

that spine tumors are known to cause significant vertebral body destruction and focal kyphotic deformity, the influence of global spinal alignment in the context of spine oncology remains unknown. As such, we conducted a retrospective cohort review of adult patients with spine tumors and investigated the incidence and association of spinopelvic deformity on outcomes after spine surgery. **Methods:** A multi-institutional retrospective cohort study was conducted on patients with spine tumors who received one or more full-length spinal (scoliosis) x-rays at two, large tertiary medical centers over a period of 7 years. Local and global spinopelvic parameters were measured on all available pre- and initial postoperative scoliosis x-rays, including pelvic tilt, sacral slope, pelvic incidence (PI), thoracic kyphosis, T1 slope, lumbar lordosis (LL), global tilt, sagittal vertical axis, coronal alignment, PI-LL mismatch, and global alignment and proportion (GAP) score. Patients were then compared between a PI-LL mismatch of ≤ 10 (appropriately aligned) or >10 degrees (positive sagittal imbalance) in terms of baseline characteristics, postoperative outcomes, and mortality. Continuous, nonparametric variables are expressed as median (interquartile range) and categorical data is expressed as frequency (%). Fisher's exact test was used to compare categorical data and Wilcoxon rank-sum test was used for continuous data. A p-value < 0.05 was considered statistically significant.

Results: Between 2012 and 2019, 82 adult patients with one or more spinal tumors received pre- and/or postoperative full-length spinal (scoliosis) x-rays at the authors' institutions. Of these patients, 38 (46%) were found to have a PI-LL mismatch ≤ 10 degrees and 44 (54%) patients had a mismatch > 10 degrees, denoting positive sagittal imbalance. Patients with sagittal imbalance were more frequently male ($n = 35$ (80%); $p = 0.001$), had extra-vertebral osseous metastasis ($n = 33$ (75%), $p = 0.04$), and presented with pain ($n = 44$ (100%), $p = 0.018$). However, other characteristics including age, functional status (i.e., mRS and KPS), pathological vertebral body collapse, treatment approach and modalities, hospital length of stay and discharge location, postoperative complication rates, mortality and survival rates were relatively similar between groups over a follow-up duration of 20 (7-33.5) months. **Conclusions:** The incidence and impact of spinopelvic deformity on patients with spinal tumors has been previously unknown. This is the first study to demonstrate that the majority of patients with spine tumors may develop spinal deformity during the course of their disease process. While previous investigations have shown a negative correlation between positive sagittal imbalance and patient outcomes in the degenerative spine population, we did not find a significant difference in our spine oncology cohort. Ultimately, larger, prospective studies with standardized imaging and follow-up protocols are needed to further elucidate the impact of spinopelvic deformity on outcomes in patients with spine tumors.

196

A050: Do the use of autograft influence the fusion and complication rate in patients undergoing 1 or 2-level ACDF surgery? A PRISMA-compliant network meta-analysis

Sathish Muthu^{1,2}, Vibhu Krishnan Viswanathan^{2,3}, Ricardo Rodrigues-Pinto^{4,5}, Juan P. Cabrera⁶, Stipe Corluka^{7,8}, Christopher Martin⁹, Michael Collins^{10,11}, Neha Agarwal¹², Yabin Wu¹³, Jeffrey C. Wang^{14,15}, Meisel Hans-Jorg¹⁶, Zorica Buser^{17,18}, and AO Spine Knowledge Forum Degenerative

¹Department of Orthopaedics, Government Medical College, Dindigul, India

²Department of Spine Surgery, Orthopaedic Research Group, Coimbatore, India

³Department of Musculoskeletal Oncology, University of Calgary, Alberta, Canada

⁴Department of Orthopaedics, Centro Hospitalar Universitário do Porto, Portugal

⁵Universidade do Porto, Portugal Instituto de Ciências Biomédicas Abel Salazar, Portugal

⁶Department of Neurosurgery, Hospital Clínico Regional de Concepción, Chile

⁷Spinal Surgery Division, Department of Traumatology, University Hospital Centre Sestre Milosrdnice, Zagreb, Croatia

⁸University of Applied Health Sciences, Department of Anatomy and Physiology, Zagreb, Croatia

⁹Department of Orthopaedic Surgery, University of Minnesota, Minneapolis, United States

¹⁰Department of Orthopaedic Surgery, Tulane University, New Orleans, United States

¹¹Department of Neurosurgery, Tulane University, New Orleans, United States

¹²P95 Epidemiology and Pharmacovigilance, Leuven, Belgium

¹³AO Foundation, Research Department, AO Spine, Davos, Switzerland

¹⁴Department of Orthopaedic Surgery, Keck School of Medicine, University of Southern California, California, United States

¹⁵Department of Neurosurgery, Keck School of Medicine, University of Southern California, California, United States

¹⁶Department of Neurosurgery, BG Klinikum Bergmannstrost Halle, Germany

¹⁷Gerling Institute, New York, United States

¹⁸Department of Orthopedic Surgery, NYU Grossman School of Medicine, New York, United States

Introduction: To date, there exists significant ambiguity regarding the benefits and pitfalls of the use of autograft, other bone graft substitutes, and different constructs for reconstruction in patients undergoing ACDF. The current study was

conducted to compare the fusion outcomes and complications for different 1 or 2-level anterior cervical decompression and fusion (ACDF) constructs performed with and without the application of autologous bone graft. **Methods:** We performed an independent and duplicate search in electronic databases including PubMed, Embase, Web of Science, Cochrane, and Scopus for relevant articles published between 2000 and 2020. We included comparative studies reporting fusion rate and complications with and without the use of autografts in ACDF across 5 different fusion constructs. A network meta-analysis was performed with the included studies in Stata, categorized based on the type of fusion constructs utilized. Available fusion constructs were ranked based on the p-score approach and surface under cumulative ranking curve (SUCRA) scores. The confidence of results from the analysis was appraised with Cochrane's CINeMA approach. **Results:** A total of 2,216 patients from 22-studies including 6 Randomized Controlled Trials (RCTs) and 16 non-RCTs were included in the network analysis. The mean age of included patients was 49.3 (\pm 3.62) years. Based on our meta-analysis, we could conclude that the use of autograft in 1- or 2-level ACDF did not affect the achievement of final fusion and mechanical implant-related complications. The final fusion and mechanical complication rates were also not significantly different across the five different ACDF fusion constructs. The use of plated constructs was associated with a significant increase in the post-ACDF dysphagia rates [OR 3.42; 95% CI (0.01,2.45)], as compared to stand-alone procedures but were associated with the lowest rates of graft collapse and subsidence. **Conclusion:** The choice of fusion constructs and use of autografts does not significantly affect the fusion and overall complication rates following 1 or 2-level ACDF.

1878

A051: An investigation of the potential of the human skeletal stem cell to replace mesenchymal stromal cells in bone tissue engineering

Daniel Ahern¹, Mathieu Riffault¹, Barry Moran², David Hoey¹, and Joseph Butler³

¹Trinity Centre for Biomedical Engineering

²School of Biochemistry and Immunology, Trinity College Dublin, Dublin, Ireland

³Department of Trauma and Orthopaedics, Mater Misericordiae University Hospital, Dublin, Ireland

Introduction: Mesenchymal stromal cells (MSCs) have long been considered as one of the key cellular precursors in bone formation and have been the subject of several pre-clinical and clinical studies exploring their role in spinal fusion. However, the clinical application of MSCs is currently limited by significant variability, which could potentially be explained by the heterogeneous nature of MSC samples. Recently, a skeletal

stem cell (SSC), and its progeny, were identified in adult human long bones. We sought to identify the presence of these cells within human vertebral body (VB) bone marrow and examine their osteogenic potential, in order to identify a cellular candidate for bone tissue engineering (TE). **Methods:** Bone marrow aspirates were obtained from the vertebral body bone marrow of patients undergoing posterior spinal fusion. Flow cytometric analysis was used to identify proportions of SSC populations within the marrow isolate, with the remaining undergoing traditional plastic adherent cell culture expansion. Serial flow cytometry was performed to identify trends in SSC cell surface marker expression over time. At Passage (P)3, PA MSCs underwent cell sorting and the SSC, BCSP, OP and CP cell populations were isolated individually from the main MSC fraction. These in turn, were culture expanded to P7 in tandem with the MSC, at which point all populations underwent flow cytometry and osteogenic and adipogenic assays. **Results:** 6 donors were recruited to this study (3 male and 3 female). The SSC and progenitors were present in varying proportions of each donor: SSC 0.0542%, BCSP 0.9%, OP 10.868%, CP 5.553%. Following culture expansion, significant changes over time were demonstrated between the proportions of the SSC and progenitors within the total cell fraction. Following culture expansion, a significant reduction in cell surface marker expression was found in all groups. For individual donors, the OP demonstrated superior osteogenic potential compared to the SSC (3-fold greater, $p < 0.05$) but not compared to the MSC. **Conclusion:** Here, we describe the presence of the SSC within the VB BM. The low presence of the SSC or progenitors within BM precludes their use from immediate cell sorting and reimplantation following BM aspiration. Therefore, cell culture expansion of MSCs is necessary to obtain a viable number of cells. While the SSC has demonstrated great promise as a pure stem cell, here, the OP cell demonstrated superior osteogenic capacity to the SSC with equivalent osteogenic capacity to the MSC. While this study is primarily limited by a small sample size, this is the first study directly comparing the SSC to the traditional MSC.

1949

A052: Allograft cellular bone matrix as an alternative to iliac crest autograft in anterior cervical discectomy and fusion

Samuel Goldman¹, Gregory Paschal¹, Frederik Abel¹, Philip Paschal¹, Celeste Abjornson¹, Andrew Sama², and Frank Cammisa²

¹Integrated Spine Research Program

²Spine Surgery, Hospital For Special Surgery, New York, United States

Introduction: Anterior Cervical Discectomy and Fusion (ACDF) is a commonly used surgical procedure to alleviate