

# Guillain-Barré Syndrome after Elective Lateral Lumbar Interbody Fusion

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## Abstract

Complications following lateral retroperitoneal transposas lumbar fusion (LLIF) surgery include femoral nerve apraxia, bowel/bladder injury, ureteral injury, and potentially, as illustrated in this case report, Guillain-Barré syndrome. Guillain-Barré syndrome (GBS) is an autoimmune inflammatory condition that typically presents after infection, or, less frequently, post-operatively. We report a case of GBS following elective lumbar fusion through the lateral retroperitoneal transposas approach (LLIF). A 56-year-old patient presented with left lower extremity (LLE) weakness on post-operative day 12. EMG showed bilateral upper extremity muscle recruitment, worse distally. Following a treatment with intravenous immunoglobulin (IVIG), the patient gradually improved, and her condition was favorable at 6-month post-operative follow-up. CSF analysis and EMG should be part of the workup for patients presenting with lower extremity neuropathy following LLIF.

## Keywords

Guillain-Barré syndrome, lateral retroperitoneal transposas approach, lumbar fusion, spine surgery

## INTRODUCTION

Guillain-Barré syndrome (GBS) is a collection of inflammatory demyelination auto-immune diseases causing peripheral neuropathies. The characteristic symptom of GBS is progressive, asymmetric, and ascending weakness, which typically begins in the lower extremities. Additional symptoms include paresthesias and areflexia. The typical course is acute progression of limb weakness that proceeds to its maximum clinical deficit in 2-4 weeks.<sup>[1]</sup> The annual US incidence of GBS is 1.2-3 per 100,000, making GBS the most common cause of acute flaccid paralysis.<sup>[2]</sup> Although the exact etiology of GBS remains unknown, suggested causes include infection or other immune stimulation that induces aberrant autoimmune response. GBS is diagnosed clinically via a thorough history and neurological examination,

through lumbar puncture revealing characteristic CSF albumino-cytologic dissociation, and through EMG.

Rarely, GBS can present after recent surgery in the absence of any other cause. GBS has been associated through multiple reports following elective spine surgery.<sup>[4]</sup> Interventions involving lumbar spinal levels L2-L3 and L4-L5 in particular have been associated with development of GBS.<sup>[2,3]</sup> In most cases, GBS develops 1-3 weeks after surgery, then resolves over weeks to months.<sup>[4]</sup> While cases of GBS following minimally invasive surgical transforaminal lumbar interbody fusion (MIS TLIF) as well as other lumbar fusion techniques have been reported, there is no reported case of GBS following lateral retroperitoneal transposas approach (LLIF). Furthermore, the classic neural stretch injury/apraxia that can be observed after LLIF can be indistinguishable from early GBS.

## CASE REPORT

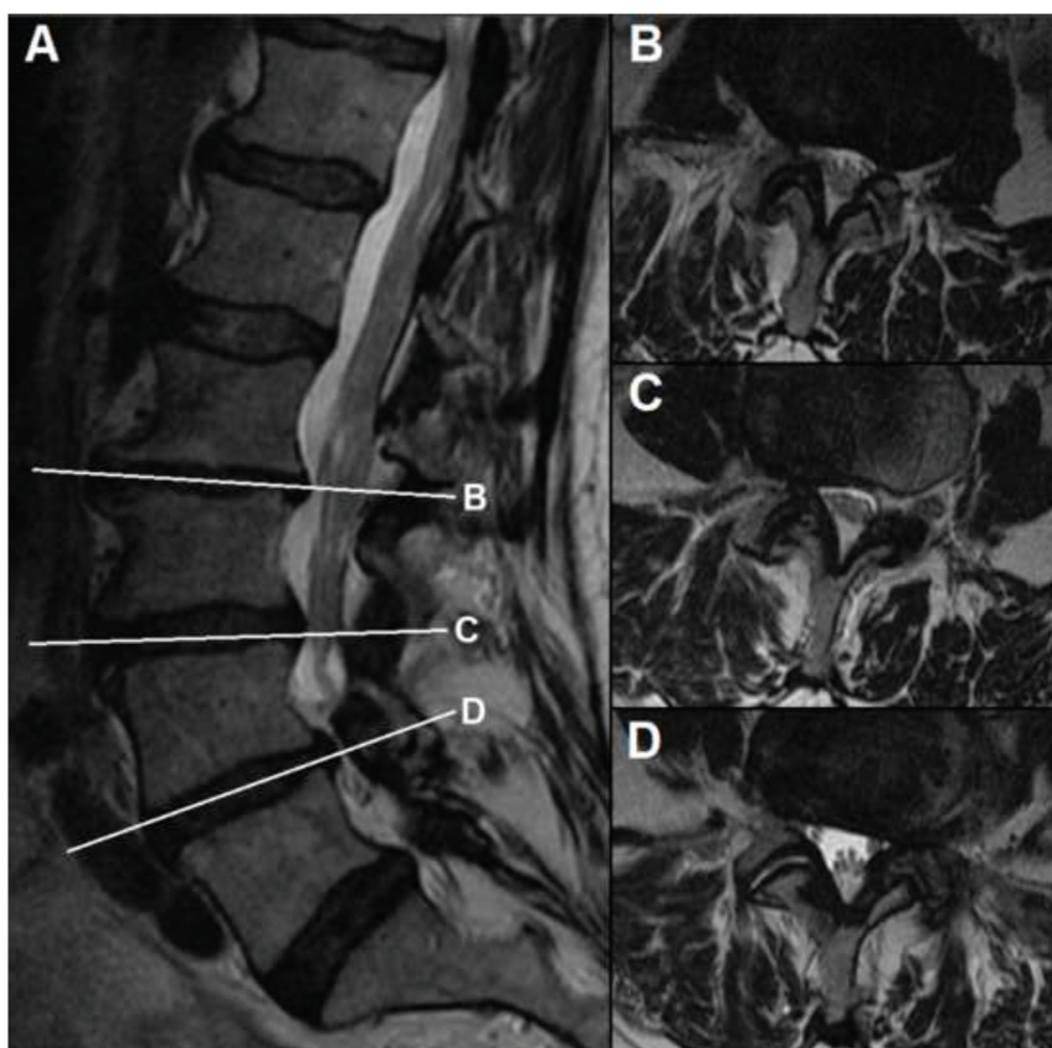
The patient is a 56-year-old female with a past medical history significant for migraines, GERD, hypothyroidism, and anxiety, who first presented with a longstanding history of low back pain present for 6-7 years. Her symptoms were tolerable with conservative management, including physical therapy, selective nerve root block, and epidural steroid injection. She had undergone L4/L5 laminoforaminotomy for degenerative disc disease and foraminal stenosis. Approximately 4 weeks post-op, the patient began experiencing mild to moderate non-radiating axial pain, which progressed to left radicular pain radiating to her foot, along with worsening left dorsiflexion weakness.

CT and MRI lumbar showed degenerative scoliosis in addition to foraminal disease at L3/4, L4/5, and L5/S1; this was most severe at the left L4/5 despite the prior decompression (**Fig. 1**). Standing lumbar flexion-extension X-ray showed no dynamic instability. Scoliosis films showed a 25-degree lumbar curve with apex at L2. Her spinopelvic parameters were as follows: lumbar lordosis 68, pelvic incidence 77 (mismatch

of 9), and pelvic tilt of 30. DEXA scan showed an L-spine T-score of -1.6, consistent with osteopenia. The Oswestry Disability Index (ODI) was calculated to be 56%.

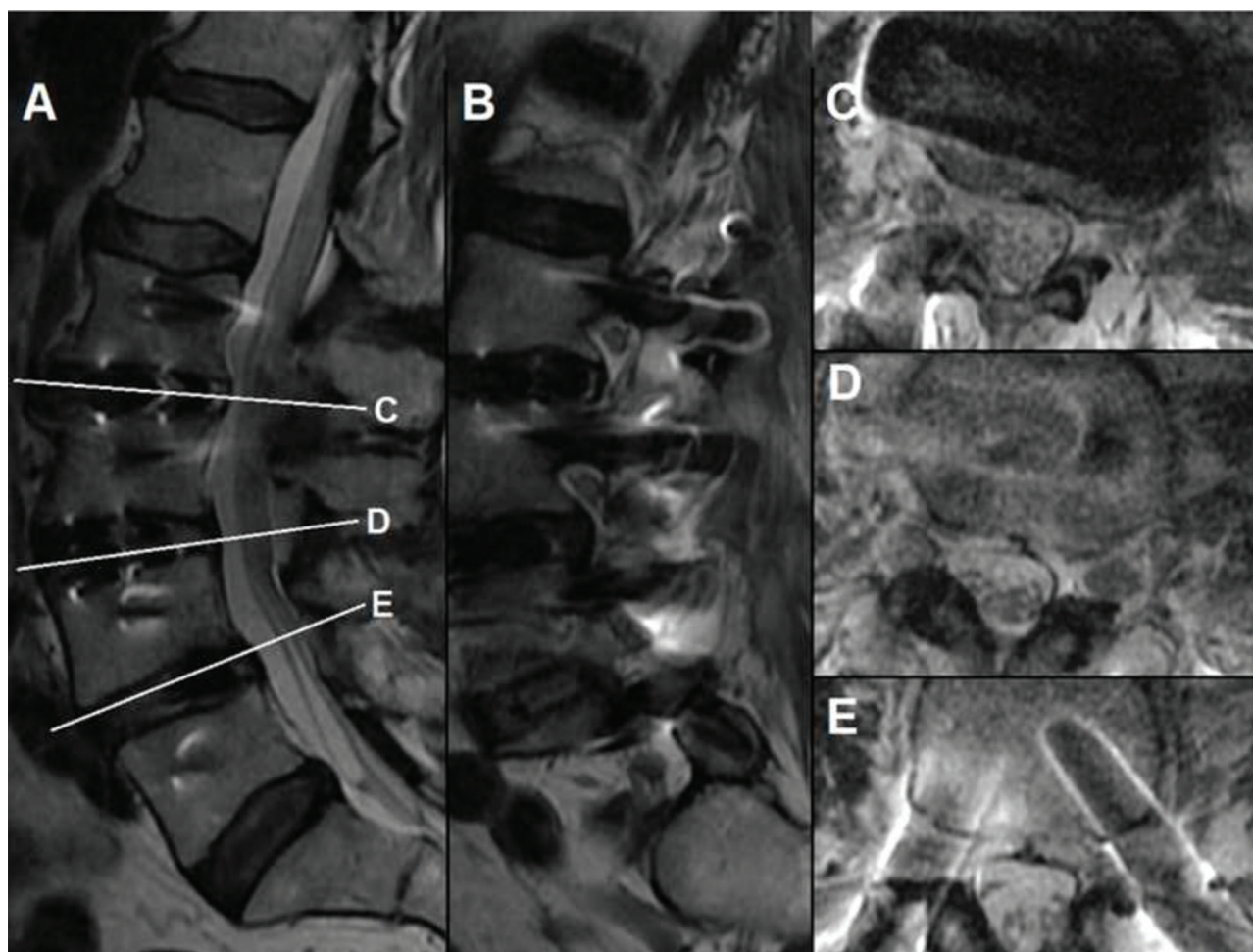
Given the presence of a focal scoliosis with severe disc degeneration at these levels, and her failure to respond to non-operative therapy, she was offered minimally invasive L2/3, L3/4 LLIF followed by L4/L5 MIS TLIF. The patient did well after a two-stage surgery and reported immediate improvement in her symptoms. She was discharged home on postoperative day 8.

On postoperative day 12, at home, the patient began to experience new worsening left lower extremity (LLE) weakness, unlike her previous symptoms. She came to the emergency room for immediate medical attention. She was unable to walk, and her LLE was objectively weak with strength graded less than antigravity in the quadriceps, dorsiflexion, and extensor hallucis longus muscles. Her sensory exam was stable. CT and MRI of her lumbar spine revealed no acute pathology (**Fig. 2**). Given the acute nature of her weakness and recent operation, the decision was made to perform an emergent exploration of her left L4 and L5 nerve roots. These nerves were



**Figure 1.** Pre-operative T2 MRI of the lumbar spine in mid-sagittal (A) and axial (B, C, D) planes which represent the L2-L3, L3-L4, and L4-L5 transdiscal views, respectively. Multi-level degenerative disc disease with intervertebral foraminal stenosis is seen.





**Figure 2.** Emergency room T2 MRI of the lumbar spine in mid-sagittal (A), left parasagittal (B), and axial planes (C, D, E) which represent the L2-L3, L3-L4, and L4-L5 transdiscal views, respectively. Left-exiting nerve roots appear free and uncompressed.

easily identified and followed from thecal sac to lateral exit in the intervertebral foramina. There was no compression of these nerves or migration of interbody cages.

Her LLE weakness persisted postoperatively, and the patient was maintained on tapering dexamethasone. By post-operative day 27, the patient reported stable LLE weakness but new weakness in her upper extremities. Nerve conduction studies were performed and showed absent bilateral radial, median, and ulnar sensory responses. There were severely diminished amplitudes with dispersion and slowing of the bilateral median and ulnar motor responses with delayed latencies. F waves were delayed and with poor persistence. EMG showed bilateral upper extremity muscle recruitment, worse distally. CSF examination revealed albumino-cytologic dissociation. Taken together, this examination was interpreted as an acute demyelinating peripheral polyneuropathy identified as an axonal variant of GBS. The patient underwent a 5-day course of IVIG and gradually improved.

At one-month post-exploratory surgery, the patient was walking with a rolling walker assist. At two-month post-exploratory surgery, the patient had returned home, was still using a rolling walker for ambulatory assistance, and regaining many activities of daily living. At 6-month post-explor-

atory surgery, the patient was walking independently without rolling walker assistance.

## DISCUSSION

A small number of GBS cases have been reported following various surgical procedures in an absence of any other known risk factors, such as infection. One retrospective cohort study found that 5/63 patients with GBS had surgery (any type) in the 6-week period prior.<sup>[1]</sup> In most cases of post-neurosurgical GBS, the EMG/nerve conduction velocity (NCV) and CSF studies are normal in the first 4-5 days. Spinal surgery had a higher incidence of GBS development than cranial surgery. Post-operative weakness is more likely to be caused by epidural hematoma than GBS so this cause must be initially ruled out.

There have been multiple documented cases of GBS following lumbar spinal surgery specifically.<sup>[2,3]</sup> Procedures below the L2 level, including MIS TLIF, have been associated with this complication in the past. Patients who developed GBS following spinal surgery as reported in the literature tend to generally have favorable outcomes, with

symptoms resolving in weeks to months, either on their own or with the administration of IVIG.<sup>[4]</sup> At the most recent follow-up, the recovery for the patient presented here seems to have also been favorable.

Since GBS can mimic other postoperative complications, especially after spinal surgery, it is imperative to tell it apart from more common diagnoses, including femoral nerve apraxia. On physical exam, GBS will appear to affect proximal muscles of lower extremities more commonly than upper extremities. In addition to the exam, GBS is diagnosed with CSF analysis, or, as in this case, EMG. The CSF analysis will show elevated protein without pleocytosis and typical albumino-cytologic dissociation while an EMG shows absent or diminished nerve potentials.<sup>[3]</sup> While the exact mechanism between spinal surgery and GBS has yet to be fully elucidated, varying patient presentations suggest an interplay of humoral and cell-mediated immune mechanisms.<sup>[5]</sup>

## CONCLUSIONS

GBS is a rare postoperative complication following lumbar spine surgeries with unknown pathogenesis. Here we report a GBS case to follow a lateral retroperitoneal approach to the lumbar spine. Because of GBS's significant risk of morbidity and mortality, GBS should be included in the postoperative differential diagnosis whenever there is motor weakness, especially with a normal post-operative MRI/CT after surgery, as in this case. GBS can be difficult to diagnose as a complication after spinal surgery, since it presents very similarly to other more common postoperative spinal complications.

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## Competing Interests

The authors have declared that no competing interests exist.

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# Синдром Гийена-Барре после планового латерального поясничного межтелового спондилодеза

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## Резюме

Осложнения после операции латерального забрюшинного транспсоасно-поясничного спондилодеза (LLIF) включают апраксию бедренного нерва, повреждение кишечника/мочевыводящего пузыря, повреждение мочеточника и, возможно, как показано в этом отчёте о случае, синдром Гийена-Барре. Синдром Гийена-Барре (GBS) - аутоиммунное воспалительное заболевание, которое обычно возникает после инфекции или, реже, после операции. Мы сообщаем о случае GBS после планового спондилодеза поясничного отдела через латеральный забрюшинный транспсоасный доступ (LLIF). У 56-летнего пациента на 12-й день после операции возникла слабость левой нижней конечности (LLE). ЭМГ показала двустороннюю рекрутацию мышц верхних конечностей, хуже в дистальном направлении. После лечения внутривенным иммуноглобулином (IVIG) состояние пациента постепенно улучшилось, и через 6 месяцев после операции его состояние было благоприятным. Анализ СМЖ и ЭМГ должны быть частью обследования пациентов с нейропатией нижних конечностей после LLIF.

## Ключевые слова

Синдром Гийена-Барре, латеральный забрюшинный транспсоасный доступ, поясничный спондилодез, хирургия позвоночника