

CNS GUIDELINE: NEUROABLATIVE PROCEDURES FOR CANCER PAIN

Congress of Neurological Surgeons Systematic Review and Evidence-Based Guideline on Neuroablative Procedures for Patients With Cancer Pain 437

Ahmed M. Raslan, Sharona Ben-Haim, Steven M. Falowski, André G. Machado, Jonathan Miller, Julie G. Pilitsis, William S. Rosenberg, Joshua M. Rosenow, Jennifer Sweet, Ashwin Viswanathan, Christopher J. Winfree, Jason M. Schwalb

COMMENTARIES (ONLINE ONLY)

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guideline on Neuroablative Procedures for Patients With Cancer Pain E218

Brian J. Williams, Joseph S. Neimat

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guideline on Neuroablative Procedures for Patients With Cancer Pain E219

Marc Sindou

NEUROPATHOLOGY REVIEW SERIES

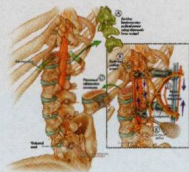
Diagnostic Pathology of Tumors of Peripheral Nerve 443

Sarra Belakhoua, Fausto J. Rodriguez

SURGICAL MANAGEMENT OF ELOQUENT AREA TUMORS

Clinical Pearls and Methods for Intraoperative Motor Mapping 457

Marco Rossi, Tommaso Sciortino, Marco Conti Nibali, Lorenzo Gay, Luca Viganò, Guglielmo Puglisi, Antonella Leonetti, Henrietta Howells, Luca Fornia, Gabriella Cerri, Marco Riva, Lorenzo Bello



On the Cover

This month's cover illustration highlights the technique for vertebral column subtraction osteotomy and reconstruction to release stretch on the spinal cord in the setting of recurrent tethered spinal cord syndrome.

By shortening the spinal column, tension on the spinal cord is relaxed leading to an improvement in symptoms in many patients. The authors of the accompanying article detail a large series of patients followed over time at 2 institutions that have had this procedure in lieu of an additional direct detethering intervention.

Printed with permission. © 2019 JHU Neurosurgery—Ian Suk. Read more in "Posterior vertebral column subtraction osteotomy for recurrent tethered cord syndrome: A multicenter, retrospective analysis" on p. 633.



Print Readers: Scan this QR code using your mobile device in order to access the online Table of Contents.

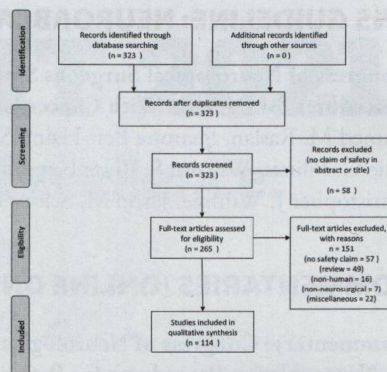
REASONS TO BELIEVE—BIostatistics & Methodology for the Neurosurgeon

468

EDITOR'S CHOICE

Claims of Safety in Neurosurgical Literature: We Shouldn't Call Something Safe Without Strong Justification

Adam Alamgir Khan, Stephen John Haines



REVIEWS

“Zooming in” on Glioblastoma: Understanding Tumor Heterogeneity and its Clinical Implications in the Era of Single-Cell Ribonucleic Acid Sequencing 477

Adham M. Khalafallah, Sakibul Huq, Adrian E. Jimenez, Riccardo Serra, Chetan Bettgowda, Debraj Mukherjee

Bilateral Deep Brain Stimulation is the Procedure to Beat for Advanced Parkinson Disease: A Meta-Analytic, Cost-Effective Threshold Analysis for Focused Ultrasound 487

Uma V. Mahajan, Vinod K. Ravikumar, Kevin K. Kumar, Seul Ku, Disep I. Ojukwu, Camilla Kilbane, Pejman Ghanouni, Joshua M. Rosenow, Sherman C. Stein, Casey H. Halpern

REVIEW (ONLINE ONLY)

NOW Circulating Biomarkers for Glioma: A Review E221

Jordan Jones, Hong Nguyen, Katharine Drummond, Andrew Morokoff

RESEARCH—HUMAN—CLINICAL TRIALS

Ten-Year Outcomes of 1- and 2-Level Cervical Disc Arthroplasty From the Mobi-C Investigational Device Exemption Clinical Trial 497

Kee Kim, Greg Hoffman, Hyun Bae, Andy Redmond, Michael Hisey, Pierce Nunley, Robert Jackson, David Tahernia, Ali Araghi

COMMENTARY (ONLINE ONLY)

Commentary: Ten-Year Outcomes of 1- and 2-Level Cervical Disc Arthroplasty From the Mobi-C Investigational Device Exemption Clinical Trial E231

Rodney John Charles Laing

RESEARCH—HUMAN—CLINICAL STUDIES

First in Man Pilot Feasibility Study in Extracranial Carotid Robotic-Assisted Endovascular Intervention 506

Virendra R. Desai, Jonathan J. Lee, Trevis Sample, Neal S. Kleiman, Alan Lumsden, Gavin W. Britz

COMMENTARY (ONLINE ONLY)

Commentary: First in Man Pilot Feasibility Study in Extracranial Carotid Robotic-Assisted Endovascular Intervention E232

Mohamed Abouelleil, Justin Singer

RESEARCH—HUMAN—CLINICAL STUDIES

Spinal Neurovascular Malformations in Klippel-Trenaunay Syndrome: A Single Center Study 515

Anthony Larson, Tristan Covington, Katelyn Anderson, Megha Tollefson, Giuseppe Lanzino, Waleed Brinjikji

Low-Dose Intravenous Heparin Infusion After Aneurysmal Subarachnoid Hemorrhage is Associated With Decreased Risk of Delayed Neurological Deficit and Cerebral Infarction 523

Matthew J. Kole, Aaron P. Wessell, Beatrice Ugiliweneza, Gregory J. Cannarsa, Enzo Fortuny, Jesse A. Stokum, Phelan Shea, Timothy Chryssikos, Nicolas K. Khattar, George A. Crabill, David L. Schreiber, Neeraj Badjatia, Dheeraj Gandhi, E. Francois Aldrich, Robert F. James, J. Marc Simard

COMMENTARY (ONLINE ONLY)

Commentary: Low-Dose Intravenous Heparin Infusion After Aneurysmal Subarachnoid Hemorrhage Is Associated With Decreased Risk of Delayed Neurological Deficit and Cerebral Infarction E234

R. Loch Macdonald

RESEARCH—HUMAN—CLINICAL STUDIES

Early Prediction of Malignant Cerebellar Edema in Posterior Circulation Stroke Using Quantitative Lesion Water Uptake 531

Gabriel Broocks, Sarah Elsayed, Helge Kniep, Andre Kemmling, Fabian Flottmann, Matthias Bechstein, Tobias D. Faizy, Lukas Meyer, Thomas Lindner, Peter Sporns, Thilo Rusche, Gerhard Schön, Marius M. Mader, Jawed Nawabi, Jens Fiehler, Uta Hanning

Reliability of Using the Proposed International Consensus Video Signs of Potential Concussion for National Rugby League Head Impact Events 538

Andrew J. Gardner

Alterations in Functional Connectomics Associated With Neurocognitive Changes Following Glioma Resection 544

Kyle R. Noll, Henry S. Chen, Jeffrey S. Wefel, Vinodh A. Kumar, Ping Hou, Sherise D. Ferguson, Ganesh Rao, Jason M. Johnson, Donald F. Schomer, Dima Suki, Sujit S. Prabhu, Ho-Ling Liu

Impact of Frailty on Outcomes Following Spine Surgery: A Prospective Cohort Analysis of 668 Patients 552

Nitin Agarwal, Ezequiel Goldschmidt, Tavis Taylor, Souvik Roy, Stefanie C. Altieri Dunn, Andrew Bilderback, Robert M. Friedlander, Adam S. Kanter, David O. Okonkwo, Peter C. Gerszten, D. Kojo Hamilton, Daniel E. Hall

COMMENTARY (ONLINE ONLY)

Commentary: Impact of Frailty on Outcomes Following Spine Surgery: A Prospective Cohort Analysis of 668 Patients E236

Michael M. H. Yang, W. Bradley Jacobs

RESEARCH—HUMAN—CLINICAL STUDIES

- Occurrence, Risk Factors, and Time Trends for Late Reoperations due to Degenerative Cervical Spine Disease: A Finnish National Register Study of 19 377 Patients Operated on Between 1999 and 2015** 558
Anna Kotkansalo, Ville Leinonen, Merja Korajoki, Katariina Korhonen, Jaakko Rinne, Antti Malmivaara
- Aneurysmal Subarachnoid Hemorrhage: Trends, Outcomes, and Predictions From a 15-Year Perspective of a Single Neurocritical Care Unit** 574
Owen B. Samuels, Ofer Sadan, Chen Feng, Kathleen Martin, Khalid Medani, Yajun Mei, Daniel L. Barrow
- Prediction of Worse Functional Status After Surgery for Degenerative Cervical Myelopathy: A Machine Learning Approach** 584
Omar Khan, Jetan H. Badhiwala, Muhammad A. Akbar, Michael G. Fehlings
- Differences in Genomic Alterations Between Brain Metastases and Primary Tumors** 592
Antonio Dono, Takeshi Takayasu, Yuanqing Yan, Bethany E. Bundrant, Octavio Arevalo, Carlos A. Lopez-Garcia, Yoshua Esquenazi, Leomar Y. Ballester
- Failure Types and Related Factors of Spinopelvic Fixation After Long Construct Fusion for Adult Spinal Deformity** 603
Se-Jun Park, Jin-Sung Park, Yunjin Nam, Tae-Hoon Yum, Youn-Taek Choi, Chong-Suh Lee

COMMENTARIES (ONLINE ONLY)

- Commentary: Failure Types and Related Factors of Spinopelvic Fixation After Long Construct Fusion for Adult Spinal Deformity** E238
Lee A. Tan
- Commentary: Failure Types and Related Factors of Spinopelvic Fixation After Long Construct Fusion for Adult Spinal Deformity** E240
Mohit Patel, Manish K. Kasliwal

RESEARCH—HUMAN—CLINICAL STUDIES

- Higher Baseline Cortical Score Predicts Good Outcome in Patients With Low Alberta Stroke Program Early Computed Tomography Score Treated With Endovascular Treatment** 612
Peng-fei Xing, Yong-wei Zhang, Lei Zhang, Zi-fu Li, Hong-jian Shen, Yong-xin Zhang, He Li, Wei-long Hua, Pei Liu, Peng Liu, Peng-fei Yang, Bo Hong, Ben-qiang Deng, Jian-min Liu
- Disability Rating Scale in the First Few Weeks After a Severe Traumatic Brain Injury as a Predictor of 6-Month Functional Outcome** 619
Jose-Miguel Yamal, Imoigele P. Aisiku, H. Julia Hannay, Frances A. Brito, Claudia S. Robertson

COMMENTARY (ONLINE ONLY)

- Commentary: Disability Rating Scale in the First Few Weeks After a Severe Traumatic Brain Injury as a Predictor of 6-Month Functional Outcome** E242
Andrew I. R. Maas, Ewout W. Steyerberg

RESEARCH—HUMAN—CLINICAL STUDIES

Preoperative Navigated Transcranial Magnetic Stimulation Improves Gross Total Resection Rates in Patients With Motor-Eloquent High-Grade Gliomas: A Matched Cohort Study 627

Philipp Hendrix, Yvonne Dzierma, Benedikt W. Burkhardt, Andreas Simgen, Gudrun Wagenpfeil, Christoph J. Griessenauer, Sebastian Senger, Joachim Oertel

Posterior Vertebral Column Subtraction Osteotomy for Recurrent Tethered Cord Syndrome: A Multicenter, Retrospective Analysis 637

Nicholas Theodore, Ethan Cottrill, Samuel Kalb, Corinna Zygourakis, Bowen Jiang, Zach Pennington, Daniel Lubelski, Erick M. Westbroek, A. Karim Ahmed, Jeff Ehresman, Daniel M. Sciubba, Timothy F. Witham, Jay D. Turner, Mari Groves, U. Kumar Kakarla

COMMENTARY (ONLINE ONLY)

Commentary: Posterior Vertebral Column Subtraction Osteotomy for Recurrent Tethered Cord Syndrome: A Multicenter, Retrospective Analysis E244

Christina Huang Wright, Manish K. Kasliwal

RESEARCH—HUMAN—CLINICAL STUDIES

Enhanced Recovery After Surgery Pathway for Single-Level Minimally Invasive Transforaminal Lumbar Interbody Fusion Decreases Length of Stay and Opioid Consumption 648

Mena G. Kerolus, Ketan Yerneni, Christopher D. Witiw, Alena Shelton, William Jeffrey Canar, Deval Daily, Ricardo B. V. Fontes, Harel Deutsch, Richard G. Fessler, Asokumar Buvanendran, John E. O'Toole

COMMENTARY (ONLINE ONLY)

Commentary: Enhanced Recovery After Surgery Pathway for Single-Level Minimally Invasive Transforaminal Lumbar Interbody Fusion Decreases Length of Stay and Opioid Consumption E246

Mohamed A. Zaazoue, Eric A. Potts

RESEARCH—HUMAN—CLINICAL STUDIES

Aging Patient Population With Ruptured Aneurysms: Trend Over 28 Years 658

James Feghali, Abhishek Gami, Sarah Rapaport, Matthew T. Bender, Christopher M. Jackson, Justin M. Caplan, Cameron G. McDougall, Judy Huang, Rafael J. Tamargo

COMMENTARY (ONLINE ONLY)

Commentary: Aging Patient Population With Ruptured Aneurysms: Trend Over 28 Years E248

Ryan G. Eaton, Ciarán J. Powers

RESEARCH—HUMAN—CLINICAL STUDIES

Clinical and Imaging Characteristics of Spinal Dural Arteriovenous Fistulas and Spinal Epidural Arteriovenous Fistulas 666

Waleed Brinjikji, Elisa Colombo, Harry J. Cloft, Giuseppe Lanzino

Vitamin D—A New Perspective in Treatment of Cerebral Vasospasm 674

Sepide Kashefiolasl, Matthias S. Leisegang, Valeska Helfinger, Christoph Schürmann, Beatrice Pflüger-Müller, Voahanginirina Randriamboavonjy, Andrea E. Vasconez, Geert Carmeliet, Klaus Badenhoop, Gudrun Hintereder, Volker Seifert, Katrin Schröder, Juergen Konzalla, Ralf P. Brandes

RESEARCH—HUMAN—CLINICAL STUDIES (ONLINE ONLY)

NOW

Industry-Sponsored Research Payments in Neurosurgery—Analysis of the Open Payments Database From 2014 to 2018 E250

Aimen Vanood, Aryana Sharrak, Patrick Karabon, Daniel K. Fahim

NOW

Length of Stay Beyond Medical Readiness in a Neurosurgical Patient Population and Associated Healthcare Costs E259

Joseph R. Linzey, Rachel Foshee, Francine Moriguchi, Arjun R. Adapa, Sravanthi Koduri, Elyne N. Kahn, Craig A. Williamson, Kyle Sheehan, Venkatakrishna Rajajee, B. Gregory Thompson, Karin M. Muraszko, Aditya S. Pandey

COMMENTARY (ONLINE ONLY)

Commentary: Length of Stay Beyond Medical Readiness in a Neurosurgical Patient Population and Associated Healthcare Costs E265

Tyler Scullen, Mansour Mathkour, Aaron S. Dumont

RESEARCH—HUMAN—STUDY PROTOCOLS

A Roadmap for Developing Plasma Diagnostic and Prognostic Biomarkers of Cerebral Cavernous Angioma With Symptomatic Hemorrhage (CASH) 686

Romuald Girard, Yan Li, Agnieszka Stadnik, Robert Shenkar, Nicholas Hobson, Sharbel Romanos, Abhinav Srinath, Thomas Moore, Rhonda Lightle, Abdallah Shkoukani, Amy Akers, Timothy Carroll, Gregory A. Christoforidis, James I. Koenig, Cornelia Lee, Kristina Piedad, Steven M. Greenberg, Helen Kim, Kelly D. Flemming, Yuan Ji, Issam A. Awad

RESEARCH—LABORATORY

Tract-Specific Relationships Between Cerebrospinal Fluid Biomarkers and Periventricular White Matter in Posthemorrhagic Hydrocephalus of Prematurity 698

Diego M. Morales, Christopher D. Smyser, Rowland H. Han, Jeanette K. Kenley, Joshua S. Shimony, Tara A. Smyser, Jennifer M. Strahle, Terrie E. Inder, David D. Limbrick

COMMENTARY (ONLINE ONLY)

Commentary: Tract-Specific Relationships Between Cerebrospinal Fluid Biomarkers and Periventricular White Matter in Posthemorrhagic Hydrocephalus of Prematurity E267

Nebras M. Warsi, George M. Ibrahim

BOOK REVIEWS (ONLINE ONLY)

Book Review: C. Miller Fisher: Stroke in the 20th Century E269

Jonathan Pineda, Tarek Y. El Ahmadieh, Salah G. Aoun, Stephen Figueroa

CORRESPONDENCE (ONLINE ONLY)

Commentary: Survival Trends After Surgery for Spinal Metastatic Tumors: 20-Year Cancer Center Experience E271

Anisse N. Chaker, Abhiraj D. Bhimani, Ankit I. Mehta

Commentary: The Glioma-Network Interface: A Review of the Relationship Between Glioma Molecular Subtype and Intratumoral Function E273

Bryan D. Choi, Benjamin L. Grannan, Daniel P. Cahill, William T. Curry

Commentary: Robot-Assisted Stereotaxy Reduces Target Error: A Meta-Analysis and Meta-Regression of 6056 Trajectories E275

Konstantin V. Slavin

In Reply: Dismantling the Apocalypse Narrative: The Myth of the COVID-19 Stroke E277

Pascal Jabbour, Ahmad Sweid, Stavropoula Tjoumakaris, Waleed Brinjikji, Kimon Bekelis, Shahid M. Nimjee, Demetrius K. Lopes, Ameer E. Hassan, Aditya S. Pandey, L. Fernando Gonzalez, Ricardo A. Hanel, Adnan H. Siddiqui, David Hasan, Sean D. Lavine, Bernard R Bendok

Letter: The Withdrawal of the United States From the World Health Organization and Its Impact on Global Neurosurgery E281

Myron L Rolle, Ulrick S. Kanmounye, Jacquelyn Corley, Kee B. Park, Craig D. McClain

Letter: Deep Brain Stimulation in Epilepsy: A Role for Modulation of the Mammillothalamic Tract in Seizure Control? E283

Naci Balak

Letter: Evaluating the Role of Advanced Practice Providers in Neurosurgery E285

Majid Khan, Jonathan Harper, Joshua Curtis Hunsaker, Kristin L. Kraus, Owicho Adogwa, Debraj Mukherjee, Ashley Kang, Karin Swartz, Thomas C. Oritano, Jian Guan, Michael Karsy

Letter: Forecasting Seizure Freedom After Epilepsy Surgery Assessing Concordance Between Noninvasive and StereoEEG Findings E288

Jiong Yue, Hui Yang

In Reply: Forecasting Seizure Freedom After Epilepsy Surgery Assessing Concordance Between Noninvasive and StereoEEG Findings E290

Reinaldo Uribe-San-Martín, Roberta Di Giacomo, Roberto Mai, Francesca Gozzo, Veronica Pelliccia, Valeria Mariani, Francesco Cardinale, Ethel Ciampi, Marco Onofri, Laura Tassi

Letter: Assessing Frailty in Neurosurgical Patients: Less is not Always More. Is There Any Construct Validity Left in the Modified Frailty Index? E292

Dana Pisciă, Victor Volovici

Letter: Guidelines for the Management of Severe Traumatic Brain Injury: 2020 Update of the Decompressive Craniectomy Recommendations E294

Rob Dickerman, Julie Williamson, Ezek Mathew

In Reply: Guidelines for the Management of Severe Traumatic Brain Injury: 2020 Update of the Decompressive Craniectomy Recommendations E296

Gregory W. J. Hawryluk, Andres M. Rubiano, Jamshid Ghajar

Letter: Predicting Long-Term Outcomes After Poor-Grade Aneurysmal Subarachnoid Hemorrhage Using Decision Tree Modeling E298
Jaskaran Singh Gosal, Kuntal Kanti Das, Deepak Khatri, Kamlesh Singh Bhaisora, Sanjay Behari

In Reply: Predicting Long-Term Outcomes After Poor-Grade Aneurysmal Subarachnoid Hemorrhage Using Decision Tree Modeling E300
Bing Zhao, Jinjin Liu

Letter: Altered Motor Excitability in Patients With Diffuse Gliomas Involving Motor Eloquent Areas: The Impact of Tumor Grading E302
Alexandra Gomes dos Santos, Cintya Yukie Hayashi, Cesar Cimonari de Almeida, Wellingson Silva Paiva, Daniel Ciampi de Andrade, Ricardo Galhardoni, Andre Russowsky Brunoni, Manoel Jacobsen Teixeira, Iuri Santana Neville

In Reply: Altered Motor Excitability in Patients With Diffuse Gliomas Involving Motor Eloquent Areas: The Impact of Tumor Grading E304
José Pedro Lavrador, Ifigenia Gioti, Szymon Hoppe, Josephine Jung, Sabina Patel, Richard Gullan, Keyoumars Ashkan, Ranjeev Bhangoo, Francesco Vergani

Letter: From Bench-Press to Bedside; Should Neurosurgeons Care About Their Strength and Conditioning? E306
Marco Mancuso-Marcello, Chandrasekaran Kaliaperumal

ERRATUM/CORRIGENDUM 707

DEPARTMENTS

Calendar of Events N7
Next Month in *Neurosurgery* N8