Outcome of Cervicocranial Artery Dissection with Different Treatments: A Systematic Review and Meta-analysis

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Objective: The purpose of this meta-analysis is to compare clinical outcomes between endovascular treatment and conservative treatment for cervicocranial artery dissection. *Methods:* Medline, Embase, and Cochrane Library databases were searched for studies comparing endovascular treatment versus conservative treatment for cervicocranial artery dissection patients. The period searched was from November 1994 to March 2013. Fifteen observational studies involving 442 cervicocranial artery dissection patients were found. Evaluated outcomes included rate of mortality, disability, and good recovery. The rebleeding rate in subarachnoid hemorrhage (SAH) patients was also recorded and compared. *Results:* In general, patients who received endovascular treatment enjoyed a lower mortality rate than those who received conservative treatment ($P = .02$, odds ratio [OR]: .5, 95% confidence interval [CI]: .27-.90), especially patients having ruptured cervicocranial artery dissection ($P = .002$, OR: .32, 95% CI .15-.66) and dissecting aneurysms ($P = .006$, OR: .31, 95% CI .14-.71). Among SAH patients with a Hunt–Hess score of 3 or more, endovascular treatment decreased mortality significantly ($P = .006$, OR: .22, 95% CI .08-.65), whereas no significant differences between these 2 treatments occurred in patients having a Hunt–Hess score less than 3. *Conclusions:* Endovascular treatment yields a better outcome, with greater benefit in patients with ruptured cervicocranial artery dissection, dissecting aneurysms, and a Hunt–Hess score of 3 or more. Randomized controlled trials comparing these 2 therapeutic strategies are needed. **Key Words:** Cervicocranial artery dissection—endovascular treatment—conservative treatment—meta-analysis.

Introduction

Cervicocranial artery dissection (CCAD) implies a tearing of the intimal, medial, or adventitial layers of the wall of the cerebral artery leading to a mural hematoma within the layers of an arterial wall. The annual incidence of cervical artery dissection is 2.6 per 100,000 population, according to a community study in North America,[1] whereas vertebral artery

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dissection has an annual incidence of 1.0-1.5 per 100,000.[2,3]

Recently, CCAD was recognized as a major cause of stroke in the younger people,[1,4,5] however, so far, best treatment for CCAD remains undetermined. Many physicians prefer antithrombotic agents or other drugs to prevent further deterioration.[4,6] However, as technology advances, several studies have shown that endovascular treatment, by reconstructing or deconstructing target vessels with balloons, coils, and stents, could immediately restore the integrity of the vessel lumen and decrease the recurrence of stroke.[7-10]

Currently available data have been derived mainly from case reports and retrospective studies. There are not enough randomized clinical trials or studies with large samples, to settle efficacy questions regarding endovascular treatment for CCAD. Therefore, this meta-analysis was performed to help fill the void and compare clinical outcomes of endovascular versus conservative therapy for CCAD.

Methods

Literature Search

Literature on the treatment for CCAD was acquired by searching the Medline, Embase, and Cochrane Library databases for the period from November 1964 through March 2013. The combination of key words used for searching related literature was "(cervicocranial artery dissection or cerebral artery dissection or internal carotid artery dissection or vertebrobasilar artery dissection or vertebral artery dissection or basilar artery dissection or anterior cerebral artery dissection or middle cerebral artery dissection or posterior artery dissection) and treatment." Reference lists from relevant review articles and all eligible studies were also searched manually.

Criteria for Considering Studies

A systematic search (including a title screen, abstract review, and full article text review) was conducted for eligible studies. Included were studies that

1. Compared endovascular treatment and conservative treatment.
2. Included 10 or more patients with CCAD that received either conservative treatment or endovascular treatment.
3. Reported at least 1 primary outcome comparing endovascular treatment and conservative treatment, ignoring difference in follow-up period.

Excluded were studies that

1. Included no CCAD patients.
2. Did not consist of both conservative treatment and endovascular treatment for CCAD.
3. Did not provide sufficient outcome data for the 2 therapeutic strategies.
4. Included less than 2 endovascular or conservative group participants.
5. Included only review, case reports, case series, commentary, guideline, editorial, author manuscript, letters, and technical note.
6. Included only non-English articles or articles without full text available.

For an article to be included, the diagnosis of CCAD must have been made by at least one of the following: arterial angiography, computed tomography angiography, magnetic resonance (MR) imaging, MR angiography, or duplex scanning.

Endovascular treatment was defined as administration of any arterial reconstruction procedure and any arterial deconstruction procedure such as stenting with or without coiling, proximal artery occlusion, arterial thrombolysis, and so on. Conservative treatment included any treatment except surgical and endovascular intervention; for example, antithrombotic therapy, analgesia, or blood pressure control. If patients were described as no treatment received, they were classified as conservative treatment. Patients were excluded who had several dissections treated by several methods and received treatment combined with surgery.

End Point Definition

In this review, the rates of mortality, disability, and good recovery were used to assess the efficacy of endovascular versus conservative treatment for CCAD. The rebleeding rate in subarachnoid hemorrhage (SAH) patients was also determined and evaluated. The 15 selected studies evaluated functional outcome as follows: 5 used the Glasgow Outcome Scale (GOS), 5 used the modified Rankin Scale (mRS), and 1 used the Karnovsky score and 4 used study-specific criteria.

Overall outcomes were categorized as follows:

1. good recovery if the patient had a GOS score of 5, mRS score of 0-1, or Karnovsky score of 80-100;
2. disability if the patient had a GOS score of 2-4, mRS score of 2-5, or Karnovsky score of 10-70; and
3. death, from any cause.

If none of the 3 assessment methods were used, patients with improved outcome (without further detailed information) were categorized as disability as were patients with permanent neurologic deficits such as hemiparesis.[11] Patients described as excellent were categorized as good recovery.

Rebleeding was defined as new incidence of SAH after receiving endovascular procedures or conservative treatment.

Data Extraction

All screening and data extraction were completed using standardized data extraction forms by 2 independent evaluators. Disagreements were resolved through