



МАТЕРИАЛЫ МЕЖДУНАРОДНОГО НЕЙРОХИРУРГИЧЕСКОГО ФОРУМА

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THE VALUE OF INTRAOPERATIVE NEUROPHYSIOLOGY IN SPINAL PEDIATRIC NEUROSURGERY

Objective: Precise intraoperative neurophysiological assessment and knowledge of the functional integrity of the nervous system takes a pivotal role in many neurosurgical procedures in the pediatric population.

Materials and Methods: Intraoperative neurophysiology consists of methods of monitoring of the functional integrity of the nervous system as well as mapping of neurogenic tissue verified via conducted response to electrical stimulation. The methods of intraoperative neurophysiology applied in resection of spinal cord tumors in the intradural and extradural compartment, in the surgical release of tethered spinal cord, treatment of spasticity via selective dorsal rhizotomy, and in the endovascular treatment of pediatric spinal cord angiomas.

Results: Our experience supports the view that IOM considered a standard of care in pediatric spinal

tumor surgery, surgery for tethered cord syndrome, and interventional endovascular procedures. In the treatment of Chiari-Malformation, the application of IOM is an option.

Conclusion: Different from other applications of neurophysiology, intraoperative Neurophysiology has become a therapeutic tool in neurosurgery and it is one of the strongest neuroprotective procedures in the operating theater. In spinal surgery intraoperative neurophysiology is not only used for documentation of loss of functional integrity but for improvement of neurological outcome and prevention of acute loss of sensorimotor control, control of bladder and bowel function, and paraparesis. Surveillance of the pathways of voluntary motor control can be feasibly applied during surgery of the pediatric population.

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OUR EXPERIENCE IN THE MANAGEMENT OF TRIGEMINAL NEURALGIA BY RADIOFREQUENCY THERMOCOAGULATION

Objective: To retrospectively analyze long-term outcomes for trigeminal neuralgia using radiofrequency thermocoagulation achieved at our neurosurgical centre.

Materials and methods: 28 patients with Trigeminal neuralgia (TN) treated by Radiofrequency thermocoagulation at our neurosurgical centre were followed up between 2016 and 2017. Amongst them 4 were men and 24 women, with mean age of 56. The most affected trigeminal branches were the maxillary (42,85%) and mandibular branches (32,14%), both branches (21,42%), ophthalmic branches with mandibular branches (3,6%). Right side (53,6%), left side (46,4%). We divided patients into 3 groups by time: A < 3 months (6 patients), B 3-6 months (10 patients), C > 6 months (12 patients). We use the visual analogue scale.

Results: Pain-free rates without medication group A were 84%, group B 90%, group C 66,7%. New or

worsening facial numbness was reported in % (A – 37,5%, B – 36%, C – 27%). No anesthesia dolorosa was reported. By facial sensitivity: moderate numbness in 15 patients (53,57%), expressive numbness in 3 patients (10,7%), complete numbness in 4 patients (14,3%), sensitivity restored in 6 patients (21,4%).

Conclusion: Our studies with follow-up will be needed to compare radiofrequency thermocoagulation and medical therapy directly with one another and determine the optimal timing for surgical intervention. The newer, methods treatment of neuropathic pain need thorough investigation for treatment efficacy in TN. Emphasis should be placed on the importance of quality of life issues as an important outcome measure, as this is the core feature patients will measure treatment success on.



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FIRST EXPERIENCE OF THE SURGICAL TREATMENT OF THE PATIENTS WITH CEREBRAL PALSY IN THE REPUBLIC OF KAZAKHSTAN

Objective: To present the first experience of the surgical treatment of the patients with cerebral palsy (CP) in the Republic of Kazakhstan (RK).

Materials and methods: The frequency of CP in RK on average is 2.0-5.9 per 1000 births. 10000 from 44,000 registered children with disabilities were diagnosed with CP. Approximately 50-70% are patients with spastic forms. We present 4 cases of CP treated surgically. There are 4 males, 7-10 years old (average 8.5 years). According to the Ashworth Scale, the spasticity level in one patient is 2, the other two have 3, and the last one – 5 points. All children were mentally preserved. The presenting symptoms were spasticity, hyperreflexia with extended zones, delay in the development of motor functions, poor coordination, balance and/or ability to walk. Given the presence of spastic paraplegia in patients, the ineffectiveness of the previous therapy,

we decided to perform SDR. The surgeries performed in accordance with standard principles.

Results: In the early postoperative period, we observed a decrease in the pathological muscle tone, gait improvement, a significant increase in the volume of passive and active movements. The postoperative thorough rehabilitation contributed to a significant improvement in the quality of children's life. The 2-year follow-up shows no recurrence of preoperative spasticity.

Conclusions: These cases show that despite the destructive nature of the operation, the postoperative effect is significant, which contributes to the improvement of the quality of the children's life and makes it much easier to take care for them.

Keywords: Cerebral Palcy, Selective dorsal rhizotomy, Central Asia, Kazakhstan

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INTERNATIONAL INFANT HYDROCEPHALUS STUDY (IIHS): 5 YEAR HEALTH OUTCOME RESULTS OF A PROSPECTIVE, MULTICENTRE COMPARISON OF ENDOSCOPIC THIRD VENTRICULOSTOMY (ETV) AND SHUNT FOR INFANT HYDROCEPHALUS

Introduction: One of the most important unanswered questions in pediatric hydrocephalus is determining whether treatment with endoscopic third ventriculostomy (ETV) versus shunt results in improved health status and quality of life (QOL). To answer this, the International Infant Hydrocephalus Study (IIHS) was started in 2005 as a prospective, multicentre study to compare ETV and shunt in infants (<24 months old) with symptomatic triventricular hydrocephalus from aqueductal stenosis. Herein, we present the 5 year primary outcome results.

Methods: IIHS utilized a prospective comprehensive cohort design, in which patients received ETV or shunt, based on either randomization or parental preference. For this analysis, we pooled the randomized arm and the parental preference arm, analyzing them together. At 5 years of age, children were assessed with the Health Utilities Index Mark 2 (HUI-2) (primary outcome) and the Hydrocephalus Outcome Questionnaire (HOQ), a measure of QOL. Results were compared in an analysis of covariance, adjusting for baseline variables including

age at surgery and baseline development status. The trial was registered at clinicaltrials.gov (NCT00652470).

Results: From a total of 158 patients who met eligibility criteria, complete 5 year outcomes were available on 78 (19 treated initially with shunt, 61 treated initially with ETV), assessed at a mean age of 62.1 months (SD 6.3). The mean 5 year HUI-2 utility score was 0.90 (SD 0.19) for ETV and 0.94 (SD 0.10) for shunt ($p=0.21$). The mean 5 year HOQ Overall score was 0.81 (SD 0.15) for ETV and 0.85 (SD 0.12) for shunt ($p=0.42$). Similarly, there were no significant differences noted between 5 year HOQ subscores (Cognitive, Social-Emotional, Physical) or developmental measures at 1, 2, and 3 years.

Conclusions: This is the first prospective direct comparison of long-term outcomes of ETV and shunt for infant hydrocephalus. These results suggest that overall health status and quality of life in this cohort of infants treated for aqueductal stenosis is high, with no significant difference between those treated initially with ETV or shunt.

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STUDY OF 65 CASES SUFFERING OF CERVICAL RADICULOPATHY OR MYELOPATHY, SURGICALLY TREATED WITH ANTERIOR CERVICAL DISCECTOMY AND FUSION OF POSTERIOR LAMINECTOMY. A SIX YEARS RETROSPECTIVE SINGLE CLINIC STUDY

Objective: Analysis of the basic characteristics and primary outcome of the patients that suffered of clinical symptomatic degenerative cervical disk disease and underwent surgery between 2012-2016 in our clinic.

Material and methods: Our study includes 65 patients in total. Amongst them 29 were men and 36 women. 37 patients presented with radiculopathy and 28 with myelopathy. 58 patients underwent anterior cervical discectomy and fusion and 7 patients underwent posterior cervical laminectomy. Post op follow-up was 6 months.

Results: Most of radiculopathy suffering patients reported immediate post-operative pain relief. Some patients mentioned intermittent episodes of neck and radicular pain, in the majority of cases self-limited. In cases of myelopathy, the majority experienced improvement in walking, pain and sphincter control, with some of

them complaining of persistent symptomatology. There was no infection among cohort. There was one patient reoperated due to hematoma, five patients had previous surgery in another level or needed additional posterior approach and three patients had evidence of fusion failure that needed follow-up but no reoperation.

Conclusion: Anterior cervical discectomy and fusion is the approach of choice in cases of cervical radiculopathy and myelopathy, with promising results for the patients. In cases especially of myelopathy, persistent symptoms may be present long term after surgery but for the majority there is enough improvement for patients to be satisfied. It is important to precisely inform patients for the aim, complication and expected results of surgical treatment of cervical degeneration disease.

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RESULTS OF THE SURGICAL TREATMENT OF THE PATIENTS WITH INTRAMEDULLARY SPINAL CORD TUMORS

Objective: To present the results of IMSCT's (Intramedullary Spinal Cord Tumor) surgery at the National Centre for Neurosurgery.

Materials and methods: A 102 patients operated from July 2008 to December 2017. Among them, 7 cases of a continued growth, 1 – recurrence. The mean age was 41 (ranged 16-67y.o), 49 were men and 45 women. Routine MRI examination, McCormick (McC) and Klekamp-Samii (KS) scale assessment was performed pre and postoperatively. Preoperative functional status was good in 37% of patients, in 63% was poor. The follow up was from 3 months to 9 years (mean 4.6 years).

Results: The improvement achieved in 66 (64.7%) with complete recovery in 8 patients (12%), no changes – 21 (20.5%), deterioration – 15 (14.7%). One patient had complete neurological recovery in a late

post-op period. Neurological worsening was due to recurrence, continued growth and histology. In 10 cases we experienced mortality, 1 due to pulmonary artery thrombosis, 3 – continued tumor growth, 2 – concomitant disease, 4 with G = III and G = IV tumors (after combined treatment). There is a direct correlation between the preoperative neurological status and the expected postoperative outcome ($p > 0.05$).

Conclusion: Along with the total resection of tumor and histological structure, the preoperative neurological status is one of the main determining factors of the expected result.

Keywords: spinal cord, intramedullary tumors (IMSCT), McCormick (McC) and Klekamp-Samii (KS), ependymomas, astrocytomas.



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ACCURACY OF SCREW PLACEMENT AND CLINICAL OUTCOMES FOLLOWING O-ARM-NAVIGATION

1. Occipital-cervical fusion

Objective: This study aimed to evaluate the accuracy of screw placement and clinical outcomes in occipital-cervical fusion patients.

Materials and Methods: Patients who underwent occipital-cervical fusion with O-arm-based navigation retrospectively reviewed between January 2015 and December 2017. Patients' characteristics, clinical and radiographic outcomes, and surgical complications were recorded and analyzed. Cervical screw insertion accuracy was evaluated using the Richter scale.

Results: Thirty consecutive patients (11 male and 19 female) with an average treatment age of 40.03 ± 15.19 years were studied. The most common etiology was atlantoaxial dislocation combined with Chiari malformation (63.33%). Weakness (76.67%) and paresthesia (70.00%) were the most common symptoms. Eight-six occipital and 139 cervical screws were placed using O-arm-assisted navigation system. In total, 130 (93.53%) cervical screws were graded as Group A, while 9 (6.47%) as Group B. The optimal accuracy rate was 88.41% (61 of 69 screws) in the first 15 patients but was 98.57% (69 of 70 screws) in the subsequent 15 patients. The mean follow-up was 7.50 ± 5.70 months. The mean JOA score was 13.30 ± 2.41 preoperatively and 15.30 ± 1.60 at final follow-up ($p < 0.001$) and the mean recovery rate was $53.26 \pm 33.82\%$. Clinical improvement was seen in 25 patients (83.33%), while no change was observed in 5 patients (16.67%). The overall complication rate was 6.67% (2/30) with one intraoperatively vertebral artery injury and one postoperatively screw loosening.

Conclusion: Occipital-cervical fusion with O-arm-based navigation is effective and safe for treating instability of craniovertebral junction. Intraoperative navigation can help surgeons insert screws accurately.

Keywords: accuracy, clinical outcome, navigation, O-arm, occipital-cervical fusion

2. Thoracic and Lumbosacral Spinal Fusion

Objective: The accuracy and safety of pedicle screw insertion markedly improved with the introduction of intraoperative three-dimensional navigation system during the last decade. This study aimed to evaluate the accuracy of pedicle screw placement using O-arm-based navigation system versus conventional freehand technique.

Materials and Methods: We reviewed the accuracy of 341 thoracic ($n=173$) and lumbosacral ($n=168$) pedicle screws placed in 60 consecutive patients using either O-arm-based navigation or freehand technique between May 2015 and April 2018. Patient-specific characteristics, treatment-related characteristics, and screw-specific accuracy were analyzed. The accuracy of pedicle screw placement was measured by Gertzbein-Robbins scale and screws grade A and B were clinically acceptable.

Results 191 screws were inserted in the O-arm-based navigation group and 150 in the freehand group. 183 (95.81%) clinically acceptable screws were placed in the navigation group and 135 (90.00%) in the freehand group. The difference was statistically significant ($p=0.034$). Twenty-four (12.57%) screws in the navigation group and 24 (16.00%) in the freehand group violated the cortex ($p > 0.05$). Medial screw deviation was the most common problem in the two groups. Based on confirmatory intraoperative O-arm scans, 23 (6.74%) screw revisions were performed in the two groups (8 screws in the navigation group and 15 screws in the freehand group).

Conclusion The O-arm-based navigation exhibits higher accuracy for pedicle screw insertion than the freehand insertion technique.

Keywords: accuracy; freehand; navigation; O-arm; pedicle screw; spine

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RADIOFREQUENCY ABLATION IN THE TREATMENT OF CHRONIC LOW BACK PAIN SYNDROMES (SACROILIAC JOINT AND FACET SYNDROME)

Introduction. Management of patients with low back pain remains an urgent problem of modern medicine. The purpose of this study is comparison the results of targeted therapy with the use of hormone therapy and radiofrequency ablation under ultrasound or fluoroscopic guidance, assessment of the quality of life of patients with chronic pain syndromes in the pre- and postoperative period.

Methods. This study was conducted at National Research Neurosurgery Center (Astana Kazakhstan) and Spine Clinic, Almaty, Kazakhstan. 44 patients with chronic pain syndromes (syndrome of the sacroiliac joint and facet syndrome) were enrolled in the study. The patients were divided into two groups (group A and group B). The group A received targeted therapy under the guidance of ultrasound or fluoroscopic using hormone therapy (hydrocortisone, kenalog, diprosan)

as periarticular blocks of the vertebral joints and intra-articular drug administration intracapsularly with SIJ syndrome (sacroiliac joint).

Results. We did not observe any complications during the procedure and in the early and late postoperative periods. After radiofrequency ablation for 2-3 days in 50% of cases, patients noted a feeling of severity in the conflict area against a significant regression of the intensity of the pain syndrome. According to the visual analogue scale of the pain assessment, the pain intensity before the operation was 7.8 ± 1.4 points, whereas in the postoperative period the pain syndrome decreased to 2.3 ± 1.0 points.

Conclusion. The advantages of minimally invasive methods of treatment of chronic pain syndromes are high effectiveness and safety.

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EXPERIENCE IN THE USE OF MINI-INVASIVE OPERATIONS IN SPINE SURGERY

Objective: The purpose of our study is to show the safety and effectiveness of this technique in the conditions of our clinic.

Material and methods: Between 2016 and 2018, minimal invasive surgery (MIS) was performed in 60 patients with degenerative diseases of the lumbar spine. All patients showed signs of instability of the affected segments of the spine. A discectomy is performed in the minimally invasive way. For inter body fusion, standard cages were used. The operation is completed with percutaneous pedicle screw fixation (Sextant).

Results: Single-level fixation of the spine was used. On average, the surgery lasted from one and a half to two hours. Segments L3-L4 – 3 cases, L4-L5 – 56 cases,

L5-S1 – 1 case. Type of cages: 9 patient – standard TLIF, 51 patient – bullet-type PLIF. In the postoperative period, 52 patients marked a significant reduction in pain immediately after the operation, 8 patients noted pain reduction within 3-4 days. Immediately after the operation CT was performed. We did not encounter any clinically significant complications.

Conclusion: MIS with percutaneous pedicle screw fixation is a safe and clinically effective procedure for fusions of the lumbar spine. The use of these technologies has made it possible to shorten the length of stay in the hospital, shorten the duration of rehabilitation and this situation will lead to a reduction in the financial costs for this group of patients.



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METHOD OF SEGMENTAL STABILIZATION OF THE CERVICAL SPINE WITH A PLATE WITH BLOCKING SCREWS

Objective: to improve the stabilization of the cervical spine with disc hernias and injuries.

Materials and methods: This method and devices used in spinal neurosurgery, namely, with degenerative diseases and injuries of the cervical spine. 10 cases were operated, including: four with hernias and six with a trauma of a cervical department of a backbone. The device consists of: a metal plate with holes – with a thread to lock the screw, a screw of different lengths. The metal plate fixed on the front surface of the cervical spine with threaded screws in the vertebral body, at the level of CIII to CVII-ThI. The use of this device makes it possible to reliably fix the fractures of the cervical spine,

also fix the established «Kages» in hernias of cervical discs. This fixation modulated from plates produced in Poland (used in traumatology to fix tubular bones).

Results: This useful model (PM) has its advantages: Easily modulated intraoperatively for the size of the vertebral bodies, the plate fixed with screws with a locking thread that does not allow the screw to «untwist».

Conclusions. The method of intraoperative fixation with a modified plate with screws, this method differs in that the plate modeled intraoperatively according to the size of the vertebral bodies and fixed with screws with a locking thread.

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TREATMENT STRATEGY OF SPINAL INTRAMEDULLARY GLIOMAS-ADVANCES AND NEW INSIGHTS

Objective. Spinal intramedullary glioma was rare with poor outcome. The aim of this study was trying to explore the best treatment strategy of intramedullary glioma to improve the quality of life of patients.

Materials and methods. The authors retrospectively summarized 25-years treatment experiences of intramedullary glioma, and reviewed 175 cases confirmed by pathological diagnosis in the last ten years. We proposed and a system of precision surgery of spinal intramedullary glioma including series of techniques. Under the guidance of this system, patients were treated in the latest 2 years.

Results. By Kaplan-Meier survival analysis, we found duration of symptoms, preoperative McCormick scores, degree of tumor resection, pathological grades, postoperative McCormick scores and short-term efficacy are prognostic risk factors. Treatments of spinal intramedullary glioma including MDT, precision surgery

of spine and enhanced recovery after surgery (ERAS-Spine) are closely related with the quality of life.

Conclusions. Today, Surgery still is the most important and effective treatment of spinal intramedullary glioma, the effects of adjuvant Therapy (RT,Chemotherapy) was limited. The quality of life is the highest priority and should guide clinical decisions, including multidisciplinary team. Standard and precision surgery of spine which is the key to minimize surgical morbidity, and ERAS-Spine are deeply related with outcomes ,especially, the quality of life of all patients and survival time of low-grade spinal gliomas. Although still has a long way in clinics, personalized biotherapy is one of the most potential future directions of spinal glioma treatment.

Keywords. Spinal intramedullary glioma, Precision spine surgery, Prognosis, Advances

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MINIMALLY INVASIVE PUNCTURE WITH USE THROMBOLYTIC EVACUATION OF SPONTANEOUS INTRACEREBRAL HEMORRHAGE

Objective: Investigate safety and efficacy of minimally invasive surgery (MIS) with alteplase in patients with intracerebral haemorrhage (ICH).

Materials and Methods: 8 patients with spontaneous ICH in basal ganglia were treated during 4 month. Criteria: Spontaneous ICH in the basal ganglia, HV \geq 30mL; GCS score \geq 7; age: 18–80. All cases had IVH, mean HV 58mL (30 – 150mL) and SBP 185 mmHg.

Pre-operative GCS (score): 13 – 2 patient, 8 – 1 patient, 13-3 patient, 8-2 patient.

ICH score: 5 patient had 72% mortality risk, 3 patient – 26% . Surgery performed < 24 hours after bleed, employed EVD, then drain catheter to active drain system. CT control after 12 hours. If CT negative for new

hemorrhage administer 2mg intrathecal alteplase in 3-10ml NaCl 0.9 %. Close system for 1 hour. Following day control CT, then repeat procedure if clot > 30mL. Continue until hematoma < 30mL.

Results: Modified Rankin scale at 60 days showed 5 patients had 5 score, 2 patient – 4 score and 1 patient – 3 score. After treatment clot was reduced in all patients. Post-operative complications not reduced.

Conclusion: This treatment at high rates of ICH score mortality over 60 days is low. Predictors of favorable outcome are youth and smaller hematoma. Use of EVD with alteplase allows drainage of hematoma regardless of depth.

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SURGICAL TREATMENT OF HEMORRHAGIC STROKE

Objective: The purpose of the study is to collect information on the epidemiology of this disease, the methods of surgical treatment of patients with acute cerebrovascular accident.

Materials and methods: The average surgical activity for hemorrhagic stroke is 17%. However, there are no convincing advantages of surgical treatment of hemorrhagic stroke compared to conservative stroke. The postoperative mortality rate is on average not less than 20%. Since the beginning of 2017, 73 patients with cerebrovascular stroke have undergone surgery. 55% of patients were between the ages of 50 and 70 years. Among the operated patients: men – 46 (63%), women – 27 (37%). Localization of stroke hematomas was dominated by putamenal – 57%, subcortical – 23% and mixed -12%.

Results: 9 operated patients who are in a coma with a dislocation syndrome before surgery – died. The cause of death was repeated cerebral hemorrhage. Postoperative mortality was 23%. When choosing the tactics for the treatment of hemorrhagic stroke, preference was given to the gentle puncture drainage of the hematoma cavity after the decompression craniotomy with additional dural plasty on the side of the hematoma with the use of frameless neuronavigation.

Conclusion: To improve the provision of medical care to patients with non-traumatic brain hemorrhages, training is needed on the basis of Stroke centers and neurovascular departments of the Republican centers (neurosurgeons, resuscitators, anesthesiologists and rehabilitation specialists).



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ORGANIZATION AND CONDITION OF THE KAZAKHSTANS' STROKE SERVICE, RESULTS OF 2017

Objective: Analysis of two-year work indicators of stroke system.

Materials and Methods: RCSP developed special forms with indicators of stroke system, forms sent to official head specialists of 16 region (neurologists, neurosurgeons) to fill in on a monthly basis during 2 years. All forms collected and analyzed by RCSP specialists. The analysis of two-year work demonstrated qualitative positive results with achievement of five indicators out of six.

Results:

- The stroke centers' facility improved by 30%;
- Stroke centers number increased from 36 to 49 by 2017, growth by 36% in two years.
- Intravenous thrombolytic therapy national average percentage increased from 1.3% to 2.2%.

- There were about 900 endovascular operations in 2016, by 2017 around 1100 were performed. Endovascular treatment increased by 23%.
- The 30-day mortality rate within 1 month decreased in 2017 from 7.1 to 5.6.

Discussion: Aforementioned improvements on indicators were possible by tight collaboration with practical practitioners per se and by round tables organization. RCSP became a trusted platform where medical professionals can directly communicate with representatives from the Ministry of Health to make mutual policy decision. In the future, RCSP will have more data to assess health impact on the patients with stroke and analyze quality of life influenced by these improvements.

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РЕЗУЛЬТАТЫ ЛЕЧЕНИЯ ОСТРОГО НАРУШЕНИЯ МОЗГОВОГО КРОВООБРАЩЕНИЯ ПО ГЕМОРАГИЧЕСКОМУ ТИПУ В АЛМАТЫ (КАЗАХСТАН). СРАВНИТЕЛЬНЫЙ АНАЛИЗ.

Цель. Проанализировать клинические случаи геморагического инсульта (ГИ) по данным ГКП на ПХВ Городская клиническая больница №7, Алматы.

Материалы и Методы. Проанализированы клинические случаи ГИ, которые получали как консервативное лечение, так и нейрохирургические вмешательства. Проведенное исследование показывает анализ случаев ГИ, клинические исходы заболевания и лечения. Период исследования составил 5 лет (2013-2017 гг.). Специализированное отделение сосудистой нейрохирургии (СНХО) было открыто в 2014 году. В этом исследовании также проведено сравнение результатов лечения, до и после открытия СНХО.

Результаты. Общее число пациентов составило 1496 (в 2013 – 389, 2014 – 333, 2015 – 259, 2016 – 305, 2017 – 210) – 772 мужчины, 724 женщины. Внутримозговые гематомы – 1234 (82, 5%), внутрижелудочковое кровоизлияние – 12 (0, 8%), субарахноидальное кровоизлияние – 244 (16,3%),

субдуральные гематомы – 6 (0, 4%). Лечились консервативно – 1306 (87,3%) и 190 (12,7%) пациентам проведено нейрохирургические вмешательства. Нейрохирургическое лечение включало эндovasкулярное лечение, микрохирургическое удаление внутримозговой гематомы под нейронавигацией, эндоскопическое удаление внутримозговой гематомы. За 5 лет смертность составила 433 случая (29%): без хирургического лечения – 390 (90,1%), после нейрохирургической операции – 43 (9,9%). Смертность до и после открытия СНХО: 2013 г. – 133 (31%), 2014 г. – 96 (22%), 2015 г. – 74 (17%), 2016 г. – 69 (16%), 2017 г. – 61 (14%).

Выводы. Для полноценного оказания медицинской помощи пациентам с ГИ необходимо наличие специализированного отделения. После открытия СНХО прослеживается тенденция снижения летальности. Исходя из этого, очевидна значимость совершенствования организации нейрохирургической помощи пациентам с ГИ.

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PRIMARY RECONSTRUCTIVE SURGERY OF SKULL DEFECTS WITH THE USE OF INDIVIDUAL TITANIUM IMPLANTS

Objective. To improve the results of surgical treatment of patients with the skull bones formations by simultaneous cranioplasty using modern technologies of three-dimensional (3D) modeling and prototyping.

Materials and methods. The study group consisted of 42% (5) of men and 58% (7) of women. The age of the patients varied from 14 to 45 years. In the pathological process were involved frontal (100%), wedge-shaped (71.4%), lattice bones (28.2%) and frontal sinuses (57%). The structure of patients' complaints is presented as follows: cosmetic defect 5 (71.4%), headaches 3 (42.9%), exophthalmos 3 (42.9%), epileptic seizures 1 (14.2%).

The production of the patient-specific titanium implants was carried out on the basis of computed tomography using laser stereolithography.

Results. The therapeutic goal was achieved by eliminating anatomical and functional disorders. A firm fixation of the implant and satisfactory cosmetic effect has been noted. There were no infectious complications.

Conclusions. Simultaneous cranioplasty with the use of the 3D modeling technique and individual implants allows to get the optimal cosmetic result, shortens the duration of surgical intervention and helps to reduce the duration of inpatient treatment.

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THE USAGE OF VERTEBROPLASTY FOR VARIOUS INJURIES OF THE SPINE

Objectives: The goal is to remove the pain syndrome and restore the supporting function of the spine and, as a result, improve patient's life quality.

Materials and methods: During 2016 – 2017, in our department were operated only 102 persons. Before the surgery, all patients pasted a CT scan, and all analyzes according to protocols. Of the treated patients, the average age of the patients was 64 years, of which 69 women, and 33 men. All had compression fractures of the vertebra, localization of damage from Th10-L4. The causes of compression were: traumatic injuries of 64 cases (62.7%), osteoporosis in 23 cases (22.5%), metastatic vertebral lesions 15 (14.8%).

Clinical symptomatology was characterized by pain syndrome in 102 (100%) patients. Neurological deficit

of the form of radicular syndrome in 56 (50%) patients, moderate conductor disorders in 19 patients (18.6%).

Results: All patients was treated according to the standard procedure. After the operation, pain relief was noted in 83 (81%), partial reduction of pain syndrome in 11 (10.8%) and in 8 (7.8%) patients, the pain syndrome was not stopped. The complication was observed as cement swelling beyond the body of the spine in 7 (6.9%) patients without complication of clinical symptoms.

Conclusion: Vertebroplasty can be widely used in many pathological processes of the vertebrae, since it is minimally invasive enough simple to perform, as well as highly effective, and in some cases an indispensable method of treatment.



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SAFETY RESECTION OF GLIOMAS IN ELOQUENT AREAS OF BRAIN USING MODERN INTRAOPERATIVE NAVIGATION METHODS (ULTRASOUND NAVIGATION, FRAMELESS NAVIGATION, METABOLIC NAVIGATION WITH 5-ALA AND NEUROPHYSIOLOGICAL NAVIGATION)

Objective: to show the advantages of using each of the navigation methods and their combination during the removal of intracerebral tumors

Materials and methods: Period from 2013-2017 in the National Medical and Surgical Center named after N.I. Pirogov 380 patients were operated with supratentorial gliomas. During the operation, ultrasound navigation (100%), frameless navigation (100%) and metabolic navigation with 5-ALA (22.1%) were used to determine the tumor boundaries. To verify the functionally significant areas of the cerebral cortex and its tracts a technique of neurophysiological navigation was used (67.6%).

Results: In the case of malignant tumors (astrocytomas WHO Grade III-IV) for visualization of infiltrated brain tissue, we used metabolic fluorescent navigation (5-aminolevulinic acid, 5-ALA), which makes it possible to visualize the tumor tissue, which is

invisible in white light and so as to perform its maximal resection.

To determine the motor centers and fibers of the corticospinal tract, we used the dynamic mapping protocol. In the case of tumor localization in the projection of speech zones, intraoperative awake surgery was performed, by which communication with the patient while performing special tests for mapping of speech zones and tracts.

Using a combination of the above described methods, total and sub-total removal of gliomas was performed in 338 patients (88.9%) with a good functional outcome (irreversible neurological deficit occurred in 3.4% of patients)

Conclusions: Removal of intracerebral tumors in eloquent areas of brain using modern navigation techniques allows total removal of the tumor with minimal risks of developing an irreversible neurological deficit.

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FLUORESCENT-ORIENTED SURGERY OF GLIOMAS WITH HIGH DEGREE OF MALIGNANCY

Objective: The analysis of the tumor resection degree using 5-ALA fluorescence in patients with a high level of malignancy.

Materials and methods: The study included 18 patients with glial tumors of high malignancy degree. Out of those 18 patients, 8 patients were male, 10 patients were female. The average age was 44 years. The age categories of patients were from 26 to 66 years. Out of 18 patients, glioblastoma was diagnosed in 10 patients, glioma G = III was in 6 patients, and G = II was in 2 patients.

Results: Total removal of tumors using 5-ALA was achieved in 13 patients, which was 72%. Subtotal

removal was in 3 patients (17%) and partial removal was achieved in 2 patients, i.e. in 11% of patients.

Conclusion: The use of 5-ALA fluorescence makes it possible to remove totally the volume of brain tumors without causing a gross neurological deficit and increases the survival rate without progression. For optimal resection with glioblastomas, the use of 5-ALA is currently included in the standard scheme of operative treatment in Europe, the USA, Japan and Australia, and now it has found its application in the Republic of Kazakhstan.

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THE RESULTS OF HYPERVASCULARIZED BRAIN TUMORS TREATMENT USING ENDOVASCULAR VESSEL EMBOLIZATION

Objective: analysis of treatment of patients with brain tumors with the use of vessel embolization.

Materials and Methods: The study included 80 patients. There were 35 patients in-group number 1, the embolization of feeding vessels was first performed, removal was carried out. Group number 2 consisted of 45 patients, the tumor removed, but preliminary embolization of the tumor vessels not performed.

Assessment of resection volume on the scale of Macdonald D.R.1990, the total removal is when more than 95% of the tumor was removed; subtotal 80-94% of the tumor; partial 50-79%; and a biopsy – <50% of the tumor.

The evaluation of the quality of life was carried out by Rankin scale.

Results: Following criteria used:

1. Total tumor removal was 91.43% in group number 1 and 60% was in group 2.
2. Average time of operation: in group 1 – 4 hours and 10 minutes. In group number 2 – 5 hours and 40 minutes,
3. Analysis of the intensity of blood loss: in group 1 – 500 ml. In group 2 – 1600 ml.
4. Assessment of the quality of life on the Rankin scale at discharge and during the observation period in group number 1 was 3.1 points, in group number 2 was 3.8 points.

Conclusion: The endovascular embolization of brain tumors reduces blood loss for 68.75% (by 1100 ml less). The duration of the operation reduced by 26.5% (for 1 hour 30 minutes). The resection volume increased total removal – 33%. The neurologic deficit after the operation was 27.3%.

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ЗАВИСИМОСТЬ ИСХОДА ЛЕЧЕНИЯ НЕЙРООНКОЛОГИЧЕСКИХ БОЛЬНЫХ ОТ ОСОБЕННОСТЕЙ КЛИНИЧЕСКИХ ПРОЯВЛЕНИЙ ЗАБОЛЕВАНИЯ И НЕКОТОРЫХ ОРГАНИЗАЦИОННЫХ АСПЕКТОВ

Цель: изучение связи/зависимости исхода хирургического лечения нейроонкологических больных от особенностей клинических проявлений заболевания и некоторых организационных аспектов.

Материалы и методы: для исследования послужили данные из медицинских карт стационарного больного Университетского госпиталя ГМУ г. Семей и Усть-Каменогорской городской больницы №1. Методом сплошного наблюдения изучено 636 медицинских карт стационарного больного за период 2012-2017 гг. Оценка связи проводилась с помощью коэффициента ранговой корреляции Спирмена.

Результаты: выявлена статистически значимая связь между исходом лечения и локализацией опухоли ($p \leq 0.01$). При этом размер опухоли не определяет исход лечения ($p = 0.72$). Отсутствует корреляция и между степенью неврологического дефицита и исходом лечения ($p = 0.14$). Наряду с этим, уста-

новлена достоверная связь исхода лечения и вида госпитализации ($p = 0.02$). Для исхода лечения имеет значение, через какое время от начала заболевания госпитализирован пациент ($p \leq 0.01$). Также определена значимая связь исхода лечения с объемом операции ($p = 0.03$), наличием операционных осложнений ($p \leq 0.01$) и длительностью нахождения в реанимации ($p \leq 0.01$).

Заключение: исход хирургического лечения нейроонкологических больных зависит от локализации опухоли, от вида госпитализации, через какое время от начала заболевания госпитализирован пациент, от объема операции, наличия операционных осложнений и длительности нахождения в реанимации;

- исход хирургического лечения нейроонкологических больных не зависит от размеров опухоли и степени неврологического дефицита.



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ANALYSIS OF PROGNOSTIC FACTORS FOR INTRACRANIAL ANEURYSMS IN THE KAZAKH POPULATION

Objective: In the presented work, we analyzed a group of patients of Kazakh nationality with ruptured and unruptured aneurysms, to determine the predictors of intracranial aneurysm rupture.

Materials and methods: A total of 334 patients were examined, of which 196 patients with ruptured aneurysms and 138 patients with unruptured aneurysms. Prognostic factors as sex, age, arterial hypertension, AAS in history, smoking, the size of the aneurysm, the number and the localization of aneurysms, were analyzed. To estimate the effect of predictive factors on the discontinuity, the statistical method of Chi-square test and t-test used.

Results: Female gender and age of 40-59 years showed more frequent detection of IA, and the presence of grade 3 arterial hypertension, size ≥ 5

mm, and the localization of IA on the arteries of the anterior circulation showed more frequent occurrence in the ruptured aneurysm group. At the same time, the presence of smoking, a multiple aneurysms, the location on the arteries of the posterior circulation and the size of the IA > 5 mm did not differ much in both study groups, or there was a slight predominance in the unruptured aneurysm group.

Conclusions: Prognostic factors of aneurysm formation in our group of Kazakh patients were female gender and age of 40-59 years, increasing the risk of aneurysm rupture – grade 3 arterial hypertension, size ≥ 5 mm, as well as localization of IA on arteries of anterior circulation.

Keywords: intracranial aneurysms, subarachnoid hemorrhage, prognostic factors.

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CEREBRAL ANEURYSM TREATMENT

Objective: To analyze the results of clipping and coiling of unruptured cerebral aneurysms and discuss about the advantages and disadvantages of both procedures.

Materials and Methods: We enrolled 383 patients who were diagnosed unruptured cerebral aneurysm in Fujita Health University Hospital, Japan, between January 1999 and December 2002. All patients were detected the aneurysm by non-invasive imaging and underwent either surgical clipping or coiling. We assigned to analyze for the patient's demographic data and aneurysmal characteristics in sex, age, symptomatic, location, size, shape and anatomical related perforating arteries. We compared the outcome and complication rates of both modalities of treatment.

Results: The method of treatment (clip or coil) chosen following the guideline that refers to the indication of the patient such as the posterior circulation aneurysms or complex aneurysm that located in the difficult to access, the endovascular coiling was used to treat in these patient. After we included the outcome of both groups after treatment, the patient of our series had morbidity and mortality rate of 1.6% and 0.52%, respectively.

Conclusions: The morbidity after treatment of unruptured cerebral aneurysm is very low for the treatment with surgical clipping or endovascular coiling. The endovascular coiling is suitable in the cases who cannot or difficult to approach by direct clipping. However, the coiling also has some limitations, when the neck is wide, wall is thin or aneurysm too small.

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SINGLE CENTER EXPERIENCE OF COMPLEX INTERNAL CAROTID ANEURYSMS MANAGED BY FLOW DIVERTER DEVICES

Objective: evaluate the results of treatment of complex internal carotid aneurysms using flow diverter devices.

Materials and methods: Retrospective analysis of patient's database with complex internal carotid artery aneurysms treated at our center between 2008 and 2017 years was conducted. Preoperative diagnosis was done by MRI, CT angiography and digital subtraction angiography. During the follow up period neurological, radiological and angiographic data was evaluated.

Results: We reviewed records of 19 patients (2 patients were male, 17 female, mean age 52 years) with complex internal carotid treated using flow diverter devices. Patients presented with headache, cranial nerves palsy and visual disturbances. At the time of presentation most frequent symptom was cranial nerves palsy. Aneurysm dome mean size was 27 mm, ranged from 20 to 45 mm. Follow up period ranged between

6 to 60 months (mean 15 months). All aneurysms were located at the internal carotid artery. The most frequent location was cavernous part. Intraoperative technical difficulties, such as migration or stent thrombosis occurred in 2 cases. Late parent artery thrombosis due to occlusion of the stent was observed in 2 cases. Postoperatively we experienced one fatal complication due to the flow diverter device occlusion and severe ischemic stroke. During the follow up period aneurysms occlusion rate was 80%. Neurological symptoms improved in 14 cases.

Conclusion: Despite single mortality in our initial experience, precise assessment of vessel anatomy, aneurysm and possible resistance to antiplatelet therapy the endovascular deployment of flow diverter devices show neurological improvement and high rates of aneurysm occlusion.

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EXPERIENCE IN THE USE OF REVASCULARIZATION IN THE REGIONAL MEDICAL CENTER IN QARAGHANDY

Objective: To prove the effectiveness of the extra-intracranial (EIC) bypass technique in the surgical treatment of giant cerebral aneurysms, as well as occlusive lesions of the brachiocephalic arteries (BCA).

Materials and methods: In the period from 2016 to 2018, EIC bypass was performed to 13 patients: 3 – giant cerebral aneurysms, 10 – occluding pathology of carotid arteries.

Two types of anastomoses used: low-flow between the STA and MCA – 11, high-flow between the EC carotid and MCA with radial artery graft – 2.

All patients with aneurysms underwent trapping operations. Double bypasses were performed in 6 cases.

Results: Twelve month follow-up was at 11 patients. The bypass patency checked with direct, CT angiography and doppler. Efficacy of anastomoses was confirmed in 2 patients with aneurysms – absence of ischemic changes (MRI) and in 9 patients with carotid lesions – improvement of cerebral perfusion (CT perfusion). There were no direct complications related to surgery in our group.

Conclusion: The implementation of revascularization procedures reduced the risk of secondary ischemic complications in the surgery of giant aneurysms and improved cerebral perfusion in the early post-stroke period (3-12 months). A low mortality rate allows this method to be proposed for use in clinical practice.



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MICROSURGICAL TREATMENT OF LARGE ANTERIOR CIRCULATION CEREBRAL ANEURYSMS

Objective: To discuss the outcome of microsurgically treated large ($d \geq 1$ cm) anterior circulation cerebral aneurysm.

Materials and Methods: Fifty-five patients with large anterior circulation cerebral aneurysm were clipped microsurgically from October 2013 to September 2017 at the neurosurgery center in First affiliated hospital of Xinjiang medical university. All surgeries were performed by Senior neurosurgeon Sailike. Patients' Clinical outcomes were evaluated with Glasgow Outcome Scale (GOS) at six months follow-up.

Results: Average follow up time was six months. Surgical mortality was 1.8%. Morbidity was 5.4%. Complete clipping was achieved in 53 cases (96%). No patients left in Vegetative State. Three patients were moderately Disabled. Good Recovery was achieved in 51 patients.

Conclusion: Microsurgery is still a method of choice for the treatment of large anterior circulation with minimal mortality and acceptable morbidity.

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KEYHOLE SURGERY OF CEREBRAL ANEURYSMS

Objective: evaluate the results of keyhole concept in aneurysm surgery

Materials and methods: In the treatment of 220 patients, the following approaches were used: supraorbital keyhole craniotomy (SOC, 117 people, 53.2%), mini-pterional craniotomy (MPC, 54 people, 24.5%), mini-orbitozygomatic craniotomy (MOZC, 19 people, 8.6%), transpalpebral approach (TPA, 30 people, 13.6%). AA was distributed as follows: 118 – anterior communicating artery, 52 – paraclinoid segment of the internal carotid artery, 46 – middle cerebral artery, 4 – basilar artery. SAH in the history was noted in 142 patients (64.6%), of which 57 were operated in an acute period (40.1%). Unruptured AA revealed in 78 patients (35.4%). Assessment of patients' status was carried out on the scale of Hunt-Hess, intensity of SAH – according to the Fisher scale.

Results. Evaluation of the results was carried out based on the results of control 3D-CT angiography. In all

cases, the aneurysms were completely obliterated. The intraoperative rupture of AA occurred in 9 cases (4.1%). Serious complications and deaths were not observed. Assessment of patients in the postoperative period was carried out at the time of 2 weeks, 6 months and 1 year. In 4 (7.4%) cases with MPC, minimal dysfunction of the temporomandibular joint and symptoms of atrophy of the temporal muscle on the approach side were detected. Puffiness of the periorbital region was noted by all patients after SOC, MOZC and TPA, which was not regarded as a complication because it was transient, regression of the edema occurred within 3 to 5 days. Numbness of the supraorbital region was noted in 160 (72.7%) patients. Cosmetic result was assessed by patients as excellent.

Conclusion. With adequate selection of patients, minimally invasive surgery can be a safe and effective method of treating cerebral aneurysms with minimal complications after rupture.



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EPILEPTOGENIC CAVERNOUS MALFORMATIONS: HOW TO TREAT

Objective: to assess the effectiveness and safety of surgical treatment of supratentorial cavernous malformations.

Materials and Methods: 35 patients with supratentorial cavernous malformations underwent surgery in Uzhhorod Regional Centre of Neurosurgery and Neurology between November 2010 and November 2016. We studied outcome of 26 patients who presented with seizure (74.3%). Their postoperative follow up was of 3 to 74 months (mean 32.2 months). Male to female ratio was 6:7. Mean age of the patients was 30.6 years. Localization of the lesions: frontal lobe – 14 patients (53.8%), temporal lobe – 7 patients (26.0%), parietal lobe – 3 cases (11.5%) insula and occipital lobe – 1 patient each (3.8%). 12 patients had complex partial seizures (46.2%) and in 11 cases we observed secondary-generalized seizures (42.3%). Simple partial seizures were rare (11.5%).

Results. Patients divided into two groups: with rare seizures (less than 10 seizures before surgery) – 12 cases (46.2%); and with chronic epilepsy (>10 seizures before surgery) – 14 cases (53.8%). Engel class I – 21 patients (80.8%), Engel II – 3 patients (11.5%), Engel III and IV – 1 patient each (3.8%). A subgroup analysis showed that excellent outcome achieved in patients with rare seizures – 100% of them are seizure-free (Engel I). Further analysis showed that both patients with Engel III and IV class had preoperative secondary-generalized seizures and drug-resistant epilepsy preoperatively. Age, sex and localization of the lesion did not affect the outcome.

Conclusions. Surgical treatment of epileptogenic cavernous malformations is safe and effective. Negative prognostic factors are long duration of the disease before surgery, secondary-generalized seizures and drug-resistant epilepsy.

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ENDOVASCULAR TREATMENT OF INTRA-AND EXTRACRANIAL ARTERIES STENOSIS AND OCCLUSION

Objective: The aim of this study was to summarize the current evidence comparing the effectiveness of carotid revascularization in diabetic patients and patients in ischemic heart disease. Analysis of the basic characteristics and identify the reasons for the prevention of ischemic stroke.

Materials and methods: We performed 155 brachiocephalic artery stenting, of them 123 carotid artery stenting, of 35 intracranial artery stenting. Procedures in 155, consecutive cases between January 2016 and May 2018. Amongst them 112 were men and 33 women, aged 30-84 (average 64 ±1.2 years). 52 patients (33,6%) suffered from Diabetes mellitus, 98 patients(63,2%) suffered from ischemic heart disease. 28 patients (18%) had a recent coronary artery stent implantation, 16 patients (10,3%) underwent Coronary

artery bypass grafting. 82 patients (52,9%) smoked cigarettes.

Results: Perioperative morbidity and mortality were both 0%. This research showing that patients with Diabetes mellitus, ischemic heart disease and who had a recent coronary artery stent implantation, underwent coronary artery bypass, smoked cigarettes are risk factors for brachiocephalic artery stenosis. Therefore, such patients need examination of brachiocephalic arteries.

Conclusion: The loss of ability to work after a stroke after conservative therapy was noted in 32.6% of patients, in operated patients is much lower and is 15.9% of patients. Much like coronary atherosclerosis, this disease leads to arterial stenosis secondary to the buildup of lipid-based plaques in intracranial vessels.



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SURGERY FOR UNRUPTURED BRAIN AVMS IN POST-ARUBA ERA

Objective: To examine the effects of navigation and embolization on outcome of surgery for unruptured brain AVMs (ubAVMs).

Materials and methods: Thirty two ubAVMs operated between 2009 and 2017 (M:F=19:13, mean age 34+9) in University of Fukui Hospital are included in this study. Thirteen patients showed epileptic seizure and nineteen had headache or no symptoms. Spetzler-Martin grade was I in six, II in seventeen, III in five, and IV in three patients. Location of bAVMs were frontal lobe in eight, parietal in eleven, temporal in four, occipital in six, and cerebellum in three patients. Feeder embolization with coils and NBCA was performed in twelve patients around one week before operation mainly occluding basal feeders. Surgery underwent by using ICG angiography and intraoperative DSA in all cases and with navigation in fourteen selected cases.

Results: Complete obliteration achieved in all cases. No cases needed additional treatment. There was no significant difference between preoperative mRS (0.67+0.79) and postoperative mRS(0.51+0.89). Surgery improved epileptic control in three, headache in six, and diplopia in one patients. Surgery-related deterioration was observed in two cases, which was hemianopia and hemiparesis, respectively. There was no embolization-related deterioration. Embolization significantly reduced occurrence of intractable bleeding during surgery. Selective balloon test occlusion embolization may be another option to determine resectability of ubAVMs near language area. Navigation did not reduce occurrence of intractable bleeding but related to improvement of symptoms.

Conclusions: Navigation, hybrid OR and proper embolization might provide safe surgical treatment with complete obliteration.

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SURGICAL TREATMENT OF THE CAVERNOUS MALFORMATIONS OF THE BRAIN WITH CLINICAL PROGRESSION BY EPILEPTIC TYPE

Objective. Determination of criterions for surgical treatment of cavernous malformations of the brain depending on the type of clinical course.

Materials and methods. 104 patients with cavernous malformations of the brain were operated during 2011- 2017 years. The group of interest consisted of 65.4% (68) men and 34, 6% (36) women. The age of patients ranged from 18 to 65 years. In 53.8% of cases (56) cavernous angiomas were localized in functionally important areas. In 58.7% of cases in study group have had cavernomas with clinical progression by epileptic type. 43 (41.3%) patients have had mixed type of clinical progression of cavernous angiomas.

For more accurate localization of deep cavernous angiomas and for selection of better access in 71.2 % (74) of cases the intraoperative ultrasound navigation was used. In 62.5 % (65) of cases, the intraoperative neuronavigation was used. In 25.9% (27) of cases intraoperative electrocorticography was performed in order to clarify the localization of paroxysmal activity.

Results. In 44.2% of cases (46) in the postoperative period a convulsive disorder stopped. In 47.1% of cases (49) frequency of attacks falls on the back of lowering anticonvulsant therapy. In 8.7% of cases (9) frequency of attacks has increased after surgery (scar formation in the area of brain surgery). It requires increased of anticonvulsant therapy dosage.