

# LA COLUMNA AL DÍA

**DEGENERATIVA**  
**DEFORMIDAD**  
**PEDIÁTRICA**  
**TUMORAL**  
**REHABILITACIÓN**  
**CERVICAL**  
**MISCELÁNEA**  
**TRAUMA**  
**OSTEOPOROSIS**

REVISTA DE LA SOCIEDAD ESPAÑOLA DE COLUMNA VERTEBRAL

Nº 0 ENERO 2024





## ¡Bienvenidos a nuestro nuevo proyecto!

Con este número comenzamos una aventura editorial que esperamos tenga éxito. Se trata de una revista cuatrimestral que revisa en profundidad la actualidad en el diagnóstico y tratamiento de los problemas de espalda desde un punto de vista multidisciplinar. La revista será una revisión de los artículos más interesantes que se hayan publicado en el mundo desde las diferentes perspectivas de los especialistas que tratamos los problemas de espalda (traumatólogos, neurocirujanos, radiólogos, rehabilitadores, etc.), así como las mejores comunicaciones presentadas en los congresos más relevantes, que permita a los lectores, a través de una lectura rápida, adquirir una información absolutamente actualizada de los progresos en el mundo de los problemas de columna.

**Dr. Luis Álvarez Galovich**  
Presidente GEER

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## A COMPARISON BETWEEN CORTICAL BONE TRAJECTORY SCREWS AND TRADITIONAL PEDICLE SCREWS IN PATIENTS WITH SINGLE-LEVEL LUMBAR DEGENERATIVE SPONDYLOLISTHESIS: FIVE-YEAR RESULTS

Kwon JW, Park Y, Ho Lee B, Young Park S, Kwang Lim C,  
Ho Yang J, Ha JW, Suk KS, Moon SH, Kim HS

### RESUMEN (ABSTRACT)

**Study design:** A retrospective observational study.

**Objective:** This study investigated the clinical and radiological results of using cortical bone trajectory (CBT) screws versus traditional pedicle (TP) screws in transforaminal lumbar interbody fusion (TLIF) during a five-year follow-up of patients with single-level lumbar degenerative spondylolisthesis.

**Summary of background data:** Few studies have compared five-year follow-up outcomes between CBT screws and TP screws in TLIF.

**Materials and methods:** We reviewed outcome data of patients with single-level lumbar degenerative spondylolisthesis who underwent TLIF procedures with CBT screws (131 patients) or TP screws (80 patients) between 2011 and 2015. Patient-reported clinical outcome data included Oswestry disability index scores and visual analog scale (VAS) scores for back and leg pain at baseline, six months, and one year, two years, and five years postoperatively. The radiographic fusion rate and prevalence of secondary surgery for adjacent segment disease were also measured.

**Results:** During the follow-up over five years, the CBT group had significantly lower VAS scores for back pain ( $P < 0.0001$ , respectively). At two years after surgery, the CBT group had significantly higher VAS scores for leg pain ( $P = 0.007$ ). At five years postoperatively, no significant differences existed in the VAS score for leg pain or in the Oswestry disability index score between the two groups. Radiographic fusion rates (CBT vs. TP: 95.5% vs. 95.9%;  $P = 0.881$ ) and adverse events during the five years after surgery were not significantly different. At two years postoperatively, the prevalence of secondary surgery to treat adjacent segment disease was significantly different between the two groups (CBT vs. TP: 13.7% vs. 5.0%;  $P = 0.044$ ).

**Conclusions:** Our results suggest that, during a five-year followup, CBT screws for TLIF were an effective treatment compared to TP screws in the setting of single-level lumbar degenerative spondylolisthesis. However, when using CBT screws for TLIF, surgeons should consider the higher rate of secondary procedures to treat symptomatic adjacent segment disease.

### COMENTARIO

Estudio de cohortes retrospectivo comparando el resultado y las complicaciones de tornillos pediculares tradicionales y tornillos de trayectoria cortical en pacientes con espondilolistesis degenerativa. No encontraron diferencias entre los dos grupos en cuanto a resultados clínicos o radiológicos pero sí una tasa mayor de complicaciones así como una mayor tasa de reoperación a los dos años en el grupo de tornillos de trayectoria cortical.

### INTERPRETACIÓN

Se trata de un estudio en el que el autor principal examina sus propios resultados después de cambiar su práctica clínica habitual al incorporar la técnica de tornillos pediculares, y las diferencias entre grupos son pequeñas, por lo que hay que interpretar con cautela las diferencias entre grupos en relación a complicaciones intraoperatorias. En cuanto a la mayor tasa de reoperación, no se aporta una explicación biomecánica que la justifique.

## DO PEEK RODS FOR POSTERIOR INSTRUMENTED FUSION IN THE LUMBAR SPINE REDUCE THE RISK OF ADJACENT SEGMENT DISEASE?

Hirt D, Prentice HA, Harris JE, Paxton EW, Alexander J, Nagasawa DT, Khosla D, Kurtz SM

Int J Spine Surg. 2021 Apr; 15(2): 251-258. DOI: 10.14444/8034  
PMID: 33900982; PMCID: PMC8059379

### RESUMEN (ABSTRACT)

**Background:** Polyetheretherketone (PEEK) rods were clinically introduced in the mid-2000s as an alternative to titanium (Ti) rods for posterior instrumented lumbar spine fusion, theorized to reduce the risk of adjacent segment disease (ASD). However, few studies have follow-up beyond 2 years. Consequently, we conducted a matched cohort study using data from Kaiser Permanente's spine registry to compare the 2 rod systems and risk for outcomes.

**Methods:** Patients aged  $\geq 18$  undergoing first posterior lumbar fusion for a degenerative diagnosis from 2009 to 2018 using either a PEEK or a Ti rod were identified. Fusions using Ti rods were 2:1 propensity score matched to PEEK rods on the following factors: patient age, body mass index, smoking, American Society of Anesthesiologists classification, diagnosis, interbody use, bone morphogenic protein use, number of levels fused, fusion levels, and operative year. The matched sample included 154 PEEK and 308 Ti fusions. We used Cox regression to evaluate ASD and nonunion, and logistic regression to evaluate 90-day emergency department (ED) visit, readmission and complication.

**Results:** We did not observe a difference in risk for ASD (hazard ratio = 1.02, 95% confidence interval [CI] = 0.66-1.59) or ED visit (odds ratio [OR] = 0.88, 95% CI = 0.48-1.59). A lower likelihood of readmission (OR = 0.34, 95% CI = 0.13-0.94) was observed following PEEK fusion compared with Ti. No non-unions or 90-day complications were observed for the PEEK group; 5 (2-year cumulative incidence = 0.7%) nonunions and 4 (1.3%) complications were observed for the Ti group.

**Conclusions:** Our multicenter study did not support the hypothesis that PEEK rods are associated with a lower ASD risk. Reasons for readmission need to be identified to better understand the differences observed here. Further study of patients with TLIF using Ti and PEEK rods and posterolateral fusion with Ti and PEEK rods is needed.

**Clinical relevance:** The present study adds to the literature supporting their midterm effectiveness of PEEK rods compared with Ti rods for both their safety and their effectiveness at the 5-7-year follow-up.

### COMENTARIO

Se trata de un estudio de cohortes emparejadas retrospectivo muy bien diseñado desde el punto de vista estadístico en el que se compara la tasa de fusión entre barras de PEEK y de titanio en artrodesis lumbar primaria con la hipótesis de que las barras de PEEK menos rígidas podrían ayudar a prevenir el desarrollo de degeneración de segmento adyacente. No se encontraron diferencias significativas en términos de tasa de fusión o complicaciones entre los grupos, pero sí una discreta disminución en la tasa de readmisión en el grupo de PEEK.

### RELEVANCIA CLÍNICA

La utilización de barras de PEEK en lugar de las más habitualmente utilizadas de titanio puede ser una alternativa eficaz en pacientes sometidos a artrodesis lumbar por patología degenerativa.

## SELECTIVE THORACOLUMBAR FUSION IN ADULT SPINAL DEFORMITY DOUBLE CURVES WITH CIRCUMFERENTIAL MINIMALLY INVASIVE SURGERY: 2 YEAR MINIMUM FOLLOW-UP

Anand N, Robinson J, Chung A, Gendelberg D,  
Jiménez-Almonte JH, Kahwaty S, Khandehroo B, Walker C  
Presented at the 2023 AANS/CNS Joint Section on Disorders  
of the Spine and Peripheral Nerves

### RESUMEN (ABSTRACT)

**Objective:** Selection of the upper instrumented vertebra (UIV) level for adult spinal deformity (ASD) remains controversial. Although selective fusion attempts have been described for fractional curves or adolescent curves, no authors have described selective thoracolumbar fusion performance for ASD with double curves. This study evaluated the clinical impact of selective fusion constructs within the lower thoracic and/or lumbar spine on ASD with double curves.

**Methods:** A retrospective review was performed on an ASD (Cobb angle  $> 20^\circ$ , sagittal vertical axis [SVA]  $> 50$  mm, and pelvic incidence minus lumbar lordosis mismatch [PI-LL]  $> 10^\circ$ ) database consisting of 438 patients who underwent correction with circumferential minimally invasive surgery (CMIS) between 2007 and 2020. The inclusion criteria were ASD double curves (lumbar Cobb angle  $> 35^\circ$  and thoracic Cobb angle  $> 30^\circ$ ), 4 or more levels fused, and minimum 2-year follow-up. Analyses were performed on spinopelvic data and clinical outcome scores. Complications were recorded, specifically the need for revision surgery and hardware-related complications.

**Results:** Twenty-one ASD double curve patients underwent selective correction with a mean  $\pm$  SD (range) follow-up of  $91 \pm 43$  (24-174) months. A total of 141 levels were fused with a mean of  $6.7 \pm 1.3$  (4-8) levels. T10 was the most proximal and most common UIV (10/21 [48%]). Pelvic fixation was performed in 12 patients (57%). Significant improvements in lumbar Cobb angle, thoracic Cobb angle, coronal balance, lumbar lordosis, thoracic kyphosis, SVA and PI-LL were achieved. The uninstrumented thoracic spine demonstrated  $14.5^\circ$  of mean coronal correction and a mean increase of  $9.4^\circ$  in kyphosis. Significant improvements in visual analog scale (VAS) and Oswestry Disability Index (ODI) scores were observed. Four patients required revision for the following reasons: 1) superficial wound infection requiring irrigation and debridement; 2) bilateral L5 pars fractures requiring L5-S1 anterior lumbar interbody fusion and pelvic fixation; 3) adjacent-segment degeneration at L5-S1 requiring anterior lumbar interbody fusion and pelvic fixation; and 4) proximal junctional kyphosis requiring revision fusion to include the entire thoracic curve. There were no instances of hardware failure such as rod breakage or screw loosening.

**Conclusions:** Selective thoracolumbar fusion with CMIS for ASD double curves can provide significant clinical improvements. Despite limiting fusion constructs to within the lower thoracic and/or lumbar spine, significant correction can be observed in the uninstrumented thoracic curve. The rate of mechanical complications was low, and the 2-year follow-up results suggested that limited fusion constructs are viable options for ASD double curve patients.

### COMENTARIO

Estudio retrospectivo en el que se analizaron los resultados clínicos y radiológicos de una serie de 141 pacientes con al menos dos años de seguimiento tras fusión selectiva mínimamente invasiva para la corrección de escoliosis del adulto de doble curva lumbar y torácica. Reportan mejoría significativa en VAS y ODI así como en todos los parámetros radiográficos medidos.

Se trata de un estudio muy interesante en el que se defiende la posibilidad de elegir fusiones selectivas en escoliosis de doble curva mientras se describe su metodología para la selección de niveles así como la técnica quirúrgica.

## INSTRUMENTED VERSUS UNINSTRUMENTED POSTEROLATERAL FUSION FOR LUMBAR SPONDYLOLISTHESIS: A RANDOMIZED CONTROLLED TRIAL

Andresen AK, Wickstrøm LA, Holm RB, Carreon LY, Andersen MØ

J Bone Joint Surg Am. 2023 Sep 6; 105(17): 1309-1317

DOI: 10.2106/JBJS.22.00941

### RESUMEN (ABSTRACT)

**Background:** In Scandinavia, spinal fusion is frequently performed without instrumentation, as use of instrumentation in the elderly can be complicated by poor bone quality and the risk of screw pull-out. However, uninstrumented fusion carries the risk of nonunion. We performed a randomized controlled trial in an attempt to determine if use of instrumentation leads to better outcomes and fusion rates when spinal fusion is performed for degenerative spondylolisthesis in the elderly.

**Methods:** This was a randomized, single-center, open-label trial of patients with symptomatic single-level degenerative spondylolisthesis who were assigned 1:1 to decompression and fusion with or without instrumentation after at least 12 weeks of nonoperative treatment had failed. The primary outcome was the change in the Oswestry Disability Index (ODI), and secondary outcomes included fusion rates within 1 year, reoperation rates within 2 years, and changes in the EuroQol-5 Dimension-3 Level (EQ-5D) score.

**Results:** Fifty-four subjects were randomized to each of the 2 groups, which had similar preoperative demographic and surgical characteristics. We found similar improvements in the ODI ( $p = 0.791$ ), back pain, leg pain, and quality of life between groups at 1 and 2 years of follow-up. Solid fusion on computed tomography (CT) scans was noted in 94% of the patients in the instrumented group and 31% in the uninstrumented group ( $p < 0.001$ ). One patient (2%) in the instrumented group and 7 (13%) in the uninstrumented group ( $p = 0.031$ ) had a reoperation within 2 years after the index surgery.

**Conclusions:** We found no difference in patient-reported outcomes when we compared instrumented with uninstrumented fusion in patients with degenerative spondylolisthesis. The uninstrumented group had a significantly higher rate of nonunion and reoperations at 2 years.

### COMENTARIO

Se trata de un ensayo clínico aleatorizado, abierto, unicéntrico en 108 pacientes con estenosis de canal lumbar y espondilolistesis degenerativa grados I o II que compara la liberación más fusión instrumentada o no instrumentada. No encontraron diferencias en la discapacidad medida por Oswestry (variable principal) al año y dos años, así como tampoco en el dolor lumbar, dolor radicular, calidad de vida (EQ-5D-3L y SF-36) ni en el cuestionario de claudicación de Zurich al año y dos años. El 94% de los pacientes instrumentados consiguió fusión frente al 34% en los no instrumentados ( $p < 0,001$ ). En el grupo instrumentación 1 paciente fue reoperado por fractura osteoporótica en un nivel superior frente a 7 en el no instrumentado (2 evacuaciones de hematoma en la primera semana y 5 repeticiones de la liberación y fusión instrumentada).

### RELEVANCIA CLÍNICA

Estos resultados equivalentes en las puntuaciones de PROMs hacen cuestionar la necesidad de fusión para obtener buenos resultados clínicos en la estenosis de canal lumbar con espondilolistesis degenerativa, ya que no parece depender de la existencia de masa de fusión. El mayor número de reoperaciones en el grupo no instrumentado debe ser tomado con cautela: el índice de fragilidad de esta variable es 1, indicando que si un solo paciente en el grupo de fusión instrumentada hubiera sido reintervenido o uno en el grupo fusión no instrumentada no hubiera sido reintervenido, las diferencias no serían significativas.

## EFFICACY OF ROUTINE INTRAOPERATIVE CRANIO-FEMORAL TRACTION IN SURGICAL TREATMENT OF ADOLESCENT IDIOPATHIC SCOLIOSIS CURVES MEASURING BETWEEN 50° AND 90°

Carl JR, Pannu G, Cherng-Yeh Chua E, Bacon A, Durbin-Johnson B, Javidan Y, Klineberg EO, Roberto RF

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### RESUMEN (ABSTRACT)

**Study design:** Retrospective Comparative Study, Level III.

**Objective:** In patients with scoliosis  $>90^\circ$ , cranio-femoral traction (CFT) has been shown to obtain comparable curve correction with decreased operative time and blood loss. Routine intraoperative CFT use in the treatment of AIS  $<90^\circ$  has not been established definitively. This study investigates the effectiveness of intraoperative CFT in the treatment of AIS between  $50^\circ$  and  $90^\circ$ , comparing the magnitude of curve correction, blood loss, operative time, and traction-related complications with and without CFT.

**Methods:** 73 patients with curves less than  $90^\circ$  were identified, 36 without and 37 with cranio-femoral traction. Neuromuscular scoliosis and revision surgery were excluded. Age, preoperative Cobb angles, bending angles, and curve types were recorded. Surgical characteristics were analyzed including number of levels fused, estimated blood loss, operative time, major curve correction (%), and degree of postoperative kyphosis.

**Results:** Patients with traction had significantly higher preoperative major curves but no difference in age or flexibility. Lenke 1 curves had significantly shorter operative time and improvement in curve correction with traction. Among subjects with 5 to 8 levels fused, subjects with traction had significantly less EBL. Operative time was significantly shorter for subjects with 5-8 levels and 9-11 levels fused. Curves measuring  $50^\circ$ - $75^\circ$  showed improved correction with traction.

**Conclusion:** Intraoperative traction resulted in shorter intraoperative time and greater correction of major curves during surgical treatment of adolescent idiopathic scoliosis less than  $90^\circ$ . Strong considerations should be given to use of intraoperative CFT for moderate AIS.

### COMENTARIO

Estudio retrospectivo comparativo de 73 pacientes con escoliosis idiopática del adolescente con curvas entre  $50$  y  $75$  grados que fueron intervenidos de artrodesis instrumentada posterior con o sin tracción transcraneal.

### RESULTADOS

Se encontró una mayor corrección del ángulo de Cobb acompañado de menor tiempo quirúrgico y menor pérdida hemática en el grupo de tracción con halo craneal.

### RELEVANCIA CLÍNICA

Los autores sugieren la utilización del halo-tracción de forma rutinaria en el tratamiento quirúrgico de la escoliosis idiopática del adolescente, incluso en los casos con curvas moderadas.

## COMPARISON OF OPERATIVE IMPLICATIONS BETWEEN ADOLESCENT AND YOUNG ADULT IDIOPATHIC SCOLIOSIS PATIENTS FROM SCOLIOSIS RESEARCH SOCIETY MORTALITY AND MORBIDITY DATABASE

Kurra S, DeMercurio P, Lavelle WF  
 Spine Deformity (2022) 10: 1133-1138  
<https://doi.org/10.1007/s43390-022-00515-7>

### RESUMEN (ABSTRACT)

**Purpose:** To compare the operative implications between adolescent idiopathic scoliosis patients (10-18 years) and young adult idiopathic scoliosis (YAdIS) patients (19-30 years).

**Methods:** This was a retrospective study querying the SRS M&M database for AIS (10-18 years) and YAdIS (19-30 years) cases enrolled between 2009 and 2015. Demographic and surgical parameters (Lenke curve classification, preoperative curve magnitude, approach type, osteotomy type, estimated blood volume (EBV), levels of fusion and ASA scores) were evaluated and compared between groups.

**Results:** N = 690: AIS (n = 607) and YAdIS (n = 83). Lenke curve classification distributions in AIS and YAdIS cases were: main thoracic, 293 vs. 34; double thoracic, 42 vs. 5; double major, 159 vs. 15; triple major, 15 vs. 5; thoracolumbar, 85 vs. 17; and lumbar, 5 vs. 6, respectively. Patients with a coronal curve > 90° were significantly greater in YAdIS vs. AIS patients, p = 0.008. Anterior and combined surgery rates were significantly higher in YAdIS, p = 0.028. Two-staged surgeries were significantly higher for YAdIS cohort, p = 0.01. Osteotomy rate was similar between groups, p = 0.42, but proportion of 3-column osteotomies was significantly higher for YAdIS, p < 0.001. ASA (severe systemic disease and some functional limitation) score 3 patients' rate was higher in YAdIS cohort, p = 0.01. EBV was significantly higher in YAdIS, p = 0.01. Average number of levels of fusions between cohorts was not significant, p = 0.87.

**Conclusions:** The operative implications observed with young adult idiopathic scoliosis patients may potentially result in more complex surgical procedures and operative-associated complications than their adolescent counterparts. Further studies are required and should include a larger number of cases, be prospective in nature and verifiable data.

### COMENTARIO

Se trata de un estudio retrospectivo tomado de la base de datos de morbilidad y mortalidad de la SRS. Estudiaron más de 607 pacientes entre 19-30 años y 690 entre 10-18 años operados de artrodesis instrumentada para la corrección de escoliosis idiopática.

### RESULTADOS

Se encontraron diferencias estadísticamente significativas entre los grupos con una mayor frecuencia de casos con doble abordaje, cirugía estadiada, osteotomía de las tres columnas en el grupo de pacientes entre 18-30 años. Se registró también una mayor pérdida hemática durante la cirugía en este grupo.

### RELEVANCIA CLÍNICA

Este estudio subraya la necesidad de detectar y tratar aquellas curvas que sean quirúrgicas antes de la edad adulta. A pesar de los buenos resultados obtenidos en la cirugía de corrección de escoliosis idiopática del adulto joven, el cirujano, los pacientes y las familias deben comprender que se enfrentan a una mayor agresividad quirúrgica y probabilidad de complicaciones.

## CONSTRUCTION OF A TOOL TO PREDICT OVERALL SURVIVAL OF PATIENTS WITH PRIMARY SPINAL TUMORS AFTER SURGICAL RESECTION: A REAL-WORLD ANALYSIS BASED ON THE SURVEILLANCE, EPIDEMIOLOGY AND END RESULTS DATABASE

Huang Z, Tong Y, Kong Q

Global Spine J. 2023 Oct; 13(8): 2422-2431. DOI: 10.1177/21925682221086539 Epub 2022 Mar 26. PMID: 35341359; PMCID: PMC10538349

### RESUMEN (ABSTRACT)

**Background:** We aim to construct a practical clinical prediction model to accurately evaluate the overall survival (OS) of patients with primary spinal tumors after primary tumor resection, thereby aiding clinical decision-making.

**Methods:** A total of 695 patients diagnosed with a primary spinal tumor, selected from the Surveillance, Epidemiology and End Results (SEER) database, were included in this study. The Cox regression algorithm was applied to the training cohort to build the prognostic nomogram model. The nomogram's performance in terms of discrimination, calibration, and clinical usefulness was also assessed in the internal SEER validation cohort. The fitted prognostic nomogram was then used to create a web-based calculator.

**Results:** Four independent prognostic factors were identified to establish a nomogram model for patients with primary spinal tumors who had undergone surgical resection. The C-index (.757 for the training cohort and .681 for the validation cohort) and the area under the curve values over time (both  $>.68$ ) showed that the model exhibited satisfactory discrimination in both the SEER cohort. The calibration curve revealed that the projected and actual survival rates are very similar. The decision curve analysis also revealed that the model is clinically valuable and capable of identifying high-risk patients.

**Conclusions:** After developing a nomogram and a web-based calculator, we were able to reliably forecast the postoperative OS of patients with primary spinal tumors. These tools are expected to play an important role in clinical practice, informing clinicians in making decisions about patient care after surgery.

### COMENTARIO

Los autores estudiaron 695 pacientes de una base de pacientes con tumores primarios de columna. Utilizaron 488 para construir un modelo de predicción que posteriormente se validó en los 207 restantes.

### RESULTADOS

Se encontraron como factores determinantes la histología, el grado, el estadio y la edad (mayor o menor de 60 años) que fueron utilizados para el desarrollo de un software informático que devuelve una predicción de supervivencia.

### RELEVANCIA CLÍNICA

Este modelo para calcular la supervivencia global de los pacientes afectados por tumores primarios de raquis puede proveer una información esencial para la toma de decisiones terapéuticas. Este modelo es de utilización libre y está disponible en internet.

## SPINOUS PROCESS-SPLITTING LAMINECTOMY APPROACH FOR TUMOR EXCISION AT CONUS MEDULLARIS OR CAUDA EQUINA LEVEL RESULTS IN SATISFACTORY CLINICAL OUTCOMES WITHOUT AFFECTING GLOBAL SPINAL SAGITTAL ALIGNMENT

Okubo T, Nagoshi N, Tsuji O, Nishimura S, Suzuki S, Nori S, Yagi M, Matsumoto M, Nakamura M, Watanabe K

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### RESUMEN (ABSTRACT)

**Study design:** Retrospective comparative study.

**Objectives:** The present study investigated radiographical changes in global spinal sagittal alignment (GSSA) and clinical outcomes following tumor resection using spinous process-splitting laminectomy (SPSL) approach without fixation in patients with conus medullaris (CM) or cauda equina (CE) tumor.

**Methods:** Forty-one patients with CM or CE tumor (19 males, 22 females, mean age at surgery of  $52.9 \pm 13.0$  years) were included in this study. The variations of outcome variables were analyzed in various GSSA profiles using radiographic outcomes. The clinical outcomes were assessed using Japan Orthopaedic Association (JOA) score and JOA back pain evaluation questionnaire (JOABPEQ).

**Results:** In all cases, the various GSSA parameters (sagittal vertical axis, C2-7 lordosis, T1 slope, thoracic kyphosis, T10-L2 kyphosis, lumbar lordosis [LL; upper, middle, and lower], sacral slope, pelvic incidence, and pelvic tilt) did not significantly change in the 2-years postoperative period. Moreover, age at surgery, the number of resected laminae, preoperative T12-L2 kyphosis, or LL did not affect the postoperative changes in T12-L2 kyphosis or LL, and had no statistically significant correlation among them. The scores of each postoperative JOA domain and the Visual Analogue Scale included in the JOABPEQ were significantly improved. There was no statistical significant group difference in each sagittal profile or clinical outcomes between CM and CE groups postoperatively.

**Conclusions:** Tumor resection using SPSL approach did not affected the various GSSA parameters examined and resulted in satisfactory clinical outcomes, indicating that SPSL approach is a suitable surgical technique for patients with CM or CE tumor.

**Keywords:** Japan Orthopaedic Association back pain evaluation questionnaire; Japan Orthopaedic Association score; Visual Analogue Scale; cauda equina tumor; conus medullaris tumor; global spinal sagittal alignment; low back pain; spinous process-splitting laminectomy.

### COMENTARIO

Se trata de un estudio retrospectivo en el que se evalúan los resultados de la cirugía de resección sin instrumentación en un grupo de pacientes con tumores medulares.

### RESULTADOS

Describen mejoría clínica medida en Japan Orthopaedic Association (JOA) y JOA para el dolor lumbar (JOABPEQ). Los autores no encontraron pérdida en el equilibrio sagital ni otros parámetros espino-pélvicos a los 2 años postquirúrgicos.

### RELEVANCIA CLÍNICA

La resección y descompresión simple sin instrumentación puede ser suficiente e incluso ventajosa en este grupo de pacientes frágiles que se pueden beneficiar de una menor agresión quirúrgica y estancia hospitalaria sin comprometer los resultados clínicos.

## PROGRAMA DE INTERVENCIÓN PSICOLÓGICA PARA POTENCIAR EL AFRONTAMIENTO ACTIVO EN PACIENTES CON DOLOR CRÓNICO DE LA ESPALDA

Pomares Ávalos AJ, Zaldívar Pérez DF, López Fernández R

Rev Soc Esp Dolor. 2022; 29(3): 149-156

### RESUMEN

**Objetivo:** Evaluar la efectividad de un programa de intervención psicológica para potenciar al afrontamiento activo en pacientes con dolor crónico de la espalda.

**Material y método:** Es una investigación de desarrollo tecnológico que parte de la metodología establecida para el diseño y evaluación de programas. Se llevó a cabo un diseño cuasi-experimental de comparación de grupos, pretest y postest con grupo de estudio y testigo. El estudio se realizó en el Hospital Dr. Gustavo Aldereguía Lima de la provincia de Cienfuegos, Cuba, de julio a noviembre de 2020. Se utilizó un muestreo intencional, no probabilístico casual o a conveniencia de participantes voluntarios, quedando conformada la muestra por 60 pacientes. Las variables estudiadas fueron las estrategias de afrontamiento, el autocuidado, las alteraciones emocionales y la discapacidad funcional. El análisis estadístico de la información se realizó en el paquete estadístico SPSS. Se utilizó la prueba de los rangos con signo de Wilcoxon para muestras relacionadas y la prueba de Mann-Whitney para realizar comparación de muestras independientes intergrupos (diferencias entre Grupo Estudio y Grupo Testigo después de la intervención). Se establece un error  $\alpha$  de tipo 1 = 0,05. Para ello se trabajó con hipótesis nula.

**Resultados:** Los resultados permiten afirmar que los indicadores más favorecidos por el programa de intervención fueron las estrategias de afrontamiento, el autocuidado y la discapacidad funcional, mientras que las alteraciones emocionales disminuyeron en menor frecuencia.

**Conclusiones:** El programa de intervención psicológica implementado demostró ser efectivo para potenciar el afrontamiento activo en los pacientes con dolor crónico de la espalda, en tanto logró promover el uso de estrategias activas, estimular el autocuidado de la salud, disminuir las alteraciones emocionales y favorecer la capacidad funcional del paciente en las distintas esferas de la vida cotidiana.

### COMENTARIO

Se trata de un estudio con diseño cuasi experimental de comparación de grupos pretest y postest con grupo estudio y grupo control. Se analizaron un total de 60 pacientes con un tiempo mínimo del dolor lumbar de 6 meses de evolución. De estos pacientes, 30 se incluyeron en el grupo estudio y 30 en grupo control. El programa realizado utilizó la intervención psicológica basada en la psicoeducación con modalidad grupal. Este programa demostró ser efectivo para potenciar el afrontamiento activo en pacientes con dolor crónico, ayudando a los pacientes a estimular el autocuidado de la salud y a disminuir las alteraciones emocionales.

### RELEVANCIA CLÍNICA

Encontramos este estudio relevante ya que la mayoría de los abordajes psicológicos que se realizan en este tipo de pacientes son pasivos, el incorporar abordajes de afrontamiento activo en los que el paciente tiene que implicarse en su proceso de entendimiento y mejoría de su patología aportaría importantes beneficios y adherencia a este tipo de programas.

## RADIOGRAPHIC PARAMETERS IN CERVICAL MYELOPATHY: REVIEW OF CURRENT LITERATURE

Waddell WH, Vaughan WE, Abtahi AM  
Clin Spine Surg. 2022 Dec 1; 35(10): 389-395  
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Epub 2022 Nov 9. PMID: 36346980

### RESUMEN (ABSTRACT)

**Study design:** This was a narrative review.

**Objectives:** Provide a comprehensive review of radiographic alignment parameters and their effect on procedure selection, surgical decision-making, and clinical outcomes for the treatment of cervical spondylotic myelopathy (CSM).

**Summary of background data:** The use of radiographic parameters to predict prognosis and surgical outcomes in patients with CSM is an evolving field given the complex presentation of patients with this condition.

**Methods:** A literature search was conducted using PubMed for surgical treatment of CSM, with an emphasis on cervical radiographic parameters and clinical outcomes.

**Results:** The principal goals of spine surgery can be broken down into decompression, stabilization, and restoration of alignment. The principle of restoring balance takes careful preoperative planning and attention to radiographic parameters including cervical lordosis, C2-C7 sagittal vertical axis, neck tilt, thoracic inlet angle, T1 slope, K-line, and modified K-line. Surgical interventions for CSM include anterior cervical discectomy and fusion, posterior cervical fusion, or laminoplasty and careful consideration of radiographic measures guide surgical decision-making is essential to ensure optimal outcomes.

**Conclusion:** Utilization of key radiographic parameters in surgical planning and decision-making allows surgeons to optimize clinical outcomes for CSM.

### COMENTARIO

Se trata de un estudio de revisión sobre el análisis radiográfico en los pacientes con mielopatía, en el que se describen los parámetros sagitales más importantes a tener en cuenta en el estudio preoperatorio de los pacientes con mielopatía cervical sometidos a cirugía, así como su relevancia clínica e implicación en la elección de la técnica quirúrgica.

## THE MORPHOLOGY OF CERVICAL DEFORMITIES: A TWO-STEP CLUSTER ANALYSIS TO IDENTIFY CERVICAL DEFORMITY PATTERNS

Jo Kim H, Virk S, Elysee J, Passias P, Ames C, Shaffrey CI, Mundis G, Protopsaltis T, Gupta M, Klineberg E, Smith JS, Burton D, Schwab F, Lafage V, Lafage R, International Spine Study Group

J Neurosurg Spine 32: 353-359, 2020

### RESUMEN (ABSTRACT)

**Objective:** Cervical deformity (CD) is difficult to define due to the high variability in normal cervical alignment based on postural- and thoracolumbar-driven changes to cervical alignment. The purpose of this study was to identify whether patterns of sagittal deformity could be established based on neutral and dynamic alignment, as shown on radiographs.

**Methods:** This study is a retrospective review of a prospective, multicenter database of CD patients who underwent surgery from 2013 to 2015. Their radiographs were reviewed by 12 individuals using a consensus-based method to identify severe sagittal CD. Radiographic parameters correlating with health-related quality of life were introduced in a two-step cluster analysis (a combination of hierarchical cluster and k-means cluster) to identify patterns of sagittal deformity. A comparison of lateral and lateral extension radiographs between clusters was performed using an ANOVA in a post hoc analysis.

**Results:** Overall, 75 patients were identified as having severe CD due to sagittal malalignment, and they formed the basis of this study. Their mean age was 64 years, their body mass index was 29 kg/m<sup>2</sup>, and 66% were female. There were significant correlations between focal alignment/flexibility of maximum kyphosis, cervical lordosis, and thoracic slope minus cervical lordosis (TS-CL) flexibility ( $r = 0.27, 0.31, \text{ and } -0.36$ , respectively). Cluster analysis revealed 3 distinct groups based on alignment and flexibility. Group 1 (a pattern involving a flat neck with lack of compensation) had a large TS-CL mismatch despite flexibility in cervical lordosis; group 2 (a pattern involving focal deformity) had focal kyphosis between 2 adjacent levels but no large regional cervical kyphosis under the setting of a low T1 slope (T1S); and group 3 (a pattern involving a cervicothoracic deformity) had a very large T1S with a compensatory hyperlordosis of the cervical spine.

**Conclusions:** Three distinct patterns of CD were identified in this cohort: flat neck, focal deformity, and cervicothoracic deformity. One key element to understanding the difference between these groups was the alignment seen on extension radiographs. This information is a first step in developing a classification system that can guide the surgical treatment for CD and the choice of fusion level.

**Keywords:** CD = cervical deformity; HRQOL = health-related quality of life; NDI = Neck Disability Index; NRS = numeric rating scale; T1S = T1 slope; TS-CL = thoracic slope minus cervical lordosis; cSVA = cervical sagittal vertical axis; cervical deformity; cervicothoracic deformity; cluster analysis; extension alignment; flat neck; focal deformity; mJOA = modified Japanese Orthopaedic Association.

### COMENTARIO

Se trata de un estudio multicéntrico retrospectivo de pacientes con deformidad cervical sometidos a cirugía. Se sometió el análisis radiográfico a un estudio de clústeres con el objetivo de identificar grupos con cierta homogeneidad. Basándose en los datos obtenidos tanto en los parámetros radiográficos como en las escalas de valoración se identificaron 3 grupos bien diferenciados: cuello plano, deformidad focal y deformidad cervicotorácica.

### RELEVANCIA CLÍNICA

Los autores describen los hallazgos de este estudio como una primera aproximación para desarrollar un sistema de clasificación para la deformidad cervical en el futuro. Sin embargo, esta identificación por grupos tiene ya utilidad directa en la toma de decisiones y planificación quirúrgica por sí misma.

## MANAGEMENT OF INCIDENTAL DUROTOMIES IN AN INTEGRATED ORTHOPAEDIC AND NEUROSURGICAL SPINAL UNIT

Rodríguez D, Amin U, Bartolomé D, Pont A, Del Arco A, Saló G, Vilá G, Isart A, Manzano D, Lafuente J  
Brain Spine. 2023 Oct 8; 3:102682. DOI: 10.1016/j.bas.2023.102682.  
PMID: 38020997; PMCID: PMC10668103

### RESUMEN (ABSTRACT)

**Introduction:** Incidental durotomy (ID) is an intraoperative event associated to prolonged bed rest and hospital stay, antibiotic use, higher patient dissatisfaction and leg pain among other complications of its postoperative course. Several repair techniques and postsurgical care have been proposed for its management. This study was designed to develop an agreed protocol in cases of ID among Orthopaedic Surgeons (OS) and Neurosurgeons (NS) integrated into a Spinal Surgery Unit.

**Research question:** Incidental durotomies management protocol.

**Materials and methods:** From 997 eligible cases operated in Hospital del Mar (Barcelona, Spain) from April 2018 to March 2022, demographic, clinical, surgical and postoperative data was collected for statistical analysis from the morbidity and mortality database, with 79 identified IDs. Redo procedures were significantly associated to OS, and cervical and anterior/lateral approaches to NS, both groups were not comparable.

**Results:** ID occurred in 7.9% of cases, more frequently after the lockdown ( $p=0.03$ ), in females ( $p=0.04$ ), during posterior approaches ( $p=0.003$ ), and less frequently in the cervical spine ( $p=0.009$ ). IDs were linked to postoperative infections ( $p<0.001$ ) and nerve root damage ( $p<0.001$ ). Patients without ID evolved more satisfactorily during the postoperative period ( $p=0.002$ ), and those with CSF leak (20/79) spent on bed rest more than twice the time as those without ( $p<0.001$ ). Multivariable logistic regression showed strong association between posterior approaches and ID, between complicated postoperative courses and ID.

**Discussion and conclusions:** ID is linked to an adverse postoperative recovery, and it should be primarily repaired under microscope, with early mobilization of patients after surgery.

### COMENTARIO

Se trata de un estudio retrospectivo de casos de durotomía incidental en pacientes sometidos a cirugía de columna. Hace, además, una exhaustiva revisión de la literatura con el objetivo de llegar a un consenso en el tratamiento de esta complicación quirúrgica.

### RESULTADOS

Lo autores encuentran una gran variabilidad en el tratamiento de la durotomía incidental dependiendo de la formación y experiencia del cirujano, resaltando diferencias importantes entre neurocirujanos y cirujanos ortopédicos especialistas en cirugía de columna. Identificaron como factores de riesgo: sexo femenino, abordaje posterior y cirugía lumbar. Encontraron un mayor riesgo de otras complicaciones en el grupo de pacientes con durotomía incidental incluyendo mayor tasa de infección de la herida quirúrgica y lesión neurológica.

### RELEVANCIA CLÍNICA

Como conclusión más importante se resalta la importancia de cierre primario hermético de la durotomía como patrón oro para el tratamiento de esta complicación y señala el drenaje lumbar como una técnica segura y eficaz cuando el cierre primario no es suficiente.

**EFFICACY OF D-WAVE MONITORING COMBINED WITH THE TRANSCRANIAL MOTOR-EVOKED POTENTIALS IN HIGH-RISK SPINAL SURGERY:  
A RETROSPECTIVE MULTICENTER STUDY OF THE MONITORING COMMITTEE  
OF THE JAPANESE SOCIETY FOR SPINE SURGERY AND RELATED RESEARCH**

Shigematsu H, Ando M, Kobayashi K, Yoshida G, Funaba M, Morito S, Takahashi M, Ushirozako H, Kawabata S, Yamada K, Kanchiku T, Fujiwara Y, Taniguchi S, Iwasaki H, Tadokoro N, Wada K, Yamamoto N, Yasuda A, Hashimoto J, Tani T, Ando K, Machino M, Takatani T, Matsuyama Y, Imagama S

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**RESUMEN (ABSTRACT)**

**Study design:** Retrospective multicenter cohort study.

**Objectives:** We aimed to clarify the efficacy of multimodal intraoperative neuromonitoring (IONM), especially in transcranial electrical stimulation of motor-evoked potentials (TES-MEPs) with spinal cord-evoked potentials after transcranial stimulation of the brain (D-wave) in the detection of reversible spinal cord injury in high-risk spinal surgery.

**Methods:** We reviewed 1310 patients who underwent TES-MEPs during spinal surgery at 14 spine centers. We compared the monitoring results of TES-MEPs with D-wave vs TES-MEPs without D-wave in high-risk spinal surgery.

**Results:** There were 40 cases that used TES-MEPs with D-wave and 1270 cases that used TES-MEPs without D-wave. Before patients were matched, there were significant differences between groups in terms of sex and spinal disease category. Although there was no significant difference in the rescue rate between TES-MEPs with D-wave (2.0%) and TES-MEPs (2.5%), the false-positivity rate was significantly lower (0%) in the TES-MEPs-with-D-wave group. Using a one-to-one propensity score-matched analysis, 40 pairs of patients from the two groups were selected. Baseline characteristics did not significantly differ between the matched groups. In the score-matched analysis, one case (2.5%) in both groups was a case of rescue ( $P = 1$ ), five (12.5%) cases in the TES-MEPs group were false positives, and there were no false positives in the TES-MEPs-with-D-wave group ( $P = .02$ ).

**Conclusions:** TES-MEPs with D-wave in high-risk spine surgeries did not affect rescue case rates. However, it helped reduce the false-positivity rate.

**COMENTARIO**

Se trata de un estudio multicéntrico retrospectivo en el que los autores analizaron la eficacia de la utilización de onda D en la detección de sufrimiento reversible de la médula espinal durante cirugía de columna de alto riesgo.

**RESULTADOS**

Encontraron 40 casos en los que se utilizaron potenciales evocados motores (PEM) con onda D y 1270 casos en los que se utilizó PEM sin onda D. Se encontró una disminución de falsos positivos clínicamente relevante y estadísticamente significativa en el grupo PEM-onda D en comparación con el grupo PEM.

**IMPLICACIÓN CLÍNICA**

Las alertas intraoperatorias llevan en muchas ocasiones a realizar gestos y maniobras no planificadas para encontrar la nota desencadenante de alerta. En muchos casos estas maniobras aumentan el tiempo y el riesgo quirúrgico. En algunos casos determinados hallazgos en la monitorización neurofisiológica llevan incluso a detener una cirugía y reprogramarla más adelante.

La utilización de onda D en cirugías de alto riesgo puede ayudar a reducir alertas neurofisiológicas en ausencia de daño o estrés neurológico real, reduciendo así la necesidad de realizar gestos innecesarios para encontrar el agente causante de la alerta.

## EFICACIA DE LA DESCOMPRESIÓN MEDULAR PRECOZ VERSUS TARDÍA EN LA RECUPERACIÓN NEUROLÓGICA TRAS LESIÓN MEDULAR TRAUMÁTICA. REVISIÓN SISTEMÁTICA Y METAANÁLISIS

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### RESUMEN

**Diseño de estudio:** Revisión sistemática y metaanálisis.

**Objetivo:** Comparar descompresión medular precoz (< 24 h) versus tardía (> 24 h) en la recuperación neurológica de pacientes con lesión medular aguda.

**Métodos:** Se realizó una revisión sistemática según el protocolo de PRISMA para identificar estudios publicados hasta diciembre de 2022.

Se incluyeron solo estudios de cohorte prospectivos y ensayos controlados que comparan la descompresión precoz versus tardía en la recuperación neurológica. Como variables se incluyeron el número de pacientes, nivel lesionado, tiempo de tratamiento, grado de ASIA, recuperación neurológica, uso de corticoesteroides y complicaciones. Para el metaanálisis se desarrolló el gráfico «forest plot». El riesgo de sesgo de los estudios incluidos se evaluó utilizando la herramienta ROBINS-I22 y Rob223.

**Resultados:** Seis de los 7 estudios seleccionados para nuestra revisión fueron incluidos en el metaanálisis, con un total de 1.188 pacientes (592 pacientes en el grupo de descompresión precoz y 596 en el grupo de descompresión tardía), el promedio de seguimiento fue de 8 meses, en 5 estudios utilizaron metilprednisolona, las complicaciones mayormente reportadas fueron los eventos cardiopulmonares tromboembólicos. Cinco estudios mostraron diferencias significativas a favor de la descompresión precoz (diferencia de riesgo: 0,10, intervalo de confianza del 95%: 0,07-0,14, heterogeneidad: 46%). El beneficio fue mayor en las lesiones cervicales e incompletas.

**Conclusiones:** Existe evidencia científica para recomendar la descompresión precoz en las primeras 24 horas tras la lesión medular traumática al mejorar la recuperación neurológica final, y debe recomendarse siempre que las condiciones del paciente y el hospital permitan hacerlo con seguridad.

### COMENTARIO

Se trata de una revisión sistemática y metaanálisis que trata sobre un tema que crea controversia en la práctica clínica diaria. Se compara la eficacia de la cirugía precoz (antes de las 24 h) frente a la tardía en pacientes con lesión medular traumática. Se valora el grado de recuperación neurológica.

El metaanálisis incluyó 6 estudios de calidad con 1.188 pacientes (592 en el grupo de descompresión precoz y 596 en el de descompresión tardía). El promedio de seguimiento fue de 8 meses. En 5 estudios utilizaron metilprednisolona a grandes dosis. Cinco estudios mostraron diferencias significativas a favor de la descompresión precoz. El beneficio fue mayor en las lesiones cervicales e incompletas.

Los autores concluyen que existe evidencia científica para recomendar la descompresión precoz en las primeras 24 horas tras la lesión medular traumática al mejorar la recuperación neurológica final, y debe recomendarse, siempre que las condiciones del paciente y el hospital permitan hacerlo con seguridad.

## CLINICAL OUTCOMES AFTER BRACING FOR VERTEBRAL COMPRESSION FRACTURES: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED TRIALS

Squires M, Green JH, Patel R, Aleem I

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### RESUMEN (ABSTRACT)

**Background:** Vertebral compression fractures are common and result in significant pain and loss of function. Treatment strategy, however, remains controversial. We conducted a meta-analysis of randomized trials to elucidate the impact of bracing on these injuries.

**Methods:** A comprehensive literature review utilizing Embase, Ovid Medline, and the Cochrane Library was performed to identify randomized trials evaluating brace therapy for adult patients with thoracic and lumbar compression fractures. Two independent reviewers assessed the eligibility of studies and risk of bias. The primary assessed outcome was pain after injury. Secondary outcomes were function, quality of life, opioid use, and kyphotic progression [anterior vertebral body compression percentage (AVBCP)]. Continuous variables were analyzed using mean differences and standardized mean differences, and dichotomous variables were analyzed using odds ratios in random-effects models. GRADE criteria were applied.

**Results:** Of 1,502 articles, a total of 3 studies with 447 patients (96% female) were included. Fifty-four patients were managed without a brace, and 393 with a brace (195 rigid, 198 soft). At 3 to 6 months post-injury, rigid bracing resulted in significantly less pain compared to no brace (SMD = -1.32, 95% CI: -1.89 to -0.76,  $P < 0.05$ ,  $I^2 = 41\%$ ), though this diminished at long-term follow-up of 48 weeks. Radiographic kyphosis, opioid use, function, or quality of life were not significantly different at any timepoint.

**Conclusions:** Moderate quality evidence demonstrates rigid bracing of vertebral compression fractures may decrease pain up to 6 months post-injury, though there is no difference in radiographic parameters, opioid use, function, or quality of life at short- or long-term follow-up. No difference was found between rigid and soft bracing; therefore, soft bracing may be an adequate alternative.

### COMENTARIO

Se trata de un metaanálisis de estudios aleatorizados en los que se estudió la diferencia entre tratamiento con y sin corsé en pacientes con fractura vertebral por compresión.

### RESULTADOS

No se encontraron diferencias significativas entre grupos en corto ni largo plazo en cuanto a consumo de analgesia, cifosis radiológica, función o calidad de vida. Sólo se encontraron diferencias en el nivel de dolor medido con la escala analógica visual a los 6 meses (1'32 vs 1'89) a favor del tratamiento con corsé.

### RELEVANCIA CLÍNICA

El corsé representa un tratamiento caro, incómodo para el paciente y no exento de complicaciones sin que haya demostrado superioridad con respecto a otras alternativas para el tratamiento de las fracturas por compresión.

## VERTEBROPLASTY VERSUS ACTIVE CONTROL INTERVENTION FOR CHRONIC OSTEOPOROTIC VERTEBRAL COMPRESSION FRACTURES: THE VERTOS V RANDOMIZED CONTROLLED TRIAL

Carli D, Venmans A, Lodder P, Donga E, Van Oudheusden T, Boukrab I, Schoemaker K, Smeets A, Schonenberg C, Hirsch J, De Vries J, Lohle P

Radiology. 2023 Jul; 308(1): e222535  
DOI: 10.1148/radiol.222535. PMID: 37462495

### RESUMEN (ABSTRACT)

**Background:** Evidence regarding percutaneous vertebroplasty (PV) for chronic painful osteoporotic vertebral compression fractures (OVCFs) remains limited.

**Purpose:** To compare pain relief, quality of life, and disability between PV and active control (anesthetic infiltration) interventions for chronic OVCF.

**Materials and methods:** This prospective randomized clinical trial was conducted between May 2013 and June 2019 in participants with pain due to OVCF lasting longer than 3 months with bone marrow edema present at MRI. Study participants were randomly assigned to undergo PV (n = 40) or active control intervention (n = 40). The primary outcome was pain severity, assessed with the visual analog scale (VAS) (range, 0-10) during 12 months after treatment. Secondary outcomes included Quality of Life Questionnaire of the European Foundation for Osteoporosis (QUALEFFO) score (range, 0-100) and Roland Morris Disability Questionnaire (RMDQ) score (range, 0-100). Outcomes were analyzed according to a longitudinal multilevel model used to test the difference between groups in change from baseline across follow-up.

**Results:** The mean age of the 80 participants (54 women) was 69 years  $\pm$  10 (SD) in the PV group and 71 years  $\pm$  10 in the active control group. VAS score was 7.6 (95% CI: 7.0, 8.2) in the PV group and 7.3 (95% CI: 6.9, 7.8) in the active control group at baseline (P = .47) and 3.9 (95% CI: 3.1, 4.8) and 5.1 (95% CI: 4.3, 6.0), respectively, at month 12 (P = .045). At month 12, the group difference from baseline was 1.3 (95% CI: 0.1, 2.6; P = .02) for VAS, 5.2 (95% CI: 0.9, 9.4; P = .02) for QUALEFFO, and 7.1 (95% CI: -3.3, 17.5; P = .18) for RMDQ, favoring the PV group.

**Conclusion:** In the treatment of pain caused by chronic OVCFs, PV is more effective for pain relief and quality of life improvement than anesthetic injection alone, with similar improvement for disability between the groups. Clinical trial registration no. NCT01963039 © RSNA, 2023. See also the editorial by Beall and De Leacy in this issue.

### COMENTARIO

Se trata de un estudio prospectivo aleatorizado con dos ramas de tratamiento para pacientes con fractura vertebral osteoporótica de más de 3 meses de evolución con dolor persistente. Estudiaron el grado de dolor e incapacidad según la escala analógica visual, Quality of Life Questionnaire of the European Foundation for Osteoporosis (QUALEFFO) y Roland Morris Disability Questionnaire (RMDQ). Se tomaron estos cuestionarios en el preoperatorio, al mes de la intervención y al año. El primer grupo se sometió a vertebroplastia y el segundo a infiltración de anestésico local en el nivel fracturado.

### RESULTADOS

No encontraron diferencias significativas preoperatorias. Al mes y 12 meses tras la cirugía se encontraron diferencias estadísticas en el grado de dolor y calidad de vida, pero no en el nivel de incapacidad.

### RELEVANCIA CLÍNICA

La fractura vertebral osteoporótica es la complicación más frecuente de la osteoporosis. Dados los conflictivos resultados en ensayos previos en las FVO crónicas, este es el primer ensayo ciego que muestra el beneficio de la VP en los mismos. La limitación principal es que la potencia estadística con este tamaño muestral sólo permitía observar una diferencia en el VAS de puntos (la diferencia mínima significativa es 1,5).

## BEST PRACTICE GUIDELINES FOR ASSESSMENT AND MANAGEMENT OF OSTEOPOROSIS IN ADULT PATIENTS UNDERGOING ELECTIVE SPINAL RECONSTRUCTION

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### RESUMEN (ABSTRACT)

**Study design:** Expert consensus study.

**Objective:** This expert panel was created to establish best practice guidelines to identify and treat patients with poor bone health prior to elective spinal reconstruction.

**Summary of background data:** Currently, no guidelines exist for the management of osteoporosis and osteopenia in patients undergoing spinal reconstructive surgery. Untreated osteoporosis in spine reconstruction surgery is associated with higher complications and worse outcomes.

**Methods:** A multidisciplinary panel with 18 experts was assembled including orthopedic and neurological surgeons, endocrinologists and rheumatologists. Surveys and discussions regarding the current literature were held according to Delphi method until a final set of guidelines was created with over 70% consensus.

**Results:** Panelists agreed that bone health should be considered in every patient prior to elective spinal reconstruction. All patients above 65 and those under 65 with particular risk factors (chronic glucocorticoid use, high fracture risk or previous fracture, limited mobility, and eight other key factors) should have a formal bone health evaluation prior to undergoing surgery. DXA scans of the hip are preferable due to their wide availability. Opportunistic CT Hounsfield Units of the vertebrae can be useful in identifying poor bone health. In the absence of contraindications, anabolic agents are considered first line therapy due to their bone building properties as compared with antiresorptive medications. Medications should be administered preoperatively for at least 2 months and postoperatively for minimum 8 months.

**Conclusion:** Based on the consensus of a multidisciplinary panel of experts, we propose best practice guidelines for assessment and treatment of poor bone health prior to elective spinal reconstructive surgery. Patients above age 65 and those with particular risk factors under 65 should undergo formal bone health evaluation. We also established guidelines on perioperative optimization, utility of various diagnostic modalities, and the optimal medical management of bone health in this population. Level of Evidence: 5.

### COMENTARIO

Este artículo se realizó para llenar el vacío en la existencia de pautas para el tratamiento de la osteoporosis u osteopenia en pacientes sometidos a cirugía por deformidad de la columna. Un panel multidisciplinario formado por cirujanos de columna, endocrinólogos y reumatólogos se reunió para crear un consenso sobre el tema. Se decidió que todos los pacientes sometidos a cirugía de reconstrucción de la columna debían ser evaluados para determinar la calidad ósea. Pacientes mayores de 65 años o menores de 65 años pero con factores de riesgo bien definidos (tratamiento corticoideo crónico, alto riesgo de fractura osteoporótica calculado por FRAX, fractura osteoporótica previa, movilidad reducida, enfermedad ósea metabólica, enfermedad renal crónica en estadio >3, antecedentes de cirugía de espalda fallida, abuso de alcohol, tabaquismo, tratamiento contra el cáncer y diabetes mellitus durante más de 10 años) deben evaluarse formalmente con respecto a la calidad ósea. La densitometría ósea de la cadera es la prueba preferida para diagnosticar la osteoporosis. La medición de unidades Hounsfield en TAC previamente disponibles también puede ser uno de los métodos a utilizar. Si se confirma el diagnóstico, y en ausencia de contraindicaciones, los agentes anabólicos se consideran tratamiento de primera línea. La medicación debe tomarse al menos 2 meses antes y continuarse durante al menos 8 meses después del procedimiento. Se trata de un consenso alcanzado por un panel de expertos que nos proporciona una matriz de fácil aplicación para evaluar y guiar a este tipo de pacientes en el día a día.

## OSTEOPOROTIC VERTEBRAL FRACTURES LOCALIZED IN THE LUMBAR AREA SIGNIFICANTLY IMPACT SAGITTAL ALIGNMENT

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### RESUMEN (ABSTRACT)

**Summary:** Lumbar fractures and/or multiple fractures at the lumbar or thoracolumbar regions are risk factors for sagittal malalignment in patients older than 70 years old. Although patients with OVF show a huge capacity to compensate after the fractures, lumbar and TL lumbar fractures require closer monitoring.

**Purpose:** To assess the impact of osteoporotic vertebral fractures on the sagittal alignment of the elderly and identify risk factors for sagittal malalignment.

**Methods:** We performed a retrospective study on a cohort of 249 patients older than 70 years old and diagnosed with osteoporosis who suffered chronic vertebral fractures. Demographic and radiological data were collected. Full-spine lateral X-rays were obtained to analyze the sagittal plane. Patients were classified according to the number and location of the fractures. Pearson's correlation coefficient was used to assess the relationships between the type of fractures and sagittal alignment.

**Results:** A total of 673 chronic fractures were detected in 249 patients with a mean number of vertebral fractures per patient of  $2.7 \pm 1.9$ . Patients were divided into 9 subgroups according to the location and the number of fractures. Surprisingly, any of the aggregated parameters used to assess sagittal alignment exceeded the threshold defined for malalignment. In the second part of the analysis, 41 patients with sagittal malalignment were identified. In this subpopulation, an overrepresentation of patients with lumbar fractures (34% vs. 11%) and an underrepresentation of thoracic fractures (9% vs. 34%) were reported. We also observed that patients with 3 or more lumbar or thoracolumbar fractures had an increased risk of sagittal malalignment.

**Conclusions:** Lumbar fractures and/or multiple fractures at the lumbar or thoracolumbar regions are risk factors for sagittal malalignment in patients older than 70 years old. Although patients show a remarkable capacity to compensate, fractures at the lumbar and thoracolumbar regions need closer monitoring.

### COMENTARIO

Se trata de un estudio de cohortes retrospectivo en el que se estudiaron un total de 673 fracturas en 249 pacientes. Se analizó el impacto de la fractura vertebral osteoporótica sobre el perfil sagital. Los autores encontraron que los pacientes con fracturas en la región lumbar o toracolumbar sufrieron una alteración significativa en el plano sagital mientras que los pacientes con fracturas osteoporóticas en la región torácica fueron capaces de activar mecanismos de compensación, limitando así la alteración en el equilibrio sagital. La limitación fundamental de este estudio es que se trata de un estudio radiológico, sin datos sobre la repercusión funcional o el dolor.

### RELEVANCIA CLÍNICA

Encontramos estos hallazgos especialmente relevantes porque pueden tener una implicación directa en la práctica clínica llevándonos a considerar tratamientos más agresivos para las fracturas vertebrales osteoporóticas en la región lumbar o toracolumbar a diferencia de aquellas en la región torácica, que en la mayoría de los casos tendrán una evolución favorable con tratamiento conservador.

## USING ARTIFICIAL INTELLIGENCE TO DIAGNOSE OSTEOPOROTIC VERTEBRAL FRACTURES ON PLAIN RADIOGRAPHS

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### RESUMEN (ABSTRACT)

Osteoporotic vertebral fracture (OVF) is a risk factor for morbidity and mortality in elderly population, and accurate diagnosis is important for improving treatment outcomes. OVF diagnosis suffers from high misdiagnosis and underdiagnosis rates, as well as high workload. Deep learning methods applied to plain radiographs, a simple, fast, and inexpensive examination, might solve this problem. We developed and validated a deep-learning-based vertebral fracture diagnostic system using area loss ratio, which assisted a multitasking network to perform skeletal position detection and segmentation and identify and grade vertebral fractures. As the training set and internal validation set, we used 11,397 plain radiographs from six community centers in Shanghai. For the external validation set, 1276 participants were recruited from the outpatient clinic of the Shanghai Sixth People's Hospital (1276 plain radiographs). Radiologists performed all X-ray images and used the Genant semi-quantitative tool for fracture diagnosis and grading as the ground truth data. Accuracy, sensitivity, specificity, positive predictive value, and negative predictive value were used to evaluate diagnostic performance. The AI\_OVF\_SH system demonstrated high accuracy and computational speed in skeletal position detection and segmentation. In the internal validation set, the accuracy, sensitivity, and specificity with the AI\_OVF\_SH model were 97.41%, 84.08%, and 97.25%, respectively, for all fractures. The sensitivity and specificity for moderate fractures were 88.55% and 99.74%, respectively, and for severe fractures, they were 92.30% and 99.92%. In the external validation set, the accuracy, sensitivity, and specificity for all fractures were 96.85%, 83.35%, and 94.70%, respectively. For moderate fractures, the sensitivity and specificity were 85.61% and 99.85%, respectively, and 93.46% and 99.92% for severe fractures. Therefore, the AI\_OVF\_SH system is an efficient tool to assist radiologists and clinicians to improve the diagnosing of vertebral fractures.

### COMENTARIO

Este artículo aborda el uso de inteligencia artificial (IA) para diagnosticar fracturas vertebrales osteoporóticas mediante radiografías simples. El estudio se centra en la aplicación de algoritmos de inteligencia artificial para analizar imágenes radiográficas y detectar fracturas vertebrales osteoporóticas. Se utilizaron técnicas de procesamiento de imágenes y aprendizaje profundo para entrenar el modelo de inteligencia artificial con 11.000 radiografías para desarrollar el modelo, que después fue validado en otras 1276. Encontraron una sensibilidad y especificidad global del 85% y 97% respectivamente.

### RELEVANCIA CLÍNICA

La implementación de la inteligencia artificial en la detección de fracturas vertebrales osteoporóticas puede suponer un ahorro de tiempo y costes significativo. Es importante destacar que la implementación clínica exitosa de la IA en este contexto dependerá de la validación continua y la integración cuidadosa en la práctica médica, asegurando su precisión y fiabilidad en diferentes escenarios clínicos.

## MRI-BASED VERTEBRAL BONE QUALITY SCORE FOR OSTEOPOROSIS SCREENING BASED ON DIFFERENT OSTEOPOROTIC DIAGNOSTIC CRITERIA USING DXA AND QCT

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### RESUMEN (ABSTRACT)

In this study, we aim to evaluate the correlation between T score measured by dual X-ray absorptiometry (DXA), volumetric bone mineral density (vBMD) derived from quantitative computed tomography (QCT) and MRI-based vertebral bone quality (VBQ), explore the diagnostic performance of VBQ in osteoporosis and determine the recognition value of VBQ in osteoporotic fracture in a relatively large cohort of elderly patients scheduled to undergo spinal surgery. A total of 260 patients were enrolled in the study. DXA and QCT were used to evaluate osteoporotic status. We calculated the lumbar VBQ score, analyzed the correlation between T score, vBMD and VBQ, and explored whether VBQ was an influential factor of bone quality and fracture by binary logistic regression as well as the diagnostic performance of VBQ in osteoporosis and fracture by ROC curve. VBQ was negatively correlated with vBMD and T score. ( $r = -0.487$  vs.  $r = -0.220$ ). The VBQ score was a risk factor for osteoporosis under the QCT diagnostic criteria (OR = 2.245, 95% CI 1.456-3.460) and osteoporotic fractures (OR = 1.496, 95% CI 1.097-2.040). It exhibited superior discriminant performance for osteoporosis diagnosed by QCT, with a cutoff value of 3.70 and an AUC of 0.7354. Its cutoff value for osteoporotic fractures was 3.72, and its AUC was 0.6717. In a cohort of elderly patients scheduled to undergo spinal surgery, the VBQ score was more strongly associated with vBMD than the T score and could identify patients with osteoporosis and corresponding vertebral compression fracture (VCF).

### COMENTARIO

Se trata de un estudio retrospectivo de datos recopilados de forma prospectiva para analizar la eficacia de la resonancia magnética en el diagnóstico de osteoporosis. Los autores compararon T-score medido en densitometría, la densidad mineral volumétrica en TC y la calidad ósea medida en RM.

### RESULTADOS

La calidad ósea medida en RM fue un factor de riesgo independiente para la aparición de fractura vertebral osteoporótica y mostró una capacidad de discriminación de osteoporosis superior a las otras medidas.

### RELEVANCIA CLÍNICA

La aparición de métodos de medición de densidad ósea mediante resonancia supone un avance considerable ya que elimina la radiación sobre el paciente que produce la densitometría. Además, en los pacientes con fracturas vertebrales o a los que se les haya hecho un RM por cualquier otra patología, dejarían de necesitar una prueba extra, con el consiguiente ahorro de recursos.



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