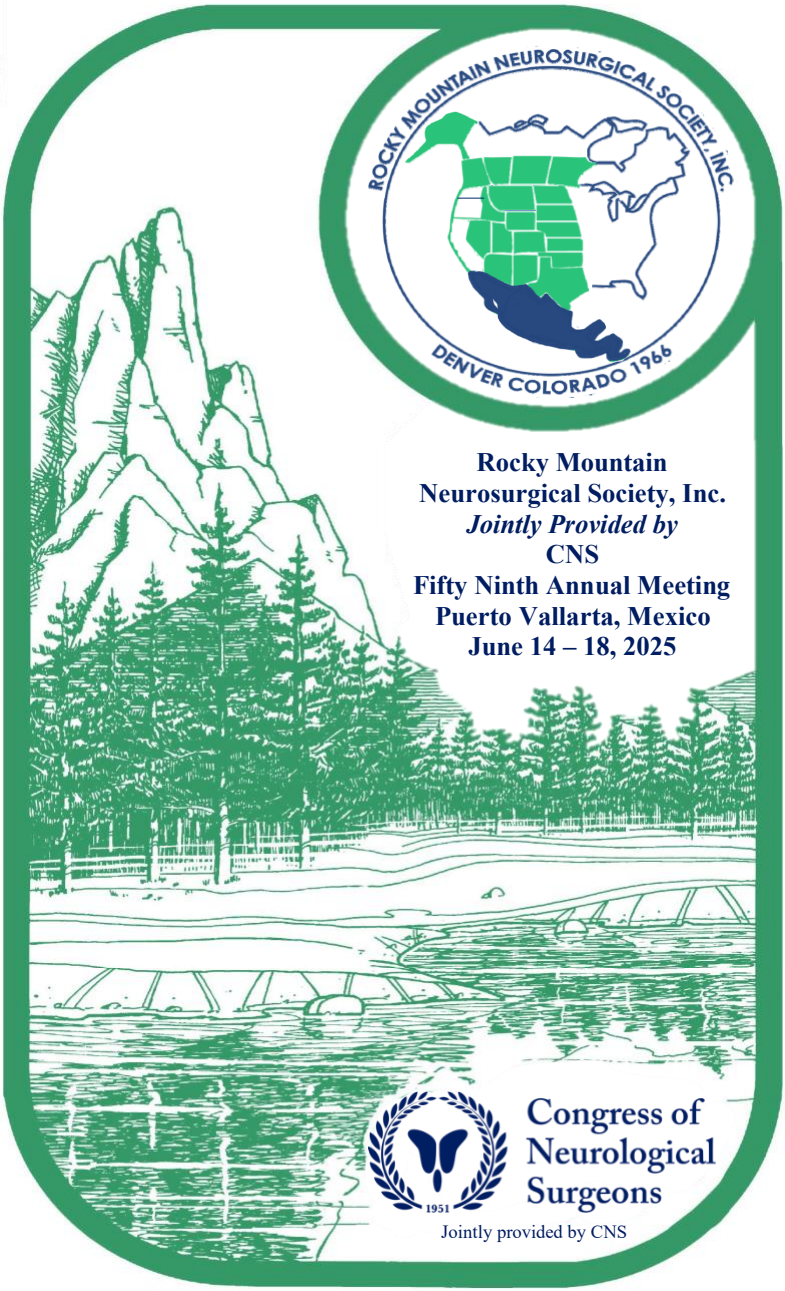
ROCKY MOUNTAIN NEUROSURGICAL SOCIETY, INC.
DENVER COLORADO 1966
Rocky Mountain
Neurosurgical Society, Inc.
Jointly Provided by
CNS
Fifty Ninth Annual Meeting
Puerto Vallarta, Mexico
June 14 – 18, 2025
1951
Congress of
Neurological
Surgeons
Jointly provided by CNS

www.rmns.org

PROGRAM

FIFTY NINTH ANNUAL MEETING

OF

THE ROCKY MOUNTAIN NEUROSURGICAL SOCIETY, INC.

Congress of Neurological Surgeons

Jointly provided by the CNS

Honored Guests:
Howard L. Weiner, MD, FACS, FAAP, FAANS, FAES
Russell Lonser, MD
Jose Carlos Sauri Barraza, MD
Daniel Rosenthal, MD

June 14 – 18, 2025

Marriott Puerto Vallarta Resort and Spa

Puerto Vallarta, Mexico

THE ROCKY MOUNTAIN NEUROSURGICAL SOCIETY, INC.

www.rmns.org

Founded 30 April, 1966, in Denver, Colorado
Incorporated 1974 in Houston, Texas

Officers and Executive Committee

2024 – 2025

President:	Erik Parker, MD
President Elect:	John Clough, MD
Vice President:	Shervin Rahimpour, MD
Secretary:	John Clough, MD
Treasurer:	Justin Davis, MD
Historian:	Joel MacDonald, MD
Past President:	Mark Mahan, MD
Member at Large:	Salah Aoun, MD

Committees

2024 – 2025

Scientific Program Committee:	Ramesh Grandhi, MD
CME Committee:	Brad Lega, MD
Local Arrangements:	Joel MacDonald, MD
Membership Committee:	Wissam Asfahani, MD
	Joseph Sramek, MD
	Richard Day, MD
Website Administrator:	Joel MacDonald, MD

MEETING AT A GLANCE

Saturday, June 14, 2025

1:00 – 4:00 p.m.	Executive Committee Meeting
3:00 – 5:30 p.m.	Registration
6:00 – 9:30 p.m.	Opening Reception & Children's Party

Sunday, June 15, 2025

7:00 – 7:55 a.m.	Physician & Exhibitor Breakfast
7:00 – 9:00 a.m.	Spouse and Children's Breakfast
8:00 a.m. – 12:00 p.m.	Scientific Session I

Monday, June 16, 2025

7:00 – 7:55 a.m.	Physician & Exhibitor Breakfast
7:00 – 9:00 a.m.	Spouse and Children's Breakfast
8:00 a.m. – 12:00 p.m.	Scientific Session II
12:30 – 5:30 p.m.	Annual Golf Tournament
6:00 – 9:00 p.m.	President's Dinner at Mesón Ibérico (executive board and guest speakers)

Tuesday, June 17, 2025

7:00 – 7:55 a.m.	Physician & Exhibitor Breakfast
7:00 – 9:00 a.m.	Spouse and Children's Breakfast
7:30 – 8:00 a.m.	Annual Business Meeting
8:00 a.m. – 12:00 p.m.	Scientific Session III
1:00 p.m. – 4:00 p.m.	Pickleball Tournament
6:00 p.m. – 10:00 p.m.	Annual Awards Banquet & Children's Party

Wednesday, June 18, 2025

7:00 – 7:55 a.m.	Physician & Exhibitor Breakfast
7:00 – 9:00 a.m.	Spouse and Children's Breakfast
8:00 a.m. – 12:00 p.m.	Scientific Session IV
12:00 p.m.	Meeting Adjournment

Resident Award

First place award for the best resident paper presented at the meeting now includes a $750 cash award. There will also be awards for second place ($500) and third place ($250) resident papers. Each of the first 10 residents to register will receive $500 travel reimbursement.

Academy Cup

Best paper from a practicing neurosurgeon (Active or Associate member).

Marriott Puerto Vallarta Resort and Spa
Paseo La Marina Norte 435, Marina Vallarta
Puerto Vallarta, Mexico 48335
52-322-226-0000

The 2025 Rocky Mountain Neurosurgical Society Meeting will be held from June 14th through June 18th at the Marriott Puerto Vallarta Resort and Spa in Puerto Vallarta, Mexico. Dr. Joel MacDonald is serving as the local arrangements chairperson for this year's meeting and he has arranged an exciting calendar of events for all attendees and their families.

The Marriott Puerto Vallarta will be an exciting venue for the 59th annual meeting. This oceanfront resort has an expansive infinity pool overlook stunning views of the ocean. The onsite Ohtli Spa offers a variety of services for relaxation. There is a kids club and outdoor pool for entertainment of our younger guests. The resort is in walking distance to the marina district, which offers many options for shopping, dining and numerous activities. There are endless opportunities for adventure on both land and sea for attendees of all ages. The schedule for this year's meeting will be similar to years past with the scientific program taking place during the morning, leaving your afternoons free to participate in our planned activities or enjoy time exploring the area on your own.

Social Highlights

All attendees, including exhibitors, are invited to our social program.

SATURDAY: Opening Reception & Children's Party **– 6:00 - 9:30 p.m.**

SUNDAY: Open night to plan your own activities

MONDAY: Annual Golf Tournament – **12:30 – 5:30 p.m.**

TUESDAY: 2nd Annual Pickleball Tournament– **1:00 – 4:00 p.m.**

TUESDAY: Annual Awards Banquet – **6:00 – 10:00 p.m.**

Dr. Howard L. Weiner

Howard L. Weiner, MD is Chief of Neurosurgery and the George A. Peterkin Jr. Endowed Chair at Texas Children's Hospital. He is a Professor and Vice Chair of Neurosurgery at Baylor College of Medicine in Houston, Texas. He is board certified by the American Board of Neurological Surgery and the American Board of Pediatric Neurological Surgery.

Dr. Weiner leads a team of 10 pediatric neurosurgeons, the largest and one of the most active groups of its kind in the nation. He has both a national and international surgical practice in pediatric epilepsy and brain tumor surgery. He has served on the editorial board of several leading medical journals and is a prominent mentor and academic leader in his field. He is well known for his holistic philosophy of hospitality in pediatric neurosurgery and patients seek his care from all around the world.

Dr. Weiner received his BA from the University of Pennsylvania and medical degree from Cornell University Medical College. He completed his neurosurgical residency and pediatric neurosurgery fellowship at New York University School of Medicine and was a research fellow in the labs of Howard Hughes Investigator Ed Ziff, PHY at NYU and Nicole Le Douarin, PhD in Paris.

Dr. Russell Lonser

Russell Lonser, MD is a Professor and Chair of Neurological Surgery at The Ohio State University College of Medicine. He also holds the Dardinger Family Chair in Neurosurgical Oncology.

Dr. Lonser specializes in the resection of brain, spinal cord, pituitary and brainstem tumors. His research focuses on nervous system drug delivery, gene therapy and tumor biology. He has authored more than 300 publications and has received multiple awards for his research. He has also served as a past president of the Congress of Neurological Surgeons.

Dr. Lonser received his medical degree from Loma Linda University School of Medicine. He completed his neurosurgical residency training at Loma Linda University Medical Center and at the University of Utah Hospital. He completed a Research Fellowship at the National Institute of Neurological Disorders and Stroke at the National Institutes of Health (NIH).

Dr. Jose Carlos Sauri Barraza

José Carlos Sauri Barraza, MD is a physician at the ABC Medical Center in Mexico City, Mexico.

Dr. Sauri was instrumental in bringing endoscopic spine surgery to Mexico. He is one of few international instructors of this technique worldwide. He is involved in research and clinical protocols, publishing numerous medical articles and contributing to the development of books, as well as spine training programs. Dr. Sauri is an adjunct Professor in the Advanced Specialty Spine Surgery Program at ABC Medical Center.

Dr. Sauri completed his medical specialty in Orthopedics and Traumatology at the National Autonomous University of Mexico. He then completed his subspecialty training in Spinal Surgery from the Université Bordeaux II, Bordeaux, France. He continued his training in Munich, Germany, with Dr. Michael Mayer to master disc prosthesis techniques, microsurgery, thoracoscopy, and anterior lumbar approaches. He continued his training in Sao Paulo, Brazil, with Dr. Pimenta to perform minimally invasive percutaneous techniques, specifically the XLIF lateral approach technique. He completed his training as a visiting instructor in spine neurosurgery at the University of Utah.

Learning Objectives

Upon Completion of this program, participants should be able to:

1. Evaluate the fusion rates with BCP<µm in Transforaminal Lumbar Interbody Fusion (TLIF).
2. Describe differences between cerebral proliferative angiopathy and arteriovascular malformations as well as the treatment course of this patient and rationale for vEGF inhibitor as a treatment paradigm for CPA.
3. Recognize injury patterns that warrant dedicated cerebral sinus imaging.
4. Integrate knowledge of the incidence, risk factors, and prognostic indicators of traumatic cerebral sinus injury into clinical decision-making.
5. Understand current management strategies for traumatic cerebral sinus injury and their relative efficacy.
6. Compare procedural efficiency metrics between craniotomy and burr-hole evacuation techniques in single-session MMAE for cSDH.
7. Indications and approaches of SI joint fusion.
8. Understand the framework for applying machine learning methods to classification of ASDs.
9. Determine if depression is an independent predictor of pain recurrence after TN surgery.
10. Understand the history of cranial ablative procedures for pain.

SCIENTIFIC PROGRAM
Rocky Mountain Neurosurgical Society
59th Annual Meeting

Sunday June 15th, 2025

08:00-12:00 SCIENTIFIC SESSION I
Moderator: Brad Duhon, MD

08:00-08:10 President – Erik Parker, MD
Introductory remarks and welcome
Exhibitors Welcome

08:10-08:40 SPECIAL GUEST LECTURE – Jose Carlos Sauri Barraza, MD
Perspectives on Spine Surgery in Mexico

08:40-08:45 Commentary/Q&A – Joel MacDonald, MD

08:45-09:15 Ben Shofty, MD, PhD
The Neurological Pathways of Creativity

09:15-10:05 SPECIAL GUEST LECTURE – Russell Lonser, MD
Neurologic manifestations of von Hippel-Lindau Disease

10:05-10:35 Break

10:35-10:50 SPECIAL GUEST LECTURE – Jose Carlos Sauri Barraza, MD
Surgical Innovation: Standalone ALIF

10:50-10:55 Commentary/Q&A – Brad Duhon, MD

10:55-11:10 SPECIAL GUEST LECTURE – Jose Carlos Sauri Barraza, MD
Surgical Innovation: Standalone LLIF in Revision Spine Surgery

11:10-11:15 Commentary/Q&A – Erik Parker, MD

11:15-11:50 SPECIAL GUEST LECTURE – Daniel Rosenthal, MD
Perspectives on Pediatric Neurosurgery in Oaxaca, Mexico

11:50-12:00 ANNOUNCEMENTS & ADJOURN

Monday June 16th, 2025

08:00-12:00 SCIENTIFIC SESSION II
Moderator: Ramesh Grandhi, MD

08:00-08:50 SPECIAL GUEST LECTURE – Howard Weiner, MD
The Transforming Power of Hospitality in Neurosurgery

08:50-09:40 SPECIAL GUEST LECTURE – Russell Lonser, MD
Convection-enhanced delivery for nervous system gene therapy

09:40-10:00 Brad Duhon, MD
Updates on MIS SI Joint Fusion

10:00-10:30 Break

10:30-11:20 SPECIAL GUEST LECTURE – Howard Weiner, MD
Perspectives & Lessons Learned in Pediatric Epilepsy

11:20-11:40 Christian Bowers, MD
Towards Equity in Academic Neurosurgery

11:40-12:00 SPECIAL GUEST LECTURE – Daniel Rosenthal, MD
Oaxaca: It's not all Just Mezcal

12:00 ANNOUNCEMENTS AND ADJOURN

Tuesday, June 17th, 2025

07:30-08:00 ANNUAL BUSINESS MEETING
08:00-12:00 SCIENTIFIC SESSION III
Moderator: Erik Parker, MD

08:00-08:15 Dr. Mohamed Salem* (Virtual Presentation)
Adjunct Meningeal Artery Embolization with Surgery In Denovo Vs Recurrent Chronic Subdural Hematomas: Propensity-score Matched Analysis

08:15-08:30 Dr. Casey Hatfield*
A retrospective single-center review of the performance of polymer embedded biphasic calcium phosphate bone graft with submicron needle-shaped topography used standalone in Transforaminal Lumbar Interbody Fusion

08:30-08:45 Dr. Ari Williams*
Novel Use of vEGF Inhibitor for Treatment of Cerebral Proliferative Angiopathy: A Case Report

08:45-09:00 Dr. Maxmillian Tjauw*
A Machine Learning Method to Diagnose Adult Coronal Deformity from Spatial and Temporal Gait Parameters

09:00-09:15 Dr. Forrest Hamrick* (Virtual presentation)
Management of Traumatic Cerebral Venous Sinus Injury

09:15-9:45 Ben Shofty, MD, PhD
Neurosurgical Treatments for Psychiatric Disease

09:45-10:15 Karol Budohoski, MD, PhD (Virtual Presentation)
Tanzania Stroke Project

10:15-10:45 Break

10:45-11:00 Dr. Sarah Nguyen* (Virtual Presentation)
Effect of Acute Intracranial Stenting in Patients with Successful Reperfusion Following Large Vessel Occlusion Secondary to Intracranial Atherosclerosis: Secondary Analyses of the RESCUE-ICAS Study

11:00-11:15 Dr. Sarah Nguyen* (Virtual Presentation)
Essential Requirements to Develop a Stroke Thrombectomy Program in Limited Resource Settings: A Delphi-Style Survey

11:15-11:30 Diwas Gautam, BS* (Virtual Presentation)
Matched-pair Analysis of Endovascular Thrombectomy Cases For Anterior Circulation Ischemic Stroke Using Balloon Guide Catheters

11:30-11:50 Ramesh Grandhi, MD
Middle Meningeal Artery Embolization for Treatment of Chronic Subdural Hematoma

11:50-12:00 Erik Parker, MD
Introduction to RMNS 60th Annual Meeting: Park City, Utah

12:00 ANNOUNCEMENTS AND ADJOURN
***Resident Award Candidate**

Wednesday, June 18th, 2025

08:00-12:00 SCIENTIFIC SESSION IV

Moderator: Joel MacDonald

08:00-08:15 Dr. Santiago Gomez-Paz (Virtual presentation)

Single-Session Versus Staged Approaches for Chronic Subdural Hematoma Treatment Using Middle Meningeal Artery Embolization with Concomitant Evacuation Surgery: A Propensity Score-Matched Analysis

08:15-08:30 Dr. Santiago Gomez-Paz (Virtual presentation)

Surgical Evacuation Techniques in Single-Session Middle Meningeal Artery Embolization with Concomitant Evacuation Surgery for Chronic Subdural Hematoma: Analysis of Procedural Efficiency and Clinical Radiographic Outcomes

08:30-08:45 Dr. Santiago Gomez-Paz (Virtual presentation)

Optimizing Single-Pass Thrombectomy: Multicenter Comparative Analysis of Direct Aspiration versus Combined Aspiration and Stent Retriever Techniques in 1,070 Patients

08:45-09:00 Dr. Omid Shoraka (Virtual presentation)

Pinpointing the Frailty Threshold: Optimal RAI-REV Score for Predicting Good Clinical Outcomes in Stroke Patients Following Thrombectomy

09:00-09:15 Dr. Omid Shoraka (Virtual presentation)

Long-Term Outcomes of Drug-Eluting Stents versus Bare Metal Stents and Medical Management in Treating Symptomatic Intracranial Atherosclerotic Disease: A Multicenter Follow-Up Study

09:15-09:30 Dr. Omid Shoraka (Virtual presentation)

A Double Burden: Depression and Early Recurrence of Pain Following surgical Management of Trigeminal Neuralgia

09:30-10:00 Break

10:00-10:30 Erik Parker, MD

Viable Bone Matrix Allograft Related Tuberculosis Outbreak - St Joseph Hospital Experience and Review

10:30-11:00 Brad Duhon, MD

Cervical Spine Pseudoarthrosis

11:00-11:45 John Clough, MD

Cingulotomy: A Review of the Procedure and Its History Along with Its Role in Todays Neurosurgical Practice

11:45-12:00 Erik Parker, MD

Closing Remarks and Meeting Adjourn

Vendor Participants

This year we have the pleasure of welcoming the following exhibitors to the Rocky Mountain Neurosurgical Society's Annual Meeting. Please stop by their booths to thank your representatives for their company's support.

Silver Sponsor

Atec Spine

Bronze Sponsors

Abbott
Cerapedics
GT Medical Technologies, Inc.
KLS Martin Group
Promethean Restorative, Inc.
Providence Medical Technology
SI-Bone
Southwest Surgical
Spineart
Sutter Medical Technologies
Western Microsurgical
VB Spine

Accreditation Statement and Designation Statement

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the Congress of Neurological Surgeons and the Rocky Mountain Neurosurgical Society (RMNS). The Congress of Neurological Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

The CNS designates this live activity for a maximum of 16.00 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

The Congress of Neurological Surgeons controls the content and production of this CME activity and attempts to assure the presentation of balanced, objective information. In accordance with the Standards for Integrity and Independence in Accredited Continuing Education established by the Accreditation Council for Continuing Medical Education (ACCME), speakers are asked to disclose all relationships they have with ineligible companies* over the previous 24 months which may be related to the content of their lecture. Speakers who have disclosed a relationship with an ineligible company whose products may be relevant to their presentation will be listed on a Disclosure to Learners made available closer to the meeting.

Historical Notes

Eight neurological surgeons from the Rocky Mountain States met informally in Denver, CO on April 30, 1966, and a Founders meeting was held which established The Rocky Mountain Neurosurgical Society.

Harry Boyd, MD	Denver, CO
Thomas Craigmile, MD	Denver, CO
Charles Elkins, MD	Tucson, AZ
Robert Imler, MD	Tulsa, OK
Alexander Johnson, MD	Great Falls, MT
Homer McClintock	Denver, CO
Chester Powell, MD	Salt Lake City, UT
William McKinney, MD	Fort Worth, TX

Because of the growth and complexity of the society in which we now live, Articles of Incorporation were approved in December 1974, in the State of Texas as a non-profit organization and The Rocky Mountain Neurosurgical Society, Inc. was established and obtained a tax-exempt status.

RMNS Constitution - Revised June 1999

Article I - Name
The organization shall be known as The Rocky Mountain Neurosurgical Society, Inc.

Article II - Purpose
The corporation is organized for exclusively educational and other charitable purposes, and is a nonprofit corporation and the period of its duration is perpetual. The purpose of the Society shall be (1) to promote knowledge within the fields of neurological surgery and allied branches of medicine. It shall be within the purposes of the corporation to use any means to such end as may from time to time seem expedient to its members or trustees, including study, investigation, research, publication, publicity, instruction, the organization of educational or other charitable activities, agencies and institutions and the aid of any such educational or other charitable activities, agencies and institutions already established; (2) the promotion of fellowship and the exchange of ideas among its members.

Article III - Membership
Section 1 - The membership of Society shall consist of five categories: ACTIVE, ASSOCIATE, SENIOR, INACTIVE, and HONORARY.
(A) ACTIVE MEMBERS shall consist of neurological surgeons who have been certified by the American or Mexican Board of Neurological Surgery, or Fellowship in the Royal College of Surgeons (Canada), and also members of allied fields who have been certified by their appropriate board in that allied specialty. Active members in allied fields shall not exceed twenty per cent (20%) of the total membership of the Society.
(B) ASSOCIATE MEMBERS will include physicians and doctors of philosophy qualifying in one of the following categories:

1) Neurological surgeons living in the geographic confines of the Society who have completed their training and have met all the requirement for Board Certification but who have not been certified by the American or Mexican Board of Neurological Surgery, or Fellowship in the Royal College of Surgeons (Canada). Following certification an Associate Member shall become eligible for Active Membership and may apply to the Membership Committee for change in classification.

2) Neurological surgeons who have an outstanding record in the field over a period of years due to high standard and quality of work.

3) Members in the Neurosciences who have had acceptable academic training equivalent to the requirements for board certification in that field.

(C) SENIOR MEMBERSHIP shall be accorded to those members over the age of sixty who have been active dues-paying members for ten (10) years or greater. Senior members will be relieved of the payment of dues and rules of attendance. They may not hold office but will retain all other privileges of membership.

(D) INACTIVE MEMBERSHIP shall be accorded to members who no longer practice in the geographic domain of the Society or members who are physically disabled or retired from practice. Inactive members shall be relieved of payment of dues. They may attend meetings of the Society but shall not vote or hold office.

(E) HONORARY MEMBERS shall be chosen from recognized leaders in the field of neurological surgery and allied fields who are neither active nor associate members. They shall not be required to pay initiation fees or dues and shall enjoy all of the privileges of active membership except those of voting or holding office. There shall be no limitation on their selection.

Section 2- Membership, except for Honorary and Inactive Members, shall consist of those physicians residing in Alaska, Arizona, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, Wyoming, adjacent provinces of Canada, and The Republic of Mexico.

Article IV Founders Group - Executive Committee

The Founders Group shall act as an Executive Committee until the time of the First Annual Meeting. They will assume all the duties of the Executive Committee, including those of the Nominating Committee, the Program Committee, and any other duties being deemed necessary. This committee will submit a nomination slate, which will be voted upon by all the Active Members. This committee has the power to accept as members of the Society any that they feel meet the requirements as outlined by the By-Laws. The power is given to the committee until the First Annual Meeting, after which time all membership applications will be acted upon as outlined in the Bylaws.

Article V - Officers

Section 1 - The officers of the Society shall consist of a President, President-Elect, Vice-President, Secretary, Treasurer and Historian. The President and Vice-President shall be elected for a period of one year and neither may succeed himself. The President-Elect shall succeed to the office of President one year following his election. The Secretary and Treasurer shall be elected for a period of three years and the Historian shall be elected for a period of five years.

Section 2 - The Executive Committee (9) shall be comprised of the President, Immediate Past President, the President-Elect, Vice-President, Secretary, Treasurer, Historian and one Member-at Large appointed by the President and a Continuing Medical Education (CME) liaison also appointed by the President.

Article VI - Duties of Officers

Section 1 - The President shall preside at all meetings of the Society and of the Executive Committee. He shall appoint all committees. He shall cast the deciding vote in any ties resulting from balloting of the members of the Society.

Section 2 - The Vice-President shall preside in the absence of the President and be the Society Parliamentarian.

Section 3 - The Secretary shall record the proceedings and attendance of each meeting and shall report this record at the succeeding meetings. He shall collect and preserve all records, including the membership roll, and shall forward to the Historian all paper which are of documentary or historical value to the Society. He shall send notice to the membership of all meetings two months in advance and shall notify all members of appointments and assigned duties. He shall carry on all other correspondence and business essential for the proper function of the Society. The Secretary shall forward to the Membership Committee all completed applications for membership within three months prior to the date of the Annual Meeting.

Section 4 - The Treasurer shall collect the dues and assessments and carry out the fiscal transactions of the Society. The Treasurer shall keep an accurate record of these transactions and render an annual report. The Treasurer shall submit records annually to a certified public accountant for report to the President. The Treasurer shall notify all members who are delinquent in payment of dues or assessments.

Section 5 - The Historian shall compile and retain all pertinent data relative to the founding, programs and functioning of the Society.

Section 6 - The Executive Committee shall have general supervision over the affairs of the Society. They shall:

(A) Make recommendations as to the time and place of the Annual Meeting.

(B) Review all applications from the Membership Committee and make their recommendations at the Annual Meeting.

(C) Have the power of decision in the consideration of each candidate's personal and professional qualifications.

(D) Upon request make a careful investigation as to a candidate's personal and professional qualifications.

(E) Call special meetings when deemed necessary.

(F) Invite official guests and, in consideration with the host for said meeting, limit their number.

(G) Review all matters concerning fiscal delinquency and absence of members and make appropriate recommendations to the Society regarding these matters.

Article VII - The Constitution

The Constitution shall be in effect from the time of its adoption. It shall be amended only by written resolution at an annual Meeting. Such resolutions must be circularized to the membership by the Secretary two months before the Annual Meeting at which time a vote will be taken. Approval by three-fourths of the voting members present will be necessary for acceptance.

RMNS By-Laws - Revised June 1999

Article I - Application and Election to Membership

Section 1 - The President shall appoint a Membership Committee of three members whose duties shall be to review all applications for membership and to conduct careful investigations as to personal and professional qualifications of all applicants. The recommendations of this Committee shall be presented to the Executive Committee at the Annual Meeting.

Section 2 - Every candidate for active, associate, senior, inactive or honorary membership shall be proposed by at least two active, associate or senior members of the Society on the required application form furnished by the Society. Appropriately completed membership applications shall be in the hands of the Secretary at least four months before the date of the Annual Meeting. Two months before the Annual Meeting the Secretary shall send to each member of the Society a list of all candidates for membership. Members are urged to submit to the Executive Committee written comments on the candidate's qualifications for membership.

Section 3 - The Executive Committee shall have power of decision in the consideration of each candidate's eligibility and its judgment upon each eligibility shall be final. No candidate for membership shall be voted upon at the Executive Session of the Society unless recommended by the Executive Committee.

Section 4 - Election to the membership shall be at the Executive Session of each Annual Meeting and if three-fourths of the votes are favorable, the candidate shall be declared elected.

Section 5 -The names of all candidates who have not been recommended for membership by the Executive Committee three years after nomination shall be withdrawn and their sponsor notified. A subsequent application of such candidate can be made after a period of two years. Any candidate for membership who has been recommended by the Executive Committee but not elected by the Society cannot be proposed again for a period of two years.

Section 6 - Any Active or Senior member in good-standing may prefer charges alleging that a member is failing to maintain good professional conduct. Such charges may be made against any class of member. All charges shall be in writing and shall specify the basis thereof. These charges shall be delivered to the Secretary who shall immediately forward a copy to the accused, by registered mail sent to his last known address, a copy to the Executive Committee, and retain the original copy. The Executive Committee shall investigate the charges and shall call on the members who file the charges for such information, witnesses, evidence etc. as may be necessary for a full investigation. Both the accused and accuser or accusers shall be given a full hearing by the Executive Committee at its next regularly scheduled meeting. The accused may conduct his own defense or shall be entitled to counsel of his own selection, but counsel for the accused shall also be allowed to secure, at the Society's expense, through the use of a competent stenographer, a verbatim report of the hearing of his case by the Executive Committee in the absence of the accused at the hearing, unless he expressly waives participation therein, the Presiding Officer shall appoint a member to represent him and the hearing shall proceed as though he were present. The hearing shall be closed to all except members of the Society and the counselors chosen for the purpose of this hearing.

Provided the investigation is satisfactorily completed and the accused has been given a hearing, if he so desires, the Executive Committee shall within ten days of the completion of the hearing, determine: (A) That the charges are not sustained, and that no further action be taken; or (B) That the charges are sustained and that the accused be:

1) censured, or

2) suspended for a definite time, or 3) expelled from the society.

The accused shall be notified by the President in writing, by registered mail sent to his last known address, the date of the meeting in which the recommendation of the Executive Committee will be made. At that meeting the accused shall be given an opportunity to make any statement that he desires before action is taken on the recommendations of the Executive Committee. The President may also make a statement and explain and define findings of the Executive Committee, but there shall be no examination of witnesses or introduction of further evidence before the Executive Committee. Censure or supervision shall require an affirmative vote of at least 2/3 of the voting members of the Executive Committee present. Expulsion shall require an affirmative vote of at least 3/4 of the voting members of the Executive Committee. Any members of this Society who may feel aggrieved by the action of the Executive Committee in censuring, suspending, or expelling him shall have the right to appeal to the entire membership at the time of the next annual meeting. At this time, the accused shall be given the

opportunity to make any statements he desires and may have counsel present if he so desires. The President of the Rocky Mountain Neurosurgical Society may also make a statement and explain and define the findings of the Executive Committee, but here shall be no examination of witnesses or introduction of further evidence before the membership. At the conclusion of the meeting, the Membership shall, by secret ballot, determine whether it will sustain or change the action of the Executive Committee. An affirmative vote of at least a majority of the voting members present shall sustain or change the action of the Executive committee.

Article II - Election of Officers

Section 1 - The officers of the Society shall be elected from the Active Membership at each Annual Meeting and shall take office at the close of that meeting. The President shall not be eligible for re-election at any time. The Vice-President, as well, may not be re-elected to the Vice-Presidency but may be eligible for any other office in the Society. The nominating committee shall notify the membership of a proposed slate of officers before the Annual Meeting. Additional nominations may be made from the floor. The election shall be by ballot and the member receiving the greatest number of votes shall be declared elected to the office for which he was a candidate. **Section 2** - In the case of a vacancy in an office, it shall be filled by appointment by the Executive Committee.

Article III - Initiation Fees and Dues

Section 1 - Every Active and Associate Member on his election to membership shall pay an initiation fee of twenty-five dollars ($25.00) by which act he acknowledges and accepts the Constitution and By-Laws. Honorary members shall not pay an initiation fee.

Section 2 - Every Active and Associate member shall pay annual dues. The amount of the dues shall be determined by the vote of the Executive Committee, so as to maintain the Society in a financially stable condition. Payment of dues shall be received by January 1 and if unpaid by March 1, shall become delinquent.

Section 3 - Any member in arrears for two years shall be notified by the Treasurer in writing, and if he fails to pay his dues within two months thereafter shall forfeit his membership. It shall be the duty of the Treasurer to notify the Executive Committee of this forfeiture.

Section 4 -The expenses of the Annual Meeting shall be paid principally from funds received as registration fees for that meeting. The amount of the registration fee for each Annual Meeting will be set by the Executive Committee.

Section 5 - The prorated expense of an invited guest shall be borne by his host.

Section 6 - While on temporary duty with the Armed Forces, any Active or Associate Member shall be exempt from paying dues.

Article IV - Guests

Section 1 - Any member may invite a guest to attend the annual meeting. The fees for non-member guests are set by the Executive Committee.

Section 2 - The Executive Committee shall be empowered to select official guests. These shall be local physicians and surgeons at the place of the meeting or especially invited guests to participate in the program.

Section 3 - The prorate share of the officially invited guests will be borne by the Society and determined/limited at the time of the invitation.

Section 4 - The limitation of the number of guests to attend any given meeting shall be at the discretion of the Executive Committee and the host for said meeting.

Section 5 - Invited guests shall be entitled to all the privileges of the Society during the annual session except attendance at business or Executive Sessions.

Article V - Meetings

Section 1 - The Rocky Mountain Neurosurgical Society, Inc. shall meet annually at such time and place as may be designated by the Executive Committee.

Section 2 - There shall be at least one annual Executive Session of Active Members of the Society at which the order of business shall be as follows:

1. Reading of the minutes of the last meeting.
2. Report of the Secretary.
3. Report of the Treasurer.
4. Report of the Executive Committee.
5. Report of the Historian.
6. Report of the review of the Treasurer's Account
7. Reports of Special Committees.
8. Unfinished Business.
9. New Business.
10. Election of Members.
11. Report of the Nominating Committee.
12. Election of Officers.

Section 3 - Members shall sign the permanent register of the Society as a record of their attendance. A special register shall be provided for guests.

Section 4 - Special meetings of the Society may be called on the advice of the Executive Committee. Every member shall be notified of the place and time of the meeting at least two weeks in advance.

Article VI - Quorum

Only Active Members shall attend any Business Session and shall constitute a quorum for business.

Article VII Parliamentary Authority

"Robert's Rules of Order - Revised Edition" shall be parliamentary authority in all matters not specified by the Constitution or By-Laws.

Article VIII - Committees

Section 1- The President shall appoint with the approval of the Executive Committee, the following committees:

(A) Program Committee, of which the Secretary is a member ex officio.

(B) Committee on Arrangements for the Annual Meeting.

(C) Membership Committee, consisting of three members.

(D) Nominating Committee, consisting of the immediate three Past Presidents.

Section 2 - The President shall appoint such other committees as indicated.

Article IX - Forfeiture of Membership

Membership may be forfeited for reasons deemed sufficient by the Society, which may be effected by a three-fourths majority vote.

Article X - Scientific Papers

Section 1 - An abstract of all papers to be read must be submitted to the Program Committee three months before the meeting, excluding those presented by invited guests of the Society. The Committee shall exercise the right of accepting or rejecting papers.

Section 2 -The time allotted for the presentation and discussion of a paper shall be at the discretion of the Program Committee subject to approval of the Executive Committee. A tentative program shall be sent to each member by the Secretary two weeks prior to the stated meeting.

Section 3 - A Resident award paper will be selected for presentation at the Annual Meeting by the Program Committee and an award will be given.

Article XI - Amendments

These By-Laws may be amended at the Annual Meeting by approval of three-fourths of the voting members present, provided due notice of the proposed changes has been given to the membership at least two months before said meeting.

Past Meetings of the Society

1966	Colorado Springs, CO	1995	Sun Valley, ID
1967	Tucson, AZ	1996	Telluride, CO
1968	Banff, AB	1997	Jasper Park Lodge, AB
1969	McAllen, TX	1998	Vail, CO
1970	Sun Valley, ID	1999	Coeur D'Alene, ID
1971	Colorado Springs, CO	2000	Alyeska, AK
1972	Guadalajara, Mexico	2001	Steamboat Springs, CO
1973	Scottsdale, AZ	2002	Santa Ann Pueblo, NM
1974	Victoria, BC	2003	Big Sky, MT
1975	Cozumel, Mexico	2004	Squaw Creek, CA
1976	Las Vegas, NV	2005	Whistler, BC
1977	Lake Tahoe, NV	2006	Sedona, AZ
1978	Colorado Springs, CO	2007	Jackson Hole, WY
1979	Jackson Hole, WY	2008	Park City, UT
1980	Park City, UT	2009	Girdwood, AK
1981	Durango, CO	2010	Telluride, CO
1982	Big Sky, MT	2011	Taos, NM
1983	Mescalero, NM	2012	Maui, HI
1984	Colorado Springs, CO	2013	Sun Valley, ID
1985	Banff, AB	2014	Victoria, BC
1986	Keystone, CO	2015	Colorado Springs, CO
1987	Deer Valley, UT	2016	Whitefish, MT
1988	Lake Tahoe, NV	2017	Lake Tahoe, CA
1989	Durango, CO	2018	Banff, AB
1990	Vail, CO	2019	Durango, CO
1991	Jackson Hole, WY	2021	Jackson Hole, WY
1992	Sedona, AZ	2022	Coeur D'Alene, ID
1993	Bigfork, MT	2023	Girdwood, AK
1994	Snowmass, CO	2024	San Antonio, TX

Past Presidents

1966–1967	**Homer G. McClintock**	**Denver, CO**
1967–1968	**Charles Elkins**	**Tucson, AZ**
1968–1969	**William McKinney**	**Ft. Worth, TX**
1969–1970	**Chester Powell**	**Salt Lake City, UT**
1970–1971	**Thomas K. Craigmile**	**Denver, CO**
1971–1972	**Alexander C. Johnson**	**Great Falls, MT**
1972–1973	**Joseph W. Robertson**	**Houston, TX**
1973–1974	**Robert G. Fisher**	**Oklahoma City, OK**
1974–1975	**Michael Pollay**	**Albuquerque, NM**
1975–1976	**Robert L. Imler, Jr.**	**Tulsa, OK**
1976–1977	**Javier Verdura**	**Mexico City, Mexico**
1977–1978	**George T. Hoffman**	**Phoenix, AZ**
1978-1979	**Michael McNally**	**Colorado Springs, CO**
1979-1980	**Richard Moiel**	**Houston, TX**
1980-1981	**R. Barton Carl**	**Oklahoma City, OK**
1981-1982	**Ralph J. Kaplan**	**Oklahoma City, OK**
1982-1983	**Paul Turner**	**Roswell, NM**
1983-1984	**Charles Clough**	**Kansas City, MO**
1984-1985	**Robert Partain, III**	**San Antonia, TX**
1985-1986	**Ronald D. Clark**	**Greeley, CO**
1986-1987	**Richard F. Tenney**	**Tulsa, OK**
1987-1988	**Robert S. Hood**	**Salt Lake City, UT**
1988-1989	**Henry Fieger**	**Denver, CO**
1989-1990	**Franco Erculei**	**Las Vegas, NV**
1990-1991	**Harry B. Tate**	**Oklahoma City, OK**
1991-1992	**David Fell**	**Tulsa, OK**
1992-1993	**Wayne Paullus**	**Amarillo, TX**
1993-1994	**Kenyon Kugler**	**Tulsa, OK**
1994-1995	**Volker Sonntag**	**Phoenix, AZ**
1995-1996	**Lee Krauth**	**Denver, CO**
1996-1997	**Robert Morelli**	**Reno, NV**
1997-1998	**Larry Tice**	**Grand Junction, CO**
1998-1999	**Ronald Apfelbaum**	**Salt Lake City, UT**
1999-2000	**Charles Fullenwider**	**Muskogee, OK**
2000-2001	**Kevin Lillihei**	**Denver, CO**
2001-2002	**Howard Morgan**	**Dallas, TX**
2002-2003	**Al Capanna**	**Las Vegas, NV**
2003-2004	**Vance MacDonald**	**Las Vegas, NV**
2004-2005	**Richard Schmidt**	**Salt Lake City, UT**
2005-2006	**John McVicker**	**Englewood, CO**
2006-2007	**Mary Kay Gumerlock**	**Oklahoma City, OK**
2007-2008	**Robert Beatty**	**Kansas City, KS**
2008-2009	**Joel MacDonald**	**Salt Lake City, UT**
2009-2010	**Jonathan White**	**Dallas, TX**
2010-2011	**Michael Brown**	**Colorado Springs, CO**
2011-2012	**Randy Jensen**	**Salt Lake City, UT**
2012-2013	**Stewart Levy**	**Denver, CO**
2013-2014	**Paul Elliott**	**Denver, CO**
2014-2015	**Paul House**	**Salt Lake City, UT**

2015-2016	**Richard Day**	**Missoula, MT**
2016-2017	**Kelly Schmidt**	**Kalispell, MT**
2017-2018	**J. Brett Dietze**	**Texarkana, TX**
2018-2019	**Kris Smith**	**Phoenix, AZ**
2019-2021	**Michael Seiff**	**Las Vegas, NV**
2021-2022	**Joseph Sramek**	**Kalispell, MT**
2022-2023	**Brad Duhon**	**Lone Tree, CO**
2023-2024	**Mark Mahan**	**Salt Lake City, UT**

Past Honored Guest Speakers

1966: Dr. Dwight Parkinson
Dr. Howard Barrows
Dr. Theodore Kurze
Dr. Edwin M. Todd
Dr. Lyle A. French

1967: Dr. R. Eustace Semmes
Dr. Harold A. Sofield
Dr. L. Cashion
Dr. Merlin K. DuVal
Dr. Paul M. Lin
Dr. Mark Kartchner
Dr. Robert L. Scanlan

1968: Dr. Burton Wise
Dr. Morley Singer

1969: Dr. Philip Dodge
Dr. Miguel Ramos-Murgia Dr. Richard

1970: Bergland
Dr. John C. Stears Dr. James Bor
Dr. Donald Nelson
Dr. Thomas Acers

1971: Dr. Philip Ellis
Dr. Henry VanDyk
Dr. Eugene Wiggs
Dr. Temple W. Williams

1972: Dr. Robert Barnard Couch
Dr. Daniel Gonzalez-Gonzalez Dr.
Eduardo Eidelberg

1973: Dr. Robert E. Flynn
Dr. John A. Hodak
Dr. Robert Scanlon
Dr. James R. Nelson
Dr. John D. Waggener
Dr. Arthur R. Dick

1974: Dr. Stanley R. Nelson
Dr. Keasley Welch

1975: Dr. Ken Winston
Dr. Russell Snyder
Dr. Rubin Bressler

1976: Dr. David Norman
Dr. Charles B. Wilson
Dr. John J. Caronna

1977: Dr. Joel B. Kirkpatrick
Dr. David G. Kline
Dr. Martin H. Weiss
Dr. O. Howard Reichman

1978: Dr. Clark Millikan
Dr. Phillip Weinstein
Dr. Wesley Moore
Dr. Patrick J. Kelly

1979: Dr. George Ojemann
Dr. George Prigatano
Dr. Donald Richardson

1980: Dr. Martin, Weiss, USC
Dr. Theodore Roberts
Dr. Robert Anderson
Dr. Richard Worley
Dr. M. Peter Heilbrun
Dr. George Sanborn
Dr. Clifford Snyder
Dr. Ann Osborn
Dr. K.C. Wong

1981: Dr. William Buchheit
Dr. Thomas Carlow
Dr. John A. Kusske
Dr. Gail Neeley
Dr. Robert Segal
Dr. Earl Walker

1982: Dr. James Harp
Dr. Richard Hermann
Dr. John R. Mullan
Dr. Phanor Perot

1983: Dr. Rubin Bressler
Dr. Harold Hoffman
Dr. Ron Lemire
Dr. Joachim Seeger

1984: Dr. Gary G. Ferguson
Dr. Madan V. Kulkarni
Dr. Jim L. Story
Dr. John M. Tew, Jr.

1985: Dr. Ernst Grote
Dr. John Loeser
Dr. James Ogilvie
Dr. John Robertson

1986: Dr. Albert Rhoton
Dr. Bryce K. A. Weir

1987: Dr. Burton P. Drayer
Dr. Patrick J. Kelly
Dr. David G. McLone

1988: Dr. Peter J. Jannetta
Dr. H Ric Harnsberger
Dr. Kalmon D. Post

1989: Dr. M Stephen Mahaley
Dr. Robert G. Ojemann
Dr. John Stears

1990: Dr. Charles G. Drake
Dr. Sanford J. Larson
Dr. John Stears
Dr. Dwight Parkinson

1991: Dr. Bennett Stein
Dr. Robin Humphreys
Dr. Daniel J. Sexton

1992: Dr. L Nick Hopkins
Dr. Wolfhard Casper
Dr. Taka Fukashima

1993:	**Dr. Raj K. Narayan**
	Dr. Donlin M. Long
	Dr. Edward H. Oldfield
1994:	**Dr. Alan Cohen**
	Dr. Stephen Papadopoulous
	Dr. Laligam N. Sekhar
1995:	**Dr. Hunt Batjer**
	Dr. Thomas Brott
	Dr. Thomas Mehalic
1996:	**Dr. Daniel Barrow**
	Dr. Michael Scott
1997:	**Dr. Steve Giannotta**
	Dr. Charles Tator
1998:	**Dr. Richard Morawetz**
	Dr. David Piepgras
1999:	**Dr. Edwards Laws**
	Dr. Regis Haid
2000:	**Dr. Albert Rhoton**
	Dr. Neal Martin
2001:	**Dr. Markin Weiss**
	Dr. J Patrick Johnson
2002:	**Dr. Duke Samson**
	Dr. Edward Benzel
2003:	**Dr. M Gazi Yasargil**
	Dr. Kevin Foley
2004:	**Dr. Arthur Day**
	Dr. Kevin Foley
2005:	**Dr. Kim Burchiel**
	Dr. Alex Valadka
2006:	**Dr. Daniel Resnick**
	Dr. Rayminel Sawaya
2007:	**Dr. Mark Hadley**
	Dr. Michael Bliss
2008:	**Dr. Peter Black**
	Dr. Kim Burchiel
2009:	**Dr. Doug Kondziolka**
	Dr. Neil Kitchen
2010:	**Dr. Lori Shutter**
	Dr. Guy Clifton
2011:	**Dr. Fredirick Boop**
	Dr. Robert Rostomily
2012:	**Dr. Jeff Bruce**
	Dr. Charles Branch
2013:	**Dr. Frederick Lang**
	Dr. Jamie Ullman
2014:	**Dr. James Rutka**
	Dr. M. Sean Grady
2015:	**Dr. Nicholas Barbaro**
	Dr. Randall Chesnut
2016:	**Dr. Richard Ellenbogen**
	Dr. Anthony Asher
2017:	**Dr. James Goodrich**
	Dr. B. Gregory Thompson
2018:	**Dr. Hunt Batjer**
	Dr. John Hurlbert
	Dr. William Couldwell
2019:	**Dr. Michael Lawton**
	Dr. Juan Uribe
2021:	**Dr. Nino Chiocca**
	Dr. David Langer
2022:	**Dr. Richard Byrne**
2023:	**Dr. Ganesh Rao**
	Dr. Richard Fessler

ABSTRACTS

TITLE: Updates on MIS SI Joint Fusion

ABSTRACT: SI Joint fusion incidence has explained in the last 10 years. This review details updated literature on primary SI joint fusion, revision, and deformity indications.

METHODS: This is a literature review on primary lateral, deformity pelvic constructs, and revision for MIS SI Joint fusion

RESULTS: Indication, workup, revision options, and deformity data are all reviewed and discussed.

CONCLUSIONS: This should provide a thorough update on current data on MIS SI joint fusion.

TITLE: Adjunct Meningeal Artery Embolization with Surgery in Denovo vs Recurrent Chronic Subdural Hematomas: Propensity-score Matched Analysis

ABSTRACT: Recent clinical trials have demonstrated the benefits of middle meningeal artery embolization (MMAE) for chronic subdural hematoma (cSDH), particularly as an adjunct to surgery. However, all trials to date have excluded patients with recurrent cSDH who previously underwent surgical evacuation, rendering the effectiveness of MMAE in this group uncertain. This study aims to compare the efficacy and safety of adjunct MMAE in de novo versus recurrent cSDH using propensity score matching (PSM).

METHODS: A multicenter analysis was conducted on consecutive patients who underwent planned adjunct MMAE with surgical evacuation (within a single admission) for cSDH across 15 cerebrovascular centers (2018 to 2023). Patients who received standalone MMAE without surgery were excluded. Patients were stratified into two cohorts: de novo cSDH (no prior surgical intervention) and recurrent cSDH (previous surgical evacuation in prior admission craniotomy, burr hole drainage, or SEPS). The primary endpoint was hematoma re accumulation or neurological deterioration requiring unplanned retreatment (i.e., surgical rescue). Secondary endpoints included radiographic improvement (50% hematoma thickness reduction, or more, on follow up imaging). PSM was performed, adjusting for age, sex, hematoma thickness, midline shift, pre-treatment antithrombotic use, and baseline modified Rankin Scale (mRS).

RESULTS: The cohort comprised 364 patients (414 combined procedures; mean age 73.5 years; 26.6% female), of whom 26.7% had undergone prior evacuation. After matching, 63 pairs exhibited comparable baseline characteristics. Bilateral embolization frequency was higher in the de novo group (41.3% vs. 19.5%; $p = 0.03$). Radiographic success was superior in the recurrent cohort (94.4% vs. 75.7%; $p = 0.025$), whereas retreatment rates did not differ significantly (2.4% vs. 7.3%; $p = 0.31$). Procedural complication rates, technical success, and favorable functional outcomes were equivalent between groups (all p values above 0.05).

CONCLUSIONS: Adjunct embolization performed concurrently with surgical evacuation for recurrent cSDH demonstrates safety and efficacy comparable to de novo cases. Although radiographic response was enhanced in the recurrent cohort, the incidence of unplanned retreatment remained equivalent. Inclusion of this patient subset in future prospective trials is warranted.

TITLE: A Retrospective Single-Center Review of the Performance of Polymer Embedded Biphasic Calcium Phosphate Bone Graft with Submicron Needle-Shaped Topography Used Standalone in Transforaminal Lumbar Interbody Fusion

ABSTRACT: Iliac crest bone graft (ICBG) is the gold standard graft material for spinal fusion procedures to treat degenerative disc disease (DDD). Limitations in the availability of autograft and morbidity associated with an additional harvest procedure led to the development of synthetic bone grafts. A novel polymer embedded biphasic calcium phosphate bone graft with a submicron needle-shaped topography (BCP<μm) was developed to provide traction for pro-healing M2 macrophages. M2 macrophages stimulate stem cells to form new bone throughout the graft, promoting predictable fusion.

METHODS: A single-center, single-arm retrospective evaluation of 20 patients who received TLIFs with BCP<μm used standalone was initiated to evaluate fusion. Patients were evaluated with computed tomography (CT) scans, X-rays, and patient-centered outcome questionnaires at 12 months post-operative. X-rays and CT scans were interpreted by an independent physician blinded to the clinical status of the patients. Interbody fusion was evaluated based on the BSF Interbody Fusion Classification, with Grade 1 characterized as “not fused” and Grades 2 and 3 characterized as “fused”.

RESULTS: Of the 20 subjects, 11 were females and 9 were males. The average age of participants was 67.2, and the average BMI was 32.30. Six participants (30%) underwent previous lumbar surgery, 7 (35%) had diabetes, and 11 (55%) were former or current smokers. Thirty-six total levels were fused with an average of 1.8 fusions per subject. Seventeen subjects had only interbody fusions, and 3 patients had interbody and posterolateral fusions. At 12 months post-operative, 34/36 (94.4%) of levels were fused. The unfused levels were likely due to infection and multiple comorbidities. The change in average VAS was 2.5/10 (25%) and all patients reported an improvement at 12 months.

CONCLUSIONS: BCP<μm demonstrated high fusion rates at 12 months post-operative in a challenging patient population. Fusion was accompanied by post-operative back and leg pain improvement. This study reports favorable fusion outcomes with a standalone calcium phosphate bone graft alternative to ICBG for interbody procedures.

TITLE: Novel Use of vEGF Inhibitor for Treatment of Cerebral Proliferative Angiopathy: A Case Report

ABSTRACT: Cerebral proliferative angiopathy (CPA) is a rare and complex cerebrovascular disorder characterized by abnormal vascular channels interspersed within normal brain tissue. Elevated levels of vascular endothelial growth factor (VEGF) are hypothesized to be involved in the pathogenesis of CPA through promotion of pathologic angiogenesis. Here, we describe a case of CPA treated with bevacizumab, a VEGF inhibitor, with discussion of longitudinal clinical and radiographic findings.

METHODS: A 32-year-old male presented with frequent partial seizures, annual grand mal seizures, and progressive weakness and spasticity of the left upper extremity and face. The patient was initially thought to have an arteriovenous malformation, and diagnosis was later revised to CPA to reflect the integration of the pathologic vasculature with normal brain parenchyma. Progressive worsening of neurologic deficits led to the decision to begin treatment with bevacizumab. Serial clinic follow-ups and radiographic surveillance were recorded before and after treatment.

RESULTS: After 8 cycles of treatment, repeat MR imaging demonstrated decreased enhancement of pathologic vasculature. The patient also reported decreased seizure frequency and transient relaxation of his left upper limb contracture. The decision was made to stop bevacizumab after 8 cycles as clinical improvement was not significant enough to warrant the side effects of treatment. At most recent follow-up, the patient had stable symptoms and is being managed conservatively

CONCLUSIONS: Here, we report the first case, to our knowledge, demonstrating radiographic improvement of a CPA lesion after treatment with bevacizumab. After 8 cycles of bevacizumab, repeat imaging demonstrated decreased enhancement of pathologic vasculature compared to pretreatment images. However, clinical improvement was marginal and the decision was made to stop bevacizumab therapy due to side effects. Despite this, the presence of clear radiographic improvement suggests a possible role for antiangiogenic agents in modulating disease progression and warrants further investigation. We are currently exploring the potential of hyperbaric oxygen therapy (HBOT) for our patient, which may address the underlying ischemia in CPA. HBOT increases generation of reactive oxygen species to modulate activity of multiple factors involved in angiogenic signaling. This seemingly paradoxical encouragement of neovascularization allows normal, controlled angiogenesis that may increase cerebral blood flow to counter ischemia. Given the rarity of this CPA and lack of consistently effective treatments in current literature, it is imperative to continue exploring additional therapeutic avenues to better manage and improve patient outcomes.

TITLE: A Machine Learning Method to Diagnose Adult Coronal Deformity from Spatial and Temporal Gait Parameters

ABSTRACT: Introduction:
Adult patients with scoliosis and coronal malalignment often report significant back pain and reduced quality of life. While these deformities are typically identified radiographically and clinically, their functional impact on ambulation is harder to quantify. Kinematic gait analysis offers detailed insight but is impractical in routine clinical settings. Temporal and spatial gait parameters are easier to obtain, yet their diagnostic value remains unclear. We aimed to classify spinal deformities using only temporal and spatial gait data through machine learning.

METHODS:
We studied 101 patients (52 coronal, 28 sagittal, 21 degenerative deformities) using a GAITRite walkway to collect spatiotemporal gait parameters. Each patient completed at least four walks over 6.67 meters. We used these parameters as input for six machine learning algorithms to classify deformity types, applying a 50:50 train-test split. Each walk was treated as a time series indexed by step count, and we engineered features capturing step-by-step and left-right foot variations. Model performance was evaluated by area under the curve (AUC), and feature weights were analyzed for the top-performing model.

RESULTS: The Gaussian Bayes Classifier achieved the highest performance, with AUCs of 0.90 for coronal and 0.88 for sagittal deformities. Large variations in step distance were strongly predictive of coronal deformities (coefficient: 0.056), while variations in step time were most predictive of sagittal deformities (coefficient: 0.013).

CONCLUSIONS: Our model identifies gait asymmetries as strong indicators of coronal and sagittal spinal deformities. These features, reflecting shifts in the center of mass, are easily measurable in clinical settings. Future work should explore their role as markers of functional disability in adult scoliosis.

TITLE: Effect of Acute Intracranial Stenting in Patients with Successful Reperfusion Following Large Vessel Occlusion Secondary to Intracranial Atherosclerosis: Secondary Analyses of the RESCUE-ICAS Study

ABSTRACT: The Registry of Emergent Large Vessel Occlusion Due to Intracranial Stenosis (RESCUE-ICAS) study demonstrated that patients undergoing acute stenting of intracranial atherosclerosis with large-vessel occlusion (ICAS-LVO) in addition to mechanical thrombectomy (MT) had better outcomes than those undergoing MT alone. We present a secondary analysis of RESCUE-ICAS to evaluate intracranial stenting among patients who achieved successful reperfusion.

METHODS: Successful reperfusion was defined as modified thrombolysis in cerebral infarction ≥2B. We analyzed two cohorts. The first cohort consisted of patients with successful reperfusion at the end of the procedure and compared those who underwent stenting and those who did not. The second cohort consisted of patients with successful reperfusion following MT and compared those who then went on to have stenting vs those who did not undergo stenting. Primary endpoints were modified Rankin Scale (mRS) score at 90 days and 24-hour infarct volume on MRI. Safety endpoints included symptomatic intracranial hemorrhage (ICH) and death at 90 days.

RESULTS: Overall, 351 (84.2%) patients had successful reperfusion, with 181 (51.7%) undergoing stenting. More patients who underwent acute stenting achieved mRS 0-2 at 90 days (adjusted odds ratio (aOR) 1.88, p=0.024). Patients who underwent stent placement were more likely to have a 24-hour MRI infarct volume <30 mL (n=131, 70.1% vs. 54.8%, p=0.022). Our second analysis demonstrated that 89 patients with acute intracranial stenting after MT with a modified thrombosis in cerebral infarction ≥ 2B experienced higher odds of mRS 0-2 at 90 days (aOR 2.19, p=0.046) and 24-hour MRI infarct volume <30 mL (aOR 3.27, p=0.042). There was no significant difference in rates of symptomatic ICH (n=22, 7.2% vs. 5.3%, p=0.466) or death at 90 days (n=85, 22.7% vs. 25.9%, p=0.480).

CONCLUSIONS: Among both the cohort with final successful reperfusion and the cohort with initial successful reperfusion after MT alone, intracranial stenting was associated with better long-term clinical and radiographic outcomes, without greater risks of morbidity and mortality.

TITLE: Management of Traumatic Cerebral Venous Sinus Injury

ABSTRACT: Cerebral venous sinus injury (CVSI) is a relatively rare but potentially morbid complication in patients with traumatic brain injury (TBI). While the association between CVSI and TBI is documented the optimal management strategy remains understudied. This retrospective cohort study aims to evaluate the incidence, risk factors, and outcomes of CVSI in patients with TBI to guide clinical decision-making and improve patient outcomes.

METHODS: We conducted a retrospective analysis of patients who presented to the University of Utah with TBI between 2016 and 2022. Patients were identified through electronic medical records, and data on demographics, injury severity, thrombotic risk factors, imaging findings, treatment approaches, and outcomes were collected. Only patients with documented evidence of TBI and radiologic confirmation of CVSI were included.

RESULTS: A total of 1255 patients with TBI were reviewed, of which 103 (8.2%) developed venous sinus injury. Sixty-four patients (62.1%) developed subocclusive sinus thrombosis, 12 (11.6%) developed complete occlusion, and 27 (26.2%) had narrowing due to external compression of the sinus. Fifty-three patients (69.7%) with subocclusive or occlusive thrombosis received anticoagulation or antiplatelet therapy, while no patients with external compression received anticoagulation. 76.7% of patients had positive clinical outcomes at last follow-up, defined by mRS of 2 or less. Patients receiving anticoagulation or antiplatelet therapy exhibited better clinical outcomes than those who did not (81.6% vs. 46.2%, $p = 0.014$)

CONCLUSIONS: This retrospective cohort demonstrates the incidence and impact of CVSI in TBI patients. Patients treated with anticoagulation or antiplatelet therapy experienced better clinical outcomes. Variation in treatment patterns within our cohort and the current literature highlights the need to further study this pathology to establish clearer guidelines for identifying and managing CVSI.

TITLE: Matched-pair Analysis of Endovascular Thrombectomy Cases for Anterior Circulation Ischemic Stroke Using Balloon Guide Catheters

ABSTRACT: Ballon guide catheters (BGC) have strong evidence supporting their efficacy in enhancing endovascular thrombectomy outcomes for ischemic stroke. However, many neurointerventionalists remain hesitant to adopt them, potentially due to incompatibility of BGC with larger bore aspiration catheters. Aspiration catheter technology has evolved in technique, materials, and catheter size. Previous studies favoring BGC either predate these advancements and/or prior matched-pair analyses have not adequately adjusted for these key differences. We provide an updated multi-center matched-pair analysis comparing angiographic and clinical outcomes for stroke thrombectomy using BGC versus non-BGC.

METHODS: This multicenter, retrospective study analyzed 400 anterior circulation thrombectomy cases performed between February 2018 to February 2024. Of these, BGC and non-BGC cases were 1:1 matched by proceduralists, age, gender, use of stent retriever + aspiration device versus aspiration-only, occlusion site, aspiration catheter size, and guide catheter position.

RESULTS: The BGC and non-BGC cohorts had similar demographic characteristics, including mean age (65.8 vs 66.7) and gender distribution (53.5% male vs 52.5%). The two groups had similar number of total passes (2.4 vs 2.5), first-pass effect (52.8% vs 52.5%), complications (6.5% vs 5.5%), and symptomatic intracranial hemorrhage rates (17.2% vs 15.5%). Higher percentage patients treated with BGC had good clinical outcome at 30-day follow up (20.5% vs 30%, $p=0.03$). Rates of embolization to new territory (2% vs 3.5%), and mRS at 90-day (28 vs 30.5) were not different between the two groups. Puncture-to-successful reperfusion time was significantly higher in BGC cases (23 minutes vs 31 minutes, $p<0.001$). BGC use was associated with better clinical outcome at discharge for patients treated within 6 hours of last known well time (OR 3.35, 95% CI 1.43-7.83, $p=0.005$).

CONCLUSIONS: In this multicenter matched-pair analysis, the use of BGCs use is associated with improved functional outcomes at discharge and faster recovery in the early post-procedural period. However, no significant differences in radiographic outcomes were observed between BGC and non-BGC groups.

TITLE: Single-Session Versus Staged Approaches for Chronic Subdural Hematoma Treatment Using Middle Meningeal Artery Embolization with Concomitant Evacuation Surgery: A Propensity Score-Matched Analysis

ABSTRACT: Surgical evacuation is the mainstay of treatment for patients with chronic subdural hematoma (cSDH) who have symptomatic mass effect, yet it carries a recurrence risk of up to 20%. Recent randomized trials have shown that adding middle meningeal artery embolization (MMAE) can significantly reduce both reoperations and overall treatment failures. However, whether performing MMAE and surgical evacuation in a single session can boost clinical efficiency without compromising safety or efficacy remains an open question.

METHODS: We retrospectively identified 429 patients across 14 institutions who underwent MMAE plus surgical evacuation of cSDH. Patients were stratified into single session (simultaneous MMAE and surgery under one anesthetic) or staged (separate sessions) cohorts. Baseline demographic, procedural, and imaging data were collected. Propensity score matching was performed to balance key baseline variables. Primary outcomes included hematoma recurrence, length of stay (LOS), and functional independence

RESULTS: Of 429 patients, 205 received single session treatment. In the unmatched analysis, single session patients showed a lower rate of reaccumulation necessitating reevacuation (4.7% vs. 10.7%; $p=0.010$) and a shorter median LOS (5 vs. 6 days; $p<0.001$). After matching, differences in reaccumulation rates were not statistically significant, but LOS remained significantly shorter (5 vs. 7 days; $p=0.002$). Functional outcomes and overall mortality were similar in both groups. Complication rates did not differ significantly, and MMAE related adverse events were rare.

CONCLUSIONS: Single session MMAE plus surgical evacuation appears to be safe and shortens LOS compared with a staged approach. The rates of functional outcomes, reevacuation, and mortality did not differ significantly from those observed in patients who underwent staged procedures.

TITLE: Surgical Evacuation Techniques in Single-Session Middle Meningeal Artery Embolization with Concomitant Evacuation Surgery for Chronic Subdural Hematoma: Analysis of Procedural Efficiency and Clinical Radiographic Outcomes

ABSTRACT: Single-session middle meningeal artery embolization (MMAE) combined with surgical evacuation is a rapidly emerging strategy in the treatment of chronic subdural hematoma (cSDH). However, the effect of different evacuation techniques within this approach remains unclear.

METHODS: We conducted a retrospective multicenter cohort study across eight U.S. institutions of patients with cSDH who underwent single-session MMAE with concomitant evacuation between 2018 and 2024. Evacuation techniques were categorized as craniotomy or burr-hole evacuation (twist drill, electric drill, or subdural evacuating port systems). Primary outcomes included procedural time, drain management, and early clinical trajectory.

RESULTS: The 205 included patients (30.2% female) underwent 276 procedures (35 craniotomies, 241 burr-hole evacuations). The median patient age was 75 years, and 157 (76.6%) patients were functionally independent at baseline. Subdural characteristics were similar in the craniotomy (n=26) and the burr-hole evacuation (n=179) patients. Patients who underwent craniotomy had longer drainage durations (p<.001) and longer operative times (209 vs. 190 min, p=.015. Patients undergoing craniotomy were also less likely to be discharged by Day 6 (p=.040). Procedural mortality rates were low overall (0.4%), and the rate did not differ significantly between craniotomy and burr-hole groups (p=.995). The early postoperative mortality rates (3.3% overall) were also comparable across both groups (p<.999). Overall mortality was higher in craniotomy patients (34.3% vs. 10.4%, aOR=3.69; 95% CI: 1.23–11.06; p=0.019), mainly due to late events.

CONCLUSIONS: In this multicenter study of single-session MMAE with concomitant evacuation for cSDH, burr hole–based techniques were associated with shorter operative times and higher rates of early drain removal, which in turn predicted earlier discharge. These findings support the preferential use of minimally invasive evacuation methods within the single-session paradigm when anatomically and technically appropriate.

TITLE: Optimizing Single-Pass Thrombectomy: Multicenter Comparative Analysis of Direct Aspiration versus Combined Aspiration and Stent Retriever Techniques in 1,070 Patients

ABSTRACT: Achieving rapid and safe first-pass successful reperfusion (FPSR) during mechanical thrombectomy strongly influences stroke outcomes. Comparative real-world data evaluating direct aspiration thrombectomy (ADAPT) versus combined stent-retriever with aspiration (Solumbra), specifically in patients achieving FPSR, remain limited. Additionally, the modifying effect of aspiration catheter size on these techniques has not been well-defined. The objective of this study is to compare procedural efficiency, efficacy, and safety between ADAPT and combined techniques among patients achieving FPSR, with particular focus on the influence of large-bore aspiration catheters.

METHODS: We retrospectively analyzed thrombectomies performed at three comprehensive stroke centers. Procedures were classified into ADAPT and combined aspiration-stent retriever techniques, noting large-bore catheter use separately. The primary outcome was rapid successful reperfusion (mTICI 2B or greater within 30 min). Secondary outcomes included first-pass effect (FPE; mTICI 2C–3), modified first-pass effect (mFPE; mTICI 2B or greater on first pass), symptomatic intracranial hemorrhage (sICH), and favorable functional outcomes (mRS 3 or lower). Multivariable logistic regression with interaction terms evaluated catheter size effects.

RESULTS: Among 1,070 cases, mean patient age was 68 ± 15 years, with similar distributions of anterior circulation (94%) and large-vessel occlusions (75%). ADAPT achieved shorter puncture-to-reperfusion times (21 vs 39 min; $p<0.001$), higher rapid reperfusion rates (71% vs 34%; $p<0.001$), and fewer sICH events (10% vs 21%; $p<0.001$). Among single-pass reperfusion successes (n=456), ADAPT maintained its advantage in rapid reperfusion (83% vs 55%; $p<0.001$) and safety (sICH: 6% vs 20%; $p<0.001$). Multivariable analysis showed ADAPT with large-bore catheters had the highest odds for rapid reperfusion (aOR 4.79; 95%CI 2.17–10.59) and mFPE (aOR 3.90; 95%CI 1.64–9.31), and lowest sICH risk (aOR 0.14; 95%CI 0.04–0.48).

CONCLUSIONS: Direct aspiration thrombectomy with large-bore catheters significantly improved procedural speed, efficacy, and safety compared to combined techniques. These findings support ADAPT with large-bore catheters as the preferred strategy to optimize first-pass success in mechanical thrombectomy.

TITLE: Pinpointing the Frailty Threshold: Optimal RAI-rev Score for Predicting Good Clinical Outcomes in Stroke Patients Following Thrombectomy

ABSTRACT: The Revised-Risk Analysis Index (RAI-rev), a frailty scoring system with scores from 0 to 81, helps predict surgical outcomes by indicating higher frailty with higher scores. This study aimed to determine the most effective RAI-rev score for predicting outcomes post-thrombectomy in stroke patients.

METHODS: A retrospective single-center study was conducted involving stroke patients who underwent thrombectomy from February 2018 to March 2024. Primary outcomes were assessed using the modified Rankin Scale (mRS) and mortality rates, with outcomes classified as good (mRS 0-2) or poor (mRS 3-6). Predictive associations were analyzed through univariable and multivariable regression analyses and Kaplan-Meier survival analysis, aiming to identify the optimal RAI-rev score threshold via Youden's index from the receiver operating characteristic (ROC) curve.

RESULTS: Out of 360 patients, 167 had good outcomes and 193 had poor outcomes at the last follow-up. The mean follow-up duration was 4.7±8.3 months. Multivariable logistic regression model identified the RAI-rev score (OR=.91, P<.001), mRS at admission (OR=.60, P<.001), use of intravascular thrombolytics (OR=2.63, P<.001), final mTICI (OR=1.43, P<.001), decompressive craniectomy (OR=.18, P=.022), and hospital length of stay (OR=.95, P=.005) as independent predictors of good outcomes, with the model's ROC AUC at .780 (P<.001; Table 1). The optimal RAI-rev score cutoff was determined to be 26 (Optimal Youden index=.458, Sensitivity= 70.7%, Specificity= 61.3%; Figure 1, AUC=.688, P<.001). Subanalysis demonstrated statistically significant differences in outcomes between patients with RAI-rev scores <26 and those with scores >26 (Table 2). Kaplan-Meier analysis confirmed better survival rates for patients with RAI-rev scores <26 (Figure 2, log-rank test, P<.001).

CONCLUSIONS: The RAI-rev score independently predicts clinical outcomes following thrombectomy in stroke patients, with an optimal cutoff score of >26, beyond which outcomes are likely poor. Further large-scale prospective studies are needed to validate this score's accuracy.

TITLE: Long-Term Outcomes of Drug-Eluting Stents Versus Bare Metal Stents and Medical Management in Treating Symptomatic Intracranial Atherosclerotic Disease: A Multicenter Follow-Up Study

ABSTRACT: Intracranial atherosclerotic disease (ICAD) is a leading cause of ischemic stroke. This study compares the long-term effectiveness of balloon-mounted drug-eluting stents (DES), percutaneous angioplasty and bare metal stenting (PTAS), and medical management (MM) in preventing stroke recurrence.

METHODS: A retrospective multicenter study was conducted, including patients who underwent stenting with DES between March 2018 and May 2023. Propensity score-matched controls for MM and PTAS groups were derived from the SAMMPRIS trial. Recurrence rates of transient ischemic attacks, strokes, intracerebral hemorrhages, and mortality were analyzed using binomial regression, Cox regression, and Kaplan-Meier survival analysis.

RESULTS: A total of 115 patients who underwent DES implantation and two propensity-matched cohorts of 115 patients who received bare metal stents (PTAS) and aggressive MM were included. The mean follow-up was 27.9±17.0 months. The DES group demonstrated significantly fewer recurrent strokes (11.3%) compared with MM (27.0%) and PTAS (27.8%) (P=.003). The MM group experienced the lowest recurrence rate of intracerebral hemorrhage (0.9%), compared to 8.7% in the PTAS group and 4.3% in the DES group (P=.018) (Table 1). Multivariable regression controlled for demographics, comorbidities, and lesion characteristics, revealed that DES was associated with reduced odds of recurrent strokes (OR=.40, 95% CI:.17-.92, P=.031) compared to PTAS throughout the follow-up (Table 2). Kaplan-Meier survival analysis showed no significant difference in overall survival between the DES, PTAS, and MM groups (log-rank test, P=.180). Multivariable Cox regression, controlled for the same variables, indicated that DES stenting lowered the hazard of recurrent strokes compared with PTAS (HR=.36, 95% CI:.16-.80, P=.012) (Figure 1).

CONCLUSIONS: Treatment of severe, symptomatic ICAD using DES was associated with lower odds of recurrent strokes and time to recurrent strokes compared with PTAS in this long-term follow-up study. Further pragmatic trials comparing MM with novel stent technologies are necessary.

TITLE: A Double Burden: Depression and Early Recurrence of Pain Following Surgical Management of Trigeminal Neuralgia

ABSTRACT: Trigeminal neuralgia (TN) often recurs after surgical intervention, and depression may contribute to earlier relapse. This study aimed to evaluate the association between depressive disorder and pain recurrence following surgical intervention.

METHODS: This single-center retrospective study included patients with TN who underwent surgical intervention between March 30, 2017, and March 30, 2024. Primary outcomes were defined as >50% pain relief at the last follow-up, recurrence of pain during the follow-up period, and time to recurrence of pain.

RESULTS: A total of 150 patients with TN who underwent 193 procedures were included. The median follow-up duration was 6.0 (IQR: 1.0-18.0) months (Figure 1). Among these cases, 54 patients had a documented diagnosis of depressive disorder, while 96 had no recorded history of depression. Female sex (74.1%) and comorbid migraine (44.4%) were significantly more prevalent in the depressed cohort (Table 1). Patients with depression also underwent balloon compression rhizotomy (52.1%) and radiosurgery (32.4%) at higher rates compared to those without depression. No other significant differences were observed in preoperative characteristics between the two groups. Postoperatively, recurrence of any level of facial pain was significantly more common in patients with depression (70.4% vs. 51.6%; P = .011). In a multivariable mixed-effects Cox regression analysis, depression emerged as an independent predictor of earlier pain recurrence during follow-up (HR=1.57, 95% CI=1.03-2.40, P=.038) (Table 3, Figure 2).

CONCLUSIONS: Depression is a common psychiatric comorbidity among patients with TN. Our results suggest that it also serves as an independent predictor of earlier pain recurrence following surgical treatment of TN. Recognizing depression alongside other preexisting conditions may aid clinicians in setting realistic expectations of surgical outcomes and guiding clinical decision-making.

TITLE: Cingulotomy: A Review of the Procedure and Its History Along with Its Role in Todays Neurosurgical Practice

ABSTRACT: From leucotomy to cingulotomy there is a long, and at times controversial, history of ablative cranial procedures for pain. The trend away from opioids in the treatment of chronic pain makes re-evaluation of prior ablative techniques a useful tool in the management of chronic pain. Techniques and outcomes of 4 cases of bilateral cingulotomy will be reviewed.

METHODS: A systematic review of the history of the procedure was completed and 4 cases of bilateral cingulotomy over the last 2 years were identified. Follow up of 6, 12 and 24 months were obtained along with changes in opioid use (MME).

RESULTS: Three out of the four patients saw a drop in their opioid use and an improvement in their activity and family interaction. No change was seen in one patient and no complications were noted in any of the patients.

CONCLUSION: Cingulotomy remains a safe and effective procedure for pain control in select cases.

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Mark your calendars, the 60th Annual Meeting of the Rocky Mountain Neurosurgical Society, Inc. will be held:
June 20th – 24th, 2026

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