JNeViS
Journal of Neurointervention and Stroke

Journal of Neurointervention and Stroke 2026;2(1):36-40
doi: 10.63937/jnevis-2026.21.22 | e-ISSN: 3123-6227

Case Report

Distal Transradial Access for Cerebral Digital Subtraction Angiography: A Case Report on Advantages, Limitations, and Practical Insights

Fritz Sumantri Usman[1,2], Asep Muhajirin[3], Evlyne Erlyana Suryawijaya[1,2,4]✉, Gamaliel Wibowo Soetanto[5]

[1]Neuro Center, PELNI Hospital, Jakarta, Indonesia
[2]Department of Neurology, Faculty of Medicine, University of Pelita Harapan, Tangerang, Indonesia
[3]Department of Nursing, Catheterization Laboratory, Pelni Hospital, Jakarta, Indonesia
[4]Department of Neurology, Siloam Hospital Lippo Village, Tangerang, Indonesia
[5]Department of Neurology, Santo Boromeus Hospital, Bandung, Indonesia

Corresponding Author:
Evlyne Erlyana Suryawijaya
Department of Neurology, Faculty of Medicine Universitas Pelita Harapan, Tangerang, Indonesia
Email: evlyne.neurologi@gmail.com

Received: December 11, 2025
Revised: January 9, 2026
Accepted: January 11, 2026
Published: May 30, 2026

Introduction: Transradial access (TRA) has showed substantial advantages over transfemoral access (TFA), including decreased morbidity and mortality and increased patient comfort, resulting in its widespread usage. The distal transradial approach (dTRA) offers advantages such as better radial artery preservation, improved ergonomics, and a lower risk of hand ischemia, with early studies reporting high technical success and few complications. In neurointervention, dTRA is emerging as an alternative for cerebral angiography, providing greater patient comfort, fewer access-site complications, and shorter hemostasis times, although evidence remains limited. **Case**: A 45-year-old man underwent cerebral digital subtraction angiography (DSA) using distal transradial access to further evaluate suspected bilateral middle cerebral artery thrombosis. **Conclusion:** Appropriate patient selection for dTRA requires careful consideration of both suitability for radial access and anatomical factors, as dTRA may be preferred in certain clinical scenarios, but caution is necessary to avoid injury to surrounding structures in the anatomical snuffbox. For diagnostic cerebral angiography, dTRA demonstrates favorable procedural success with improved safety and patient comfort; however, further studies are required to support its wider application in neurointervention.

Keywords: Cerebral angiography, Cerebral digital subtraction angiography, Distal transradial access, Radial access

Highlights
- dTRA is a safe alternative to TRA with ergonomic benefits in selected anatomy.
- Careful technique is required in dTRA to avoid snuffbox-related complications.
- dTRA enables effective cerebral angiography with fast hemostasis and artery preservation.

Introduction

Radial artery access has become an established technique for coronary and peripheral angiography following its initial description in the late 1980s by Campeau. In interventional cardiology, substantial evidence has demonstrated that the transradial approach (TRA) provides significant advantages over the transfemoral approach (TFA), including lower rates of bleeding-related complications, reduced mortality, improved patient preference, and decreased healthcare costs. Large randomized trials, including the MATRIX study involving over 8,400 patients, have confirmed these benefits, reporting significant reductions in bleeding events and mortality.[1,2]

More recently, a distal modification of the transradial approach, termed distal transradial approach (dTRA), has been introduced in coronary interventions. One recognized limitation of conventional TRA is radial artery occlusion (RAO), a generally asymptomatic complication occurring in 4% of patients, which may limit the vessel suitability for future vascular access or grafting. By

utilizing a more distal puncture site beyond the origin of the superficial palmar branch, dTRA may preserve proximal radial artery integrity and collateral hand circulation, thereby reducing ischemic risk while also offering improved procedural ergonomics, greater comfort for awake patients due to a more natural hand position, shorter hemostasis times, and preservation of the radial artery for future interventions.[1,2,3]

In the neurointerventional field, dTRA has recently gained attention as an alternative access site for cerebral digital subtraction angiography (DSA). Puncture at the anatomical snuffbox (Figure 1) has been shown to be technically feasible and safe, with radial artery diameters comparable to those at the wrist. While TFA remains the traditional standard, TRA has gained popularity due to lower access-site complications, earlier mobilization, and improved patient comfort, despite an inherent learning curve. As an extension of this approach, dTRA offers additional patient-centered advantages; however, published data on its use in diagnostic cerebral angiography remain limited. This case report presents our initial experience using dTRA for diagnostic cerebral DSA.[3,4]

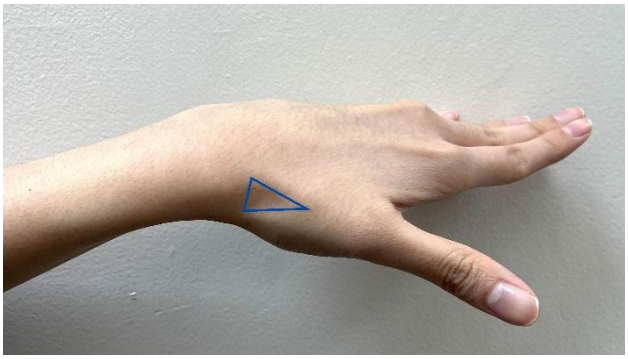

Figure 1. Anatomical landmarks of the snuffbox.

Case

A 45-year-old man with history of hypertension and diabetes presented with a two-month history of slurred speech. He was diagnosed with ischemic stroke. Non-contrast head computed tomography demonstrated multiple lacunar infarcts involving the left basal ganglia and bilateral internal capsules, raising suspicion of bilateral middle cerebral artery thrombosis.

The patient was positioned with the hand resting alongside the ipsilateral hip. Padding was placed beneath the hand to provide stable support for catheter and guidewire manipulation. In contrast to conventional TRA, dTRA permits the hand remain in a neutral and ergonomic position, with the palm oriented toward the hip. Mild ulnar abduction was achieved by flexing the thumb across the fingers, elevating the radial fossa. Following standard sterile preparation, a radial drape was applied with a fenestration to expose the wrist. Local anesthesia was administered by infiltrating 2 mL of 2% lidocaine into the periarterial tissue of the anatomical snuffbox.

Arterial access was obtained using a 20-gauge needle advanced at a 45–50° medial angle toward the radial artery. Following brisk arterial backflow, a 0.021-inch guidewire was introduced, and a 10-cm 5F introducer sheath (Terumo) was inserted. Intra-arterial nitroglycerin (300 µg) was administered to prevent vasospasm, followed by 3,000 U of heparin. Similar to TFA, catheterization was performed using an anteroposterior projection. Due to the proximity of the arm to the body, table rotation was generally unnecessary to visualize the right forearm. The subsequent steps of the procedure were performed in accordance with standard TRA protocols.[5,6,7] Figure 2 depicts the dTRA procedure.

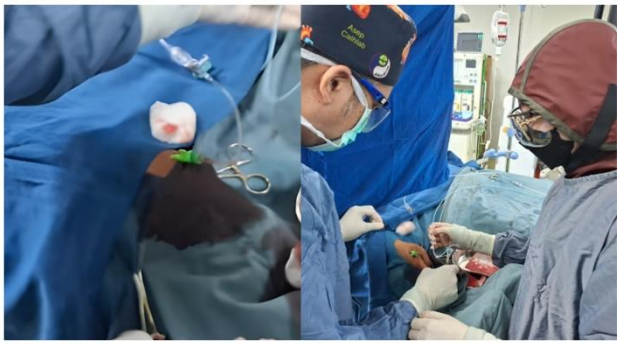

Figure 2. dTRA procedure.

Hemostasis was achieved using a STEPTY™ P compression device (Nichiban) with minimal compression sufficient to preserve radial artery patency.

Cerebral DSA via dTRA demonstrated a 60% symptomatic stenosis of the left middle cerebral artery (proximal M1). Additional findings included asymptomatic 40% stenosis of the right anterior cerebral artery (A1), asymptomatic 40% stenosis of the right middle cerebral artery (proximal M1), and 30% stenosis of the right external carotid artery, along with a fetal-type posterior communicating artery and bilateral posterior cerebral artery hypoplasia. Dual antiplatelet therapy for three months and strict vascular risk–factor control were recommended. The imaging findings of the cerebral DSA are shown in Figure 3.

Discussion

Patient selection remains a key factor in dTRA. In general, individuals suitable for conventional TRA are also appropriate candidates for dTRA. Wang et al., in a study including 62 patients undergoing both diagnostic cerebral angiography and neurointerventional procedures, reported a procedural success rate of 75.8% and demonstrated that success was strongly influenced by vessel diameter and the presence of a clearly palpable

distal radial pulse, while lower body mass index was associated with a higher risk of puncture-related complications.[8] Across published studies, including case reports, single-center research, and meta-analyses, dTRA has been increasingly adopted in neuroangiography and neurointervention, with reported technical success rates ranging from approximately 76.7% to 98.7%.[2,9-14] Technical refinements may further improve outcomes; for example, ultrasound-guided puncture has been shown to increase success rates, with Mori et al. reporting an improvement from 87% to 97%.[15] Most studies describe the use of 4–6 Fr sheaths and standard diagnostic catheters for cerebral DSA.[9-15]

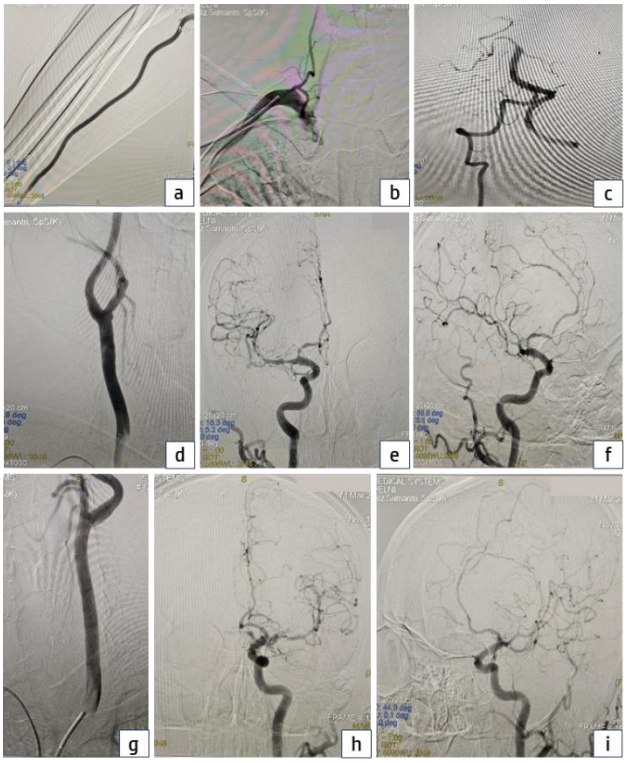

Figure 3. **(a)** Arteriography was performed from the radial artery to the right subclavian artery to confirm the absence of tortuosity and spasm along the vessel. A 0.035" angled guidewire was introduced, followed by advancement of a 5 Fr SIMMONS II diagnostic catheter. **(b)** Upon reaching the right subclavian artery (RSA), angiographic acquisition of the right vertebral artery (RVA) was performed. **(c)** Selective imaging of the RVA was obtained. **(d)** The guidewire was advanced into the descending aorta, followed by manipulation of the SIMMONS II catheter; cannulation of the right common carotid artery (RCCA) was then achieved. **(e)** Angiographic imaging was performed following RCCA injection in anteroposterior (AP) and **(f)** 45° oblique projections. **(g)** Cannulation of the left common carotid artery (LCCA) was performed. **(h)** Angiographic imaging was obtained following LCCA injection in anteroposterior (AP) and **(i)** 45° oblique projections.

For cerebral DSA, TRA has become a well-established alternative to the transfemoral approach due to its favorable safety profile and patient-centered benefits. Evidence from large meta-analyses and prospective studies consistently demonstrates lower access-site and overall complication rates with TRA, particularly in patients at increased bleeding risk or those unable to tolerate prolonged immobilization.[16-19] In addition, TRA is associated with faster post-procedural recovery, shorter hospital stays, and comparable procedural success, thereby improving efficiency and patient satisfaction. The superficial, easily compressible radial artery allows for reliable hemostasis and early ambulation, which is especially beneficial in elderly or frail patients. Nevertheless, optimal outcomes depend on appropriate anatomical suitability and operator experience.[17-19]

dTRA may offer additional advantages in selected patients, including those with coagulopathy, ongoing anticoagulation, or limited forearm supination, as arm positioning may be more favorable.[3,4,6] In addition, preservation of the proximal radial artery may reduce the risk of radial artery occlusion and facilitate future vascular access.[20,21] However, as the anatomical snuffbox contains adjacent structures such as the cephalic vein and superficial branches of the radial nerve, careful procedural handling is essential to minimize complications, including hematoma, tendon injury, periosteal irritation, and radial nerve injury.[4,6,7,16] These anatomical and technical constraints also explain the higher puncture difficulty and susceptibility to spasm in patients with small or poorly palpable distal radial arteries.[22] Therefore, while dTRA represents a promising access option, it should be considered a complementary rather than a universal replacement for conventional TRA, with outcomes highly dependent on appropriate patient selection and operator experience.

Conclusion

dTRA is emerging as a promising approach for diagnostic cerebral angiography, offering a high success rate with minimal complications. Its potential advantages include a reduced risk of ischemia, preservation of the proximal radial artery for future procedures, shorter hemostasis time, and improved patient comfort. Ongoing and future studies will help determine the extent to which this technique will be widely adopted within the neurointerventional field.

Acknowledgement
None.

Conflict of interest
The authors declare that an author of this manuscript is a member of the journal's editorial team. However, the author was not involved in the peer-review process, editorial evaluation, or decision-making for this publication. To ensure an unbiased and objective procedure, all editorial processes from submission to publication were conducted independently, without the author's input or authority.

Patient consent for publication
Written informed consent was obtained from the patient for the publication of all clinical details and accompanying images in this report.

Funding
The authors received no financial support for the research, authorship, or publication of this case report.

Author contribution
Fritz Sumantri Usman: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Resources, Writing–Original Draft, Writing–Review and Editing, Visualization, Supervision, Project Administration. **Asep Muhajirin:** Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Resources, Writing–Original Draft, Writing–Review and Editing, Visualization, Supervision, Project Administration. **Evlyne Erlyana Suryawijaya:** Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Resources, Writing–Original Draft, Writing–Review and Editing, Visualization, Supervision, Project Administration. **Gamaliel Wibowo Soetanto:** Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Resources, Writing–Original Draft, Writing–Review and Editing, Visualization, Supervision, Project Administration.

References
1. Valgimigli M, Gagnor A, Calabró P , Frigoli E, Leonardi S, et al. Radial versus femoral access in patients with acute coronary syndromes undergoing invasive management: A randomised multicentre trial. Lancet. 2015;385(9986):2465–76. DOI: 10.1016/s0140-6736(15)60292-6
2. Brunet MC, Chen SH, Sur S, McCarthy DJ, Snelling B, et al. Distal transradial access in the anatomical snuffbox for diagnostic cerebral angiography. J Neurointerv Surg. 2019;11(7):710–3. DOI: 10.1136/neurintsurg-2019-014718
3. Fischman AM, Patel RS, Lookstein RA. Transradial access in interventional radiology: Background, applications and techniques. Cham: Springer; 2022. [Book]
4. Bhatia V, Kesha M, Kumar A, Prabhakar A, Chauhan R, et al. Diagnostic cerebral angiography through distal transradial access: Early experience with a promising access route. Neurol India. 2023;71(3):453–7. DOI: 10.4103/0028-3886.378692
5. Barbeau GR, Arsenault F, Dugas L, Simard S, Larivière MM. Evaluation of the ulnopalmar arterial arches with pulse oximetry and plethysmography: Comparison with the Allen's test in 1010 patients. Am Heart J. 2004;147:489–93. DOI: 10.1016/j.ahj.2003.10.038
6. Doscher W, Viswanathan B, Stein T, Margolis IB. Hemodynamic assessment of the circulation in 200 normal hands. Ann Surg. 1983;198:776–9. DOI: 10.1097/00000658-198312000-00018
7. Seto AH, Roberts JS, Abu-Fadel MS, Czak SJ, Latif F, et al. Real-time ultrasound guidance facilitates transradial access: RAUST (Radial Artery access with Ultrasound Trial). JACC Cardiovasc Interv. 2015;8:283–91. DOI: 10.1016/j.jcin.2014.05.036
8. Wang W, Ma Y, Wang C, Shi P, Lv W, et al. Risk factors for puncture-related complications after cerebrovascular angiography and neuroendovascular intervention with distal transradial approach. BMC Neurol. 2024;24(1):432. DOI: 10.1186/s12883-024-03940-5
9. Hoffman H, Bunch KM, Mikhailova T, Cote JR, Ashok Kumar A, et al. Transition from proximal to distal radial access for diagnostic cerebral angiography: Learning curve analysis. World Neurosurg. 2021;152:e484–91. DOI: 10.1016/j.wneu.2021.05.125
10. Umekawa M, Koizumi S, Ohara K, Ishigami D, Miyawaki S, et al. Distal radial artery approach is safe and effective for cerebral angiography and neuroendovascular treatment: A single-center experience with Ultrasonographic Measurement. Interv Neuroradiol. 2022;30(2):280–7. DOI: 10.1177/15910199221135308
11. Patel P, Majmundar N, Bach I, Dodson V, Al-Mufti F, et al. Distal transradial access in the anatomic snuffbox for diagnostic cerebral angiography. AJNR Am J Neuroradiol. 2019;40(9):1526–8 DOI: 10.3174/ajnr.a6178
12. Saito S, Hasegawa H, Ota T, Takino T, Yoshida Y, et al. Safety and feasibility of the distal transradial approach: A novel technique for diagnostic cerebral angiography. Interv Neuroradiol. 2020;26(6):713–8. DOI: 10.1177/1591019920925709
13. Goland J, Domitrovic L, Doroszuk G, Garbugino S, Ypa P. Distal radial approach for neurointerventional diagnosis and therapy. Surg Neurol Int. 2019;10:211. DOI: 10.25259/sni_410_2019
14. Weinberg JH, Sweid A, Khanna O, Mouchtouris N, Asada A, et al. Access through the anatomical snuffbox for neuroendovascular procedures: A single institution series. Oper Neurosurg. 2020;19(5):495–501. DOI: 10.1093/ons/opaa141
15. Mori S, Hirano K, Yamawaki M, Kobayashi N, Sakamoto Y, et al. A comparative analysis between ultrasound-guided and conventional distal transradial access for coronary angiography and Intervention. J Interv Cardiol. 2020;2020: 7342732. DOI: 10.1155/2020/7342732
16. Hamouda AM, El Gazar T, Ali MA, Jha KS, Cwajna M, et al. Transradial versus transfemoral access in diagnostic cerebral angiography: A comprehensive systematic review and meta-analysis of clinical outcomes and complications. Neuroradiol. 2025;67(5):1105–19. DOI: 10.1007/s00234-025-03581-6

17. Wang Z, Xia J, Wang W, Xu G, Gu J, et al. Transradial versus transfemoral approach for cerebral angiography: A prospective comparison. J Interv Med. 2019;2(1):31-34. DOI: 10.1016/j.jimed.2019.05.008
18. Romano DG, Frauenfelder G, Tartaglione S, Diana F, Saponiero R, et al. Trans-Radial Approach: Technical and clinical outcomes in neurovascular procedures. CVIR Endovasc. 2020;3(1):58. DOI: 10.1186/s42155-020-00152-z
19. Snelling BM, Sur S, Shah SS, Khandelwal P, Caplan J, et al. Transradial cerebral angiography: Techniques and outcomes. J Neurointerv Surg. 2018;10(9):874-81. DOI: 10.1136/neurintsurg-2017-013584
20. Eid-Lidt G, Rodríguez AR, Castellanos JJ, Pasos JIF, López KEE, et al. Distal radial artery approach to prevent radial artery occlusion trial. JACC: Cardiovasc Interv. 2021;14(4):378–85. DOI: 10.1016/j.jcin.2020.10.013
21. Oliveira M, Caixeta A. Distal transradial access to prevent proximal radial artery occlusion: What is really known? J Transcat Intervent. 2021;29:eA202102. DOI: 10.31160/JOTCI202129 A202102
22. Thongplung K, Kanaderm C, Witayanan JN, Kanoksilp A, Chantadansuwan T. Efficacy and success rate of distal radial artery access at the anatomical snuffbox for coronary intervention at Central Chest Institute of Thailand. BMC Cardiovasc Disord. 2025;25(1):115. DOI: 10.1186/s12872-025-04545-7