Nationwide surveillance of IC anterior (or dorsal) wall aneurysm: with special reference to its dissecting nature

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Summary

Two hundred and twenty-one cases of IC dorsal aneurysm (ICDA) with subarachnoid hemorrhage (SAH) from 365 cases in the nationwide surveillance of ICDA (NSICDA) data bank were studied with special reference to the dissecting type. Dissection of the internal carotid artery (ICA) was confirmed in 50 out of 221 SAH cases. In 193 surgically treated cases, 40 were of the certified dissecting type. Including those with clinical features which strongly suggests the existence of dissecting changes in the ICA wall, 97 cases (55.6% of operated) were thought to be a dissecting type. Incidence of intraoperative bleeding is significantly higher and surgical outcome is significantly worse in the dissecting type than in the non-dissecting type. Treatment options for this peculiar and formidable aneurysm (An) are described.

Keywords: IC dorsal aneurysm; arterial dissection; nationwide surveillance.

Introduction

Aneurysms arising from the superior (or anterior) wall of the C1-C2 portion of the ICA have been known as an ICDA [6, 11–13] or, in Japan, IC anterior wall aneurysm [9, 13]. The term “blood blister-like aneurysm” has been widely used for the non-saccular and wide-based type as well [1, 2, 4, 7, 13, 14, 16–18]. ICDA has also been well known as a strange and dangerous aneurysm that easily ruptures at the neck during surgery [1, 3, 5, 7, 8, 10–14, 17, 18]. In addition, it often regrows and reruptures even after seemingly successful clipping [1, 3, 6, 8, 9, 11–15]. The reason why this peculiar An shows these strange clinical manifestations has not yet been fully clarified. In this report, we will show the data obtained from the nationwide surveillance on the ICDA in Japan with special reference to its dissecting nature and present some illustrative cases from our own series.

Materials and methods

NSICDA was conducted in 2004 by retrograde registration of cases with ICDA treated in the period between 2001 and 2003 in hospitals approved by board committee of Japan Neurosurgical Society. ICDA was defined simply as an aneurysm on the superior (or anterior) wall of C1-C2 portion of the ICA without any branch artery around the neck. Four hundred and ninety-nine out of 1237 board-approved institutes (40.3%) responded to the surveillance. Eventually 365 cases with ICDA, of which 144 were incidentally found as an unruptured An, and 221 (comprising 60.5% of the total) found with SAH, were registered from 181 hospitals. In this report, 221 SAH cases were studied in detail especially with regard to its dissecting nature. Neurological grade on admission to hospital was assessed by Hunt-Kosnik’s grading, and outcome at discharge by Glasgow Outcome Scale (GOS). Statistical analysis was made by Student’s t-test, Chi-square test or Mann–Whitney U-test.

Angiographical characteristics of ICDA

ICDA arises exclusively from the superior (or anterior) wall of the C1-C2 portion of the ICA without any branching artery and often shows unusual and peculiar features on angiogram. It may look as a saucer-like bulging without any neck portion (Fig. 1A), a broad based and double contoured bulging (Fig. 1B) or a quite irregularly ragged shaped dome like a bunch of grapes (Fig. 1C). Abnormal narrowing of the ICA, proximal or distal to the dome, may frequently be associated with the ICDA (Fig. 1B). These peculiar figures of ICDA strongly suggest that it is different from the ordinary aneurysm with which neurosurgeons are facing in their daily practice, and the possibility is implied that many of these unique An might be dissecting in nature.

Cases with dissection in NSICDA

Fifty-six cases, comprising 15.5% of the 361 total cases, were registered to NSICDA as clinically confirmed dissecting aneurysm. Restricted to 221 cases manifested with SAH, 50 (22.5%) were dissecting. Postoperative mortality rate of dissecting aneurysm is 25% and that of the non-dissecting type is 17.8%; hence the overall surgical outcome of
the first type is significantly worse ($P < 0.05$) than that of the latter one (Fig. 2A). There were 30 cases out of 153 operated non-dissecting aneurysms in which serious intraoperative bleeding occurred in a way that the aneurysmal neck tore off from the parent ICA wall instead of bleeding from the dome. Since this kind of wall disruption (direct neck tear) is quite unusual in normal berry-type An, this type may well be regarded as dissecting in nature. Including cases with intraoperative neck tear definitely into the dissecting group, the postoperative mortality rate becomes 31.4%, and overall outcome is essentially the same as that of pure dissecting group (Fig. 2B).

**Illustrative case**

**Case 1**

A 45-year-old housewife was admitted with severe headache which had suddenly occurred 2 h earlier. She was awake and showed no neurological abnormality other than headache. Brain CT scan on admission revealed SAH restricted within the right side of the basal and ambient cisterns (Fig. 3A). Cerebral angiogram on the day of admission demonstrated no An on the right side, while ICDA was present on the left C2 portion (Fig. 3B and C). Since no An was found on the right side where the blood clot was exclusively present, early surgical exposure was abandoned. The patient suddenly became semicomatose (grade 4) on day 5, and immediate angiogram revealed a newly developed round bulging on the superior wall of the right C2 portion (Fig. 3D). She died of brain damage caused by the rebleeding, and permission for autopsy was given by her family.

Histopathological finding of the right ICA disclosed dissection of the wall at the ruptured site (Fig. 4A), and dissection of the left ICA where unruptured ICDA was present (Fig. 4B).

**Case 2**

A 55-year-old female was transferred from a local hospital where she suffered the second SAH and had become semicomatose. Brain CT scan