*Case Report / Olgu Sunumu*

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Turk J Osteoporos

# *Lumbar Transverse Process Pseudoarticulation: Congenital Versus Post-traumatic – A Case Report*

## *Lomber Transvers Çıkıntı Psödoartikülasyonu: Konjenital mi Travmatik mi? – Olgu Sunumu*

***Benil Nesli Ata[1], Buğra İnce[2]***

[1]İzmir City Hospital, Clinic of Physical Medicine and Rehabilitation, İzmir, Türkiye
[2]University of Health Sciences Türkiye, İzmir City Hospital, Department of Physical Medicine and Rehabilitation, İzmir, Türkiye

## *Abstract*

Bone bridging between lumbar transverse processes is a rare anatomical variant, most often post-traumatic but occasionally congenital. Although frequently asymptomatic, it may present with low back pain, scoliosis, or neurological deficits, and can complicate radiological interpretation. Differentiation between congenital and post-traumatic forms relies on detailed imaging assessment and clinical history. We report the case of a 76-year-old male presenting with acute low back pain, right lower limb weakness, and foot drop due to lumbar disc extrusion. Imaging incidentally revealed a pseudoarticulation between the right L3 and L4 transverse processes. Morphology and history supported a post-traumatic origin prior to skeletal maturity. The patient underwent decompression and fusion surgery, followed by a structured rehabilitation protocol including gait training, balance exercises, progressive resistance training, and targeted muscle strengthening, resulting in marked improvement in neurological function and overall functional capacity. This case highlights the importance of recognizing transverse process pseudoarticulation as a rare but clinically relevant finding that may influence diagnostic evaluation and surgical planning in lumbar spine pathology.
**Keywords:** Low back pain, lumbar vertebrae, pseudarthrosis, spinal fusion, ankylosis

## *Öz*

Lomber transvers çıkıntılar arasındaki kemik köprüleşme, çoğunlukla post-travmatik ancak nadiren konjenital olabilen nadir bir anatomik varyanttır. Çoğu zaman asemptomatik olmakla birlikte, bel ağrısı, skolyoz veya nörolojik defisit ile ortaya çıkabilir ve radyolojik yorumlamayı zorlaştırabilir. Konjenital ve post-travmatik formların ayırıcı tanısı, ayrıntılı görüntüleme değerlendirmesi ve klinik öyküye dayanır. Bu yazıda, lomber disk ekstrüzyonuna bağlı akut bel ağrısı, sağ alt ekstremitede güçsüzlük ve düşük ayak ile başvuran 76 yaşında bir erkek olgu sunulmaktadır. Görüntülemede, sağ L3 ve L4 transvers çıkıntıları arasında tesadüfen saptanan psödoartikülasyon mevcuttu. Morfoloji ve öykü, iskelet maturasyonu öncesinde gelişmiş post-travmatik bir kökeni destekledi. Hastaya dekompresyon ve füzyon cerrahisi uygulandı; ardından uygulanan, yürüme eğitimi, denge çalışmaları, progresif dirençli egzersizler ve hedefe yönelik kas güçlendirme uygulamalarını içeren yapılandırılmış rehabilitasyon protokolü ile nörolojik fonksiyonlarda ve genel fonksiyonel kapasitede belirgin iyileşme elde edildi. Bu olgu, transvers çıkıntı psödoartikülasyonunun nadir ancak klinik açıdan önemli bir bulgu olduğunu ve lomber omurga patolojilerinde tanısal değerlendirme ile cerrahi planlamayı etkileyebileceğini vurgulamaktadır.
**Anahtar kelimeler:** Bel ağrısı, lomber omurlar, psödoartroz, spinal füzyon, ankiloz

**Corresponding Author/Sorumlu Yazar:** Benil Nesli Ata MD, İzmir City Hospital, Clinic of Physical Medicine and Rehabilitation, İzmir, Türkiye
**E-mail:** drbenilnesli@gmail.com **ORCID ID:** orcid.org/0000-0003-0900-0069
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## Introduction

Osseous bridging between lumbar transverse processes is an extremely rare anatomical variant, with only a limited number of cases reported in the literature. It is typically asymptomatic but may occasionally present with low back pain, scoliosis, or neurological deficits (1,2). While congenital forms have been described, the majority are post-traumatic, often related to repetitive or direct mechanical stress.

Following trauma, heterotopic ossification within the intertransverse soft tissues may lead to either pseudoarticulation or true bony fusion (3). Differentiation between congenital and post-traumatic origins relies on radiological characteristics—such as bridge morphology, symmetry, and cortical continuity—criteria previously described as key diagnostic features in the literature (3) and should be integrated with a detailed clinical history.

Recognition of this entity is important not only because of its rarity but also due to its potential to be misinterpreted during lumbar imaging, particularly in patients with back pain or structural anomalies. Here, we present a case of lumbar disc herniation with foot drop, in which intertransverse pseudoarticulation was incidentally detected. The morphological characteristics and clinical implications are discussed with reference to current literature.

Previous reports have predominantly focused on isolated case descriptions, often lacking detailed analysis of clinical relevance. Although the incidence is low, recognition of transverse process pseudoarticulation has increased with advances in imaging modalities, particularly computed tomography (CT). Case reports have indicated that in patients with unexplained back pain or atypical scoliosis, such anatomical variants may serve as diagnostic clues or, conversely, as confounding factors in clinical interpretation (4-7). This underscores the importance of heightened awareness among clinicians and radiologists, especially when evaluating older adults or individuals with a history of mechanical loading, such as occupational lifting.

Therefore, this case aims to contribute to the understanding and diagnostic differentiation of intertransverse osseous bridging, with particular emphasis on distinguishing between congenital and post-traumatic etiologies, and to highlight its potential impact on diagnostic evaluation and surgical planning in lumbar spine pathology.

## Case Report

A 76-year-old male presented with acute low back pain that began ten days earlier after heavy lifting. Although the back pain had partially subsided, he reported progressive numbness and sharp pain radiating to the posterior thighs and calves, along with weakness in right ankle dorsiflexion and frequent tripping during ambulation. He denied bowel or bladder dysfunction or saddle anesthesia.

Neurological examination revealed a positive straight leg raise at 50° on the right and globally restricted lumbar range of motion. Muscle strength was normal in the left lower limb. In the right lower limb, ankle dorsiflexion and hallux extension were graded 1/5, while strength in the quadriceps, hamstrings, and plantar flexors was preserved. No atrophy or abnormal muscle tone was observed. Sensory examination revealed hypoesthesia in the right L4 dermatome. Deep tendon reflexes, including the patellar and achilles reflexes, were diminished on the right. Babinski sign was absent bilaterally. The patient demonstrated an unsteady gait with frequent tripping on the right side, consistent with foot drop. There was no history of significant comorbidities or previous spinal trauma.

Lumbar magnetic resonance imaging (MRI) demonstrated a right foraminal disc extrusion at L3-L4, compressing the exiting L3 nerve root, accompanied by mild diffuse disc bulging at L4-L5 and L5-S1 without significant central or foraminal stenosis (Figure 1A-D). Standing anteroposterior radiographs of the lumbar spine incidentally revealed a pseudoarticulation between the right transverse processes of L3 and L4, associated with right-sided lumbar scoliosis measuring a Cobb angle of 15° (Figure 1A-1B). High-resolution CT confirmed the pseudoarticulation, showing a corticated osseous bridge with a narrow pseudo-joint space, consistent with a post-traumatic morphology (Figure 2A-F). Postoperative CT images demonstrated the integrity of the L2-L5 posterior fusion instrumentation and satisfactory alignment (Figure 3).

Given the presence of foot drop, the patient underwent L3-L4 total laminectomy, right-sided discectomy, and L2-L5 posterior spinal fusion. Postoperative recovery was uneventful, and written informed consent was obtained for publication of the case.

Following surgery, the patient was enrolled in a structured rehabilitation protocol comprising task-specific gait training, static and dynamic balance exercises, progressive resistance training focused on the ankle dorsiflexors, and targeted lower limb muscle strengthening. Fall prevention strategies were emphasized due to his age and initial instability. Neurological recovery and functional status were monitored through serial clinical evaluations and gait performance assessment. Over six weeks, the patient demonstrated gradual improvement in right ankle dorsiflexion strength (from 1/5 to 3/5), reduced tripping episodes, and increased walking endurance, reflecting significant gains in both neurological function and overall functional capacity.

## Discussion

Osseous bridging or pseudoarticulation between adjacent lumbar transverse processes is most commonly post-traumatic in origin (4). In a review of 72 cases, only 11 were classified as congenital, highlighting the rarity of the congenital form (3). Billet et al. (3) proposed radiological criteria for differentiating traumatic from congenital bridges: Traumatic lesions are typically irregular, asymmetrical, and involve narrow-angle connections.

The morphology of the bridge may offer insights into the underlying mechanism of trauma. Approximately 45% of

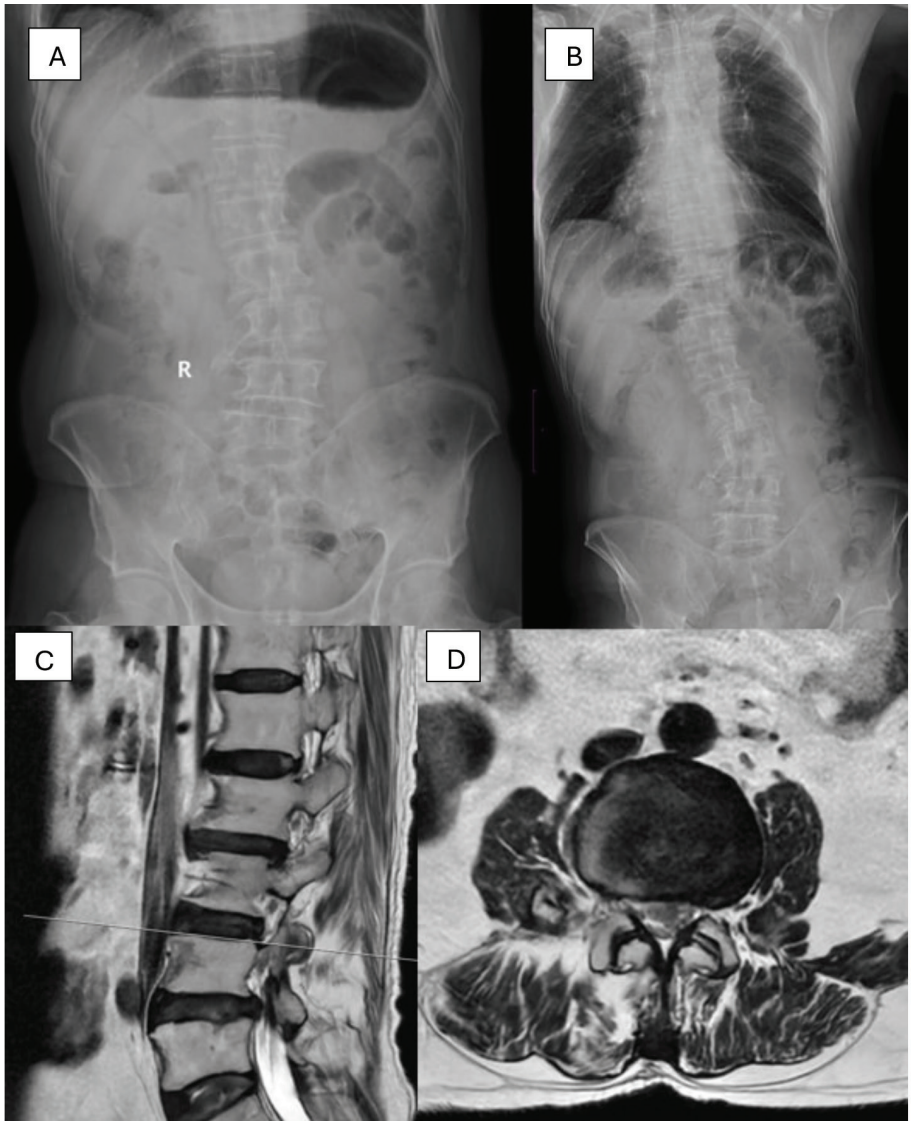


**Figure 1.** A and B; Simple anteroposterior radiograph shows osseous bridging between the right transverse processes of L3 and L4 vertebrae along with minor scoliosis and narrowing of the disc space. C and D) Sagittal and axial T2-weighted MRI of the lumbar spine disc herniation at L3-L4 level
MRI: Magnetic resonance imaging

traumatic bridges exhibit an "H" or "h" shape, likely resulting from mid-transverse process fractures due to indirect repetitive strain. Another 20% present with "K" or "Y" configurations, often associated with basal fractures from more severe trauma. About 15% are fragmented or "Z"-shaped, typically seen in high-energy injuries. These forms can mimic progressive myositis ossificans (PMO), a condition characterized by heterotopic bone formation within muscle tissue following trauma (3,7). On imaging, PMO may initially appear as amorphous calcifications in the soft tissue adjacent to the transverse processes. Over time, it can mature and resemble organized bony structures, making differentiation from true bridging difficult. However, in our patient, the presence of cortical continuity with the vertebra and structured articulation clearly excluded PMO as a diagnosis.

In the present case, an "h"-shaped osseous bridge was observed between the right transverse processes of L3 and L4. The irregular and asymmetrical appearance, along with the absence of congenital anomalies, strongly suggests a traumatic origin, likely related to a past, undiagnosed fracture sustained before skeletal maturity.

In contrast to traumatic forms, congenital bridges typically appear as symmetrical, smooth, and well-corticated connections. These may present as rounded "O"-shaped tips of the transverse processes with continuity extending from the vertebral body (5). Dunoyer described this pattern as "kissing-interspinous" morphology, in which the adjacent transverse process tips are closely apposed with smooth cortical margins (5). Congenital bridging may coexist with skeletal anomalies such as spina bifida

occulta, accessory ribs, sacralization of L5, or the presence of six lumbar vertebrae—none of which were observed in this patient (3).

The direction of accompanying scoliosis can also offer etiological clues. In congenital cases, the convexity of the curve typically points away from the affected side, possibly due to growth inhibition. In traumatic cases, the convexity often faces the affected side, potentially reflecting dysfunction of the ipsilateral quadratus lumborum muscle (6). Interestingly, in this case, the convexity was toward the unaffected side, which supports the hypothesis of trauma occurring during skeletal development, rather than a congenital anomaly.

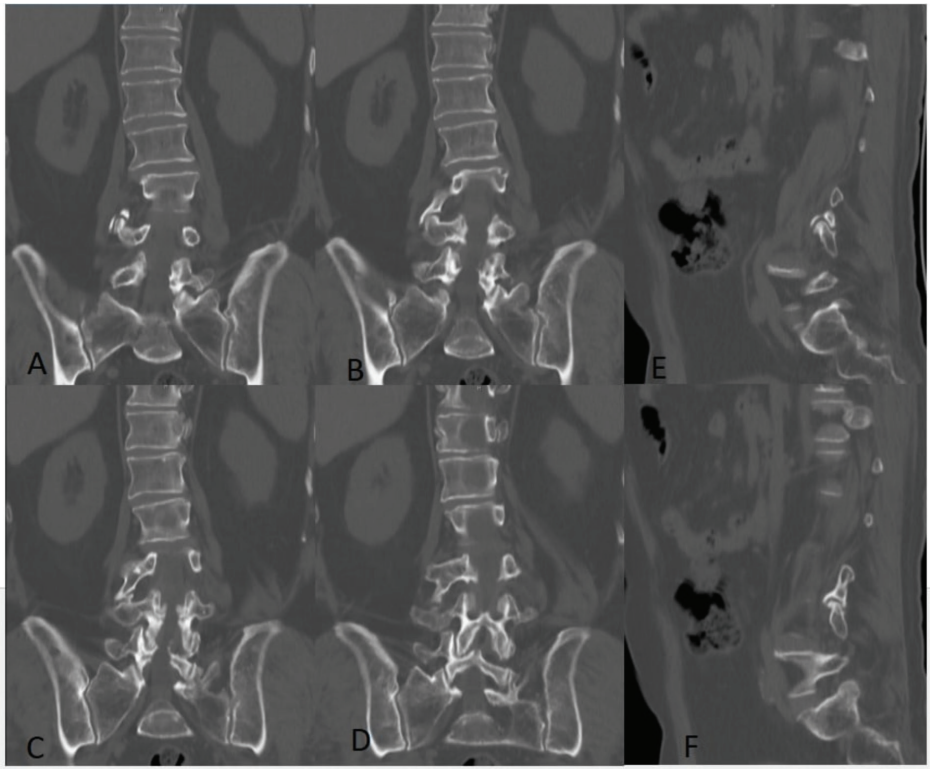


**Figure 2.** A-D; Coronal, E, and F; sagittal CT image shows "h" shaped osseous bridging and pseudoarticulation between the right transverse processes of the L3, and L4 vertebrae, pseudoarthrosis
CT: Computed tomography

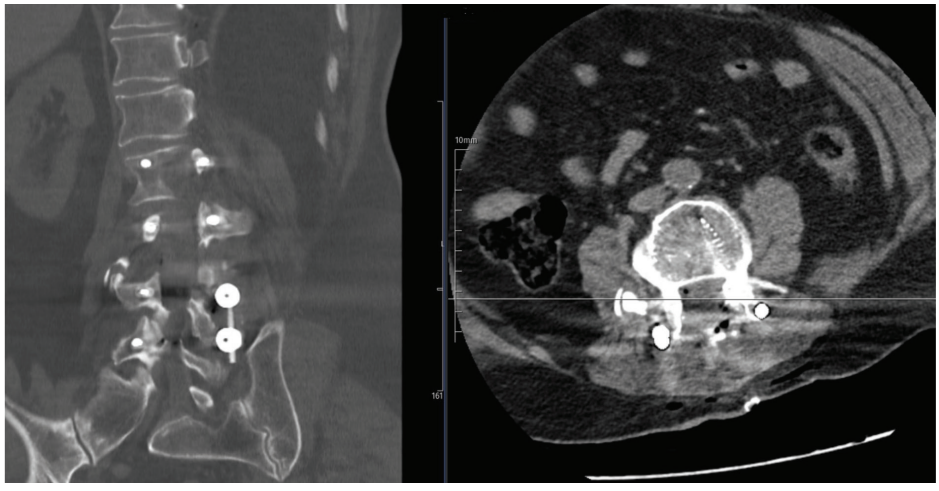

**Figure 3.** Postoperative CT images demonstrating spinal instrumentation from L2 to L5 and the relationship to the bridging site
CT: Computed tomography

Some reports suggest that the absence of degenerative changes in adjacent joints supports a congenital etiology (7). However, this remains controversial, as degeneration is multifactorial—affected by age, loading, and joint mobility (8). Pseudoarthrosis is present in approximately 62% of transverse process bridges, particularly in the mobile lower lumbar segments (5). In congenital cases, it results from differential growth rates in ossification centers; in traumatic cases, it is attributed to inadequate immobilization post-injury (9).

From a diagnostic standpoint, the distinction between congenital and traumatic transverse process bridges can be challenging, particularly in the absence of clear trauma history. Radiographic signs such as irregular margins, asymmetry, and narrow angulation point toward a traumatic origin, while smooth, symmetrical formations support a congenital basis. Integrating clinical details—such as age, symptom onset, and associated spinal findings—with detailed CT or MRI evaluation is essential to avoid misclassification. Failing to recognize these features may lead to unnecessary diagnostic procedures, delayed treatment, or misdirected surgical planning. Therefore, a multidisciplinary approach involving radiologists, spine surgeons, and rehabilitation specialists is recommended when incidental bony anomalies are encountered in symptomatic patients.

In patients with atypical lumbar symptoms or unexplained scoliosis, transverse process bridging—though rare—should be considered, particularly in older adults with a history of mechanical stress. In our patient, the combination of irregular bridge morphology, absence of congenital markers, and scoliosis direction supported a diagnosis of post-traumatic pseudoarticulation acquired before skeletal maturity. Although often asymptomatic, such anatomical variations may become relevant in the context of back pain or neurosurgical evaluation (10). This case not only illustrates the importance of recognizing rare but clinically meaningful anatomical variants in spinal imaging but also underscores the need for thorough preoperative imaging assessment, as incidental findings may influence surgical approach and postoperative rehabilitation planning.

## Conclusion

This case underscores that intertransverse pseudoarticulation, although rare and often asymptomatic, should remain in the differential diagnosis of lumbar pathology, particularly in patients presenting with back pain and incidental imaging findings. Careful assessment of radiographic morphology, scoliosis direction, and the presence or absence of associated congenital anomalies can help differentiate post-traumatic from congenital origins. Awareness of such anatomical variants is crucial not only to avoid diagnostic pitfalls but also to inform surgical planning, guide postoperative rehabilitation strategies, and ultimately optimize patient outcomes in complex spinal cases.

### Ethics

**Informed Consent:** Written informed consent was obtained from the patient for the use of anonymized clinical data and images for publication.

### Footnotes

### Authorship Contributions

Concept: B.N.A., Design: B.İ., Data Collection or Processing: B.N.A., Analysis or Interpretation: B.N.A., B.İ., Literature Search: B.N.A., Writing: B.N.A., B.İ.

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