

its effectiveness in our practice, we find very few centers taking up this procedure due to fear of complications. We address this issue with our protocol explaining the hydrodynamic principles involved in effective delivery of the procedure.

**Methods:** We conducted a study including patients undergoing PEICHE procedure and compared with the group undergoing standardized microscopic hematoma evacuation (MHE). Using core operative tenets of Minimize Brain Manipulation, Minimize Cavity Distortion, Obtain and Maintain Hemostasis and Intra-op evaluation of completeness of evacuation and hydrodynamic principle of Pascal's law, Bernoulli principle and laminar flow, a standardized PEICHE method was used to remove clot. Variables like patient epidemiological characteristics, volume of hematoma pre and post procedure, morbidity and mortality were studied.

**Results:** 35 patients underwent PEICHE during the study period. This was compared with 71 patients undergoing MHE. There was no significant variation between the two groups in terms of age, GCS and hematoma volume. Using PEICHE, we could evacuate almost 90% of clot volume with no procedure related morbidity. There were 8.6% 30-day mortality in endoscopic group as compared to 9.9% in craniotomy. None except 1 case, had to undergo decompressive craniectomy, due to cerebral edema. The clot volume evacuated was comparable to MHE. In PEICHE group, hospital stay was shorter than other two groups but not statistically significant.

**Conclusions:** Our study supports use of pure endoscopic intracerebral hematoma evacuation (PEICHE) as an effective and safe procedure if adopted using hydrodynamic principles and the results are comparable to microscopic hematoma evacuation (MHE) with an advantage of less tissue trauma.

<https://doi.org/10.1016/j.bas.2024.103847>

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Brain and Spine 4 (2024) 103845

**Stereotactic radiosurgery versus whole-brain radiotherapy in melanoma brain metastasis: A systematic review and meta-analysis**

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Oral e-Poster Presentations - Booth 3: Neuro-Oncology 7 (Brain metastases), Neuro-Oncology 8 (Advanced Imaging and Monitoring of Cerebral Functions), October 16, 2024, 12:40 PM - 2:10 PM

**Background:** Melanoma is an aggressive malignancy with a propensity towards the brain, with brain metastases (BM) clinically diagnosed in 40–50% of metastatic cases and the main cause of mortality and morbidity among patients with metastatic melanoma. The aim of this study was to discover any significant difference in overall survival and disease recurrence between SRS and WBRT.

**Methods:** A systematic review and meta-analysis was conducted in accordance with PRISMA guidelines. Three databases were searched, and articles published from 2000 to October 2023 included (last search date 2nd November 2023). Meta-Analysis was performed using R studio.

**Results:** Of the 128 articles identified, a total of 19 studies were included in the analysis (2617 patients- 1117 WBRT & 1500 SRS). The median overall survival for patients that underwent WBRT was 4.4 months compared to 7.8 months for patients that underwent SRS. A Wilcoxon rank sum test was conducted and a significant difference in overall survival was found between the two groups ( $p < 0.05$ ) with a Wilcoxon value of,  $W = 27.5$ . Random-effect meta-analysis of recurrence failed to reach a statistically significant result, though showing a trend of increased risk for recurrence in patients treated with SRS (RR = 0.63, CI: 0.37-1.06,  $p = 0.61$ ). Number of patients with neurocognitive decline was also recorded; however only 6/19 studies reported it: 39/127 (31%) in WBRT and 21/52 (40%) in SRS patients.

**Conclusions:** This is the first systematic review and meta-analysis discussing the efficacy and safety of WBRT versus SRS in metastatic brain melanoma. Although SRS may increase the risk of recurrence, it appears to offer significant increase in overall survival compared to WBRT. Furthermore, when considering the safety profile of WBRT, it may prove as a superior treatment modality even when accounting for cofounders. Further randomised controlled trials will need to be conducted to formalise a treatment pathway for these patients with poor prognosis.

<https://doi.org/10.1016/j.bas.2024.103845>

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Brain and Spine 4 (2024) 103846

**Reoperations For Adjacent Segment Disease In A Cohort Of Patients Operated For Degenerative Cervical Myelopathy**

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Oral e-Poster Presentations - Booth 2: Spine 1 (Degenerative), Spine 2 (Degenerative), October 16, 2024, 12:40 PM - 2:10 PM

**Background:** The incidence of radiographic adjacent segment disease (ASD) following cervical spine surgery ranges from 2-4%/year. Surgery represents the definitive treatment for degenerative cervical myelopathy (DCM). According to the latest guidelines, surgery is recommended for severe and moderate DCM. The frequency of symptomatic ASD and the reoperation rates in patients with DCM are not well documented. This study aims at analyzing reoperation rate for ASD in a cohort of patients operated for DCM.

**Methods:** A prospectively collected database of 175 consecutive patients who underwent surgery for DCM at Geneva University Hospital between 2008 and 2023 was analyzed regarding reintervention rate for ASD.

**Results:** The overall reoperation rate was 19.4% (34/175) with 5 patients (2.9%, 5/175) reoperated for a proximal or distal ASD. The median age at first surgery was 41.0 years [range: 34-55 years]. The mean time to develop a symptomatic ASD which required surgery was 5 years (SD: 3.5 years, range: 1-9.5 years). All patients but 1 (N=4, 80%) had an anterior cervical discectomy and fusion (ACDF) as first intervention, the other patient had two-level corpectomy. Among patients who had ACDF in the first place, 3 (60%) had one-level ACDF and only 1 (20%) had a two-level procedure. No patient had postoperative hematoma or infection. Every patient but 1 (N=4, 80%) had a one-level ACDF as second surgery. Only 1 (20%) presented with a proximal and distal ASD associated to pseudoarthrosis. Therefore, he underwent implant revision and two-level ACDF. Only 1 patient (20%) underwent a third surgery for a second ASD. After 5.7 years he developed a second proximal ASD and underwent one-level ACDF.

**Conclusions:** In our cohort 2.9% of patients were reoperated for ASD. This long-term complication may be more related to anterior procedures, and it was treated with an extension of the anterior approach.

<https://doi.org/10.1016/j.bas.2024.103846>

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Brain and Spine 4 (2024) 103847

**Optoacoustic Recording in Neurosurgery: A Novel Approach for Real-Time Tumor Differentiation Using Operation Suction Device Sounds**

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Oral e-Poster Presentations - Booth 4: Emerging Technologies & Innovation 1, Research, October 16, 2024, 12:40 PM - 2:10 PM

**Background:** Cranial oncological surgery has encountered significant challenges in the real-time differentiation between tumor and healthy brain tissue. Traditional methods, such as fluorescence-based techniques, have their limitations, necessitating the exploration of innovative approaches to enhance surgical precision.

**Methods:** This study investigated the feasibility of using optoacoustic recording with an operative suction device during tumor resections. The research included 10 patients (6 with glioblastoma, 4 with metastases), employing a method to capture intraoperative sounds. These sounds were processed by an AI system for pattern recognition. Importantly, a 10-point system was established to gauge the viscosity of brain tissue, ranging from 0 (healthy) to 10 (tumor), with 5/6 serving as the borderline zone.

**Results:** The AI was able to successfully identify reproducible sound patterns that correlated with different tissue types, demonstrating a high level of precision in distinguishing between tumor tissue and healthy brain tissue. Specifically, when the operations were randomly presented to the software, it accurately determined the tissue's score within a range of +/- 1 point on the established 10-point scale. This technique proved effective even in complex scenarios, such as awake

craniotomies, showcasing its robustness and versatility. Moreover, the setup required minimal preparation time, indicating its practicality for integration into standard surgical workflows.

**Conclusions:** This study confirms the viability of optoacoustic recording in neurosurgery as an innovative method for the real-time differentiation of tumor tissue. The approach presents a promising advancement in surgical precision, potentially transforming the landscape of cranial oncological surgery.

<https://doi.org/10.1016/j.bas.2024.103847>

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Brain and Spine 4 (2024) 103848

**Enhancing XLIF Safety: Intraoperative Identification and Stimulation of the Iliohypogastric Nerve**

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Oral e-Poster Presentations - Booth 2: Spine 1 (Degenerative), Spine 2 (Degenerative), October 16, 2024, 12:40 PM - 2:10 PM

**Background:** The Extreme Lateral Interbody Fusion (XLIF) is a widely employed technique for degenerative spine conditions, offering a safer alternative to anterior and posterior approaches by reducing vascular, visceral, and muscle manipulation risks from L2 to L5 vertebral levels. However, XLIF poses a significant risk of damaging the lumbar plexus, particularly the iliohypogastric nerve, during the psoas muscle dissection. This nerve is involved in sensory innervation of the gluteal region and motor functions of the lateral abdominal muscles. Its damage may lead to abdominal muscle weakness and sensory loss in its innervation area. To limit the risk of neurological sequelae, electrophysiological monitoring is routinely employed during the XLIF approach. To date, little to no mention of intraoperative identification and stimulation of the iliohypogastric nerve has been made.

**Methods:** We introduce a new surgical method focused on identifying and stimulating the iliohypogastric nerve during lateral spine surgeries, detailed in a step-by-step video and anatomical images. The technique employs directional EMG neuromonitoring linked to muscle dilators for safe psoas passage and utilizes a monopolar probe for direct nerve stimulation, enhancing procedural safety.

**Results:** Following skin incision, the superficial muscle fascia is cut parallelly, and dissection through the external oblique muscle exposes the internal oblique muscle underneath. A monopolar probe is employed to locate the iliohypogastric nerve by stimulating muscle fibers, adjusting the stimulation from 0.5 mA to 12 mA to pinpoint the nerve path. The muscle fascia is cut above and below the nerve, allowing for its transposition along the vertebral body lateral wall, thereby enlarging the surgical workspace.

**Conclusions:** The intraoperative identification and direct stimulation of the iliohypogastric nerve during the transpsoas XLIF approach is a safe and reliable technique. Intraoperative neurophysiological monitoring allows to safeguard this nerve and the lumbar plexus, decreasing the risk of post-operative neurological complications.

<https://doi.org/10.1016/j.bas.2024.103848>

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Brain and Spine 4 (2024) 103849

**Enhancing outcomes: Neurosurgical resection in brain metastasis patients with poor Karnofsky performance score - A comprehensive survival analysis**

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Oral e-Poster Presentations - Booth 3: Neuro-Oncology 7 (Brain metastases), Neuro-Oncology 8 (Advanced Imaging and Monitoring of Cerebral Functions), October 16, 2024, 12:40 PM - 2:10 PM

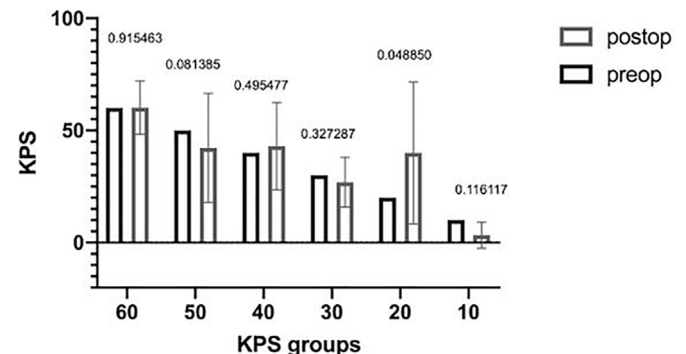
**Background:** A reduced Karnofsky performance score (KPS) often leads to the discontinuation of surgical and adjuvant therapy, owing to a lack of evidence of survival and quality of life benefits. This study aimed to examine the clinical and treatment outcomes of patients with KPS < 70 after neurosurgical resection and identify prognostic factors associated with better survival.

**Methods:** Patients with a preoperative KPS < 70 who underwent surgical resection for newly diagnosed brain metastases (BM) between 2007 and 2020 were retrospectively analyzed. The KPS, age, sex, tumor localization, cumulative tumor volume, number of lesions, extent of resection, prognostic assessment scores, adjuvant radiotherapy and systemic therapy, and presence of disease progression were analyzed. Univariate and multivariate logistic regression analyses were performed to determine the factors associated with better survival. Survival > 3 months was considered favorable and ≤ 3 months as poor.

**Results:** A total of 140 patients were identified, with a median overall survival of 5.6 months (range 0-58). There was a significant improvement in KPS after surgery in patients with a preoperative KPS of 20% (p = 0.048). In the other groups, no significant changes in KPS were observed. Adjuvant radiotherapy was associated with better survival (44 [84.6%] vs. 32 [36.4%]; hazard ratio [HR], 0.0363; confidence interval [CI], 0.197–0.670, p = 0.00199). Adjuvant chemotherapy and immunotherapy resulted in prolonged survival (24 [46.2%] vs. 12 [13.6%]; HR, 0.474; CI, 0.263–0.854, p = 0.013). Systemic disease progression was associated with poor survival (36 [50%] vs. 71 [80.7%]; HR, 5.975; CI, 2.610–13.677, p < 0.001).

**Conclusions:** Neurosurgical resection is an appropriate treatment modality for patients with low KPS. Surgery may improve functional status and facilitate further tumor-specific treatment. Combined treatment with adjuvant radiotherapy and systemic therapy was associated with improved survival in this cohort of patients. Systemic tumor progression has been identified as an independent factor for a poor prognosis.

**Optional Image**



<https://doi.org/10.1016/j.bas.2024.103849>

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**Stand Alone Porous Titanium Cages in Anterior Cervical Discectomy: A Retrospective Multicenter study**

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Oral e-Poster Presentations - Booth 2: Spine 1 (Degenerative), Spine 2 (Degenerative), October 16, 2024, 12:40 PM - 2:10 PM

**Background:** ACDF stands as a widely employed surgical intervention for various cervical conditions. Commonly used interbody devices include allograft, titanium, and PEEK. In recent years, promising results are being obtained from trabecular titanium cages. Few data can be found in the literature regarding implants on the cervical segment. The purpose of this study is to evaluate the rates of subsidence, fusion, cage mobilization, maintenance of sagittal alignment in porous titanium cervical implants.

**Methods:** A retrospective, multicenter study was conducted collecting data from consecutive patients treated with single- or double-level ACDF. The clinical