Conservative versus early surgical treatment in the management of pyogenic spondylodiscitis: a systematic review and meta-analysis [Abstract]

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FU (p<.001). 81,3 % of the patients had an intraoperative blood loss of less than 100 ml. Mean time of surgery was 92 minutes (± 28) with 6 days (± 3) as the mean length of stay. There were no significant group differences between upper (C3-C6) and lower (C6-T1) cervical spine concerning symptom relief (all p>.05). All surgery levels were identified correctly. Anterior revision surgery was performed in 3 patients because disc herniation could not be completely removed from dorsal.

Conclusions: Intraoperative 3D navigation was successfully used for PCF in our patient cohort, resulting in significant symptom relief. Especially during procedures on the lower cervical spine and cervicothoracic junction, 3D navigation simplified orientation and thus ensures an equivalent outcome as on the upper cervical spine.

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SPINAL GLYMPHATIC CLEARANCE – A LONG TERM (7D) DISPLAY OF SPINAL PERIVASCULAR SPACES IN A MOUSE MODEL.

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Oral e-Poster Presentations - Booth 2: Spine 1 (Trauma&Misc), September 25, 2023, 10:00 AM - 10:40 AM

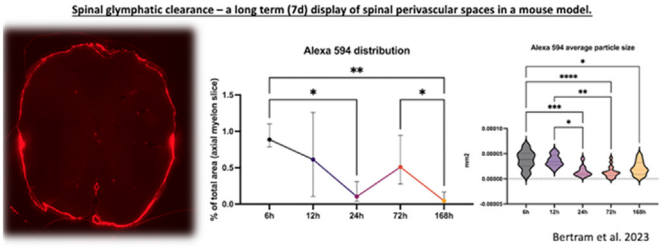
Background: The circulation within perivascular spaces of the central nervous system, aka the “glymphatic system” is enjoying more and more attention. Its potential to transport and clear metabolites as well as drugs into and from neuronal tissue made it an ideal candidate for research in context of neurodegenerative and neuroinflammatory diseases. However, spinal cords perivascular clearance pathways and dynamics have not yet been properly characterized. Since acute and chronic spinal cord injuries are partially driven by an inflammatory component, there is an intrinsic neurosurgical interest to understand spinal cords perivascular clearance dynamics.

Methods: The fluorescence marker Alexa 594 was injected into the cisterna magna of mice. Eight animals were euthanized after 6, 12, 24, 72 and 168h respectively and spinal cords dissected for histological analysis. Axial slices were examined via fluorescence microscopy and analyzed using ImageJ to examine tracer distribution.

Results: Alexa 594 was found along intramedullary vessels and in the subarachnoid compartment. Ordinary one-way ANOVA revealed a significant decrease in stained area of the axial slices over the observed period. A relative decline in stained area comparing 6h (100% ± 63) vs. 24h (15% ± 13;p<.05) 6h vs. 168h (19% ± 32; p<.01) and 72h (80% ± 100) vs 168h (0<.05) suggests a polynomial function of clearance. The average size of fluorescent particles found decreases significantly between 12 and 24h (3.6 ± 1.2x10-5 vs. 1.5 ± 1.1x10-5mm2; p<.05) after intrathecal injection, displaying a distribution along smaller-caliber vessels.

Conclusions: We demonstrate a mouse model to perform medium to long-term observation of glymphatic circulation. To our knowledge this is the first display of perivascular influx and long term circulation from subarachnoid space into the spinal cord and vice versa. Its role in spinal cord injury can be derived from multiple studies of the brains clearance but must be investigated further.

Optional Image



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THE CORRELATION BETWEEN THE PARAVERTEBRAL MUSCLE QUALITY AND SYMPTOMS OF LUMBAR SPINAL STENOSIS

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Oral e-Poster Presentations - Booth 2: Spine 1 (Trauma&Misc), September 25, 2023, 10:00 AM - 10:40 AM

Background: The correlation between the severity of graphical findings and neurological deficit in lumbar spinal stenosis (LSS) patients remains controversial. The predominant works have not shown any dependence between the mentioned categories. The origin of the problems is multifactorial and simplified models cannot accurately classify and quantify the patient's condition. The variety of possible symptoms is probably evidence of this. In our study, we add another element to the correlation that is easy to detect and quantify — the state of the paravertebral muscles in the MR image and the degree of cauda equina compression.

Methods: We assessed subjective difficulties using the Oswestry Disability Index (ODI) and clinical symptoms by grading the modified Neurological Disability Score for lumbar spinal stenosis (mNIS-LSS), age and sex of the patients. We measured the spinal canal area, the dural sac area (Hamanishi) and the sedimentation classification (Schizas) on MRI. In addition, we evaluated the state of the paravertebral muscles according to a five-point scale (Goutallier). Finally, we tested the correlation between all the categories at the significance level of p <0.05.

Results: Sixty-one patients operated for symptomatic LSS were enrolled, with a median age of 67. In total, we evaluated 162 spinal segments.
Muscle degeneration correlates with age higher than seventy and with the sex of the patients. Muscle degeneration is more typical for women.
There is no correlation between all other studied categories.

Conclusions: the lumbar spine. However, using it as an explicit criterion to assess the patient's condition and decide on the indication of surgical treatment is still questionable, despite some optimistic results.

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CONSERVATIVE VERSUS EARLY SURGICAL TREATMENT IN THE MANAGEMENT OF PYOGENIC SPONDYLODISCITIS: A SYSTEMATIC REVIEW AND META-ANALYSIS.

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Oral e-Poster Presentations - Booth 2: Spine 1 (Trauma&Misc), September 25, 2023, 10:00 AM - 10:40 AM

Background: Spondylodiscitis is a prevalent type of spinal infection, with pyogenic spondylodiscitis being the most common subtype. While antibiotic therapy is the standard treatment, some argue that early surgery can aid in infection clearance, improve survival rates, and prevent long-term complications such as deformities. However, others view early surgery as excessively risky. Due to the

high mortality rate of up to 20%, it is crucial to determine the most effective treatment.

Methods: The primary objective of this study was to compare the mortality rate, relapse rate, and length of hospital stay for conservative and early surgical treatments of pyogenic spondylodiscitis, including determinants of outcomes. The study was registered on PROSPERO with the registration number CRD42022312573. The databases MEDLINE, Embase, Scopus, PubMed, and JSTOR were searched for original studies comparing conservative and early surgical treatments of pyogenic spondylodiscitis. The included studies were assessed using the ROBINS-1 tool, and eligible studies were evaluated using meta-analyses, influence, and regression analyses.

Results: The systematic review included 31 studies. The meta-analysis, which had a pooled sample size of 10,954 patients from 21 studies, found that the pooled mortality rate among patients treated with early surgery was 8%, while the rate was 13% for patients treated conservatively. The mean proportion of relapse/failure was 15% for patients treated with early surgery and 21% for those treated conservatively. Furthermore, the analysis concluded that early surgical treatment is associated with a 40% and 39% risk reduction in relapse/failure and mortality rates, respectively, when compared to conservative management. Additionally, early surgical treatment resulted in a 7.75-day reduction in length of hospital stay per patient ($p<0.01$). The most highly significant predictors of treatment outcome were found to be intravenous drug use, diabetes, the presence of an epidural abscess, positive cultures, location of infection, and age ($p<0.001$).

Conclusions: Overall, early surgical management was found to be consistently significantly more effective than conservative management in terms of relapse/failure and mortality rates when treating pyogenic spondylodiscitis, particularly for non-spinal epidural abscess spondylodiscitis.

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PERCUTANEOUS NAVIGATED TRANSPEDICULAR INSTRUMENTATION IN SUBAXIAL CERVICAL SPINE: EARLY SINGLE-CENTER EXPERIENCE

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Oral e-Poster Presentations - Booth 2: Spine 1 (Trauma&Misc), September 25, 2023, 10:00 AM - 10:40 AM

Background: Transpedicular (TPD) screw placement in cervical spine is a demanding procedure biomechanically superior to massa lateralis screws. The advent of intraoperative 3D imaging with neuronavigation (NN) established the safe use of TPD trajectory in cervical spine. In various cases there is no dorsal decompression needed, in our consideration these patients are well suitable for a minimal invasive approach. In our single-center study we report our initial experience with percutaneous approach for TPD screw placement.

Methods: Inclusion criteria for the study was the indication for dorsal cervical instrumentation without need for decompression e.g., after ventral surgery. We use the pronation position with the head fixed in carbon Mayfield on which the navigation reference is also attached. In lower cervical spine the reference frame is fixed on the spinous process. We carry out a reference scan with mobile intraoperative 3D-imaging device, navigate the soft tissue dilatation through a small skin incision and pre-drill in the planned TPD trajectory into which we insert Kirschner wire. We perform a control 3D scan followed by navigated implantation of the cannulated screws. The final assessment with implanted rods is then performed by an intraoperative 3D scan.

Results: Our actual patient cohort contains 6 cases with 32 percutaneously implanted TPD screws in subaxial cervical spine. There was no neurovascular injury. Navigation accuracy when comparing screenshots of the planned screw trajectory during pre-drilling and the real position of the Kirschner wire and the screws from the intraoperative 3D scan was in all cases <1mm. Patients were discharged on the 2nd postoperative day. An outpatient check-up with a radiograph was performed 6 and 12 weeks after the surgery when we were able to state intact implanted construct and unproblematic wound healing.

Conclusions: We state the safety and benefit of percutaneous implantation of TPD screws in subaxial cervical spine. Intraoperative 3D-imaging with neuronavigation is enabling safer procedure with less tissue exposition. Due to superior biomechanical nature of TPD trajectory there is legitimate consideration about lowering the number of involved levels.

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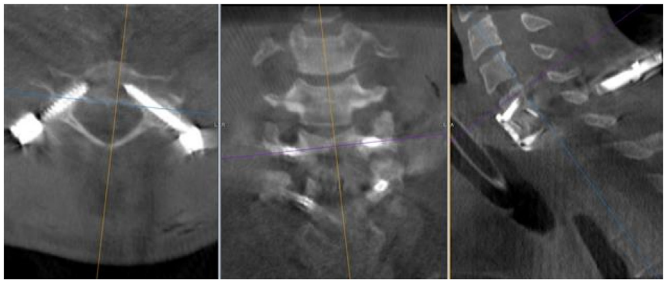

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SPINOPELVIC INJURIES: CLINICAL AND RADIOLOGICAL LONG-TERM OUTCOMES IN A SERIES OF PATIENTS

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Oral e-Poster Presentations - Booth 2: Spine 1 (Trauma&Misc), September 25, 2023, 10:00 AM - 10:40 AM

Background: Spinopelvic dissociations are rare lesions related to high energy-injury mechanisms. We describe the subjects treated at our center with complex sacral fractures requiring spinopelvic fixation, their complications, and long-term outcomes.

Methods: Methods: In this retrospective study, we gathered information regarding the different injuries, the surgical procedure, and the recovery period. The long-term (one-year) clinical outcomes are described, via the Short Form-36, the EuroQol Group Survey, and the Oswestry disability index (ODI). Radiological assessment of spinopelvic parameters was done with standing radiography of the entire spine. We used Pearson and Kendall-tau tests to look for significance between long-term clinical outcomes and the radiological parameters.

Results: Results: We collected 26 patients, 12 were males, and 14 were women, with a median age of 35 years [range 16 – 67 years]. High-speed accidents affected seven subjects; the remaining suffered from fall accidents. 15 sacral fractures were C-type, and 11 were B-type per the new AO classification. At least eight subjects had neurologic deficits at admission.

After surgery, eight subjects suffered from deep wound infections; new neurologic deficits were present in two patients.

Long-term outcomes show that pain (73%) and gait disturbances (62%) were the main issues experienced by these patients. After surgery, ten subjects achieved neurologic improvement; nine remained with permanent deficits. Spinopelvic parameters showed an overall moderate deformity (odontoid hip axis angle (OD-HA) = 2.03º, spinal vertical alignment = 5.02cms, T1-pelvic angle = 24.59º, pelvic incidence-lumbar lordosis mismatch = 17.32º, pelvic tilt = 25.9º). There was not a good correlation between clinical outcomes and radiological parameters. Only ODIs scores showed a medium correlation with the OD-HA ($\tau = 0.39$ ($p < 0.05$)).

Conclusions: Conclusions: Spinopelvic injuries pose high rates of morbidity. Radiological parameters do not correlate well with long-term follow-up outcomes. Further studies are needed to confirm this and find other factors influencing clinical outcomes.

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THE CERVICO-THORACIC JUNCTION FRACTURES IN PATIENTS WITH ANKYLOSING SPONDYLITIS AND DIFFUSE IDIOPATHIC SPINE HYPEROSTOSIS

Ayoub Saaid [1], Stefano Colonna [1], Nicola Marengo [1], Alessandro Fiumefreddo [1], Salvatore Petrone [2], Andrea Bianconi [1], Fabio Cofano [1,2], Diego Garbossa [1], Marco Ajello [1]. [1] *University Of Turin, Neuroscience Department "Rita Levi Montalcini", Turin, Italy;* [2] *Spine Surgery Unit, Humanitas Gradenigo Hospital, Turin, Italy*