Endovascular management of acute basilar artery occlusion

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Purpose

The goal of this study is to assess the feasibility and efficacy of endovascular treatment in patients with acute basilar artery occlusion (BAO).

Methods and Materials

Between June 2006 and June 2010, 21 patients who underwent treatment with low-dose Intraarterial (IA) urokinase combined with mechanical clot disruption for basilar artery occlusion. Either cerebral CT or MR obtained in all patients and cerebral angiography and IA treatment was performed. All patients in this study were not performed Intravenous treatment. After demonstration of an occlusion on diagnostic angiography, an end-hole microcatheter over a microguide wire was advanced through 6-F guide catheter into occlusion site. The microcatheter tip was placed into the thrombus, and then a 100,000-U bolus of urokinase diluted 10 mL in mixture of saline and contrast medium (7:3) was manually infused for 3 to 5 minutes. Mechanical clot disruption was undertaken after 100,000-U of urokinase was administered. Mechanical clot disruption with microcather and microwire was undertaken after 100,000-U of urokinase was administered. Mechanical clot disruption consisted of multiple passes of the microwire through the clot. After withdrawal of the microwire from the microcatheter, an additional 100,000-U of urokinase was manually infused for 3 to 5 minutes through microcatheter at the site of the remaining thrombus. Reattempt of mechanical clot disruption using microcatheter and microwire was performed. Patients with distal migration of thrombus into posterior cerebral artery were additionally infused the 100,000-U of urokinase through microcatheter at site of the occluded artery. Patients who were not achieved the complete recanalization after mechanical clot disruption were performed a percutaneous angioplasty or/and stent insertion about severe stenosis of vertebrobasilar artery. Recanalization status was classified according to the Thrombolysis in Cerebral Ischemia (TICI) scale and recanalization was defined as TICI grades II or III. Age, sex, time to treatment, urokinase dose, duration of the procedure, recanalization, and symptomatic hemorrhages were analyzed. Clinical outcome measures were assessed on admission and at discharge of National Institutes of Health Stroke Scale (NIHSS) score, at 3 months after treatment modified Rankin Score (mRS).

Results
21 patients with acute BAO (6 women, 15 men) with a median age of 67.5 years (range, 47 - 87 years) met study criteria. The median NIHSS score was 13.2 (range, 2-33) on admission and median time from symptom onset to IA therapy was 354 minute (range, 155-720). The median IA treatment duration was 87 minute (range, 40-140) and the UK dose was 50,000 - 400,000-U (median, 247,000-U). Of these patients, five patients were performed the additional injection of urokinase due to distal migration of thrombus into the posterior cerebral artery (100,000 - 200,000-U). Four patients were the severe stenosis of basilar artery after urokinase infusion and mechanical clot disruption with microcatheter and microwire. Of these patients, three patients were performed the stent placement (Figure 1) after angioplasty and one were only performed the angioplasty. Three patients were remained the mural thrombus into the basilar artery after mechanical clot disruption with microcatheter and microwire, and were performed the mechanical clot disruption with HyperForm compliant balloon catheter. Recanalization (TICI grade II or III) was achieved in 17 patients (80.9%). TICI grade III was occurred in 10 patients (47.6%) include, and TICI grade 2 was achieved in 7 patients (33.3%). Four patients (19.1%) was failed the recanalization of posterior circulation. Of these patients, two patients had a massive thrombus into the vertebrobasilar artery, one was stopped the treatment due to procedure-related subarachnoid hemorrhage, and one had a diffuse and long segmental stenosis of basilar artery. There was symptomatic hemorrhage in two patients (Figure 2). Two patients were occurred the procedure-related hemorrhage due to wire-related injury or maybe vessel rupture after angioplasty.

Three patients (14.3%) died within one-week after procedure. One patient with hemorrhage complication died and two with incomplete recanalization due to massive thrombus died. At discharge (17/21), the median NIHSS score was 7.88 (range, 0-27). The NIHSS score of 11 patients was improved. In 6 patients, the NIHSS score was increased. At the 3-month follow-up, the functional outcome was favorable (mRS, 0-2) in 12 (57.1%) of the 21 patients. Unfavorable (mRS, 3-6) in 9 (42.9%) patients and among them 5 (23.8%) patients included three patients dead after procedure died within the 3-month follow-up timefram.

Images for this section:
Fig. 1: Recanalization in BAO with stent placement. (a) Rt vertebral artery angiogram showing stenosis of vertebrobasilar junction (arrow). (b) After placement of 2.75x12 mm stent, there was recanalization of vertebrobasilar junction.
Fig. 2: After the endovascular treatment, CT showed hemorrhage in Lt cerebellum.
Conclusion

Our study showed that low-dose IA thrombolytics with mechanical clot maceration is feasible, safe and effective treatment treatment. A high rate of recanalization, rapidity, high rate of survival rate and good functional outcome can be achieved.

References


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