

Adrenal Insufficiency Following Extensive Corticosteroid For Pain Management: A Cautionary Case and Shift to Regenerative Therapies

Jeffrey Hu, BA¹; Brooks Johnson, MD²; Stephen Covington, DO²
Creighton University School of Medicine¹, Department of Anesthesiology and Perioperative Medicine, Mayo Clinic, Phoenix, AZ²

INTRODUCTION

- Corticosteroid injections are widely used in the management of spine and musculoskeletal pain.
- Repeated exposure may suppress the hypothalamic-pituitary-adrenal (HPA) axis via negative feedback inhibition of ACTH, leading to secondary adrenal insufficiency (SAI)
- Symptoms of SAI, including fatigue, weakness, hypotension, and malaise, are nonspecific and may be misattributed to chronic pain, aging, or comorbid illness
- Cumulative steroid burden may be underestimated when patients receive care across multiple health systems

CASE DESCRIPTION

A 72-year-old female with chronic neck pain, bilateral shoulder osteoarthritis, and lumbar spondylosis presented for longitudinal pain management while residing seasonally in Arizona and the Midwest.

- Over several years she received numerous interventional pain procedures by multiple providers, including cervical medial branch radiofrequency ablations, interlaminar epidural steroid injections, facet joint injections, hip and shoulder injections, and trigger point injections
- Interventions provided short-lived relief with progressive escalation in frequency
- Cumulative corticosteroid exposure was not centrally tracked because care occurred across multiple unaffiliated health systems
- Around 9 months after escalation of interventional care, she presented to the emergency department with worsening cervical radicular pain, fatigue, weakness, and hypotension
- Endocrine evaluation revealed a markedly low morning cortisol with inadequate response to cosyntropin stimulation and suppressed ACTH levels, consistent with SAI due to HPA axis suppression

INTERVENTION

- Glucocorticoid replacement therapy led to clinical improvement
- Pain management strategy was transitioned to steroid-sparing approaches
- Patient underwent platelet-rich plasma (PRP) injections to the bilateral glenohumeral joints and lumbar facet joints, resulting in meaningful symptom relief
- Neuromodulation with spinal cord stimulation is currently being considered for persistent lumbar pain

Table 1. Procedures Performed at Local Institution

Date	Procedure	Corticosteroid	Dose (mg)
Nov 2023	TFESI	Dexamethasone	10
Jan 2024	ILESI	Methylprednisolone	80
Mar 2024	IA joint injection	Methylprednisolone	40
Mar 2024	Cervical RFA (peri-procedural)	Methylprednisolone	40
Apr 2024	ILESI	Methylprednisolone	80
Oct 2024	TPI	Methylprednisolone	20
Jan 2025	ILESI	Dexamethasone	10

Table 2. Procedures Performed by Outside Providers

Date	Procedure	Corticosteroid	Dose (mg)
May 2022	Facet Injection	Methylprednisolone	80
Aug 2022	Cervical RFA	Methylprednisolone	80
Aug 2022	Lumbar RFA	Methylprednisolone	80
Sep 2022	Cervical ILESI	Methylprednisolone	80
Nov 2022	SI joint injection	Methylprednisolone	80
May 2023	Cervical ILESI	Methylprednisolone	80
May 2023	Hip IA injection	Methylprednisolone	80
Jun 2023	Cervical ILESI	Methylprednisolone	80
Aug 2023	Lumbar ILESI	Methylprednisolone	80
Jul 2024	GT bursa injection	Methylprednisolone	80
Oct 2024	Lumbar RFA	Methylprednisolone	80

Abbreviations: TFESI = transforaminal epidural steroid injection; ILESI = interlaminar epidural steroid injection; IA = intra-articular; RFA = radiofrequency ablation; SI = sacroiliac; TPI = trigger point injection; GT = greater trochanter

DISCUSSION

- Secondary adrenal insufficiency is a clinically significant complication of cumulative corticosteroid exposure and early recognition can be challenging due to nonspecific symptoms^{1,2}
- Risk increases with:
 - Repeated high-dose exposure
 - Escalating procedural frequency
 - Above average steroid dosing for non-epidural procedures
 - Use across multiple unaffiliated health systems without centralized dose tracking
- Fragmented care may obscure total corticosteroid burden, delaying recognition of adrenal suppression
- In this case, early identification of an extensive injection history was essential to prompt diagnosis and treatment.
- When corticosteroids are contraindicated, steroid-sparing strategies such as regenerative therapies and neuromodulation are effective

CONCLUSION

Repeated corticosteroid injections may result in clinically significant suppression of the HPA axis and secondary adrenal insufficiency. Cumulative steroid burden maybe underestimated, especially when patients receive interventional pain care across multiple health systems. This case highlights the importance of proactively eliciting detailed procedural histories and considering steroid-sparing strategies when corticosteroid use is contraindicated.

REFERENCES

- Bleicken B, Hahner S, Ventz M, Quinkler M. Delayed diagnosis of adrenal insufficiency is common: a cross-sectional study in 216 patients. *Am J Med Sci.* 2010;339(6):525-531. doi:10.1097/MAJ.0b013e3181db6b7a
- Whelan G, Sim J, Smith B, Moffatt M, Littlewood C. Are Corticosteroid Injections Associated With Secondary Adrenal Insufficiency in Adults With Musculoskeletal Pain? A Systematic Review and Meta-analysis of Prospective Studies. *Clin Orthop Relat Res.* 2022;480(6):1061-1074. doi:10.1097/CORR.0000000000002145