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Data Article

The dataset on the clipped cerebral aneurysm and their radiological findings in three-dimensional computed tomography, time-of-flight magnetic resonance angiography (TOF-MRA), and Pointwise Encoding Time Reduction with Radial Acquisition (PETRA)-MRA

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A R T I C L E I N F O

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Less invasive

A B S T R A C T

These data present the 141 intracranial arterial branches' visibilities near the 72 cerebral aneurysms in postoperative 58 patients treated with titanium or cobalt-chromium-nickel-molybdenum (CCNM) alloy clips. The visibilities were evaluated using time-of-flight magnetic resonance angiography (TOF-MRA), pointwise encoding time reduction with radial acquisition (PETRA)-MRA, which uses MRA with ultrashort echo time (UTE-MRA) and subtraction technique between saturated and non-saturated images, and three-dimensional computed tomography angiography (3DCTA). We retrospectively acquired the data from the medical records of Suwa Red Cross Hospital. Each method's appearance was compared, and associations between visibility on PETRA-MRA, arterial diameter, clip numbers, clip shapes, clip materials, and amounts of hematoma were summarized. Our article on

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PETRA-MRA's usefulness for proximal and branched arteries evaluation after cerebral aneurysm clipping [1] was based on these data. This dataset would be useful for reference value for other neurosurgeons or radiologists for further analysis on PETRA-MRA and another UTE-MRA like SILENT-MRA after cerebral aneurysm clipping.

Specifications Table

Subject	Clinical Neurology
Specific subject area	Neurosurgery
Type of data	Table
How data were acquired	We investigated the medical records of Suwa Red Cross Hospital and collected data.
Data format	Raw
Parameters for data collection	We retrospectively collected age, sex, aneurysm location, and clip detail from the medical records. We also investigated radiological findings like subarachnoid hemorrhage (SAH) volume, presence of motion artifact, diameters of proximal and branched arteries in three-dimensional computed tomography angiography (3DCTA). The visibilities in time-of-flight magnetic resonance angiography (TOF-MRA) and pointwise encoding time reduction with radial acquisition (PETRA)-MRA was decided by majority voting by 3 neurosurgeons.
Description of data collection	From the Suwa Red Cross Hospital stroke database, we retrospectively retrieved the data from all 141 intracranial arterial branches near the 72 cerebral aneurysms in 58 patients treated with titanium or cobalt-chromium-nickel-molybdenum (CCNM) alloy clips. The 6 neurosurgeons as authors cooperatively collected data described in the Parameters for data collection.
Data source location	Institution: Suwa Red Cross Hospital City/Town/Region: Suwa Nagano Country: Japan Latitude and longitude (and GPS coordinates) for collected samples/data:] 36.0430059, 138.1068495
Data accessibility	With the article
Related research article	Akihiro Nishikawa, Yukinari Kakizawa, Naomichi Wada, Yasunaga Yamamoto, Masahito Katsuki, Toshiya Uchiyama Usefulness of Pointwise Encoding Time Reduction with Radial Acquisition and Subtraction-Based Magnetic Resonance Angiography after Cerebral Aneurysm Clipping [1] World Neurosurg X. 9 (2021) 100,096. https://doi.org/10.1016/j.wnsx.2020.100096.

Value of the Data

- Data includes detailed characteristics of the description in the 3DCTA and visibility in PETRA-MRA.
- This dataset would be useful for reference value for further analysis on 1.5-tesla PETRA-MRA [1,2] and 3-tesla PETRA-MRA [3].
- This dataset would also be useful for further investigation on another ultrashort echo time (UTE)-MRA sequence like SILENT-MRA [4–6].

1. Data Description

The dataset in this table describes the characteristics of the patients with clipped cerebral aneurysm and their radiological findings. The detailed data are available in the supplementary file as a Microsoft Excel file.

Title of the table: Characteristics of the patients with clipped cerebral aneurysm and their radiological findings.

Variables of 58 patients, 72 aneurysms	Number (%) or Median (range)†
Sex, women:men	46:12 (aneurysms, 59:13)
Age	71 (35–86)
Ruptured: Unruptured	30:42
SAH volume, absent: small:large	44:22:6
Aneurysm location	
Middle cerebral artery	
-Middle cerebral artery bifurcation	25 (34.7%)
-M1 of the middle cerebral artery	2 (2.8%)
-Distal middle cerebral artery	2 (2.8%)
Internal carotid artery	
-Internal carotid artery-posterior communicating artery	15 (20.8%)
-Internal carotid artery-anterior choroidal artery	4 (5.6%)
-Paraclinoid internal carotid artery	1 (1.4%)
-Internal carotid artery bifurcation	1 (1.4%)
Anterior cerebral artery	
-Anterior communicating artery	14 (19.4%)
-Distal anterior cerebral artery	7 (9.7%)
-A1 of the anterior cerebral artery	1 (1.4%)
Clip number, 1:2:3	56:15:1
Clip material, titanium: CCNM	70:2
Clip shapes	
-Fenestrated	8
-Bayonet	17
-Straight	30
-Curved	34
Severe motion artifact	6 (8.3%)
Proximal artery diameter in 3DCTA (mm)	2.42 (0–5.05)
Diameter of the smaller branched artery in 3DCTA (mm)	1.19 (0–3.64)
-Visibility of smaller branched artery in PETRA-MRA	28 visible
Diameter of the larger branched artery in 3DCTA (mm)	1.89 (0.23–3.81)
-Visibility of larger branched artery in PETRA-MRA	52 visible

Abbreviations; 3DCTA; three-dimensional computed tomography angiography, SAH; subarachnoid hemorrhage, PETRA; pointwise encoding time reduction with radial acquisition.

2. Experimental Design, Materials and Methods

2.1. Patients

We investigated 58 patients who underwent surgical clipping using titanium (56 patients) or CCNM (2 patients) clips. Thirty aneurysms were ruptured cerebral aneurysms and 42 unruptured. Titanium means ASTM F1342G2 (ISO5832–2) or ASTM F136 (ISO5832–3). Age, sex, whether the aneurysm was ruptured or not, SAH volume, aneurysm location, number of clips, clip material, clip shape, and radiological findings described as following were collected.

2.2. Image acquisition

We investigated TOF-MRA, PETRA-MRA, and 3DCTA to evaluate clipping and follow-up imaging. They were taken between March 2018 and April 2020 in Suwa Red Cross Hospital. Imaging studies were performed in the same chronological order after surgical clipping of ruptured aneurysms using titanium clip as possible. 3DCTA examinations were performed immediately or one day after the surgery. TOF-MRA and PETRA-MRA were performed 7 days postoperatively in unruptured cases and 14 days postoperatively in ruptured cases, when the vasospasm might have fewer effects on radiological evaluation. In the two cases with CCNM clips, the patients underwent clipping surgery over 10 years ago, whereas PETRA-MRA was performed in an outpatient clinic in May 2018.

TOF-MRA and PETRA-MRA were performed on a 1.5-tesla clinical scanner (MAGNETOM Area; Siemens, Erlangen, Germany) by a 20-channnel head-neck coil. The detailed scan parameters for TOF-MRA were as following: repetition time/echo time, 25/7.0 ms; flip angle, 20 °; field of view, 180 × 180 mm; matrix, 256 × 256; thickness, 0.6 mm; voxel size, 0.9 × 0.7 × 0.6 mm; and acquisition time, 5 min 21 s. The detailed scan parameters for PETRA-MRA were the following: repetition time/echo time, 3.32/0.07 ms; flip angle, 6 °; field of view, 280 × 280 mm; matrix, 288 × 288; thickness, 0.97 mm; voxel size, 0.97 × 0.97 × 0.97 mm; acquisition time with/without pre-saturation pulse, 2 min 53 s/4 min 47 s; and total acquisition time, 7 min 40 s. To clearly visualize the cerebral arteries, a pre-saturation pulse was applied. 3DCTA were performed using 320-row CT scanner (Aquillion ONE; Canon Medical Systems, Tochigi, Japan). Scan parameters comprised: rotation period, 1.0 s; tube voltage, 100 kV; tube current, 420 mA; field of view, 200 mm; matrix, 512 × 512; slice thickness, 0.5 mm; and voxel size, 0.9 × 0.7 × 0.6 mm.

2.3. Image analysis

Diameters of the proximal and branched arteries of the aneurysm were measured on reconstructed 3DCTA images using a picture archiving and communication system (Synapse; software version 4.1, FUJIFILM Medical Systems U.S.A., Massachusetts, United States). Three neurosurgeons subjectively and independently assessed the visibility of proximal and branched vessel continuity at the clipping site and neck remnant in both TOF- and PETRA-MRA images. Vessel diameters were measured on the 3DCTA but not on the MRAs. Vascular diameters were measured at the narrowest point within 5 mm from the clip. Regarding branched arteries, the diameter of the two-branched arteries was measured. In three or more arteries, such as trifurcation, the two larger arteries were measured. In the case of anterior communicating artery (ACoA) aneurysms, the diameter was measured with A1 portion of the anterior cerebral artery (ACA) on the developed side as the proximal artery, and ACoA and distal ACA on the ipsilateral side as the branched artery. When the artery was partially discontinued on the 3DCTA, the diameter was defined as 0 mm. When the artery was not described fully within 5 mm on the 3DCTA, we defined it as *Not described* and excluded them from the analysis.

The SAH volume around the clipping site was assessed in fluid-attenuated inversion recovery images because the interpretation of TOF-MRA can be difficult or impossible under the presence of a hematoma in contrast to PETRA-MRA using subtraction methods. SAH volume was classified into three groups: no-SAH (no hematoma), small-SAH (hematoma thickness $<$ 10 mm), and large-SAH (10 mm $\leq$ hematoma thickness).

2.4. Inclusion and exclusion criteria for investigation

Only the patients who underwent clipping using titanium (56 patients) were investigated, and those using CCNM (2 patients; Case 57 and 58) were excluded. Then 6 patients in the 56 patients had severe motion artifacts, so they were also excluded (Case 12, 35, 37, 39, 40, and 44). Case 40 had 2 aneurysms. Eventually, 63 aneurysms of the 50 patients were investigated in our article [1].

Regarding the branched arteries on the 3DCTA, the diameters were defined as 0 mm when they were partially discontinued. When they were not described fully within 5 mm, we defined them as *Not described* and excluded them from the analysis. Eventually, 114 branches were investigated in our article [1].

Ethics Statement

The hospital ethics committee approved this study, and the ethical approval number is 2–13 of the Suwa Red Cross Hospital Research Ethics Committee. All personal patient information was removed from the database to protect patient privacy.

CRediT Author Statement

Akihiro Nishikawa: Resources, Validation, Writing - Review & Editing; **Masahito Katsuki:** Resources, Formal analysis, Writing - Original Draft; **Yukinari Kakizawa:** Resources, Conceptualization, Validation, Supervision; **Naomichi Wada:** Resources, Validation, Resources; **Yasunaga Yamamoto**: Resources, Conceptualization; **Toshiya Uchiyama**: Resources.

Declaration of Competing Interest

The authors declare that they have no known competing for financial interests or personal relationships which have, or could be perceived to have, influenced the work reported in this article.

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Supplementary Materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.dib.2021.106874.

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