Vascular neurologists and neurointerventionalists on endovascular stroke care

Polling results

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The use of endovascular therapy for acute ischemic stroke (AIS) lacks standardization and consensus on several aspects, such as which research areas are most urgent, which patients may benefit the most from such therapy, and who can perform the procedures. These questions may be related to research and evidence gaps. The aim of the roundtable meeting poll was to bring together experts from vascular neurology and neurointerventionalists to explore their opinions about several aspects of AIS care as it pertains to endovascular therapy. The responders, who participated in the polling in-person, were invitees to a roundtable meeting in Chicago, Illinois, in the summer of 2008. The meeting was sponsored by the Society of Vascular & Interventional Neurology (SVIN). The attendees were vascular neurologists or neurointensivists with a practice of greater than 5 years and an interest in AIS, or neurointerventionalists with experience in endovascular AIS therapy who had performed 100 or more procedures over their career. The results of this polling may be interesting to policymakers as well as physicians taking care of patients with AIS, as they can appreciate the challenges of AIS therapy and in building a system of care for this complex patient group. Readers will have an opportunity to learn the opinions of the responders and the approach to AIS at their institutions and then compare them with their own systems of care. This poll addresses controversial questions related to basic science, pathophysiology, epidemiology, public health, neuroimaging triage, therapeutic approaches, periprocedural management, and future directions. Readers may draw their own conclusions from the responses.

We used real-time wireless audience polling at the end of each presentation and asked pertinent clinical and management-related questions to obtain data on various expert opinions. Each presentation covered an aspect of AIS or endovascular management. The polling questions were formulated by the moderator of each session ahead of time, and one of the authors (T.N.N.) was in charge of the process. The attendees were also allowed to submit new polling questions to address comments and discussions that arose during the sessions.

The total number of participants in each session and talk varied between 14 and 30. Because of space limitations, we did not include here the recorded comments and discussion after the questions, but we believe the data objectively quantify the opinions of experts in endovascular AIS intervention (see appendix on pages S7–S15).

SUMMARY Endovascular revascularization therapy is a promising method for treating patients with AIS; however, many challenges remain. The findings from the SVIN roundtable meeting highlight several important points regarding the present state of endovascular therapy and the future direction of the field. Patient selection is essential for the success of endovascular therapy in acute stroke.[1] The spectrum of dramatic benefit and failure in endovascular therapy for AIS underscores the importance of identifying markers for those who will be helped and those who will be harmed. Simple rapid imaging such as noncontrast head CT remains fundamental to patient evaluation. However, further study is needed in advanced imaging such as perfusion studies, in order to liberate stroke triage from the constraint of time and reach more patients.[2] Furthermore, the triage system for stroke networks, requirements of providing institutions, and guidelines for those trained in neurointerventional procedures need to be better defined.[3,4] Stroke intervention techniques vary among neurointerventionalists, which emphasizes the need to identify the optimal revascularization approach. This might include a single or multimodal use of mechanical devices, thrombolytic agents and doses, and adjunctive therapies. Perioperative management also varies, and not all factors that might change outcome are known.

From the Boston Medical Center (T.N.N.), Boston, MA; Medical College of Wisconsin (O.O.Z., J.R.L., B.-F.F., T.J.F., A.B., J.A.M., M.A.L.), Milwaukee; St. Louis University (R.C.E., N.A.V.), St. Louis, MO; Asia Pacific Comprehensive Stroke Institute (N.J.), Pahoa, HI; University of Miami (D.R.Y.), Miami, FL; Wayne State University (A.R.X.), Detroit, MI; JFK Neuroscience Center (J.F.K.), Lake Worth, FL; University of California Los Angeles (D.S.L., N.S.), Los Angeles; Emory University (R.G.N., R.G.), Atlanta, GA; Massachusetts General Hospital (J.R.S.), Boston; Rush University (M.C.), Chicago, IL; University of Michigan (D.B.Z.), Ann Arbor; Duke University (D.L.M.), Durham, NC; Texas Stroke Institute (V.J.), Plano; University of Massachusetts (B.B.), Boston; University of Pittsburgh (T.G.J.), Pittsburgh, PA; University of Louisville (A.A.-C.), Louisville, KY; Baptist Vascular Institute (I.L.), Miami, FL; and Michigan State University (S.I.H.), East Lansing.

Go to Neurology.org for full disclosures. Disclosures deemed relevant by the authors, if any, are provided at the end of this article.

The variability in triaging patients, in the neurointerventional technical approach, and in periprocedural management is an indication of the urgent need for consensus, standardization, and additional research to provide evidence to support particular approaches for particular patient populations.

The armamentarium available to neurointerventionalists continues to expand, but the optimal design for a revascularization device remains unknown and demands continued innovation. As the young field of endovascular revascularization therapy continues to evolve and patient selection is better defined, education of health care providers and awareness among those in the community will become essential to carry the success of endovascular therapy in the battle against AIS.

In these interesting polling questions, participants of the SVIN roundtable meeting addressed each aspect of the care of patients with ischemic stroke as it pertains to endovascular therapy, and their answers may be of interest to readers, policymakers, and researchers alike. However, because of space limitations, only certain polling questions and responses were included in this report, which may limit the ability to understand the full complexity of the system of care for AIS.

Moreover, some new areas of clinical care and research may not have been addressed by the polling questions or the roundtable topics. A clinical continuum network of care with a spokes-and-hub model (whether ship-and-drip or retrieve-and-ship to a tertiary stroke center) and research network needs were not brought up in this polling report.

We would like to underscore that the current polling report reflects the opinions of the attendees of the SVIN roundtable but is limited in lacking supportive data and sampling errors. Polling different attendees might have produced different responses.

AUTHOR CONTRIBUTIONS

Dr. Nguyen: study concept or design, study supervision. Dr. Janjua: drafting/revising the manuscript. Dr. Zaidat: drafting/revising the manuscript, study concept or design, analysis or interpretation of data, acquisition of data, obtaining funding. Dr. Alex Abou-Chebl: drafting/revising the manuscript. Dr. Edgell: drafting/revising the manuscript, study concept or design, study supervision. Dr. Yavagal: study concept or design, acquisition of data, study supervision. Dr. Xavier: drafting/revising the manuscript. Dr. Kirman: drafting/revising the manuscript, study concept or design, study supervision. Dr. Liebeskind: drafting/revising the manuscript, analysis or interpretation of data. Dr. Nogueira: drafting/revising the manuscript, acquisition of data. Dr. Vora: drafting/revising the manuscript, acquisition of data. Dr. Sims: study concept or design, contribution of data. Dr. Lynch: study concept or design, statistical analysis, study supervision. Dr. Lazzaro: drafting/revising the manuscript, analysis or interpretation of data. Dr. Fitzsimmons: study concept or design, contribution of vital reagents/tools/patients, acquisition of data. Dr. Wolfe: study concept or design, acquisition of data. Dr. Badruddin: drafting/revising the manuscript, study concept or design. Dr. Chen: analysis or interpretation of data, acquisition of data. Dr. Zahuranec: analysis or interpretation of data, acquisition of data. Dr. Janardhan: drafting/revising the manuscript, study concept or design, analysis or interpretation of data. Dr. Madden: analysis or interpretation of data, participation in discussion. Dr. Hussain: drafting/revising the manuscript, study supervision. Dr. McDonagh: study concept or design. Dr. Linfante: drafting/revising the manuscript, study concept or design, analysis or interpretation of data, acquisition of data, study supervision. Dr. Gupta: study concept or design, acquisition of data. Dr. Jovin: drafting/revising the manuscript, study concept or design, analysis or interpretation of data, contribution of vital reagents/tools/patients, acquisition of data, statistical analysis, study supervision, obtaining funding. Dr. Sanossian: drafting/revising the manuscript.

DISCLOSURE

Dr. Nguyen served as Associate Editor of *Frontiers of Vascular and Interventional Neurology* and Editor of the SVIN Newsletter. Dr. Janjua received travel funding to attend the roundtable summit. Dr. Zaidat serves on the scientific advisory board for Talecris; served on the adjudication committee for Stryker; received speaker honoraria from Stryker; served on the editorial board of *Frontiers in Neurology* (Endovascular & Interventional Neurology Section); serves as Editor of *The Journal of Neurointerventional Surgery*; serves as Associate Editor and is a member of the Editorial Board of *Journal of Stroke & Cerebrovascular Diseases*; served as a consultant for Stryker Neurovascular-Commercial, Codman Neurovascular-Commercial, and Microvention Inc.-Commercial; and has received research support from a Society of Vascular & Interventional Neurology (SVIN) grant for this educational activity. Dr. Abou-Chebl served on the Scientific Advisory Boards for Focal Cool Inc. and Arterain Medical Inc.; served on the Editorial Advisory Boards for *Stroke* and *Frontiers in Neurology*; served on the speakers bureau for BMS/Sanofi Partnership; performs cerebral angiography and intra-arterial thrombolysis; has received payments from Focal Cool Inc.; and holds stock options in Arterain Medical Inc., Focal Cool Inc., and Arterain Medical Inc. Dr. Edgell serves as Associate Editor for *Frontiers of Interventional Neurology*. Dr. Yavagal received an honorarium from Penumbra Inc. for consultation and speaking; serves as an Associate Editor for *Frontiers in Endovascular Neurology*; and serves as a consultant to Penumbra Inc., Codman Neurovascular, Micrus Inc, Genentech, and Boston Scientific. Dr. Xavier received research support from Concentric Medical, Inc.; and received research support from Medical University of South Carolina–NIH sponsored study. Dr. Kirmani serves on the editorial board of *Frontiers in Endovascular and Interventional Neurology*. Dr. Liebeskind served as a consultant for Concentric Medical and CoAxia and received research support from NIH. Dr. Nogueira served on the scientific advisory board for Concentric Medical, Inc., EV3 Neurovascular Inc., CoAxia Neuro-Interventional Therapeutics, Inc., and Rapid Medical Reverse Medical, and he performs thrombectomy for acute ischemic stroke. Drs. Vora, Sims, Lynch, Lazzaro, and Fitzsimmons report no disclosures. Dr. Wolfe has a patent pending on endovascular treatment system. Dr. Badruddin reports no disclosures. Dr. Chen serves as Associate Editor of *Frontiers in Neurology*. Dr. Zahuranec received funding for travel or speaker honoraria from the Society of Vascular and Interventional Neurology and received research support from NIH/NINDS and AHRQ. Dr. Janardhan reports no disclosures. Dr. Madden received speaker honoraria from the Society for Vascular Interventional Neurology; serves on the editorial board of *Respiratory Research*; and received research support (government grant NSF IOS-0641436). Dr. Hussain serves as an Associate Editor of *Frontiers in Neurology* (Neurointervention Section) and performs neurointervention and endovascular stroke therapy at Michigan State University (50% of time). Dr. McDonagh serves on the editorial board of *Journal of Neurosurgical Anesthesiology*; served as consultant for Cephalogics, Inc., LLC (Division of Allied Minds); and receives research support from the Alzheimer's Disease Research Foundation. Dr. Linfante serves on the Scientific Advisory Board of Codman Neurovascular; serves on the editorial boards of *Stroke* and *Journal of Neurointerventional Surgery*; served as a consultant for Codman and Concentric Medical; and served on the speakers bureau of Codman. Dr. Gupta serves on the Scientific Advisory Boards for Reverse Medical (Chair of DSMB), Rapid Medical (Chair of DSMB), Concentric Medical, and CoAxia; and served as Associate Editor for *Journal of Neuroimaging*. Dr. Jovin serves on the Scientific Advisory Board for Concentric Medical Inc., Medical Advisory Board for CoAxia Inc. Medical, and Advisory Board for eV 3 Inc.; served as Associate Editor of *Journal of Neuroimaging*; was employed by Concentric Medical Inc., CoAxia Inc., and eV 3 Inc.; and served as an expert witness. Dr. Sanossian served on the speakers bureau of Boehringer Ingelheim Pharmaceuticals. **Go to Neurology.org for full disclosures.**

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REFERENCES

1. Ishkanian AA, McCullough-Hicks ME, Appelboom G, et al. Improving patient selection for endovascular treatment of acute cerebral ischemia: a review of the literature and an external validation of the Houston IAT and THRIVE predictive scoring systems. Neurosurg Focus 2011;30:E7.
2. Menon BK, Puetz V, Kochar P, Demchuk AM. ASPECTS and other neuroimaging scores in the triage and prediction of outcome in acute stroke patients. Neuroimaging Clin N Am 2011;21:407–423.
3. Meyers PM, Schumacher HC, Alexander MJ, et al; Writing Group for American Academy of Neurology, American Association of Neurological Surgeons Cerebrovascular Section, Society of Neurointerventional Surgery, Society of Vascular and Interventional Neurology. Performance and training standards for endovascular ischemic stroke treatment. J Stroke Cerebrovasc Dis 2009;18:411–415.
4. Leifer D, Bravata DM, Connors JJ 3rd, et al; American Heart Association Special Writing Group of the Stroke Council; Atherosclerotic Peripheral Vascular Disease Working Group; Council on Cardiovascular Surgery and Anesthesia; Council on Cardiovascular Nursing. Metrics for measuring quality of care in comprehensive stroke centers: detailed follow-up to Brain Attack Coalition comprehensive stroke center recommendations: a statement for healthcare professionals from the American Heart Association/American Stroke Association [erratum in 2011;42:e369]. Stroke 2011;42:849–877.

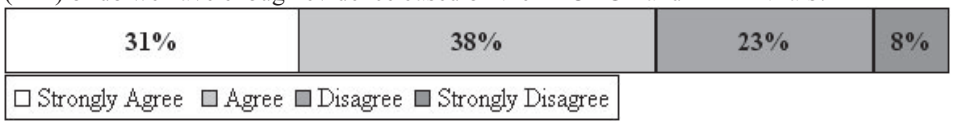
APPENDIX: POLLING DATA

Session I. Public health and policy perspectives in endovascular acute ischemic stroke intervention

1. Are general neurologists aware of all endovascular acute ischemic stroke (AIS) therapy options?

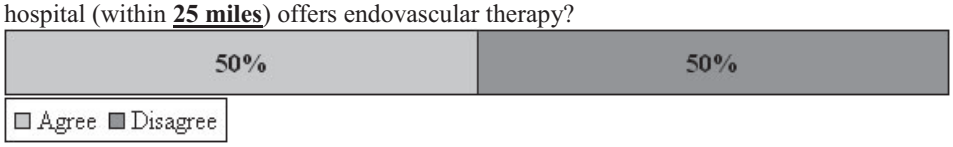
The majority (18/22) felt that general neurologists are unaware of all options for AIS patients.

2. Do we need more randomized trials of intra-arterial chemical therapy only (IAT) or do we have enough evidence based on the PROACT and MELT trials?



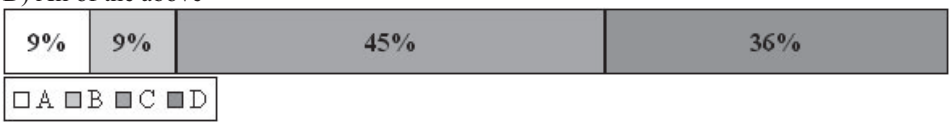
Total of (15/22) 69% either agree or strongly agree.

3. Hospitals not offering endovascular therapy should not accept early acute ischemic stroke (AIS) patients with NIHSS greater than or equal to 8 if a nearby hospital (within **25 miles**) offers endovascular therapy?



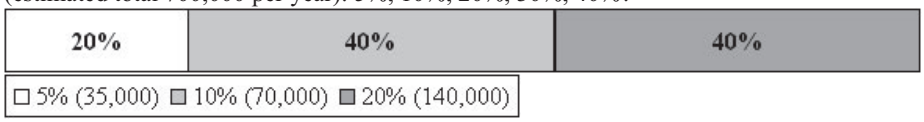
This is divided with 11/22 responders indicating the need for a different paradigm of clinical network such as doing endovascular therapy in one hospital and sending the patient to a different institution for care.

4. What is the best way to improve access to stroke intervention?
   A) Telestroke from community hospitals, and transfer appropriate patients
   B) Increase availability of neuro-interventionalists in community hospitals
   C) Emergency responders to bypass community hospitals; directly to comprehensive stroke center
   D) All of the above



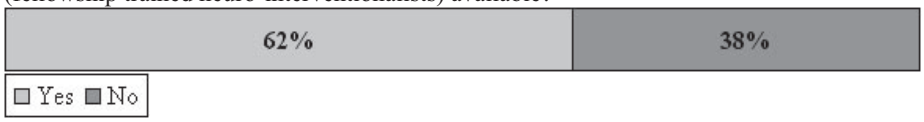
This indicates the need for establishing comprehensive stroke centers to improve access (10/22) and 8/22 felt all the above measures would improve access to AIS care.

5. What percentage of AIS patients are eligible for endovascular therapy (estimated total 700,000 per year): 5%, 10%, 20%, 30%, 40%?



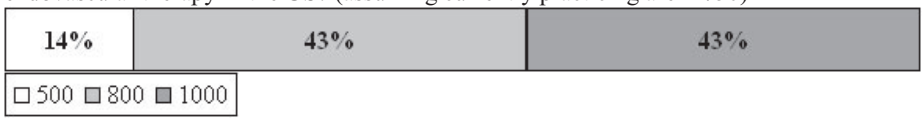
This is an opinion question to start the discussion and more data-driven conclusions are addressed in the supplement. The full group of 22 responders felt that no more than 20% of all strokes would be candidates for AIS endovascular therapy but they are unsure if it would be 10% or 20%.

6. If endovascular therapy becomes standard of care, is there adequate workforce (fellowship trained neuro-interventionalists) available?



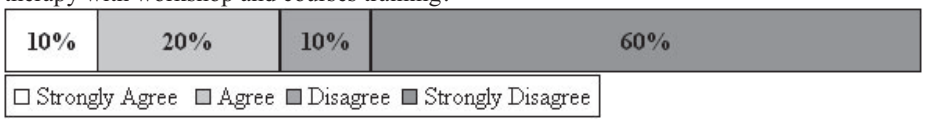
This is a controversial question with different opinions, but almost 2/3 of the responders (13/21) felt it is adequate.

7. What is the required workforce (neuro-interventionalists) needed for endovascular therapy in the US? (assuming currently practicing are = 750)



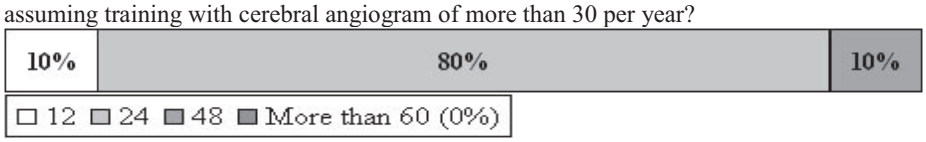
The workforce needed to provide coverage for endovascular therapy is felt to be between 800-1000: 6/14 of the responders answered 800; the other 6/14 answered 1000; and 2/14 responded that 500 interventionalists are adequate.

8. Should "non-fellowship trained" interventionalists perform endovascular therapy with workshop and courses training?



In this question to address potential demand, 30% (6/20) felt it is appropriate to use non-neurointerventionalists to cover the need while 70% (14/20) disagreed.

9. Minimum number of procedures (per year) needed to maintain competence in assuming training with cerebral angiogram of more than 30 per year?



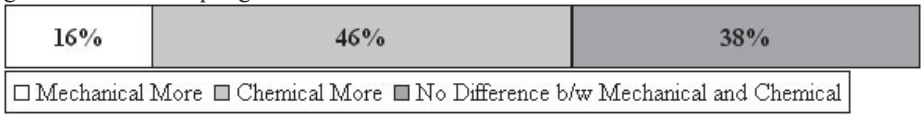
The majority of the attendees (18/20) felt about 24 procedures per year are enough to maintain competency with endovascular therapy given performance of 30 separate cerebral angiograms.

10. Should certified neuro-critical care specialists (neuro-intensivists), certified vascular neurologists, and dedicated neurocritical units be a required part of comprehensive stroke centers (CSC)?

This question shows 65% (13/20) agree or strongly agree that dedicated neurocritical units, certified neurointensivists, and vascular neurologists are required for comprehensive stroke centers. This data may help guide future policy makers as they look into comprehensive stroke center guidelines.

Session II. Patho-physiologic Basis of endovascular AIS intervention

1. Which endovascular modality (mechanical versus pharmacological) has a greater risk of disrupting blood brain barrier?



Almost half (12/26) of the responders felt local chemical thrombolysis associated with disruption to blood brain barrier.

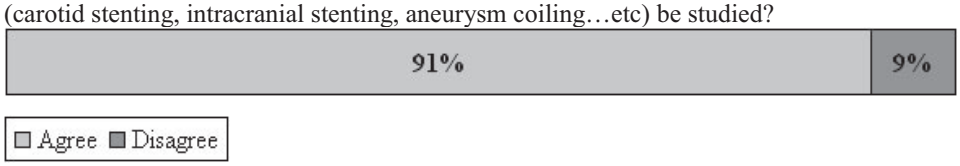
2. After multiple failed clinical trials, should neuroprotectants be studied for AIS therapy?

Two third of the responders felt that neuroprotective agents may still have a role as an adjunctive therapy.

3. Do we need a clinical trial comparing endovascular with or without neuro-protective agents?

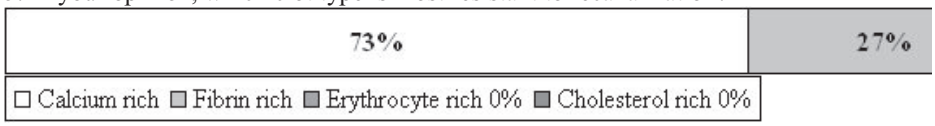
Almost half the responders (11/26) felt that endovascular therapy with or without neuroprotective agents would be a useful study.

4. Should prophylactic neuro-protection before other neurointerventional therapy (carotid stenting, intracranial stenting, aneurysm coiling…etc) be studied?



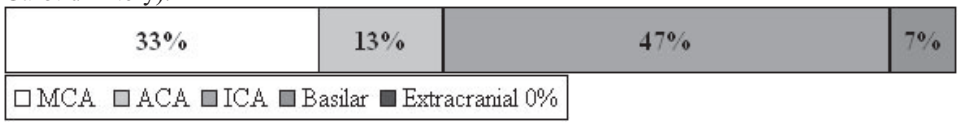
The responding attendees underscored the need to have neuroprotective agents studied as adjunctive and prophylactic therapy.

5. In your opinion, which clot type is most resistant to recanalization?



Responders thought calcium and fibrin rich (white thrombi) clots are resistant to recanalization versus red thrombi (erythrocyte rich).

6. In your opinion, clot location at which artery is most resistant to recanalization? (MCA: Middle Cerebral artery; ACA, Anterior Cerebral artery; ICA, Internal Carotid Artery).



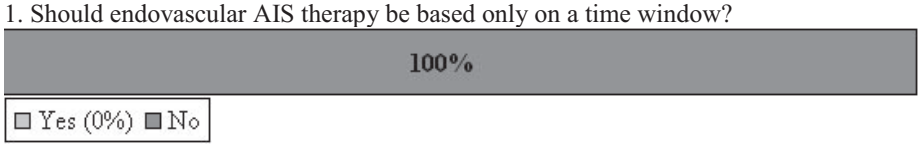
The responders felt that MCA and basilar artery clots are more resistant than ICA and ACA.

7. Is a clinical study needed on clot composition as it pertains to treatment a priority?

The group was divided on the need for a study on clot composition. However, it emphasizes that clot composition and higher resolution neuroimaging techniques may be of value in identifying clot composition and guiding therapy.

Session III. Imaging in Patient Selection for Endovascular Therapy:

1. Should endovascular AIS therapy be based only on a time window?

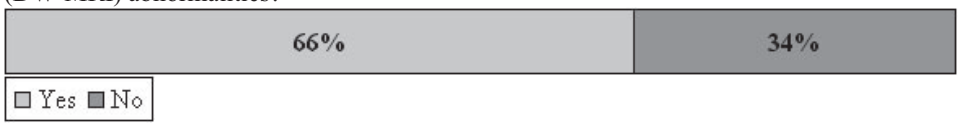


The responders unanimously agreed that time is not the only triaging factor for eligibility to interventional AIS therapy.

2. Do you offer endovascular acute ischemic stroke therapy to patients presenting beyond 8 hours of symptom onset?

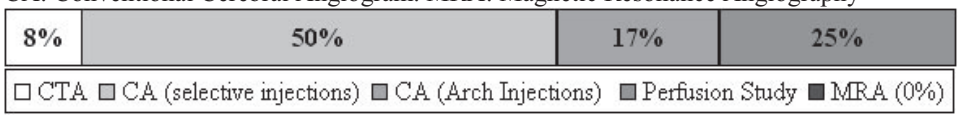
Almost 2/3 of the responders have offered AIS interventional therapy beyond 8 hours.

3. Have you observed reversal of diffusion-weighted magnetic resonance imaging (DW-MRI) abnormalities?



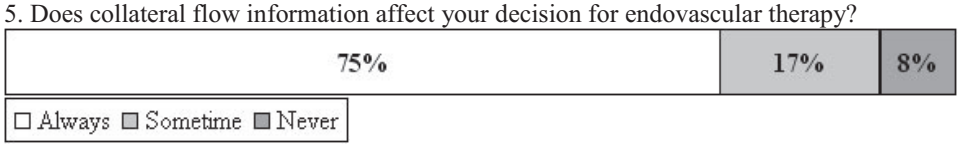
This indicates that 2/3 of responders believe that not all DW-MRI signals are irreversible.

4. What is your preferred method for imaging collateral cerebral circulation before endovascular therapy? CTA: Computerized Tomographic Angiography. CA: Conventional Cerebral Angiogram. MRA: Magnetic Resonance Angiography



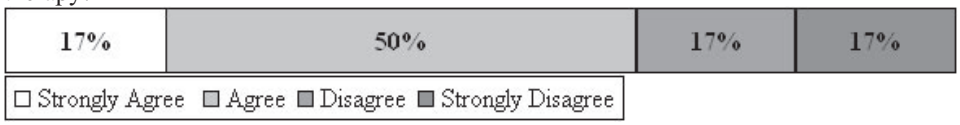
The majority uses Conventional Angiogram to study the collateral circulation.

5. Does collateral flow information affect your decision for endovascular therapy?



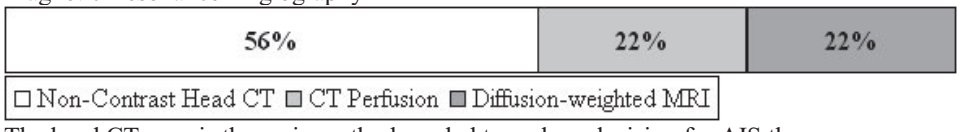
The full understanding of the collateral circulation makes a difference in the approach to interventional AIS therapy according to 3/4 of the responders.

6. Do you use Cerebral blood Volume (CBV) in your decision for endovascular therapy?



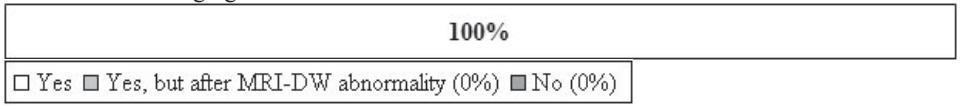
Given that there is no data to support CT perfusion, 34% of the responders felt that the CT perfusion in not reproducible at this time to make a therapeutic decision.

7. What is your preferred diagnostic study to assess the ischemic core prior to interventional management of AIS? CT: Computerized Tomography. MRI: Magnetic Resonance Angiography



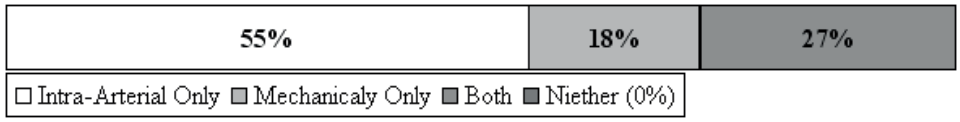
The head CT scan is the main method needed to make a decision for AIS therapy.

8. Should endovascular therapy be offered in the following clinical scenarios? Patient A: NIHSS of 10 wake up stroke with large artery occlusion and good pial collateral on CT angiogram?



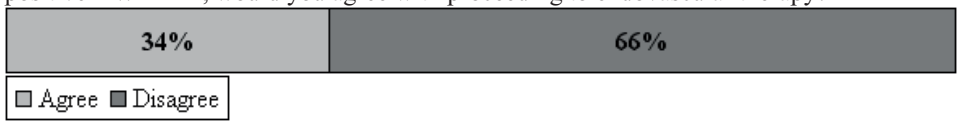
The wake up stroke with CT angiogram showing cortical vessels indicating pial collateral in spite of proximal of occlusion and confirmed by conventional angiogram provided enough support for the responders to proceed with endovascular therapy.

Patient B: NIHSS of 16, presentation between 6-24 hours with normal Head CT and ASPECT of 10?



This example is applying CT head only that is within normal limit in patients with severe stroke presenting after the standard time window. Still close to half of the responders recommended proceeding with endovascular therapy.

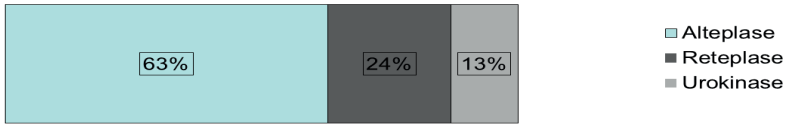
Patient C: NIHSS of 18, presentation between 3-4 hours after symptom onset with positive DWI-MRI, would you agree with proceeding to endovascular therapy?



The concept of possibly "futile endovascular therapy" is when the patient presents early, but parenchymal image showing significant damage. 2/3 of the responders were hesitant to proceed with endovascular therapy.

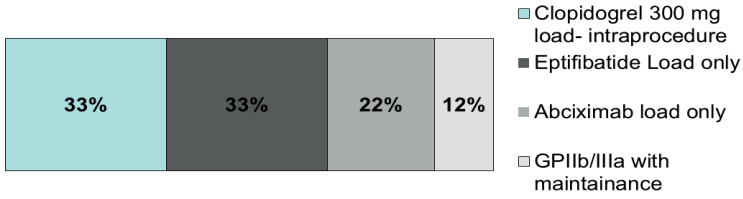
Session IV: Endovascular Techniques and Devices for Acute ischemic Stroke (AIS) Interventional Therapy.

1. Which of the following thrombolytic agent do you use most often during intra-arterial pharmacological intervention?



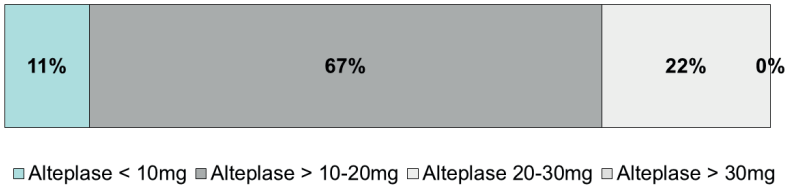
Alteplase is the most commonly used intra-arterial agent in 12/19 responders; with 1/4th using Reteplase and fewer percent using Urokinase.

2. A stent is placed emergently for acute middle cerebral artery occlusion. What antiplatelet regimen do you use acutely (with or without Aspirin)?



When acute stenting is necessary to achieve recanalization, antiplatelet management becomes complicated to avoid stent thrombosis without increasing risk of cerebral hemorrhage. One third of responders used clopidogrel load as soon as the stent is placed, one third of responders loaded the patient with eptifibatide, and one fifth load with abciximab.

3. What is the maximum dose intra-arterial thrombolytic would you use?

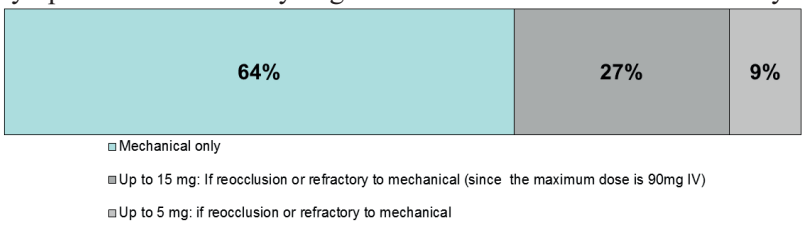


Intra-arterial optimal dosing of alteplase is unkown; however 12/18 of responders use on average 10-20mg of alteplase intra-arterially during AIS therapy .

4. Does it make a difference to follow partial recanalization with glycoprotein inhibitors if using chemical thrombolysis versus mechanical thrombectomy?

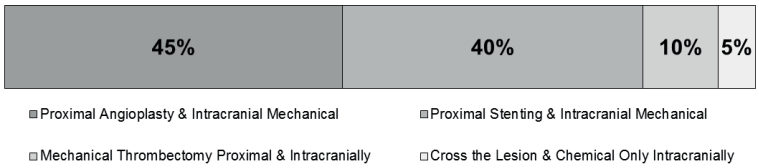
To prevent re-occlusion following partial recanalization with chemical thrombolysis, 73% (22/30) of the group felt it was necessary in cases of partial recanalization.

5. A 65-year-old woman presents with NIHSS of 14 at 2 and 1/2 hours from symptom onset, her weight is 80kg and she received 72 mg intravenous rtPA (Alteplase), and has persistent large artery occlusion at the 4th hour from symptom onset. Would you give additional intra-arterial thrombolysis?



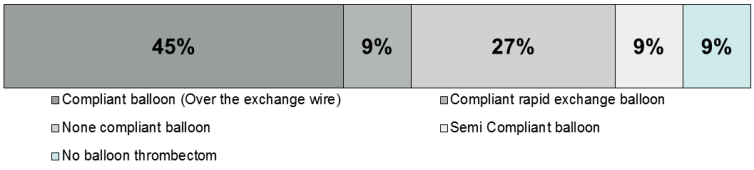
16/25 (64%) of the responders would avoid any additional local thrombolytic after a full dose of IV rtPA with persistent clinical deficit and vessel occlusion.

6. A 58-year-old man presents with acute right proximal carotid occlusion at 5 hours from symptoms onset. What would be your first choice of intervention?



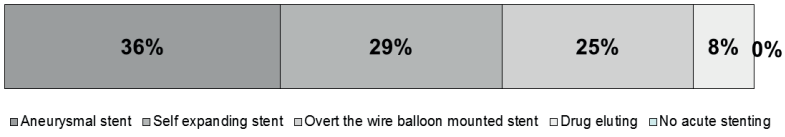
Sometimes proximal carotid occlusion may be encountered during endovascular AIS therapy with various approaches. This group (17/20) felt that the proximal disease should be treated first with either balloon angioplasty only or with proximal carotid stenting to allow access to the distal lesion.

7. During endovascular acute ischemic stroke intervention which type of angioplasty balloon would you prefer (assuming large cerebral artery occlusion)?



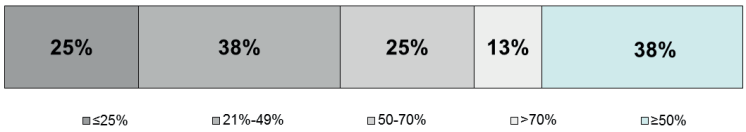
The optimal type of balloon to be used to achieve recanalization without the risk of vessel rupture is felt to be the compliant balloon (45%), which may be related to the predicted diameter and less likely to recoil.

8. During endovascular acute stenting for AIS, which type of stent would you prefer (assuming large cerebral artery occlusion)?



The limitation of acute stenting is the peri-procedure antiplatelet management; stent-retriever would eliminate this complexity. Aneurysmal stents were the number one choice followed by self-expanding and balloon mounted stents.

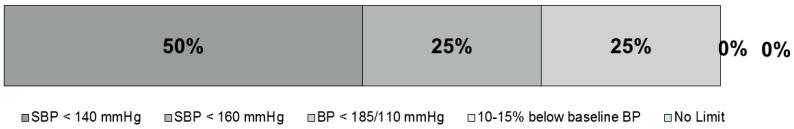
9. What is your institution's average recanalization rate using Thrombolysis in Cerebral Ischemia (TICI) grading system of TICI IIb or higher for endovascular acute ischemic stroke intervention with the mechanical thrombectomy?



Contrary to the published single arm device studies data, only 38% of the participants experienced TICI IIb or higher recanalization rate of more than half of the cases. Most of the participants (63%) experienced TICI IIb recanalization in less than 50% of the cases.

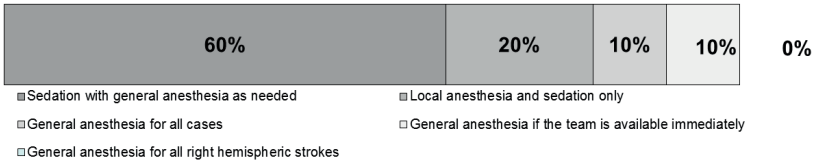
Session V. Periprocedural Management for Endovascular Therapy

1. In patients with complete recanalization (TICI Score of 3) after acute stroke occlusion and without reperfusion hemorrhage, what is your goal of systolic blood pressure (SBP) in the first 24-48 hours?



Optimal BP to maintain cerebral perfusion without the risk of cerebral hemorrhage following endovascular therapy is unknown. The responders felt it should not be more than 185 and 14/28 recommended the SBP should be less than 140 mmHg following complete recanalization post AIS endovascular therapy.

2. What kind of anesthesia do you use for acute stroke intervention (assuming patient has "protected" airway)?

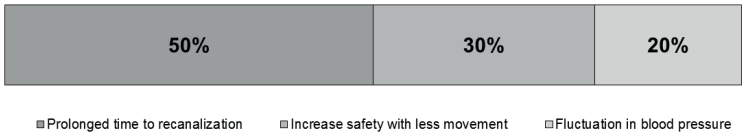


The type of anesthesia used during endovascular AIS therapy is controversial if it is associated with poor outcome. The majority of the cases (18/30) preferred to start with conscious sedation and convert to general anesthesia if needed.

3. What is the availability of anesthesia physicians and teams for endovascular acute ischemic stroke intervention at your institution?

General anesthesia is always available for 12/30 (40%) participants, and it is unclear if this is contributing to utilization of anesthesia in cases of endovascular AIS therapy.

4. What is the risk/benefit of anesthesia for IA stroke intervention?

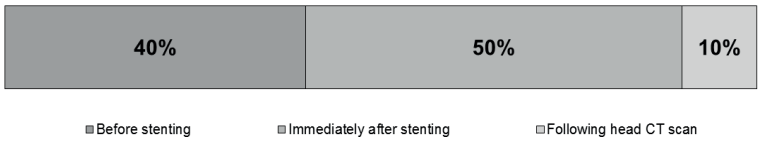


Several pros and cons for use of general anesthesia were discussed; 30% felt it increased safety by reducing movement and reduces contrast and radiation dose, while 70% felt it increased the time to recanalization and fluctuation in blood pressure.

5. What is the average expected time delay in endovascular AIS intervention due to addition of general anesthesia?

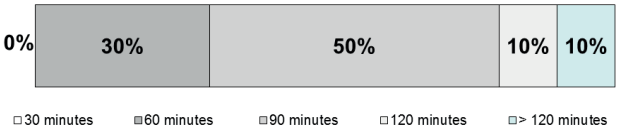
The majority of the participants expected at least 45 minutes delay due to general anesthesia.

6. In your opinion, when should GbIIb/IIIa inhibitors be used for acute stenting in endovascular ischemic stroke intervention?



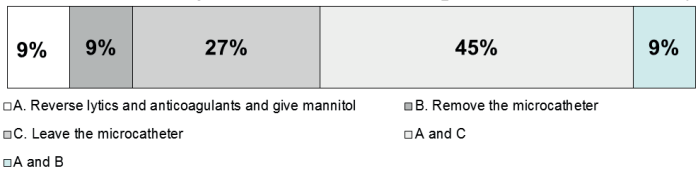
The practice of when to administer GP IIb/IIIa after acute stenting for AIS varies but the majority seems to administer it prior to CT scan of the head; immediately before or after placing the stent within the clot.

7. What is the average door-to-puncture time for endovascular acute ischemic stroke intervention patient at your institution?



This is one of the interesting questions that may guide the criteria for future comprehensive stroke centers. The door to puncture time is 90 minutes for most responders (15/30) and 60 minutes for 9/30. The national goal for door-to-puncture time should be around 60-90 minutes.

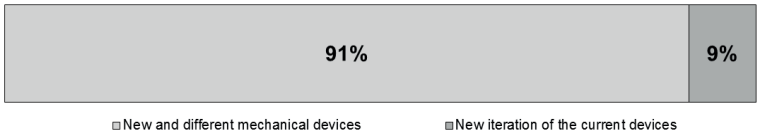
8. During endovascular AIS intervention after passing the occluding clot the micro-catheter injection shows vessel perforation. How do you normally proceed?



Managing microcatheter perforation is very critical. Leaving the microcatheter in place and reversing anticoagulants and thrombolytics and administering mannitol as the initial steps are recommended. Injecting adhesive material as the microcatheter is being pulled may also be performed.

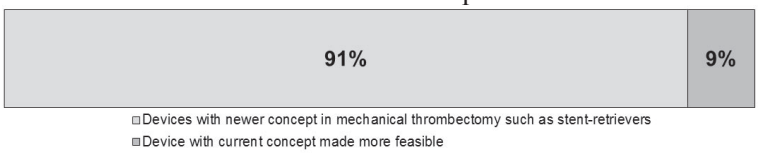
Session VI. Future Direction in Management for Endovascular Ischemic Stroke Therapy

1. Do you believe that we need new and different mechanical devices versus new iteration of the current devices?



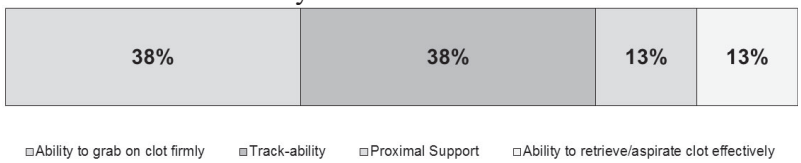
This question indicates the future of this evolving technology because current devices are not satisfactory for neurointerventionalists and there are opportunities to design newer, more efficacious, and safer thrombectomy tools.

2. In your opinion, do we need devices with a newer concept of revascularization or do we make the current device concept more feasible?



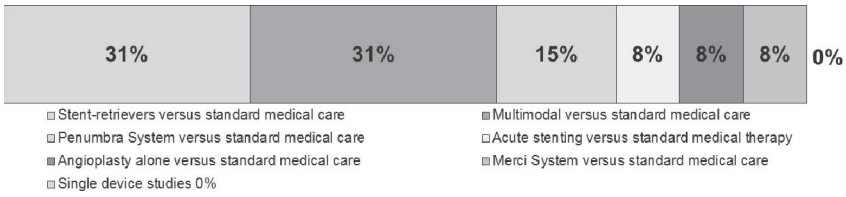
The newer devices need to be new concept rather than just being feasible and easy to use.

3. In your opinion, which is the most limiting factor in having an effective mechanical thrombectomy device?



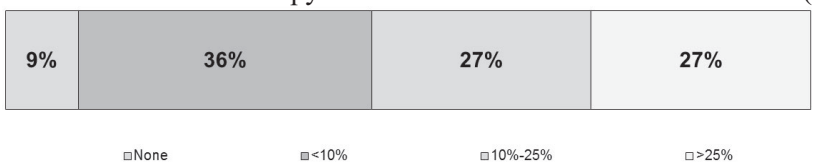
In this technical device design polling question, item one and four are related and the group emphasized the importance of grabbing the clot firmly to have effective retrieving ability and good trackability of the device to be able to navigate the cerebral anatomy to reach to the clot.

4. In your opinion, which one of the following should be the most important endovascular AIS intervention trial in the near future?



The needed trial should be randomized and should compare thrombectomy devices to standard medical care in 100%; however the preference was divided to the new stent-retriever devices and multimodal therapy versus standard of care.

5. What percentage of research dollars will you dedicate to stem cell research for Endovascular AIS Therapy from all ischemic stroke available funds (100%)?



Stem cell research in AIS is innovative and delivery via the intra-arterial route needs further exploration. Allocation of research resources to stem cell research was felt to be an important goal and 73% of the responders thought allocation of less than 25% of the resources to stem cell research in AIS is reasonable.

Vascular neurologists and neurointerventionalists on endovascular stroke care: Polling results

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