Acta Neurochirurgica
 Supplements

Editor: H.-J. Steiger
Preface

On October 9–11, 2009, the Tenth International Conference on Cerebral Vasospasm was held for the first time in Chongqing, China. Literally translated to mean “double happiness”, Chongqing was the perfect venue to host members of the community from all over the world to witness and participate in such a historic event. Just like the city’s meaning would have you to believe, the conference was a joyous time for both the Chinese neurosurgery researchers who organized this well established conference and the vasospasm researchers from other countries who were delighted to have a meeting on a tour boat called the Misty Star. For many, being on a ship was a new experience, while for others, it was a time to soak in the beauty of China. The conference catered to more than 90 researchers from various countries around the world, presenting over 90 articles ranging from clinical trials to molecular biology experiments. This was all done while enjoying a cruise down the largest river in China, the Yangtze River, and experiencing the greatness of China’s historic hydroelectric dams, the Three Gorges and the Three Little Gorges.

The meeting focused on subarachnoid hemorrhage research with topics divided into two main subcategories – early brain injury and delayed vasospasm. Since 1972 when the first conference on cerebral vasospasm took place, delayed vasospasm has been regarded as the single most important treatable cause of mortality and morbidity after subarachnoid hemorrhage. However, since the successfulness of steering patients out of vasospasm by an endothelin receptor antagonist failed to reduce mortality, more attention was placed on global cerebral injury, which was termed early brain injury. Since then, more than 20% of all published studies on subarachnoid hemorrhage in the last 3 years have been focused on early brain injury, with 45% targeting delayed vasospasm. As a result, the Tenth International Conference on Cerebral Vasospasm dedicated close to one third of all presentations to early brain injury.

The conference followed the Misty Star into the Chinese ghost city of Fengdu, which is located high atop a beautiful hill. Meeting attendees were able to take a gondola ride and dashed into the “Gates of Hell”. Chinese people worship and respect the notion of death and for this reason, many believe that is why they built the “Gates of Hell” on a beautiful hill – like Heaven on Earth. This seems to be a coincident with the research on subarachnoid hemorrhage; it was believed over 50 years ago that delayed vasospasm was the major cause of death in victims. Nevertheless, the failure of Clazosentan to reduce mortality led researchers to shy away from the theory of delayed cerebral vasospasm, and transformed subarachnoid hemorrhage research into the birth of early brain injury.

Towards the end of the conference, the Misty Star led the meeting participants to a vast clearing of water, before the greatest dam on earth, the Three Gorges Dam appeared before them. Crossing the greatest dam during the evening provided a magnificent view for the participants and set the mood for the researchers.

In closing, it is with great pleasure that we would like to present the Volume Two entitled “Clinical Management” a collection of 43 chapters showcasing the magnificent works
conducted by the conference participants. These chapters include studies on early brain injury, the pathophysiology of delayed cerebral vasospasm, the clinical manifestations of subarachnoid hemorrhage, and the latest strategies on treatments. Additionally, we are delighted to present two historic review articles conducted by our honored guest, Dr. Nicolas Dorsch and our distinguished keynote speaker, Dr. Ryszard Pluta. These chapters also include bench investigations conducted by researchers and scientists from all across Asia, North America, and European countries highlighting the achievements in subarachnoid hemorrhage since the Ninth International Conference on Cerebral Vasospasm in Istanbul, Turkey almost 3 years ago.

And finally, to our dear participating colleagues, we would like to thank YOU especially for your participation and support of the Tenth International Conference on Cerebral Vasospasm. We look forward to seeing you in Cincinnati, OH, USA at the 11th Conference in 2011.

Chongping, People’s Republic of China
Shanghai, People’s Republic of China
Loma Linda, CA, USA

Hua Feng
Ying Mao
John H. Zhang
Acknowledgement

International Organization Committee
Hua Feng (Chairman), Chogngqing
Jian-Min Liu (Co-Chairman), Shanghia
Talat Kırı, Istanbul
Shigeru Nishizawa, Kitakyushu
Ryszard Pluta, Bethesda
Volker Seifert, Frankfurt
John Zhang (Secretary), Loma Linda
Gang Zhu, Chogngqing

International Scientific Committee
Austin R.T. Colohan, Loma Linda
Jens Dreier, Berlin
Nick Dorsch, Sydney
Hua Feng, Chogngqing
Satoshi Iwabuchi, Tokyo
Carla Jung, Heidelberg
Kenji Kanamaru, Suzuka
Hideyoshi Kasuya, Tokyo
Chunjin Kim, Chonbu
Kevin S. Lee, Charlottesvile
Jianmin Liu, Shanghia
Ying Mao, Shanghai
Shigeru Nishizawa, Kitakyushu
Hiroki Ohkuma, Hirosaki
Ryszard M. Pluta, Bethesda
Wai Poon, Hong Kong
Gustavo Pradilla, Johns Hopkins
Jacob Hansen-Schwartz, Glostrup
Fatima Sehba, New York
Volker Seifert, Frankfurt
Wei Shi, Xian
Hans-Jakob Steiger, Dusseldorf
Xiaochuan Sun, Chongqing
Claudius Thome, Heidelberg
Hartmut Vatter, Frankfort
George Wellman, Vermont
Changman Zhou, Beijing
John Zhang, Loma Linda
Mario Zuccarello, Cincinnati
Contents

Part III: Therapeutical Studies

Section VII: Experimental Treatment for Cerebral Vasospasm

The Role of Apolipoprotein E in the Pathological Events Following Subarachnoid Hemorrhage: A Review ....................................................... 5
Guo, Z.-d., Sun, X.-c., and Zhang, J.H.

Mechanisms of Statin Treatment in Cerebral Vasospasm ......................... 9
Sugawara, T., Ayer, R., Jadhav, V., Chen, W., Tsubokawa, T., and Zhang, J.H.

The Effect of Phosphodiesterase Inhibitor Tadalafil on Vasospasm Following Subarachnoid Hemorrhage in an Experimental Rabbit Model ............... 13
Narin, F., Bilginer, B., Isikay, A.I., Onal, M.B., Soylemezoglu, F., and Akalan, N.

Effect of a Free Radical Scavenger, Edaravone, on Free Radical Reactions: Related Signal Transduction and Cerebral Vasospasm in the Rabbit Subarachnoid Hemorrhage Model ............................................. 17
Munakata, A., Ohkuma, H., and Shimamura, N.

Comparison of Nimodipine Delivery Routes in Cerebral Vasospasm
After Subarachnoid Hemorrhage: An Experimental Study in Rabbits .......... 23

Effect of Recombinant Osteopontin on Cerebral Vasospasm After Subarachnoid Hemorrhage in Rats ......................................................... 29
Suzuki, H., Hasegawa, Y., Kanamaru, K., and Zhang, J.H.

The Effect of Intracisternal Zn (II) Protoporphyrin IX on Vasospasm Process in the Experimental Subarachnoid Hemorrhage Model ................. 33
Isikay, I., Bilginer, B., Narin, F., Soylemezoglu, F., and Akalan, N.

Temporal Profile of the Effects of Intracisternal Injection of Magnesium Sulfate Solution on Vasodilation of Spastic Cerebral Arteries in the Canine SAH Model ................................................................. 39
Mori, K., Miyazaki, M., Hara, Y., Aiko, Y., Yamamoto, T., Nakao, Y., and Esaki, T.
Comparison of Intrathecal Cilostazol and Nimodipine Treatments in Subarachnoid Hemorrhage: An Experimental Study in Rabbits

Onal, M.B., Bilginer, B., Narin, F., Ziyal, M.I., Soylemezoglu, F., and Ozgen, T.

Blocking Cerebral Lymphatic Drainage Deteriorates Cerebral Oxidative Injury in Rats with Subarachnoid Hemorrhage

Sun, B.-l., Xie, F.-m., Yang, M.-f., Cao, M.-z., Yuan, H., Wang, H.-t., Wang, J.-r., and Jia, L.

Comparison of Intrathecal Dotarizine and Nimodipine Treatments in Cerebral Vasospasm After Subarachnoid Hemorrhage: An Experimental Study in Rabbits


Changes of Blood–Brain Barrier Permeability Following Intracerebral Hemorrhage and the Therapeutic Effect of Minocycline in Rats


Comparison of Intrathecal Flunarizine and Nimodipine Treatments in Cerebral Vasospasm After Experimental Subarachnoid Hemorrhage in Rabbits

Civelek, E., Solmaz, I., Onal, M.B., Kircelli, A., Temiz, C., Seer, H.I., Izi, Y., and Gonul, E.

Treatment with Ginsenoside Rb1, A Component of Panax Ginseng, Provides Neuroprotection in Rats Subjected to Subarachnoid Hemorrhage-Induced Brain Injury

Li, Y., Tang, J., Khatibi, N.H., Zhu, M., Chen, D., Tu, L., Chen, L., and Wang, S.

The Effects of Intrathecal Nicergoline and Nimodipine in Cerebral Vasospasm: An Experimental Study in Rabbits

Solmaz, I., Onal, M.B., Civelek, E., Kircelli, A., Ongoru, O., Ugurel, S., Erdogan, E., and Gonul, E.

Metabolic Reflow as a Therapy for Ischemic Brain Injury


Section VIII: Surgical & Endovascular Treatment for Cerebral Vasospasm

The Influence of Cisternal and Ventricular Lavage on Cerebral Vasospasm in Patients Suffering from Subarachnoid Hemorrhage: Analysis of Effectiveness

Hänggi, D. and Steiger, H.-J.

Dural Arteriovenous Fistulae at the Craniocervical Junction: The Relation Between Clinical Symptom and Pattern of Venous Drainage

Chen, G., Wang, Q., Tian, Y., Gu, Y., Xu, B., Leng, B., and Song, D.
Surgical Procedure and Results of Cisternal Washing Therapy for the Prevention of Cerebral Vasospasm Following SAH ......................... 105
Nakagomi, T., Furuya, K., Nagashima, H., Tanaka, J.-i.,
Ishii, T., Takanashi, S., Shinohara, T., Watanabe, F.,
Ogawa, A., Fujii, N., and Tamura, A.

Objective Evaluation of the Treatment Methods of Intracranial Aneurysm Surgery .............................................................. 111
Xu, R., Zhu, J., Sun, X.-c., He, Z.-h., and Zhang, X.-d.

Recurrent Vasospasm After Endovascular Treatment in Subarachnoid Hemorrhage ................................................................. 117
Frontera, J.A., Gowda, A., Grilo, C., Gordon, E., Johnson, D.,
Winn, H.R., Bederson, J.B., and Patel, A.

Endovascular Embolization for Intracranial Aneurysms: Report of 162 Cases ...... 123
Tang, W., Feng, H., Chen, Z., Miu, H., Pan, J., Lin, J., and Zhu, G.

Treatment of Post-hemorrhagic Cerebral Vasospasm:
Role of Endovascular Therapy ................................................... 127
Grande, A., Nichols, C., Khan, U., Pyne-Geithman, G.,
Abruzzo, T., Ringer, A., and Zuccarello, M.

Delayed Intracranial Hemorrhage Associated with Antiplatelet Therapy in Stent-Assisted Coil Embolized Cerebral Aneurysms ...................... 133

Microsurgical Treatment of Ruptured Intracranial Aneurysm:
A 120-Case Analysis .............................................................. 141
Tang, W., Feng, H., Chen, Z., Miu, H., Pan, J., Lin, J., and Zhu, G.

Section IX: Clinical Management of Subarachnoid Hemorrhage

Clazosentan: Prevention of Cerebral Vasospasm and the Potential to Overcome Infarction ..................................................... 147
Beck, J. and Raabe, A.

Current Management of Subarachnoid Hemorrhage in Advanced Age .............. 151
Shimamura, N., Munakata, A., and Ohkuma, H.

A Numerical Approach to Patient-Specific Cerebral Vasospasm Research .......... 157
Ho, H., Zhang, C., Xie, X., and Hunter, P.

Evidenced Based Guidelines for the Management of Good Grade Subarachnoid Haemorrhage Patients in Leeds, UK ....................... 161
Quinn, A.C., Hall, G., Marsh, S., Clark, M., and Ross, S.

Clinical Trial of Nicardipine Prolonged-Release Implants for Preventing Cerebral Vasospasm: Multicenter Cooperative Study in Tokyo .......... 165
Kasuya, H.

Intravenous Magnesium Sulfate After Aneurysmal Subarachnoid Hemorrhage: Current Status ....................................................... 169
Chu Wong, G.K., Vai Chan, M.T., Gin, T., and Poon, W.S.
Predictors Analysis of Symptomatic Cerebral Vasospasm
After Subarachnoid Hemorrhage ................................................ 175
Yin, L., Ma, C.Y., Li, Z.K., Wang, D.D., and Bai, C.M.

Intra-arterial Administration of Fasudil Hydrochloride for
Vasospasm Following Subarachnoid Haemorrhage: Experience of 90 Cases .... 179
Iwabuchi, S., Yokouchi, T., Hayashi, M., Sato, K., Saito, N., Hirata, Y.,
Harashina, J., Nakayama, H., Akahata, M., Ito, K., Kimura, H., and Aoki, K.

Role of Controlled Lumbar CSF Drainage for ICP Control in Aneurysmal SAH ...... 183
Murad, A., Ghostine, S., and Colohan, A.R.T.

Chronic Hydrocephalus After Aneurysmal Subarachnoid Space Hemorrhage ...... 189

Statins in the Management of Aneurysmal Subarachnoid Hemorrhage:
An Overview of Animal Research, Observational Studies, Randomized Controlled Trials and Meta-analyses ............................................ 193
Kramer, A.H.

New Modalities to Assess Efficacy of Triple-H Therapy: Early Experience .... 203
Bhargava, D., Al-Tamimi, Y., Quinn, A., and Ross, S.

Nicardipine Pellets for the Prevention of Cerebral Vasospasm ..................... 209
Thomè, C., Seiz, M., Schubert, G.A., Barth, M., Vajkoczy, P.,
Kasuya, H., and Schmiedek, P.

Part IV: Imaging Studies

Section X: Neural Imaging for Subarachnoid Hemorrhage

Neuromonitoring in Intensive Care: A New Brain Tissue Probe for
Combined Monitoring of Intracranial Pressure (ICP) Cerebral Blood Flow (CBF) and Oxygenation ....................................................... 217
Keller, E., Froehlich, J., Muroi, C., Sikorski, C., and Muser, M.

Vasospasm After Subarachnoid Hemorrhage: A 3D Rotational Angiography Study . 221
Yao, G.-E., Li, Q., Jiang, X.-J., Liu, J., Li, J.-L.,
Zhang, L.-L., Li, L.-L., Zhang, J., and Xie, P.

Value of Noninvasive Imaging in Follow-Up of Intracranial Aneurysm ............... 227

Neuroimaging Research on Cerebrovascular Spasm and Its Current Progress ....... 233
Chen, F., Wang, X., and Wu, B.

Detection and Characterization of Intracranial Aneurysms
with Dual-Energy Subtraction CTA: Comparison with DSA .......................... 239
Lv, F., Li, Q., Liao, J., Luo, T., Shen, Y., Li, J., Zhang, J., and Xie, P.

Author Index ................................................................. 247

Subject Index ............................................................... 251

Table of Contents (Vols. 1 and 2) ................................................. 257