

Intraarterial Thrombolysis Following Clipping of an Unruptured Aneurysm

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Intraoperative thromboembolic events rarely complicate intracranial aneurysm surgery.¹⁻³ The management strategies of such potentially life threatening complications occurring after aneurysm clipping have not been established.

We report a 43-year-old female who experienced a transient episode of expressive aphasia due to distal emboli from a small unruptured multilobulated aneurysm of the left internal carotid artery (ICA) bifurcation (Figure A). Complementary work-up

was negative for other etiologies explaining the transient ischemic attack. Given the patient's young age, the aneurysm's size and the presence of associated ischemic events, a surgical treatment was proposed. The aneurysm was clipped without any resistance at the neck. Blood flow assessed using the intraoperative ultrasound after aneurysm clipping was normal in the proximal A1 and M1 arteries. Immediately after surgery, the patient was easily arousable and presented no language or motor deficit. Two hours later, the patient became drowsy, aphasic and severely hemiparetic on the right side, scoring 10 on the National Institutes of Health (NIH) stroke scale. Urgent computed tomogram (CT) scan showed no hemorrhage or acute sign of ischemia (Figure B). Immediate angiography showed a subocclusive thrombus in the left terminal ICA extending in the M1 segment and an occlusive embolus distally in the left MCA (Figure C). Furthermore, blood flow was decreased in all MCA branches and there was absence of significant leptomeningeal collaterals. The aneurysm was completely excluded (Figure C). Facing this acute ischemic event that would most likely lead to severe disability or even death if left untreated, and because of the unavailability of a mechanical device such as the Merci Retrieval System,⁴ superselective intra-arterial thrombolysis was used to recanalize the occluded arteries. After injecting 10mg of Alteplase in the left terminal ICA and M1 segment, angiography showed satisfactory recanalization of these vessels. Since distal emboli persisted in the rolandic and parietal branches, a second injection of Alteplase (8mg) was administered (Figure D). CT scan performed immediately after thrombolysis revealed left fronto-orbital and lentiform hemorrhages and mild left Sylvian subarachnoid hemorrhage not requiring surgical treatment (Figure E). The day after thrombolysis, the NIH stroke scale was 5 and the patient continued to evolve favorably. At 18 month follow-up, the patient scored 1 on the modified Rankin scale.

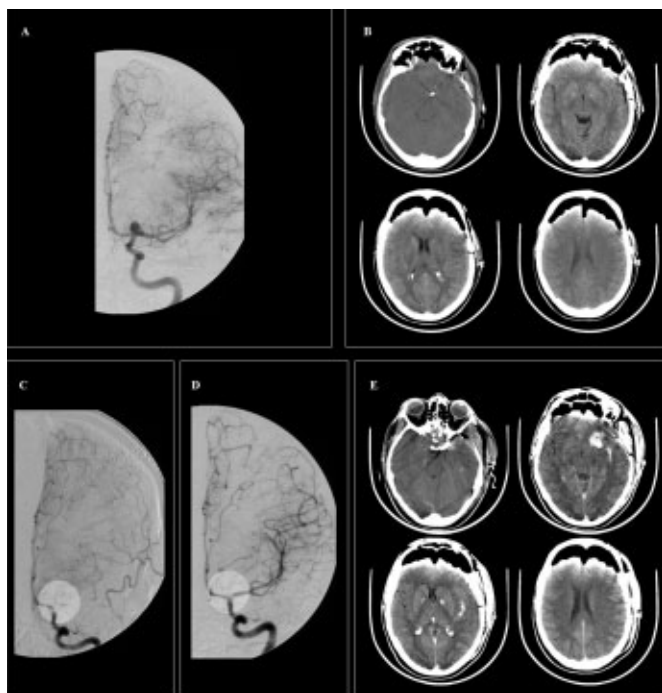


Figure. A) Cerebral angiography confirming the presence of an aneurysm of the left internal carotid artery ; B) Urgent post-operative CT-scan showing no hemorrhage or acute sign of ischemia. C) Immediate angiography showing a subocclusive thrombus in the left terminal ICA extending in the M1 segment and an occlusive embolus distally in the left MCA. D) Satisfactory repermeabilization of the left terminal ICA and M1 segment following thrombolysis. E) CT-scan performed immediately after thrombolysis revealing left fronto-orbital and lentiform hemorrhages and mild left Sylvian subarachnoid hemorrhage not requiring surgical treatment.

DISCUSSION

Although not frequent, thromboembolic events have been reported following aneurysmal surgery.¹⁻³ No management

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strategy has been established. The largest study of post-operative intra-arterial thrombolysis (IAT) for stroke is a multicenter, retrospective case series.⁴ In this study, two of three patients with a recent craniotomy had a fatal intracranial hemorrhage (ICH) after IAT. The small sample size precludes any firm conclusion. Also, surgical procedures were not described for these patients.⁴ This information could be relevant as the risk of ICH after IAT in the acute post-craniotomy setting might be influenced by factors specific to the surgery as for example dissection within cerebral parenchyma versus subarachnoid spaces. To date, the safety of IAT for strokes following intracranial neurosurgical interventions remains unknown.

In our case, we faced a severely symptomatic thrombo-embolic event following aneurysm surgery in the absence of significant collaterals. In this life-threatening situation, we assumed that the benefit of arterial recanalization and limiting the infarct volume in the dominant hemisphere outweighed the risk of intracerebral hemorrhage. Although intra-arterial recombinant tissue plasminogen activator (r-TPA) doses up to 40mg have been proven safe,⁵ a total of 18mg of Alteplase was administered to this patient with satisfactory recanalization of frontal and parietal branches. At that time a mechanical embolectomy device was not available. In such situations, a pharmacologic thrombolysis or other mechanical devices may represent treatment alternatives.

In summary, this report deals with a life-threatening situation which required a treatment with potential hemorrhagic complications. Until now, the safety of IAT for post-operative strokes remains unknown. For patients with proximal occlusion of the ICA with minimal collaterals, IAT in the post-craniotomy setting should perhaps be considered as a treatment option with the potential benefits outweighing the risks if mechanical devices are not available or are unsuccessful.

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