which allows the user for segmental three-dimensional anatomical modification in virtual reality.

Conclusion: Multi-volume rendering allows for patient specific surgical planning of deformity correction in virtual reality.

BRAIN AND SPINE
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Current state and future perspectives of spinal navigation and robotics - an AO Spine survey

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Objective: The use of robotics in spine surgery has gained popularity in recent years. This study aims to assess the current state of navigation and robotics in spine surgery and raise awareness of their educational implications across the AO Spine regions.
Methods: An online questionnaire comprising 27 questions was distributed to AO spine members between October 25th and November 13th, 2023, using the SurveyMonkey platform (https://www.surveymonkey.com; SurveyMonkey Inc., San Mateo, CA, USA). Statistical analyses (descriptive statistics, Pearson Chi-Square tests) and generation of all graphs were performed using SPSS Version 29.0.1.0 (IBM SPSS Statistic).
Results: We received 424 responses from AO Spine members (response rate = 9.9 %). The participants were mostly board-certified orthopedic surgeons (46 %, n=195) and neurosurgeons (32%, n=136) with an equal distribution from academic/non-academic institutions (50 %, n=212). While 49% (n=208) of the participants reported occasional or frequent use of navigation assistance, only 18 % (n=70) indicated the use of robotic assistance for spinal instrumentation. A significant difference based on the country's median income status (p<0.001) and the respondent's number of annual instrumentation procedures (p<0.001) has been observed. While 11 % (n=47) of all surgeons use a spinal robot frequently, 36 % (n=153) of the participants stated they don't need a robot from a current perspective. Most participants (77%, n=301) concluded that high acquisition costs are the primary barrier for the implementation of robotics.
Conclusion: Although the hype for robotics in spine surgery increased recently, robotic systems remain non-standard equipment due to cost constraints and limited usability. Spinal navigation appears to have a broader international utilization.

BRAIN AND SPINE
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Comprehensive Management of Osteoporotic Vertebral Compression Fractures: A Narrative Review and Algorithm Development

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Objective: Osteoporotic vertebral compression fractures (OVCFs) are pervasive among the elderly population, contributing significantly to morbidity and mortality. Despite their prevalence, current clinical guidelines lack consistent recommendations for the diagnostic and therapeutic management of OVCFs. This narrative review, spanning articles from 1993 to 2023, aims to address critical questions faced by physicians dealing with elderly patients presenting acute back pain, proposing an algorithm for OVCF clearance based on clinical presentation, radiological features, and the Osteoporotic Fractures (OF) classification.
Methods: An extensive literature search in PUBMED from January 1993 to May 2023 was conducted, focusing on clinical, experimental studies, systematic reviews, and meta-analyses related to OVCFs. Relevant articles were selected based on their contribution to answering key questions in the management of OVCFs.
Results: The algorithm recommends initial radiological assessment using multidetector or multiplanar reconstruction (MPR) CT scans, considering age, red flags, and clinical presentation. Magnetic resonance imaging (MRI) is advised in specific cases, guided by spine surgeon consultation. The OF classification system aids in categorizing fractures for appropriate management, with an associated scoring system helping determine treatment approach. Laboratory evaluations

guide pharmacological treatment for osteoporosis, which is crucial for preventing subsequent fractures. Conservative and surgical management options are discussed, emphasizing the importance of early ambulation and the potential benefits of vertebral augmentation procedures.
Conclusion: This comprehensive review provides a practical algorithm for the management of OVCFs, addressing diagnostic and therapeutic uncertainties. The proposed algorithm, grounded in current literature, serves as a guide for physicians in emergency departments and general practice, facilitating timely and accurate decision-making for optimal patient outcomes. Collaborative efforts between spine teams and bone disease specialists are crucial for a holistic approach to OVCF management, ensuring a balance between conservative and surgical interventions.
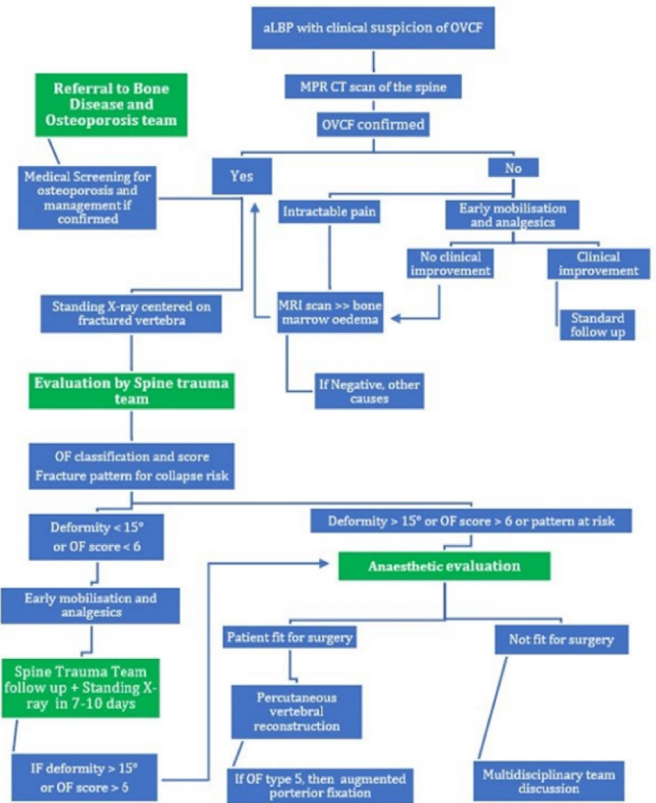
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Feasibility of an inductive pedicle screw loosening detection concept using a pulse induction metal detector

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Objective: Pedicle screw loosening is a major problem in spine surgery. Computed tomography (CT) is the gold standard to diagnose screw loosening. Disadvantages of CT include low sensitivity and specificity for the detection of loosened screws as well as the need for radiation exposure. The aim of this study was to provide a proof of concept of a novel, non-invasive, inductive sensing device for transcutaneous detection of screw loosening using a pulse induction metal detector.
Methods: Two fresh frozen human cadavers were initially instrumented in the lumbar spinal region (L1 to L5). After assessment of the sensing device behavior using a wooden beam and 3D printed place holders of predefined distances, the ability of implant detection and screw stability determination were assessed during two experiments. Pedicle screw loosening was induced using 3D printed drill / loosening guides during the instrumentation of the lumbar spine. Screw stability was determined by applying weight to the spinous processes of interest and measuring the relative movement of the pedicle screw using the inductive sensor coil.