



**Cover image:** Photograph demonstrating incision in the region of the inferolateral orbit for direct access to a cavernous sinus dural arteriovenous fistula as described in the report by Wenderoth J.

#### Editor

Felipe C. Albuquerque

#### Associate Editors

Michael Chen  
David Fiorella  
Joshua Hirsch  
Italo Linfante  
William Mack  
J Mocco

#### Associate Editor, Basic Science

Matthew Gounis

#### Assistant Editors, Social Media

Reade DeLeacy  
Andrew Ducruet  
Kyle Fargen  
Ashutosh Jadhav

#### Editor Emeritus

Robert W. Tarr

#### SNIS Executive Director

Marie Williams

#### Editorial Office

Journal of NeuroInterventional Surgery BMJ

Publishing Group Ltd

BMA House

Tavistock Square

London, WC1H 9JR, UK

T: +44 (0)20 7383 6170

E: [info.jnis@bmjgroup.com](mailto:info.jnis@bmjgroup.com)

#### Guidelines for authors and reviewers

Full instructions are available online at <http://JNIS.bmj.com/fora>. Articles must be submitted electronically <http://mc.manuscriptcentral.com/jnis>. Authors retain copyright but are required to grant JNIS an exclusive licence to publish <http://JNIS.bmj.com/fora/licence.dtl>

ISSN: 1759-8478 (print)

ISSN: 1759-8486 (online)

Twitter: @JNIS\_BMJ

**Disclaimer:** While every effort is made by the publishers and editorial board to see that no inaccurate or misleading data, opinions, or statements appear in this Journal, they wish to make it clear that the data and opinions appearing in the articles and advertisements herein are the responsibility of the contributor or advertiser concerned.

Accordingly, the publishers and the Society of NeuroInterventional Surgery, the editorial committee and their respective employees, officers and agents, accept no liability whatsoever for the consequences of any such inaccurate or misleading data, opinion or statement. While every effort is made to ensure that drug doses and other quantities are presented accurately, readers are advised that new methods and techniques involving drug usage, described within this Journal, should only be followed in conjunction with the drug manufacturer's own published literature.

**Copyright:** © 2017 Society of NeuroInterventional Surgery. All rights reserved; no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without prior permission. Journal of NeuroInterventional Surgery is published by BMJ Publishing Group Ltd, typeset by Nova Techset Private Limited, Bengaluru & Chennai, India and printed in the UK on acid free paper. Journal of NeuroInterventional Surgery (ISSN 1759-8478) is published monthly by BMJ Publishing Group and is distributed in the USA by Air Business Ltd. Periodicals postage paid at Jamaica NY 11431. POSTMASTER: send address changes to Journal of NeuroInterventional Surgery, Air Business Ltd, c/o Worldnet Shipping Inc., 156-15, 146th Avenue, 2nd Floor, Jamaica, NY 11434, USA.

## Contents

Volume 9 Issue 3 | JNIS March 2017

### Editor's column

#### 219 Incremental progress

F C Albuquerque

### Commentary

#### 220 Proposal for an improved classification system for cavernous sinus dural arteriovenous fistula (CS-DAVF)

J Wenderoth

### Ischemic stroke

#### 225 Implications of limiting mechanical thrombectomy to patients with emergent large vessel occlusion meeting top tier evidence criteria

R Bhole, N Goyal, K Nearing, A Belayev, V T Doss, L Eljovich, D A Hoit, G Tsigoulis, A V Alexandrov, A S Arthur, A W Alexandrov

#### 229 Comparison of outcome and interventional complication rate in patients with acute stroke treated with mechanical thrombectomy with and without bridging thrombolysis

R Weber, H Nordmeyer, J Hadisurya, M Heddier, M Stauder, P Stracke, K Berger, R Chapot

#### 234 Lenticulostriate infarctions after successful mechanical thrombectomy in middle cerebral artery occlusion

J F Kleine, E Beller, C Zimmer, J Kaesmacher

#### 240 ASPECTS discrepancies between CT and MR imaging: analysis and implications for triage protocols in acute ischemic stroke

F K Hui, N A Obuchowski, S John, G Toth, I Katzan, D Wisco, E Cheng-Ching, K Uchino, S-M Man, S Hussain

#### 244 Rescue mechanical thrombectomy using a retrievable stent for thromboembolic occlusion occurring during coil embolization of ruptured intracranial aneurysms

J H Ahn, H S Jun, J H Song, B M Cho, H K Lee, B-C Kim, D-K Hyun, I B Chang

#### 250 Remote aspiration thrombectomy in large vessel acute ischemic stroke

D C Haussen, M Bouslama, J A Grossberg, R G Nogueira

#### 253 Active push deployment technique improves stent/vessel-wall interaction in endovascular treatment of acute stroke with stent retrievers

M Wiesmann, M-A Brockmann, S Heringer, M Müller, A Reich, O Nikoubashman

#### 257 Experimental evaluation of stent retrievers' mechanical properties and effectiveness

P Machi, F Jourdan, D Ambard, C Reynaud, K Lobotesis, M Sanchez, A Bonafé, V Costalat

### Hemorrhagic stroke

#### 264 Clinical outcome after surgical clipping or endovascular coiling for cerebral aneurysms: a pragmatic meta-analysis of randomized and non-randomized trials with short- and long-term follow-up

A F Delgado, T Andersson, A F Delgado

#### 278 Larger size ratio associated with the rupture of very small ( $\leq 3$ mm) anterior communicating artery aneurysms

T Xu, B Lin, S Liu, X Shao, N Xia, Y Zhang, H Xu, Y Yang, M Zhong, Q Zhuge, B Zhao, W Chen

#### 283 Use of flow diverters in the treatment of unruptured saccular aneurysms of the anterior cerebral artery

P Bhogal, R M Moreno, O Ganslandt, H Bänzner, H Henkes, M A Perez

### Head and neck

#### 290 Novel approaches to access and treatment of cavernous sinus dural arteriovenous fistula (CS-DAVF): case series and review of the literature

J Wenderoth

**MORE CONTENTS ►**



This article has been chosen by the Editor to be of special interest or importance and is freely available online.



This article has been made freely available online under the BMJ Journals Open Access scheme.

See <http://JNIS.bmj.com/site/about/guidelines.xhtml#open>

C O P E

Member since 2005

This journal is a member of and subscribes to the principles of the Committee on Publication Ethics

<http://publicationethics.org/>

equator network

recycle  
When you have finished with this please recycle it

## Neuroimaging

- 297** Subjective and objective evaluation of image quality in biplane cerebral digital subtraction angiography following significant acquisition dose reduction in a clinical setting  
*A R Honarmand, A Shaibani, T Pashaei, F H Syed, M C Hurley, C L Sammet, M B Potts, B S Jahromi, S A Ansari*
- 302** Three-dimensional image fusion of CTA and angiography for real-time guidance during neurointerventional procedures  
*Q Zhang, Q Sun, Y Zhang, H Zhang, T Shan, J Han, W Pan, C Gu, R Xu*

## Basic science

- 307** Concomitant coiling reduces metalloproteinase levels in flow diverter-treated aneurysms but anti-inflammatory treatment has no effect  
*E Thielen, M McClure, A Rouchaud, Y-H Ding, D Dai, D Schroeder, J Cebal, D F Kallmes, R Kadirvel*
- 311** Flow diversion of bifurcation aneurysms is more effective when the jailed branch is occluded: an experimental study in a novel canine model  
*R Fahed, J C Gentric, I Salazkin, G Gevry, J Raymond, T E Darsaut*

## Standards

- 316** Initial hospital management of patients with emergent large vessel occlusion (ELVO): report of the standards and guidelines committee of the Society of NeuroInterventional Surgery  
*R A McTaggart, S A Ansari, M Goyal, T A Abruzzo, B Albani, A J Arthur, M J Alexander, F C Albuquerque, B Baxter, K R Bulsara, M Chen, J E D Almandoz, J F Fraser, D Frei, C D Gandhi, D V Heck, S W Hetts, M S Hussain, M Kelly, R Klucznik, S-K Lee, T Leslie-Mawzi, P M Meyers, C J Prestigiacomo, G L Pride, A Patsalides, R M Starke, P Sunenshine, P A Rasmussen, M V Jayaraman, on behalf of the Standards and Guidelines Committee of the Society of NeuroInterventional Surgery (SNIS)*

## Socioeconomics

- 324** Medicare expenditures for elderly patients undergoing surgical clipping or endovascular intervention for unruptured cerebral aneurysms  
*K Bekelis, D Gottlieb, Y Su, N Labropoulos, G Bovis, M T Lawton, T A MacKenzie*
- 330** Developing a statewide protocol to ensure patients with suspected emergent large vessel occlusion are directly triaged in the field to a comprehensive stroke center: how we did it  
*M V Jayaraman, A Iqbal, B Silver, M S Siket, C Amedee, R A McTaggart, G Paolucci, J Rhodes, J Potvin, M Tucker, N Alexander-Scott*

## Electronic pages

- e9** Spontaneous subarachnoid hemorrhage due to ruptured cavernous internal carotid artery aneurysm after medical prolactinoma treatment  
*S S Khalsa, T C Hollon, R Shastri, J D Trobe, J J Gemmete, A S Pandey*
- e10** Trigemino-cardiac reflex caused by selective angiography of the middle meningeal artery  
*T Tamura, D E Rex, M G Marosfoi, A S Puri, M J Gounis, A K Wakhloo*
- e11** The transclival artery: a variant persistent carotid-basilar arterial anastomosis not previously reported  
*J D Kirkland, B C Dahlin, W T O'Brien*
- e12** Transvenous ethanol sclerotherapy of feeding arteries for treatment of a dural arteriovenous fistula  
*M D Alexander, V Halbach, A Nicholson, F Settecase, R J Darflinger, M R Amans*