Transient Cardiac Arrest Induced by Adenosine: A Tool for Contralateral Clipping of Internal Carotid Artery-Ophthalmic Segment Aneurysms

Hugo Andrade-Barazarte[1,3], Teemu Luostarinen[2], Felix Goehre[1,4], Juri Kivelev[1], Behnam Rezai Jahromi[1], Christopher Ludtka[1], Hanna Lehto[1], Rahul Raj[1], Tarik F. Ibrahim[1,6], Mika Niemela[1], Juha E. Jääskeläinen[5], Juha A. Hernesniemi[1]

■ BACKGROUND: **The disadvantages of a contralateral approach (CA) include deep and narrow surgical corridors and inconsistent ability to achieve proximal control of the supraclinoid internal carotid artery (ICA). However, a CA remains as a microsurgical option for selected ICA-ophthalmic (opht) segment aneurysms.**

■ OBJECTIVE: **To describe transient cardiac arrest induced by adenosine as an alternative tool to obtain proximal vascular control and soften the aneurysm sac in selected patients while performing a CA.**

■ METHODS: **From January 1998 to December 2013, we retrospectively identified 30 patients with ICA-opht segment aneurysms treated through a CA. Of those, 8 patients received an intravenous bolus of adenosine to induce transient cardiac arrest for softening of the aneurysm sac. We reviewed preoperative clinical status, characteristics of the contralateral aneurysm, adenosine doses, asystole time, recovery of normal circulation, outcome, and complications.**

■ RESULTS: **No preoperative cardiac or pulmonary pathologies were found in the study population. All contralateral ICA-opht segment aneurysms were unruptured, small, and saccular in shape. Transient cardiac arrest was induced because it was impossible to apply a temporary clip on the parent contralateral supraclinoid ICA. The median dose of adenosine was 22.5 mg (range, 5—50 mg) and the asystole time ranged from 20 to 40 seconds. All patients (n = 8) had good postoperative outcomes. No brain infarction or cardiac complications appeared postoperatively.**

■ CONCLUSIONS: **In selected patients, transient cardiac arrest induced by adenosine during a contralateral approach allows a brief flow arrest and softening of the aneurysm for safer exposure and clipping.**

INTRODUCTION

A contralateral approach represents a microsurgical option for selected internal carotid artery (ICA)-ophthalmic (opht) segment aneurysms.[1—16] The contralateral approach offers several advantages over an ipsilateral approach, because it avoids the need for an anterior clinoidectomy and its related comorbidity.[4,7,12] The disadvantages of a contralateral approach include deep and narrow surgical corridors and inconsistent ability to achieve proximal control of the supraclinoid ICA. Techniques for proximal control include endovascular methods and surgical approaches such as dissection of the ICA in the neck and contralateral anterior clinoidectomy to expose the supraclinoid ICA for temporary clipping.

Transient cardiac arrest induced by intravenously administered adenosine allows temporary flow arrest during a microsurgical approach in deep locations, complex aneurysms, and during intraoperative rupture.[17—22] However, its use on contralateral

Key words
- Adenosine
- Contralateral approach
- Intracranial aneurysm
- Internal carotid artery
- Ophthalmic aneurysm
- Outcome
- Transient cardiac arrest

Abbreviations and Acronyms
CA: Contralateral approach
ECG: Electrocardiogram
ICA: Internal carotid artery
opht: ophthalmic

From the Departments of [1]Neurosurgery and [2]Anesthesiology, Intensive Care, Emergency Care and Pain Clinic, University of Helsinki and Helsinki University Hospital, Helsinki, Finland; [3]Department of Neurosurgery, University Central Hospital Antonio Maria Pineda, Barquisimeto, Venezuela; [4]Department of Neurosurgery, Stroke Center, Bergmannstrost Hospital, Halle, Germany; [5]Department of Neurosurgery, NeuroCenter, Kuopio University Central Hospital, Kuopio, Finland; and [6]Department of Neurosurgery, Loyola University Medical Center, Maywood, Illinois, USA

To whom correspondence should be addressed: Hugo Andrade-Barazarte, M.D. [E-mail: hugoaba@hotmail.com]

Citation: World Neurosurg. (2015) 84, 6:1933-1940.
http://dx.doi.org/10.1016/j.wneu.2015.08.038

*Journal homepage: **www.WORLDNEUROSURGERY.org***

*Available online: **www.sciencedirect.com***

1878-8750/$ - see front matter © 2015 Elsevier Inc. All rights reserved.

Table 1. Characteristics of the Patients and Unruptured Internal Carotid Artery-Ophthalmic Segment Aneurysms Approached Contralaterally

Patient	Age (Years)	Sex	Associated Pathologies	Preoperative ECG	Number of Aneurysms	Presentation	Contralateral Internal Carotid Artery-Ophthalmic Segment Aneurysm					Intraoperative Events	Number of Adenosine Doses	Postoperative ECG
							Location	Neck (mm)	Size (mm)	Projection	Shape			
1	53	Female	No	Normal ECG	1	Incidental	Left	2.56	3.25	Medial	Saccular	None	Single dose	Normal ECG
2	58	Male	Hypercholesterolemia and HBP	Normal ECG	1	Incidental	Left	2.20	1.70	Supero medial	Saccular	None	Multiple doses (3)	Normal ECG
3	24	Female	No	Normal ECG	1	Incidental	Left	3.40	3.00	Medial	Saccular	None	Single dose	Normal ECG
4	34	Female	No	Normal ECG	2	Incidental	Right	3.60	3.80	Supero medial	Saccular	None	Single dose	Normal ECG
5	52	Female	No	Normal ECG	1	Incidental	Left	2.72	3.40	Superior	Saccular	None	Multiple doses (2)	Normal ECG
6	34	Male	SEL	Normal ECG	1	Incidental	Right	2.70	4.20	Superior	Saccular	None	Multiple doses (2)	Normal ECG
7	26	Female	No	Normal ECG	1	Screening	Right	2.90	1.70	Supero medial	Saccular	None	Single dose	Normal ECG
8	36	Female	No	Normal ECG	4	Previous SAH, other aneurysm	Right	2.90	2.40	Supero medial	Saccular	None	Single dose	Normal ECG

ECG, electrocardiogram; HBP, high blood pressure; SEL, systemic erythematous lupus; SAH, subarachnoid hemorrhage.

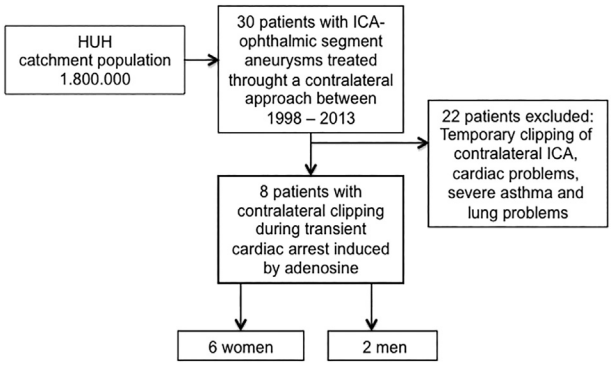

Figure 1. Flow chart for the study population. HUH, Helsinki University Hospital; ICA, internal carotid artery.

approaches for ICA-opht segment aneurysms has never been described before.

Our aim is to describe transient cardiac arrest induced by adenosine as a safe and useful alternative in selected patients while performing a contralateral microsurgical approach and when proximal temporary clipping of the supraclinoid ICA is difficult.

METHODS

Study Cohort

We collected data from the Helsinki Intracranial Aneurysm Database, which includes 10,021 patients with 14,153 intracranial aneurysms evaluated by the Department of Neurosurgery at the Helsinki University Hospital since 1937.

From January 1998 to December 2013, we retrospectively identified 30 patients with ICA-opht segment aneurysms treated through a contralateral microsurgical approach. Of those, 8 patients received an intravenous bolus of adenosine to induce transient cardiac arrest for softening of the unruptured aneurysm sac (Table 1). Exclusion criteria included patients in which temporary clipping of the supraclinoid ICA was possible, and the presence of associated diseases such as cardiac pathologies, severe asthma, or pulmonary problems (total n = 22). The study population comprised 6 women and 2 men (Figure 1), with a median age of 35 years (range, 24–58 years) at the time of diagnosis.

Preoperative Clinical Evaluation

We retrospectively evaluated the preoperative neurological status and cardiac condition as well as the previous history and the presence of other diseases (Table 1).

Radiological Evaluation

For all patients, we measured the length, neck diameter, and maximal size of the contralaterally approached aneurysm (Table 1). Furthermore, we evaluated its projection from the

Download English Version:

https://daneshyari.com/en/article/6044559

Download Persian Version:

https://daneshyari.com/article/6044559

Daneshyari.com