A case report of spontaneously healed isolated posterior inferior cerebellar artery dissection with headache alone

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Abstract

Background: Isolated posterior inferior cerebellar artery dissections can cause subarachnoid hemorrhages or infarctions. Surgical treatments for hemorrhagic stroke cases and medical treatments using antithrombotic agents for ischemic stroke cases have been done, whereas there are very few reports on non-stroke posterior inferior cerebellar artery dissections and the treatment strategy for non-stroke cases has not been established. This is the first detailed report on spontaneously healed isolated posterior inferior cerebellar artery dissection with headache alone.

Case presentation: 48 years old healthy male felt severe right-side throbbing headache and came to OIKE Clinic on the fourth day after the onset. MRI studies revealed his right posterior inferior cerebellar artery dissection and showed no infarctions or hemorrhages. He was observed carefully under continuous monitoring of blood pressure and hydrated sufficiently, given analgesic anti-inflammatory agents. Two weeks later, the dissected vessel’s diameter grew up to the maximal size, though the patient’s headache was rapidly improved around that day. Surgical treatments for prevention of subarachnoid hemorrhage were considered but careful conservative therapy continued in accordance with the patient’s strong desire. Gradually the dissection finding had been improving. Four months later, MRI study showed his right posterior inferior cerebellar artery was seen almost normal in size and shape.

Conclusions: If isolated posterior inferior cerebellar artery dissection with headache alone is detected early on, it might be one therapeutic option to undergo the careful conservative therapy with repeated MRI examinations and assessment of the patient’s headache.

Keywords: Isolated posterior inferior cerebellar artery (PICA) dissection, Headache, Spontaneous healing

Background

Isolated posterior inferior cerebellar artery dissections (iPICADs) can cause subarachnoid hemorrhages or infarctions\(^1\). The incidence of iPICAD had been thought very rare. The reports of iPICAD with stroke, however, are increasing with the progress of high resolution MRI techniques. Surgical treatments for hemorrhagic stroke cases and medical treatments using antiplatelet or
anticoagulant agents for ischemic stroke cases have been done. The treatment strategy for iPICADs with headache alone, however, is not yet established, because the reports on non-stroke iPICADs are still rare. Herein, a non-stroke iPICAD case healed spontaneously is reported and the iPICAD cases in the literature are reviewed.

**Case Presentation**

48 years old male, who had no past medical or traumatic history and no family history of cerebral artery dissections, felt severe right-side throbbing headache suddenly and came to OIKE clinic on the fourth day after the onset. MRI study revealed a tiny dissection like finding (pearl and string sign like) on his right proximal segment (tonsillomedullar segment) of PICA (Fig.1A). PICA dissection could not be denied and he was observed carefully under continuous monitoring of blood pressure, heart rate and other vital signs and he was hydrated sufficiently, given analgesic anti-inflammatory agents (a non-steroid anti-inflammatory drug: Loxoprofen Sodium Hydrate 60-300mg a day). The seventh day’s MRI study showed that the diameter of the PICA was expanding more and the patient’s PICAD was conclusively diagnosed (Fig.1B). The other MRI sequences showed no infarctions or hemorrhages (Fig 1C, D). Careful conservative therapy was continued. His headache severity was assessed by numerical rating scale (NRS) every day. The inner and outer diameters of the dissected PICA were measured by MRI T1-weighted high resolution vessel wall imaging (HRVWI) (Fig.1F) and T2-weighted HRVWI (basi-parallel anatomical scanning (BPAS)) (Fig.2), respectively. Two weeks later after the onset of headache, the dissected vessel’s diameter grew up to the maximal size (Fig.2A), though the patient’s headache improved steeply on the eighth day (Fig.3). Surgical treatments for prevention of subarachnoid hemorrhage were considered but the patient desired to continue the conservative therapy. Since the eighth day, the patient did not feel severe headache again. Four weeks later after the onset, the dissection finding on MIP images began to improve. Eight weeks later after the onset, his PICA looked like almost normal on MIP and T1-weighted HRVWI and the outer diameter was still bulging on T2-weighted HRVWI (BPAS). Finally, four months later after the onset, the outer diameter was seen almost normal in size and shape (Fig.2). The patient runs marathon races again.

**Discussion**
According to the Spontaneous Cervicocephalic Arterial Dissections Study (SCADS-I) criteria, the patient was definitely diagnosed as artery dissection (one minor criteria and both of two additional criteria matched). Of all cervicocephalic artery dissections, vertebral artery dissections (VADs) are common and the therapeutic strategy for VAD has been established. The reports of iPICAD with stroke are increasing with the progress of high resolution MRI techniques but those with headache alone are still few. In the last decade, over 70 cases of iPICAD have been found in the literature, but almost all the cases were with subarachnoid hemorrhages or infarctions. Non-stroke iPICAD cases were only two and one of two cases was diagnosed with the coexisting VAD. PICA is a small vessel and PICAD is often tiny finding even with high resolution MRI techniques and therefore can be overlooked unless accompanied with stroke.

The present case’s patient was fortunately suspected to have iPICAD at the beginning of the clinical course and followed by MRI examination. High resolution vessel wall imaging (HRVWI) was useful in this case. T1-weighted HRVWI showed no apparent hyperintensity spot indicating intramural hematoma in the vessel wall. This imaging technique was also useful to confirm the intraluminal size change. The outer diameter was followed by basi-parallel anatomical scanning (BPAS), one type of T2-weighted HRVWI. The outer diameter shrinkage followed the internal diameter improvement. It was not necessary to perform conventional angiography for this patient.

For VADs with headache alone, conservative therapies are usually selected. The therapeutic strategy for non-stroke iPICAD, however, is not yet determinate. The other case of the reported two iPICAD with headache alone was surgically treated to prevent subarachnoid hemorrhage because the dissection finding of radiological examination was progressive, though the patient headache had relieved. In the cases that the dissection findings of radiological examination are progressive, it might be permissible to perform any surgical treatments in order to avoid the rupture of dissected arteries. But it should be noticeable that non-stroke iPICAD may heal spontaneously like the present case. Maruyama et al. reported spontaneous vertebral and internal carotid artery dissection cases. They emphasized on the importance of the location, nature and severity of cervical and occipital
pain. In the present case, the patient felt severe throbbing headache continuously at least during his PICAD finding was worsening. After he relieved from the occipital pain, his PICAD finding stopped its exacerbation and gradually improved on MRI study. The improvement of severe headache might be a clue to continue conservative therapy for non-stroke iPICAD, even though radiologic studies’ findings appear to be worsening.

Conclusions
This is the first detailed report on spontaneously occurred and healed iPICAD with headache alone, followed by MRI examinations. With the progress of high resolution MRI techniques, iPICAD will be detected more frequently. It is important to detect iPICAD as soon as possible. If iPICAD with headache alone is detected early on, it might be one potent therapeutic option to undergo the careful conservative treatment including strict blood pressure control, sufficient hydration and anti-inflammatory agent administration, with repeated MRI examinations and assessment of the headache severity.

Abbreviations
BPAS : basi-parallel anatomical scanning
DWI: diffusion weighted image
FLAIR: fluid-attenuated inversion recovery
HRVWI: high resolution vessel wall imaging
iPICAD: isolated posterior inferior cerebellar artery dissection
MIP: maximum intensity projection
MRA: magnetic resonance arteriogram
MRI: magnetic resonance imaging
NRS: numerical rating scale
VAD: vertebral artery dissection

Declarations

Ethics approval and consent to participate
This manuscript was approved by the institutional review board (OIKE Clinic ethics committee, approval reference number 18-01), and informed consent for participation was obtained from the patient.

**Consent for publication**
Written informed consent was obtained from the patient for publication of this report and any accompanying images.

**Availability of data and materials**
All data generated or analyzed during this study are included in this published article and its supplementary information files.

**Competing interests**
None.

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Figures
A, B and C are MRA (MIPs). A (4 days after onset) shows ‘pearl and string sign’ like finding of the patient’s right PICA. The PICA inner diameters are growing gradually (7 days later) (B) and (14 days later) (C). The FLAIR and DWI shows no hemorrhages and infarctions, respectively (D and E). T1-weighted vessel wall image depicts no apparent intramural hematomas of the patient’s right PICA (F). (All arrows indicate the affected PICAs.)
MRA (MIP) in upper raw (A-D), BPAS in middle raw (E-H) and BPAS zooming in the affected PICA in lower raw (I-L). From the left column to the right column, the data of two weeks after the onset (A, E and I), one month (B, F and J), two months (C, G and K) and four months (D, H and L) are lined. Chronological changes of PICA inner diameter (MIP) and outer diameter (BPAS) are shown. MIPs show that the inner diameter of the right PICA grows maximally on the 14th day and are gradually downsizing. These MRI findings show the inner diameter reduction precedes the outer diameter’s shrinkage.
The patient’s headache severity was measured by numerical rating scale (NRS) every day.

The inner diameter of the affected PICA was measured using cross-sectional view of T1-weighted HRVWI and the outer diameter was measured using original data of T2-weighted HRVWI (BPAS). Two weeks later after the onset of headache, the dissected vessel’s diameter grew up to the maximal, though NRS score of the patient’s headache improved steeply on the eighth day. Since then, NRS scores had been kept within 2. The maximum inner and outer diameters shrunk gradually to normal size.

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