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ABSTRAKTBOOK



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Endoscopic Pituitary Surgery with and without Indocyanine Green Fluorescence: A Single-center Comparative Cohort Study

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5 beste abstrakts, 22. oktober, 2026, 14:00 - 15:00

Objective

Intraoperative indocyanine green (ICG) fluorescence imaging may improve visualization during endoscopic transsphenoidal surgery (ETSS) for pituitary adenomas. However, the impact if ICG on clinical outcomes remains uncertain. This study assessed radiological, endocrinological, and surgical outcomes following standardized Four-hand ETSS performed with and without ICG fluorescence imaging.

Methods

This single-center comparative cohort study included 252 consecutive procedures (130 ICG-assisted, 122 conventional Four-hand). The primary outcome was residual tumor on scheduled postoperative MRI approximately 3 months after surgery. Secondary outcomes were postoperative complications within 30 days, short-term biochemical remission for functional tumors and novel postoperative pituitary insufficiency.

Results

Radiological residual tumor was identified after 22 ICG-assisted procedures (23.2%) and 47 standard Four-hand procedures (47.5%; $p < 0.001$). Surgery without ICG remained independently associated with radiological residual tumor (adjusted OR 3.38, 95% CI 1.66–7.15; $p = 0.001$) after adjustment for preoperative tumor volume and Knosp-grade, repeat surgery, tumor diagnosis, age, and sex. Early biochemical remission rates among functional tumors were similar between cohorts (68.2% vs 71.2%; $p = 0.841$). The ICG-cohort had a lower number of cases with novel pituitary dysfunction, albeit not statistically significant ($p = 0.1$). The occurrence of both postoperative CSF-leak and meningitis were identical in both cohorts ($p = 1.0$).

Discussions and conclusions

ICG-assisted Four-hand ETSS was independently associated with a substantially lower likelihood of postoperative residual tumor compared to procedures performed without ICG. The improvement in radiological resection rate may be partially attributed to case-mix and a surgical learning-curve. Indocyanine green-guided ETSS was non-inferior to the standardized four-hand technique with respect to short-term postoperative endocrine morbidity, remission rates and surgical complications. Prospective multicenter studies are warranted to determine whether these findings translate into improved long-term patient outcomes.

Extent of Resection and Perioperative Neurological Status as Prognostic Markers in Glioblastoma: a Population-Based Study

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5 beste abstrakts, 22. oktober, 2026, 14:00 - 15:00

Introduction

Maximal safe resection is the suggested standard for surgical treatment for patients with IDH-wildtype glioblastoma. Surgical safety is prioritized over radical extent of resection (EOR) because new neurological deficits are considered detrimental for survival. The aim of this study was to explore the combined impact of extent of resection and neurological status on survival in glioblastoma patients, using standardized tools for neurological function (neurological assessment in neuro-oncology (NANO scale) and extent of resection (RANO resect classification).

Methods

Population-based study of all adult patients who underwent resection for newly diagnosed glioblastoma from 2019 to 2022 in a geographically defined region. EOR was evaluated according to the RANO resect classification. Neurological function was assessed using the NANO scale preoperatively, immediately after surgery, and before start of radiotherapy. Kaplan Meier survival analysis, chi-square and log-rank tests were used to compare groups.

Results

The median overall survival (mOS) for 503 patients was 12.9 months. RANO resect class 1 was associated with significantly longer mOS compared to patients with RANO classes 2, 3, and 4 (21.0 vs. 14.8, 8.3, and 4.5 months, respectively; $p < 0.01$). Preoperatively neurologically intact patients (NANO-score 0) had a longer mOS, than patients with neurological deficits. Neither the postoperative NANO-score nor the change in the score impacted survival.

Conclusions

Being neurologically intact before surgery and supramaximal resection were independent, strong predictors of longer survival. Mild to moderate new postoperative neurological deficits did not impact mOS, suggesting that supramaximal resection may confer a survival benefit even when such deficits are induced.

Long-Term Outcomes from an Institutional Series of Childhood-Onset Craniopharyngioma

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5 beste abstrakts, 22. oktober, 2026, 14:00 - 15:00

Introduction

Data on long-term outcomes including treatment-related morbidity in patients with childhood-onset craniopharyngioma (CP) are often limited by short follow-up and low numbers of cases. The aim of this retrospective observational study was to evaluate these parameters from an institutional series of patients, specifically comparing radical and more moderate, staged multimodal treatment strategies.

Methods

All patients diagnosed and treated for CP during childhood (<18 years) at Oslo University Hospital between 1992 and 2025, and with a minimum of nine months of follow-up were included. Clinical data from patient's medical charts and radiological images were reviewed.

Results

Thirty-seven patients were included (20M:17F), with a median age at diagnosis of 6.9 years (interquartile range [IQR] 4.3-10). Thirty-four patients underwent a total of 55 surgical resections. Nine patients received intracystic treatment and/or aspirations, six received postoperative radiotherapy, and one was treated with immunotherapy. The duration of follow-up was a median of 116 months (IQR 15-204), with hypothyroidism (94%) as the most common long-term morbidity in the cohort following treatment. Between the groups of patients treated initially with radical surgery (Group A; n=23) and those managed with a more moderate, staged multimodal approach (Group B; n=14), we found a significantly longer progression-free survival rate (log-rank p=0.021) in Group B. There were no significant differences in clinical and functional outcomes between the two treatment groups, but all deceased patients (n=5) were from Group A.

Conclusion

In this retrospective study of childhood-onset craniopharyngioma spanning over three decades of management, both radical and more moderate, staged multimodal treatment strategies resulted in similar long-term clinical and functional outcomes, but the latter strategy resulted in significantly better tumor control. Our findings support the current imperative of preferring the long-term quality of life and acceptable morbidity rather than surgical radicality at all costs.

Psychotropic Medication Use Before and After Diagnosis or Treatment of Unruptured Intracranial Aneurysms: A Nationwide Pharmacoepidemiologic Cohort Study

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5 beste abstrakts, 22. oktober, 2026, 14:00 - 15:00

Background

The diagnosis of unruptured intracranial aneurysms (UIAs) may lead to psychological distress. Sometimes prophylactic aneurysm treatment is considered in hope of improving patient psychosocial function. However, psychological symptoms in patients with UIAs may also reflect the pre-morbid condition before the diagnosis or other factors unrelated to the diagnosis of UIAs. Similarly, the impact of UIA treatment on psychological outcomes has been investigated in a limited number of studies, with heterogeneous and sometimes conflicting results. The aim of the study was to compare the use of prescribed psychotropic medications (anxiolytics, antidepressants, antipsychotics, and hypnotics): (1) before and after diagnosis or treatment for UIAs, (2) between treated patients, untreated patients, and matched controls, and (3) between patients treated with surgical clipping and endovascular treatment.

Methods

This pharmacoepidemiologic nationwide registry-based cohort study included all patients aged 18-66 years diagnosed or treated for UIA in Norway between 2008 and 2018. Patients were identified from the Norwegian Patient Registry and linked on individual level to prescription data from the Norwegian Prescription Database. Controls were randomly selected from the Norwegian population and matched 1:1 to untreated patients based on age and sex. Use of psychotropic medications was assessed before and after diagnosis or treatment.

Results

A total of 5002 participants were included (954 treated patients, 2024 untreated patients, and 2024 matched controls). There was no difference in psychotropic medication use between treated and untreated patients. Both treated and untreated patients had significantly higher use of antidepressants, anxiolytics, and hypnotics compared to controls. No differences were observed in use of antidepressants, anxiolytics, and hypnotics between patients treated with surgical clipping and endovascular treatment.

Conclusions

Patients with UIA have higher use of psychotropic medications compared to matched controls both before and after diagnosis or treatment for UIA suggesting that mental health in UIA patients is worse than in the general population long before diagnosis or treatment for UIAs. The lack of difference in use of psychotropic medications between treated and untreated patients with UIA suggests that the psychological stress from being diagnosed with UIA alone may not be a good indication for elective treatment of UIAs.

Trends in Primary Management Strategies for Cervical Spine Fractures and Failure Rates of Conservative Management

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5 beste abstrakts, 22. oktober, 2026, 14:00 - 15:00

Background

Primary management strategies for cervical spine fractures (CS-Fx) can be either surgical or conservative, where surgical strategies entail fixation, whereas conservative strategies include either rigid cervical collar immobilization or no stabilization. Historically, the choice of strategy has relied heavily on CT imaging, but MRI has become increasingly integrated into the initial work-up, particularly for assessment of discoligamentous complex (DLC) integrity and signs of spinal cord injury.

Aim

To evaluate temporal trends in primary CS-Fx management strategy and the failure rate of primary conservative treatment.

Methods

In this population-based retrospective cohort study, residents of Southeast Norway diagnosed with a CS-Fx from 2015–2024 were included. Primary outcomes were time-trends in initial management strategy (no stabilization, collar immobilization, or surgical fixation) and failure rates of initial conservative management strategies, defined as subsequent need of surgical fixation.

Results

The cohort comprised 4,686 patients. Median age was 65 years. Work-up included CT in all cases and MRI in 65%, increasing from 58% in 2015–2016 to 68% in 2023–2024 ($p=0,2$). Concomitant cervical spinal cord injury was present in 11%. Initial management strategy was no stabilization in 12%, rigid collar immobilization in 70%, and surgical fixation in 18%. Overall, the failure rate of initial non-surgical treatment was 4%. During the study period, collar treatment remained stable at 70%, no immobilization management increased from 10% to 14%, and surgical treatment declined from 21% to 17%. Concurrently, the failure rate of conservative management decreased from 7% to 2%. Overall, these changes represent an approximate 4% shift from surgery to collar treatment and another 4% shift from collar treatment to no immobilization. Time trend analysis determines these as statistically significant trends and will be presented.

Conclusions

Conservative non-immobilization management of CS-Fx has become increasingly favored, accompanied by a marked reduction in treatment failures. These real-world trends support a more selective, guideline-aligned approach to non-operative care, particularly relevant in aging populations.

Laser Interstitial Thermal Therapy (LITT) for Epilepsy and Intracranial Tumour: The First Norwegian Experience

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Frie foredrag 1, 22. oktober, 2026, 10:00 - 10:30

Background

LITT is a minimally invasive, MRI-guided stereotactic ablation technique used in the treatment of drug-resistant epilepsy and selected intracranial tumours. It was introduced at Oslo University Hospital in 2020. We report the first Norwegian experience.

Materials and Methods

Consecutive series of 23 patients treated 2020–2025: 20 for epilepsy and 3 for tumour. The Visualase laser probe was implanted using VarioGuide and CT guidance, with MR thermometry. Seizure outcome was classified by Engel class at 12 months. Quality of life was assessed with QOLIE-31, RAND-36, EQ-5D-5L, GAD-7, NDDI-E and AEP before surgery and at scheduled follow-up. Complications and length of stay were obtained from medical records.

Results

Results below concern the 12 epilepsy patients without hypothalamic hamartoma. Median age was 29.5 years (18–50). Ablation was left-sided in 8 and in the dominant hemisphere in 6 of 10 with recorded language dominance. Of 11 with a recorded 12-month outcome, 9 achieved Engel class I (5 IA), 1 class III and 1 class IV, the latter subsequently undergoing open resection. Median hospital stay was 3 days (2–6). Complications occurred in 4 of 12 patients (transient dysphasia or diplopia and one permanent visual field defect). Paired quality-of-life data, available for 8 patients, are preliminary. The QOLIE-31 total score improved in all 8. Improvement was most pronounced for seizure worry, followed by social functioning, medication effects and cognitive functioning, whereas emotional well-being and energy/fatigue were unchanged. Anxiety and depression scores fell, and no patient had an elevated GAD-7 or NDDI-E score at last assessment, compared with 4 and 3 at baseline. The benefit emerged only after 6 months. Patients with hypothalamic hamartoma (n = 8) and tumour (n = 3) are discussed separately.

Conclusion

LITT was introduced at our centre with a high rate of seizure control, short hospital stay and few permanent complications, including after ablation in the dominant hemisphere. Quality of life improved consistently. The series is small, uncontrolled and based on incomplete data. Our experience suggests LITT is a useful adjunct to open surgery in carefully selected patients.

MR-Guided Focused -Ultrasound (MRgFUS) Thalamotomy at Oslo University Hospital: Service Establishment and Early Clinical Experience

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Frie foredrag 1, 22. oktober, 2026, 10:00 - 10:30

Background

MRgFUS thalamotomy is an incisionless stereotactic treatment for medication-refractory tremor. We present the establishment of the service at Oslo University Hospital, the treatment pathway and experience from the first patients.

Methods

A standardised multidisciplinary pathway has been developed. Indications and contraindications are defined, and a structured clinical and radiological protocol covers preoperative, intraoperative and postoperative assessment. Treatment is performed using the ExAblate Prime system with MR thermometry in the awake patient. Non-ablative sonications combined with structured clinical testing guide target refinement and the final ablation.

Results

We present early results following the start of treatment on 27 August 2026, including baseline characteristics, procedural parameters, tremor response and treatment-related adverse events at discharge.

Conclusion

A standardised multidisciplinary pathway for MRgFUS thalamotomy has been established at OUS within existing neurosurgical, radiological and neurological infrastructure. Procedural parameters and clinical outcomes are recorded prospectively in a dedicated registry, providing a basis for quality assurance, service development and future research.

The Increasing Burden of Alcohol-Related Traumatic Brain Injury in Older Adults – Two Decades of Population-Based Data from Southwestern Norway

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Frie foredrag 1, 22. oktober, 2026, 10:00 - 10:30

Objective

The objective of this study was to assess epidemiological patterns of alcohol-related traumatic brain injury (TBI) in older adults over a period of 20 years.

Methods

This is an observational population-based study utilizing prospectively collected data from the institutional trauma registry at Stavanger University Hospital in Southwestern Norway. Patients aged 60 years and older admitted due to TBI between January 1, 2004, and December 31, 2023, were included. Patient demographics and trauma-related variables, and outcome after TBI were described.

Results

A total of 1021 older patients with TBI were admitted during the 20 year-study period; 172 (17%) were under the influence of alcohol. Most patients suffered mild TBI (73%), and fall related injuries were the most common mechanism of injury (76%). The crude incidence rate increased from 40 to 81 TBI cases per 100 000 population yearly. Alcohol-related TBI tripled, while non-alcohol-related cases doubled during the study period. The overall 30-day mortality rate was 16%.

Conclusion

This study shows an increasing number of hospital-registered TBI in older patients, with also increasing alcohol-related TBI in this age group. The triad of aging, alcohol consumption, and TBI represents an essential future challenge, requiring focused efforts and evidence-based interventions to reduce both human and socio-economic burdens.

Expanding the Surgical Repertoire for Vestibular Schwannoma: Initial Clinical Experience with the Translabrynthine Approach in 20 Patients

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Frie foredrag 2, 22. oktober, 2026, 16:00 - 17:00

Background

Surgical management of vestibular schwannoma (VS) requires balancing tumor control with preservation of neurological function and quality of life. At the National Treatment Center for Vestibular Schwannomas at Haukeland University Hospital (HUH), the retrosigmoid approach has traditionally been the standard surgical approach. In 2024, the translabyrinthine (TL) approach was introduced as a complementary approach for selected patients. It provides wide exposure of the internal auditory canal, early identification of the facial nerve, and avoids cerebellar retraction, at the cost of sacrificing residual hearing. We report our initial experience following implementation of this approach.

Methods

We retrospectively reviewed all patients with sporadic VS undergoing resection through a TL approach at HUH between January 2024 and September 2026. Demographic characteristics, tumor size and Koos grade, operative time, extent of resection, postoperative facial nerve function, adjuvant stereotactic radiosurgery (SRS), and perioperative complications were assessed.

Results: Twenty patients were included, with a mean age of 39 years. Eighteen patients had Koos grade IV tumors. The median extracanalicular tumor volume was 10.9 cm³. Median operative time was approximately 8.5 hours. Gross-total resection was achieved in three patients, near-total resection in six, and subtotal resection in 11. At last follow-up, all patients had favorable facial nerve function (House-Brackmann grade I-II). Five patients underwent postoperative SRS for residual or recurrent disease. No patients required reoperation for tumor progression. One patient required reoperation for a postoperative complication.

Conclusion

Introduction of the TL approach has expanded our surgical repertoire for VS and was associated with favorable facial nerve outcomes in this initial series. A planned near-total or subtotal resection was frequently used, particularly in large tumors, with postoperative SRS providing an additional strategy for management of residual or recurrent disease. Our early experience supports the TL approach as a valuable complementary option within an individualized, function-oriented treatment strategy for VS. The approach also expands the surgical toolbox for other complex skull base lesions requiring wide lateral skull base exposure.

Long-Term Outcomes and Complications of Intrathecal Baclofen Pump Therapy: A 17-Year Retrospective Cohort Study of 110 Patients

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Frie foredrag 2, 22. oktober, 2026, 16:00 - 17:00

Background

Intrathecal baclofen (ITB) pump therapy is an established treatment for severe spasticity, but long-term complication rates and device retention data from real-world clinical practice remain limited, particularly from Scandinavian centers. This study aimed to characterize postoperative complications, device retention, and long-term outcomes following primary ITB pump implantation at a medium-sized Norwegian neurosurgical center.

Methods

We conducted a retrospective single-center medical record-based study of all primary ITB pump implantations performed at the Department of Neurosurgery, Haukeland University Hospital, Bergen, Norway, between 2006 and 2023. Data were collected on patient demographics, diagnosis, surgical procedure, complications, reoperations, device retention, and mortality.

Results

A total of 110 patients (44 children, 66 adults) underwent primary ITB pump implantation during the study period, with a median follow-up of 7.9 years (946 pump-years). The most common diagnoses were cerebral palsy in children (73%) and spinal cord injury in adults (29%). Twenty-one patients (19%) required reoperation: 13 (12%) for mechanical catheter failure and 8 (7%) for infection. An additional 21 patients (19%) experienced complications managed conservatively (seroma, superficial wound infection, urinary tract infection, pneumonia). Among survivors at last follow-up, 84% of children and 77% of adults retained their ITB pumps. No procedure-related deaths occurred.

Conclusion

In this 17-year single-center cohort, complication rates and device retention were comparable to published multicenter series. Catheter mechanical failure and infection requiring reoperation were the most common surgical complications. These data provide useful benchmarks for patient counseling and quality assurance in medium-sized neurosurgical centers.

Minimally Invasive Image-Guided Cervical Pedicle Screw Placement: An Ongoing Systematic Review

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Frie foredrag 2, 22. oktober, 2026, 16:00 - 17:00

Background

Cervical pedicle screws provide strong three-column fixation but remain technically demanding because of narrow pedicles and adjacent neural and vascular structures. Intraoperative three-dimensional (3D) imaging and navigation may facilitate accurate placement through minimally invasive or percutaneous approaches. Building on our previously published clinical series in cervical spine injuries, this review evaluates the broader clinical evidence.

Methods

MEDLINE and Embase were searched together through Ovid, and CENTRAL separately, for studies published from January 2000 to 9 July 2026. Eligible reports are peer-reviewed human clinical studies of minimally invasive or percutaneous C2–C7 pedicle screw placement using an intraoperatively acquired 3D dataset for prospective navigation. Two reviewers independently screen records, assess full texts, extract data, and evaluate risk of bias using design-appropriate tools. The primary outcome is the proportion of target screws with an acceptable final CT or CBCT position, defined as complete pedicle containment or cortical breach <2 mm. Secondary outcomes include completion without conversion to an open exposure, screw correction or revision, operative time, blood loss, length of stay, 30-day readmission and reoperation, and neurological, vascular, or wound complications. Findings will be synthesised descriptively, with meta-analysis where study comparability permits.

Results

The combined Ovid MEDLINE and Embase search identified 167 records, of which 121 remained after automated deduplication. CENTRAL retrieved one additional record. Cross-database deduplication and study selection are ongoing. Updated study-, patient-, and screw-level findings, including harmonised accuracy, feasibility, perioperative and safety outcomes, will be presented at the meeting.

Conclusion

This review will determine whether the favourable findings reported in early feasibility cohorts are reproduced across the expanding clinical literature. It will define the current evidence for minimally invasive, 3D image-guided cervical pedicle screw placement and identify priorities for future comparative studies.

Revision Surgery After Surgical Treatment of Cervical Spine Fractures: Rates, Indications, Timing, and Association with Surgical Approach

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Frie foredrag 2, 22. oktober, 2026, 16:00 - 17:00

Introduction

Revision surgery after cervical spine fracture (CS-Fx) fixation is an adverse event associated with increased morbidity and potential neurological deterioration. Initial surgical approach may influence the likelihood of subsequent revision. Purpose of this study was to determine the rate, timing, and indications for revision surgery after CS-Fx fixation and evaluate the association between the primary surgical construct and revision risk.

Material and Methods

Retrospective cohort study based on prospectively collected data from a quality control registry for acute CS-Fxs. Group comparisons were performed using Pearson's χ^2 and Fisher's exact tests. Outcome measures; rate of revision surgery, indication for revision surgery, time from index surgery to revision surgery, rate of neurological worsening, association between primary fixation type and need for revision surgery, and type of fixation at revision surgery.

Results

In this cohort of 1008 consecutive patients surgically managed for CS-Fxs from 2015–2024, the first surgical approach was anterior fixation in 56% of the patients, posterior fixation in 32%, combined in 10%, and laminectomy without fixation in 2%. The overall rate of revision surgery was 8.6%. Rate of early revision for suboptimal primary surgery was 28/1008 (2.8%). Median time to revision surgery for this indication was 2 days. Osteosynthesis failure with progressive deformity was observed in 40/1008 patients (4.0%). Median time to revision surgery for this indication was 16 days (IQR 10–31). Surgical site infection (SSI) requiring revision surgery occurred in 14/1008 (1.4%) patients, with a median time to revision of 21 days (IQR 18–33). Revision surgery due to suboptimal index surgery or osteosynthesis failure was significantly more frequent after anterior procedures than after posterior approaches ($p=0.024$ and $p=0.002$), whereas revisions for SSI occurred significantly more often following posterior fixation ($p=0.004$).

Conclusion

Posterior fixation should be considered when fracture patterns are associated with a greater risk of mechanical failure. However, this must be balanced against the higher incidence of SSI associated with posterior approaches. For any surgical approach; knowledge of the inherent complication risks and the rates and timing of revision-demanding failure is crucial for optimal postoperative care planning, as well as for patient information purposes.

Supraorbital Versus Orbito-Supraorbital Approach: a Direct Exoscopic Cadaveric Comparison of Surgical Exposure and Operative Freedom

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Frie foredrag 2, 22. oktober, 2026, 16:00 - 17:00

Background

In cerebrovascular and skull base surgery, small modifications of the surgical approach may substantially influence surgical exposure and operative freedom. The eyebrow supraorbital approach provides a minimally invasive corridor to the anterior cranial fossa and anterior circulation. Additional removal of the superior orbital rim may further improve the angle of attack, visualization, and instrument maneuverability, particularly for deep midline targets.

Objective

To compare the standard eyebrow supraorbital approach with an orbito-supraorbital modification including superior orbital rim removal, focusing on surgical access to the anterior communicating artery (ACoM) complex and suprasellar region. A secondary objective was to establish a cadaveric before-and-after model allowing direct comparison of both approaches in the same specimen.

Methods

Five formalin-fixed, latex-injected cadaver heads (10 approaches) underwent standardized eyebrow supraorbital craniotomy under exoscopic visualization. The ACoM complex served as the primary target, with the internal carotid artery bifurcation and, when accessible, the middle cerebral artery bifurcation as secondary targets. Quantitative and qualitative outcome measures included craniotomy dimensions, target depth, visualization, dissectability, bimanual maneuverability, need for brain retraction, exoscope angulation, and feasibility of clip application. Following the initial assessment, the approach was converted to an orbito-supraorbital craniotomy by removing the superior orbital rim and orbital roof, after which all targets were reassessed without further intradural dissection.

Preliminary Results

Conversion to the orbito-supraorbital approach required only a limited additional extradural step. Preliminary observations suggest a shallower working trajectory with improved visualization and operative freedom, particularly for the ACoM complex, whereas differences for access to the ICA and MCA bifurcations appeared less pronounced. Quantitative analyses are ongoing.

Conclusions

This exoscopic cadaveric model enables direct within-specimen comparison of supraorbital and orbito-supraorbital approaches while minimizing anatomical variability. Final quantitative and qualitative results will be presented at the Norwegian Neurosurgical Autumn Meeting 2026.

Brain Arteriovenous Malformations in Children – an Institutional Experience from 25 Years of Treatment

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Frie foredrag 3, 23. oktober, 2026, 09:00 - 10:00

Background

Data from long-term outcomes in children treated for brain arteriovenous malformations (AVMs) remain limited.

Objective

To analyse long-term clinical and radiological outcomes in children treated at Oslo University Hospital (OUH) for brain AVMs over a 25-year period.

Methods

We retrospectively reviewed clinical and radiological data from children (≤ 18 years) treated for brain AVMs at OUH between 2000 and 2024, with a minimum follow-up of one year.

Results

A total of 96 children were treated (mean age 12.8 ± 4.8 years). Most AVMs (87%) were Spetzler-Martin grades 1–3; 15% were located infratentorially. At presentation, 54% of patients presented with bleeding, while 8% were asymptomatic. As a single-modality treatment, microsurgery was performed in 39%, stereotactic radiosurgery in 28%, and embolization in 2%, while 9% were initially managed conservatively. Multimodal treatment was used in 21.9%, and 49.4% underwent repeated treatments. New or recurrent bleeding occurred in 11% of patients during the follow-up. Among patients who had completed treatment ($n=75$), obliteration was achieved in 80%, significantly more frequently following hemorrhagic presentation. Obliteration rates were 89% after microsurgery and 52% after radiosurgery, respectively, with significantly higher radiosurgical obliteration rates in the hemorrhagic group. Recurrence after radiologically documented obliteration occurred in 7%, exclusively following microsurgery. Favourable clinical outcome, defined as a modified Rankin Scale (mRS) score of 0–2, was achieved in 84%, although significantly less in patients presenting with haemorrhage. Overall mortality was 5%, with no significant difference between the hemorrhagic and non-hemorrhagic groups. On univariable analysis, hydrocephalus, hematoma volume, nidus size, infratentorial location, Spetzler-Martin grade, supplementary grade, and combined grade predicted unfavorable clinical outcome, with combined grade being the strongest predictor. On multivariable analysis, hemorrhagic presentation was a strong predictor of obliteration, whereas radiosurgery and increasing number of treatments were associated with failure to achieve obliteration.

Conclusion

Despite hemorrhagic presentation in more than half of patients, most of them achieved favourable long-term clinical outcomes. Microsurgery and stereotactic radiosurgery provided the highest obliteration rates, particularly following hemorrhagic presentation, while endovascular treatment primarily had a supplementary role.

NORspine-AID: AI Enabled Decision Support for Spine Surgery Integrated into the Electronic Health Record – a Feasibility Study

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Frie foredrag 3, 23. oktober, 2026, 09:00 - 10:00

Background

Prediction models for surgery are seldom useful due to lack of integration into the workspace of the clinicians, namely the electronic health record (EHR). Further, few decision support tools are evaluated in clinical trials. We developed NORspine-AID, a decision support trained on the Norwegian Registry for Spine surgery, which is integrated into the EHR DIPS Arena. In this study, we aimed to evaluate and iteratively redesign the decision support and workflow for future clinical trials.

Methods

In this feasibility study, we used mixed methods in a spine surgery outpatient clinic. Primary outcome was surgeon and patient acceptability for using the decision support and workflow in further clinical trials. Secondary outcome was rate of patients who completed their pre-consult questionnaire, rate of surgeons who used the decision support, and consult duration in minutes. Consultations were observed. Surgeons and patients were semi-structurally interviewed afterwards. The decision support and workflow were changed iteratively.

Results

We included seven surgeons and 13 patients. The surgeons had 4-30 years of experience in spine surgery, with a mean of 16 years. The patients age ranged 25-76 years, of which ten had lumbar disc herniation, and three had lumbar spinal stenosis. They had slightly better function than that of the registry, with mean Oswestry Disability Index 38 versus 43. All accepted the final version of the decision support and workflow for further clinical trials. All surgeons highlighted improved preparation and history, especially due to having ODI, BMI and duration of symptoms available ahead of the consultation. Some surgeons worried about trust in cases of surgeon-decision disagreement. Patients reported full trust in their surgeon even if there was disagreement. Compliance to questionnaires and the decision support was 100%. Consults lasted on average 27.3 minutes (SD 5.1), and the history was consistently completed during the first 7 minutes.

Discussion

We consider NORspine-AID feasible enough for multi-center trials. Our study found no notable security issues. Our findings are explorative, and not representative, and we do not know yet whether using the decision support will improve surgery outcome. Further studies should include control groups to assess this.

NORspine-AID: Using National Register Data for AI-Enabled Spine Decision Support Integrated in the Electronic Health Record – Innovation Report

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Frie foredrag 3, 23. oktober, 2026, 09:00 - 10:00

Background

Registry data are under-utilized to improve surgery outcomes. Prediction models trained on registry data are seldom accessible due to lack of validation and integration into the electronic health record (EHR).

Methods

Using data from the Norwegian national quality registry for spine surgery (NORspine), we developed NORspine-AID, an AI-enabled decision support to inform shared decision making on spine surgery. The models were validated on NORspine, and simplified models were externally validated on national data from Sweden and Denmark. NORspine-AID was integrated into the EHR DIPS Arena and shows predicted function by Oswestry Disability Index (ODI) 12 months after surgery as well as leg and back pain outcome for similar patients. User panels contributed to design of the user-interface. The solution was designed for yearly updates and makes up a framework that can be used by other national quality registries.

Results

Models were trained on 18,377 lumbar disc herniation and 24,540 of spinal stenosis cases. Mean absolute errors were 11 and 12 ODI points for disc herniation and spinal stenosis, respectively. Bias across sex, age, education and native language was low, with mean error differences consistently below 5 ODI points between the groups. Simplified models performed almost the same in external validation. User panels preferred a color-coded design to visualize the predicted outcomes. The solution is made to adhere to regulatory demands for future clinical trials and implementation. We conducted a successful end-to-end test in a protected test environment before launch in the EHR's regular production environment.

Conclusion

This innovation lays the groundwork for evaluation of NORspine-AID in clinical trials. Potential broad adoption and scaling to other registers depends on how clinicians and patients perceive usability and safety, and on whether clinical trials will show improved patient outcomes. An ongoing feasibility study will therefore be followed by a clinical pilot study and a register embedded prospective randomized trial.

Outer-Diameter Shrinkage of the Carotid Fork in Caucasian Moyamoya Angiopathy: A CISS MRI Reproducibility and Diagnostic Phenotype Study

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Frie foredrag 3, 23. oktober, 2026, 09:00 - 10:00

Background

Moyamoya Angiopathy MMA is a progressive steno-occlusive disease affecting the terminal portion of the internal carotid artery (ICA) and the proximal segments of its main branches, the middle and anterior cerebral arteries (M1 and A1). The diagnostic criteria for the disease were revised in Japan in 2021, introducing a new MRI-based diagnostic approach, MRI-CISS. This revision builds on previous studies, mainly from Asia, that demonstrated a significant decrease in the outer vessel diameter in patients with Moyamoya disease compared with control groups.

Hypothesis

Given the heterogeneity of Western Moyamoya patients and previously demonstrated differences between Western and Asian MMA patients, we considered it necessary to test the assumption that outer vessel diameter shrinkage is specific for Moyamoya disease in European Caucasians.

Methods

High-resolution CISS-imaging was performed in patients enrolled in a prospective moyamoya disease cohort. Patients with confirmed moyamoya disease (bilateral or unilateral) of Caucasian or Southeast Asian origin were included. Outer vessel diameters of the ICA, M1, A1, and Basilar artery BA were measured independently by two neuroradiologists. Interobserver agreement was assessed using the intraclass correlation coefficient (ICC). Because moyamoya disease is an asymmetric condition, each hemisphere was treated as an individual case. Vessel outer diameter / BA ratios were compared with Southeast Asian measurement, published East Asian reference values and the contralateral healthy side.

Results

Among patients with confirmed moyamoya angiopathy, 21 were excluded due to moyamoya syndrome or non-Southeast Asian or Caucasian ancestry. Ultimately, 25 Caucasian and 3 Southeast Asian patients were included (6 males, 22 females). 23 patients had bilateral disease and 5 had unilateral disease. The mean age was 48 years (range 26–70). Analyses were conducted on 56 hemispheres. The ICC demonstrated excellent agreement between the two neuroradiologists. Ongoing analyses will further assess the robustness and reproducibility of the MRI-CISS method and validate the 2021 diagnostic criteria within our cohort. Final results will be presented at the Neurosurgical National autumn meeting.

Submillimeter Accuracy in Varioguide-assisted SEEG Surgery: The Impact of iCT-based Registration

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Frie foredrag 3, 23. oktober, 2026, 09:00 - 10:00

Background

Stereoelectroencephalography (SEEG) is a procedure used to localize the epileptogenic zone in patients with drug-resistant epilepsy (DRE). Accurate electrode placement is critical to minimize risks of hemorrhagic complications. In frameless systems, accuracy depends heavily on the registration quality. This study evaluates the influence of three successive registration techniques on electrode placement accuracy using Varioguide.

Methods

Patients undergoing SEEG from 2015-2025 were prospectively categorized by registration modality into: surface matching with Z-touch and pre-calibrated pointer (P), surface matching with Softouch (ST), and automatic image registration with intraoperative CT (iCT). Radial and Euclidean error at entry point (EP) and target point (TP), angular error, and depth error were calculated from XYZ coordinated. In addition, axis-specific deviations were analyzed. Complication rates were recorded.

Results

In total, 150 patients received 1,738 electrodes. Median radial EP error improved significantly across groups: P (n=207) 2.3 mm (IQR 1.4-3.6), ST (n=909) 1.4 mm (0.8-1.9), and iCT (n=622) 0.8 mm (0.5-1.12). Median Euclidean TP error decreased from 2.8 mm (1.8-4.4) in P to 1.7 mm (1.1-2.3) in ST and 1.4 mm (0.9-1.8) in iCT. Median 3D angular error improved from 1.8° (1.1-2.9) in P to 1.4° (0.9-2.1) in ST and 1.1° (0.7-1.6) in iCT. All error reductions were statistically significant. Post-explantation CT identified hemorrhage in 57 (38%) of patients; however, only one patient developed transient neurological deficits.

Conclusion

Registration is a critical determinant of the performance in frameless SEEG implantation. Whenever available, iCT-based automatic registration provides the highest implantation accuracy and should be the preferred registration technique.

Long-Term Functional and Radiological Outcomes Among Survivors of Ankylosing Spondylitis-Associated Cervical Spine Fractures: a Cross-Sectional Follow-Up Study

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Frie foredrag 4, 23. oktober, 2026, 11:15 - 12:00

Background

Patients with ankylosing spondylitis (AS) are predisposed to unstable cervical spine fractures, often following low-energy trauma. While short-term outcomes have been described, long-term functional and radiological outcomes among survivors remain poorly characterized.

Methods

Survivor cohort study with combined retrospective and prospective case identification and cross-sectional long-term follow-up, including patients with AS-associated cervical spine fractures treated at a single regional neurotrauma center between 2010 and 2020. Surviving patients underwent cross-sectional long-term follow-up including patient-reported outcomes, neurological and functional assessment, and cervical CT imaging. Primary outcomes included Neck Disability Index, Numeric Rating Scale for neck pain, American Spinal Injury Association Impairment Scale (AIS), Karnofsky Performance Status, living status, and CT-based fracture healing.

Results

Among 144 patients with AS-associated cervical spine fractures, 102 were alive and eligible for follow-up; 97 completed assessments at a median follow-up of 4.2 years. Median Neck Disability Index was 16% (IQR 6–30). Most patients lived independently (80%), with median Karnofsky Performance Status 80 (IQR 70–90). Among patients with spinal cord injury, 50% recovered to AIS E and 71% improved by at least 1 AIS grade. Neck pain was generally mild (median Numeric Rating Scale 2), and CT demonstrated solid bony fusion in 96% of assessed cases.

Conclusions

Among long-term survivors, neck-related disability and pain were generally low, independence was preserved in most patients, and fracture healing rates were high.

Nationwide Neurosurgical Compensation Claims in Norway (2015–2024): Insights from a No-Fault System

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Frie foredrag 4, 23. oktober, 2026, 11:15 - 12:00

Background

Medico-legal claims are often used as proxies for malpractice burden and health care quality. However, they reflect not only underlying clinical events but also the structure of the compensation system through which they are adjudicated. This is particularly relevant in neurosurgery, where high baseline risk and uncertainty in outcome attribution may influence both the propensity to file claims and their subsequent resolution.

Methods

We retrospectively analyzed 620 neurosurgery-related compensation decisions issued in Norway between 2015 and 2024, assessing clinical domain, injury category, administrative decision grounds, and failure-process domain.

Results

Compensation was granted in 93 of 620 decisions (15.0%). Nontraumatic spinal disorders represented the largest domain (225/620, 36.3%) but had a low grant rate (23/225, 10.2%), whereas grant rates were higher in cerebrospinal fluid/shunt disorders (17/43, 39.5%) and trauma (9/29, 31.0%). Within nontraumatic spinal disorders, cervical degenerative disease showed particularly low compensability (8/149, 5.4%). Among granted decisions, the leading failure-process domains were preoperative or diagnostic (35/93, 37.6%), intraoperative or procedural (22/93, 23.7%), and perioperative or postoperative (13/93, 14.0%).

Conclusions

In this national neurosurgical dataset from a no-fault compensation system, compensation was uncommon and primarily reflected avoidable failures along the care pathway rather than adverse outcomes alone, meaning that many clinically recognized complications or poor outcomes, including those following technically adequate surgery, did not meet criteria for compensation. Compensation data should therefore not be interpreted as surgical complication rates, but as a system-filtered signal of avoidable failure whose meaning depends on compensation system design. Meaningful comparison across countries requires attention to differences in compensation pathways.

Retrospective Analysis of Selective Nerve Root Block Injections as a Predictor of Surgical Outcome and Long-Term Pain Relief

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Frie foredrag 4, 23. oktober, 2026, 11:15 - 12:00

Background

In selective nerve root block (SNRB), local anesthetic and corticosteroids are injected around a specific nerve root to identify a symptomatic level in radicular pain. Evidence that a positive block predicts surgical outcome remains limited. We evaluated its predictive value for surgical outcome and duration of pain relief.

Methods

All transforaminal SNRBs performed at our department from 29.10.2024 to 01.07.2026 were retrospectively identified: 225 blocks in 183 patients; 165 patients (204 blocks) with completed follow-up were analyzed. MRI findings were classified as root-level stenosis, disc herniation, synovial cysts, or no clear mechanical nerve root compression. Response was defined as improvement of radicular pain and long-term effect as >4 weeks. Fisher's exact test and logistic regression were used.

Results

Mean age was 57 years; 61% were female and 47% had previous spine surgery. MRI showed root-level stenosis in 47%, disc herniation in 38%, no clear compression in 10%, and synovial cysts in 5%. Overall, 117/165 patients (71%) responded; 49% of responders had long-term effect (NNT 2.9). Patients without clear MRI compression responded in 11/17 (65%). Recess stenosis independently predicted failure (60% vs 77%; OR 0.37, $p=0.008$), while coexisting central stenosis was associated with lower response (40% vs 74%, $p=0.013$). Previous decompression was not associated with response ($p=0.39$). After a positive block, 29/32 (91%) patients operated at the evaluated level improved. Short-lived response predicted surgical success similarly to durable response (22/24 vs 7/8). Of six operated despite a negative block, four improved (sensitivity 88%; specificity 40%, 95% CI 5–85%).

Conclusion

A positive SNRB predicted surgical success regardless of response duration. A negative block should not by itself exclude surgery. SNRB provided lasting relief in half of responders without surgery during follow-up. Prospective studies are needed to establish its predictive and therapeutic value.

Subaxial Cervical Spine Fractures in Ankylosing Spondylitis: Management and Outcomes from a 10-Year Population-Based Cohort

Pål Nicolay Rydning¹, Hege Linnerud¹, Jalal Mirzamohammadi¹, Tor Brommeland¹, Magnus Evjensvold², Vidar Stenset¹, Dag Ferner Netteland¹, Eirik Helset¹, Markus K. H. Wiedmann¹

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Frie foredrag 4, 23. oktober, 2026, 11:15 - 12:00

Background

Patients with ankylosing spondylitis (AS) are predisposed to unstable cervical spine fractures (CS-Fx) with a high risk of cervical spinal cord injury (cSCI). Evidence regarding optimal management and outcomes in this population remains limited. This study aimed to describe treatment strategies and short-term outcomes in a prospectively collected, population-based cohort.

Methods

This 10-year population-based study included all traumatic subaxial CS-Fx in patients with AS treated at Oslo University Hospital, the sole neurotrauma center serving Southeast Norway (2015–2024). Data were prospectively collected and analyzed for fracture morphology, management approach, surgical technique, complications, and 90-day mortality.

Results

A total of 132 fractures occurred in 127 patients (median age 70 years, 88% male). Most injuries resulted from low-energy falls (86%). AO type B or C fractures accounted for 94%, and 20% were associated with SCI. Primary management was surgical in 67% and conservative in 33%, with posterior fixation as the predominant surgical approach (76%). Among patients initially managed conservatively, 14% required delayed surgery. Revision surgery was performed in 9%, most commonly for implant failure after anterior-only fixation or deep infection. Ninety-day mortality was 16% and was independently associated with advanced age, higher ASA score and in-hospital pneumonia, but not with SCI, functional status, or treatment modality.

Conclusions

Most AS-related subaxial CS-Fx are highly unstable and benefit from early surgical stabilization. Conservative management carries a substantial risk of failure. The high short-term mortality reflects patient frailty rather than treatment strategy. Multidisciplinary evaluation and close follow-up are essential, particularly for patients managed nonoperatively.

Distance Dependent Accuracy Differences of Continuous Dynamic Motor Mapping in Supratentorial Brain Tumor Surgery

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Frie foredrag 5, 23. oktober, 2026, 13:00 - 14:00

Introduction

Continuous dynamic mapping (CDM) provides real-time information on the proximity to motor pathways during brain tumor surgery. The aim is to enable more extensive tumor resection while reducing the risk of postoperative motor deficits. We investigated whether CDM can be used as a reliable intraoperative tool to estimate the distance to the corticospinal tracts (CST) by comparing CDM-based distance estimates with distance measurements derived from postoperative diffusion tensor imaging (DTI).

Methods

This retrospective observational study included patients with supratentorial gliomas who underwent surgery with combined tractography, neuronavigation and CDM at Oslo University Hospital between January 2021 and April 2024. Intraoperatively, the lowest motor stimulation threshold was recorded during tumor resection. Postoperatively, MR including DTI was performed to visualize the CST and to measure the shortest three-dimensional (Euclidean) distance between the resection cavity and the CST. These data provided the basis for comparing intraoperative distance estimates (from CDM stimulation thresholds) with anatomically derived postoperative distance measurements (from DTI).

Results

Preliminary analyses demonstrate a generally good agreement between distance estimates obtained with CDM and those derived from postoperative DTI ($r=0.818$, $p<0.001$) and furthermore indicate that the discrepancy between the two measurements differs depending on the distance to the CST.

Discussion and Conclusion

Our findings support the concept that CDM can serve as a clinically useful tool for intraoperative mapping of motor pathways during glioma surgery. The close correspondence between physiological and anatomical distance estimates is in line with previously published data and reinforces the validity of CDM as a supplement to imaging-based planning, where the added information about distance dependencies in its precision may help to further optimize the balance between extent of resection and preservation of motor function.

Experiences of being diagnosed with unruptured intracranial aneurysm in a population-based health survey: A qualitative interview study

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Introduction

Most unruptured intracranial aneurysms (UIA) are small and carry a low rupture risk. Many patients are therefore not treated with occlusion but managed conservatively. Evidence on the psychological impact of living with an untreated UIA is limited and conflicting.

Research question

To explore experiences of receiving a diagnosis of a UIA and having to live with it over time.

Material and Methods

The Tromsø7 health survey examined 1862 participants with magnetic resonance angiography and 85 diagnosed with conservatively managed UIAs were eligible for inclusion. We invited 24 based on purposive maximum-variation sampling according to age, sex, and aneurysm size, and 18 consented. Twelve participated in semi-structured interviews before data saturation was achieved. We excluded two because the interviews revealed exclusion criteria (cognitive impairment and treated aneurysm). Data from 10 interviews conducted median eight years after diagnosis were included in a thematic analysis.

Results

In retrospective narratives, many participants recalled experiencing serious worry or fear shortly after the diagnosis. Most described a subsequent process of adaption to the uncertainty through trust in clinicians, resilience, normalization and meaning-making, which enabled them to reestablish normality in everyday life. Concerns could resurface around follow-ups. Few described persistent anxiety at the time of the interview. The diagnosis motivated healthy lifestyle changes for many.

Discussion and Conclusion

The interviews revealed substantial psychosocial impacts of having to live with untreated UIAs. We suggest these insights could inform decision-making in contexts where clinicians and patients must balance the potential benefits and burdens of imaging and surveillance.

Plasma Brain-Derived Tau in Adult Moyamoya Angiopathy: Associations with Cognitive Impairment and Cerebrovascular Reserve

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Introduction

Adult moyamoya angiopathy (MMA) is a chronic intracranial steno-occlusive disease characterised by cerebral hypoperfusion, impaired cerebrovascular reserve (CVR), and increased stroke risk. Persistent cognitive impairment, fatigue, and reduced functional capacity are common despite clinical stability, but objective biomarkers of ongoing brain injury are lacking. Brain-derived tau (BD-tau) is a brain-specific blood biomarker of neuronal injury with diagnostic and prognostic value in acute ischaemic stroke; its relevance in chronic cerebral hypoperfusion is unknown. We investigated whether plasma BD-tau is altered in stable adult MMA and associated with cognitive impairment or CVR.

Methods: In this cross-sectional case-control study, 37 adults with MMA and 14 healthy controls were included. Plasma BD-tau was measured using the S-PLEX assay. Group differences were assessed using multivariable linear regression of ln-transformed BD-tau adjusted for age and sex. Associations of BD-tau with the Global Cognitive Impairment Index (GCII) and CVR were evaluated using multivariable linear regression.

Results

Plasma BD-tau did not differ between patients with MMA and healthy controls after adjustment for age and sex (adjusted geometric mean ratio 1.04, 95% CI 0.83–1.30; $p=0.730$). Higher BD-tau was associated with greater cognitive impairment ($\beta=0.338$, 95% CI 0.004–0.672; $p=0.047$), although this association was attenuated after adjustment for prior stroke. BD-tau was not associated with CVR status (adjusted geometric mean ratio 0.88, 95% CI 0.66–1.17; $p=0.372$).

Conclusions

Plasma BD-tau is not elevated in clinically stable adult MMA and is not associated with impaired CVR, suggesting limited utility as a biomarker of chronic haemodynamic compromise. Its modest association with cognitive impairment warrants investigation in larger longitudinal studies.

Quality Improvement in Norwegian Spine Surgery

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Frie foredrag 5, 23. oktober, 2026, 13:00 - 14:00

Quality Improvement in Norwegian Spine Surgery; *Experience from the Norwegian Registry for Spine Surgery*

Background

The Norwegian Registry for Spine Surgery (NORspine) was established in 2007 to monitor outcomes and quality of surgical treatment for degenerative spinal disorders. Several quality indicators (QIs) have subsequently been introduced to identify variation in clinical practice and facilitate quality improvement.

Methods

Nationwide registry data from NORspine were used to evaluate temporal trends in selected process and outcome indicators. Data from patients undergoing surgery for lumbar disc herniation and lumbar spinal stenosis were analyzed over the available observation periods.

Results

Several indicators demonstrated substantial improvement over time.

The proportion of lumbar disc herniation patients with low preoperative radicular pain decreased from approximately 7% in 2011 to 5.5% in 2023.

Preoperative antibiotic prophylaxis increased from 48% during 2007–2010 to 98.8% by 2013 and remained consistently high thereafter.

Use of an operating microscope or surgical loupes increased from below 80% in 2010 to 94% in 2024, including an increase from 70% to 90% for lumbar spinal stenosis surgery.

Incidental dural tears decreased from 6.8% to 3.5% in lumbar spinal stenosis surgery and from approximately 2% to just above 1% in lumbar disc herniation surgery between 2010 and 2024.

The rate of primary fusion surgery for degenerative lumbar spondylolisthesis decreased from 2010 to 2024.

Primary micro-decompression surgery for degenerative lumbar spondylolisthesis increased in the same period.

The infection rate after spinal surgery was around 4% in 2011. The following years since 2011, postoperative surgical site infection has shown a slightly decreasing trend towards 3% of all patients operated.

Conclusion

Nationwide registry data demonstrate substantial changes in several aspects of Norwegian spine surgery during the past decade. High adherence to established safety measures, increased use of magnification devices, improved patient selection, and decreasing rates of incidental dural tears suggest improved and increasingly standardized surgical practice. There has been a shift towards less invasive surgery for degenerative lumbar spondylolisthesis.

NORspine illustrates how a national clinical registry and systematically defined quality indicators can support continuous quality improvement in spine surgery.

