Surgical Treatment for Ruptured Vertebral Artery Dissecting Aneurysms

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Abstract

We analyze 20 cases of ruptured vertebral artery dissecting aneurysms and discuss the best choices for the surgical procedure. The preoperative Hunt and Kosnik grade was I in nine cases, Ia in four cases, II in three cases, III in three cases, and IV in one case. Rebleeding occurred in six cases, in four cases within 24 hours after the initial bleeding, and in every case within 6 days. In two cases surgery was performed within 3 days after the initial bleeding, in two cases within 4 to 7 days, in 16 cases after more than 7 days. A total of 22 operations were performed in the 20 patients (coating in 12, trapping in 6, proximal clipping of the vertebral artery in 2, clipping of the bleeding point in 2). A case of proximal clipping rebled 32 days after the operation and subsequently died. Both cases of clipping of the bleeding point were reoperated because of rebleeding and a slipped clip, respectively. All cases in which trapping or coating was performed resulted in a good outcome. Trapping is the most reliable method of preventing rebleeding. Coating or proximal clipping is an optional procedure, but cannot always prevent rebleeding because of the continuing circulation.

Key words: dissecting aneurysms, subarachnoid hemorrhage, surgical treatment, trapping, vertebral artery

Introduction

The surgical strategy for treating ruptured vertebral artery dissecting aneurysms remains a matter of controversy. The purpose of the present report is to analyze our 20 cases and to discuss the best surgical procedure for it.

Materials and Methods

The subjects were 20 patients, 15 males and five females, varying in age from 34 to 62 years old. We assessed the Hunt and Kosnik grade, site of the aneurysm, whether rebleeding occurred or not, timing of the operation, the surgical procedure, and the 6-month follow-up outcome.

Results

Table 1 shows the clinical grades on admission and just before the operation. There are large changes in grade between two points because many patients were operated on in the chronic stage than in the acute stage. Rebleeding before surgery occurred in six cases (rebleeding rate 30%), four out of six cases

<table>
<thead>
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<th>Grade</th>
<th>On admission</th>
<th>Just before the operation</th>
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<tbody>
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<td>I</td>
<td>0</td>
<td>9</td>
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<tr>
<td>Ia</td>
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<td>II</td>
<td>7</td>
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<tr>
<td>III</td>
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rebled within 24 hours after the initial bleeding and all six cases within 6 days. The aneurysm was on the right side in 13 cases and the left side in seven. It was on the non-dominant side in 11 cases, on the dominant side in eight, and there was no dominance in one case. The site of the aneurysm was distal to the origin of the posterior inferior cerebellar artery (PICA) in 17 cases and proximal to it in two cases, and the aneurysm extended for almost the entire length of the intracranial vertebral artery in the remaining case.

The operation was performed within 3 days after the initial bleeding in two cases, within 4 to 7 days in
two cases, and after more than 7 days in 16 cases. In the early period of this study our principle was the chronic stage surgery, because the natural history of the disorder had not been fully defined and it was difficult to select the most suitable timing of operation. However, since most of the rebleeding had occurred in the acute stage and the rate of rebleeding was relatively high, we have employed the acute stage surgery when possible in recent cases. A total of 22 operations were performed in the 20 patients by the lateral suboccipital approach, with 12 operations consisting of coating, six of trapping, two of clipping at the bleeding point, and two of proximal clipping of the vertebral artery. In the beginning of this study we adopted proximal clipping, however, rebleeding occurred in the second case 32 days after the operation. Therefore, we selected trapping procedure as the first choice of treatment whenever possible, which could completely isolate the dissection from the circulation. When the trapping was impossible, for example, the aneurysmal side was the dominant side or perforators originating from the aneurysm were detected intraoperatively, we performed coating as much of the abnormal vessel as possible. In both cases of clipping at the bleeding point we needed to reoperate because of rebleeding and a slipped clip, respectively.

Case 1: A 57-year-old male was admitted to a local hospital for treatment of severe headaches and vomiting. Six days later rebleeding occurred and he was transferred to an affiliated hospital. The patient was treated conservatively in the acute stage. Figure 1 shows the right and left vertebral angiograms. A fusiform dilatation was noted in the right vertebral artery at the branch point of the PICA and a stenotic lesion was observed in the artery just distal to the dilatation. The dominant vertebral artery was on the opposite side. Based on these findings, proximal clipping was considered insufficient because there was some possibility of retrograde filling of the aneurysm from the opposite vertebral artery. However, on day 58, only proximal clipping just proximal to the fusiform dilatation was performed, because the surface of the aneurysm looked whitish, and it was thought that it would not easily rebleed. Also, it was impossible to reach the most distal portion of the aneurysm because of tight adhesion between the medulla and the aneurysm. Follow-up angiography was not performed because of respiratory complications. Massive rebleeding into the posterior fossa occurred 32 days after the operation, and the patient died. This case shows that vertebral artery dissecting aneurysms may rebleed even in the chronic stage if the surgical procedure is insufficient.

The 6-month follow-up outcome was excellent in 14 cases, good in four, poor in one, and dead in one. The cause of the unfavorable outcome in the two cases was complicated brain stem infarctions caused by thromboembolic ischemia following failed clipping and rebleeding following proximal clipping, respectively. All patients treated by trapping or coating had a good outcome. There was no rebleeding when we performed coating alone. Transient palsy of the lower cranial nerves was seen in five cases.

Discussion

The natural history of ruptured vertebral artery dissecting aneurysms cannot be precisely described at present. However, according to the literature, the rebleeding rate is high, 18% to 67%, and most rebleedings occur in the acute stage, especially within 24 hours after the initial bleeding. The timing of rebleeding is not different from that in intracranial saccular aneurysms, and the outcome of these patients is also usually poor. Accordingly, it is better to operate in the acute stage. However, perfect treatment for dissecting aneurysms is difficult. Dissecting aneurysms are generally unclippable. Proximal clipping has been commonly accepted as the first choice of therapy. Actually, proximal clipping can be performed when the size of the opposite vertebral artery is equal to or larger than the affected artery. However, rebleeding after proximal clipping caused by reflux from the opposite vertebral artery has recently been reported. From this view point, trapping is the most reliable
procedure in terms of prevention of rebleeding. However, when the affected vertebral artery is dominant, these procedures are generally impossible. To make matters worse, trapping is sometimes difficult in exposing the distal part of the vertebral artery beyond the aneurysm. Coating is an optional procedure, but cannot always prevent rebleeding because of the continuing circulation.

Proximal clipping was performed only in our first two cases, but rebleeding occurred 32 days later in our Case 1. We then tried performing trapping as the initial procedure. When that was impossible, we performed coating as much of the abnormal vessel as possible.

Based on these experiences, we came to the conclusion that trapping should be the first choice of treatment for ruptured vertebral artery dissecting aneurysms in the acute stage when possible, and that it is better to perform coating or proximal clipping when the trapping is impossible. However, these procedures are not completely satisfactory in preventing of rebleeding, and thus it is necessary to check to be sure that there is no longer any evidence of the blood inflow into the dissection or progression of the dissection after proximal clipping and coating.

References


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