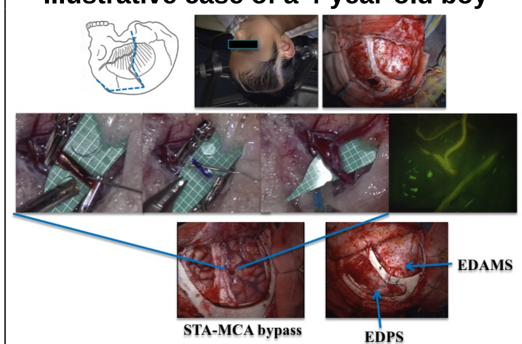
Surgery for moyamoya disease

Outcome of revascularization



Postoperative MRA and SPECT showing improved blood flow after combined direct and indirect bypass surgery for moyamoya disease.

Illustrative case of a 4-year-old boy



Combined direct and indirect bypass technique

Conclusions

- Headache in pediatric moyamoya disease is associated with change in cerebral hemodynamics.
- Revascularization including combined direct bypass and indirect techniques may be required to reduce headache in patients with MMD.

Learning Objectives

By the conclusion of this session, the participants should be able to: 1) Understand the clinical features associated with hemodynamic changes in Moyamoya disease; 2) Discuss various revascularization procedures and their outcomes; 3) Identify combined direct and indirect revascularization procedures as effective treatment for headache associated with pediatric Moyamoya disease.