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Transient Hiccups Persisting After Nerve Block with Compound Betamethasone: A Case Report

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Abstract

Persistent hiccups are a rare adverse event of local glucocorticoid injection in interventional pain management, whereas most reported cases are attributed to systemic chemotherapy or steroid administration. Clinical evidence on hiccups secondary to compound betamethasone cervical sympathetic ganglion block, and their differential diagnosis in patients with gastrointestinal comorbidities, remains limited. We report two cases: Case 1 developed persistent hiccups within after cervical sympathetic ganglion block with compound betamethasone, lasting approximately 12 hours; Case 2 experienced symptom onset on the day after ultrasound-guided paravertebral nerve block with the same agent, normal electrolytes, no response to baclofen/acupuncture with the symptoms persisting for 7 days.

Keywords

compound betamethasone; ultrasound-guided nerve block; hiccups; adverse drug reaction; gastroesophageal reflux disease

1 Background

Local injection of long-acting glucocorticoids during interventional pain management may trigger hiccups as a rare adverse event. Most relevant clinical observations focus on Central Nervous System Tumors, Injury and Inflammatory Diseases, Gastrointestinal and Abdominal Disorders and Cancer and on

Chemotherapy etc[1]. Detailed clinical descriptions of hiccups secondary to nerve block procedures in pain clinics and relevant confounding comorbidities remain limited in current literature. This case elaborates clinical manifestations, differential diagnosis and conservative management strategies of nerve block with steroid-induced hiccups.

2 Introduction

Hiccups originates from unregulated diaphragmatic spasm caused by overactivation of the medullary reflex arc innervated by vagus, phrenic and sympathetic nerves. According to unified clinical classification standards, hiccups is divided into three categories based on duration: hiccups (<48 h), persistent hiccups (48 h to 1 month), and intractable hiccups (>1 month)[2].

Glucocorticoids such as compound betamethasone are widely used in peripheral nerve and sympathetic ganglion block for anti-inflammatory and analgesic purposes. After local injection, steroids can be absorbed into systemic circulation, cross the blood-brain barrier and reduce the inhibitory threshold of brainstem GABAergic synapses, leading to excessive excitation of the hiccup reflex center and triggering hiccups[3]. Most existing clinical reports describe hiccups following application of Dexamethasone sodium phosphate and Prednisolone, corticosteroids exert a bidirectional effect on hiccups: they can act as a trigger for hiccup episodes, and may also alleviate hiccup symptoms of specific etiologies in certain clinical scenarios[1]. We present two cases of patients who developed hiccups after undergoing nerve block therapy with compound betamethasone injection, with spontaneous resolution of symptoms thereafter to provide clinical reference for differential diagnosis and conservative treatment of steroid-induced hiccups. All patients in this case report agreed with the content and provided written consent for publication.

3 Case Presentation

3.1 Patient Information

Case 1: A 38-year-old male presented with allergic rhinitis discomfort and received ultrasound-guided C3–4 cervical sympathetic ganglion block. Past medical history: previous positive Helicobacter pylori infection without any clinical symptoms

and spontaneous clearance of Helicobacter pylori. Laboratory examination showed elevated serum total cholesterol and triglycerides, and he had not taken any lipid-lowering agents; long-term daily coffee intake; no history of hiccups, drug allergy or neurological diseases. Physical examination showed stable vital signs, no tenderness or sensory disturbance in the neck, and normal cardiopulmonary abdominal signs. Written informed consent was obtained for interventional treatment and anonymous case publication, complying with the Declaration of Helsinki.

The patient took the supine position with a pillow under the shoulder to fully extend the neck. After routine disinfection and draping, high-frequency ultrasound was used to locate the left of C3–4 cervical sympathetic space(Fig. 1&2). The injection cocktail was compound betamethasone 1 mL + 2% lidocaine 4 mL + sterile water for injection 5 mL. Real-time ultrasound monitoring confirmed no intravascular, intrathecal or tracheal puncture; the mixed liquid was slowly injected. The operation proceeded smoothly. The patient developed Horner's syndrome, which resolved spontaneously without intervention. He remained under observation for 30 minutes with no immediate discomfort prior to discharge.

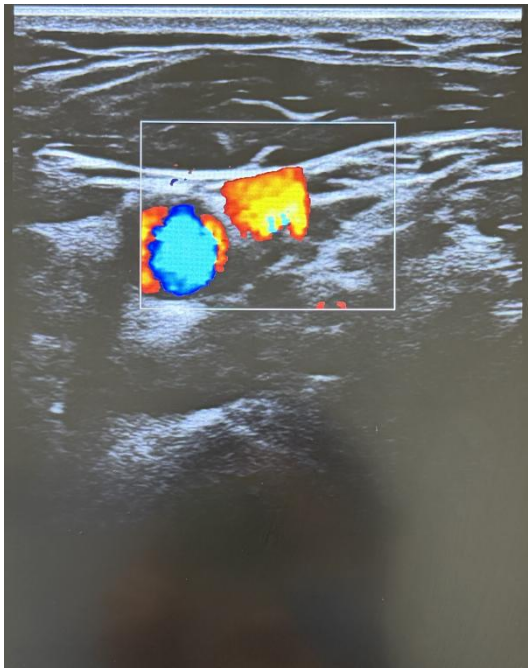


Fig. 1

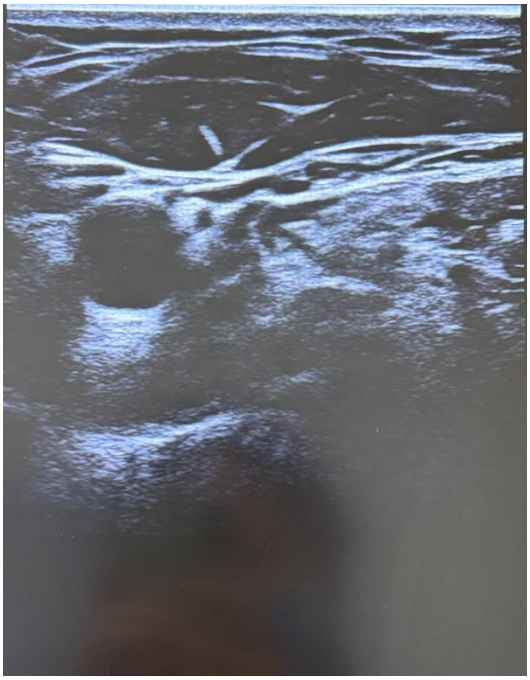


Fig. 2

Hiccups appeared on the second day after block, with hiccups occurring every several seconds, lasting throughout the day and occasionally pausing for about 12 hours. The symptom seriously affected sleep (nap) quality. After the onset of hiccups, the patient contacted physicians of our department for consultation. We conducted one week of follow-up to monitor the dynamic changes of the patient's condition. The patient received no additional therapeutic interventions. No specific anti-hiccup drugs or secondary nerve block rescue were applied. The persistent hiccups gradually relieved within one day and disappeared completely without sequelae.

Case 2:

Case Summary：A 76-year-old male presented to the pain management clinic with six months history of dorsolumbar pain secondary to lumbar disc herniation, reporting 1 week of hiccups symptoms. He underwent ultrasound-guided T11 intercostal nerve block combined with psoas major injection therapy. The injectate consisted of lidocaine, ropivacaine, compound betamethasone injection, and sterile water for injection.

The patient had a past medical history significant for three chronic illnesses. He suffered from hypertension, whose blood pressure remained well controlled through routine outpatient monitoring. He also had gastroesophageal reflux disease, and his symptoms were kept in check by oral omeprazole. Additionally, he experienced insomnia and took oral benzodiazepines to manage this sleep disturbance. On the second day following the interventional procedure, he developed frequent hiccups that recurred every several seconds. These symptoms were far more severe in the daytime and milder at night, making it difficult for him to fall asleep. The hiccups would occasionally wake him up during sleep, leading to disrupted, fragmented sleep cycles.

During the clinical course, the patient self-discontinued lorazepam (his prescribed benzodiazepine) without medical guidance, a serum electrolyte panel obtained at the pain clinic was unremarkable. Oral baclofen and traditional Chinese acupuncture were administered, but neither intervention yielded symptomatic improvement. The hiccups persisted for approximately 7 days before gradually

abating and resolving spontaneously. No additional discomfort was reported by the patient throughout the episode.

3.2 Auxiliary Examinations and Etiological Judgment

After hiccups onset, systematic examinations were completed to exclude other causes of hiccups. No imaging or endoscopic examinations were arranged for the patient. The clinical course was followed up via telephone and WeChat interviews to monitor symptom changes.

The core evidence includes the clear temporal sequence between steroid injection and hiccups onset, complete exclusion of other organic triggering factors, and symptom relief that aligns with the metabolic cycle of long-acting glucocorticoids[4]. Gastroesophageal reflux is considered an aggravating factor rather than the primary cause, as reflux symptoms remained stable before the block, and hiccups were a new-onset symptom.

4 Discussion

Etiology, Pathogenesis and High-Risk Populations

Hiccups arise from aberrant hyperactivation of the medullary hiccup reflex arc innervated by the vagus, phrenic and sympathetic nerves[1]. Homeostatic regulation of this reflex arc depends on the balanced activity of multiple central and peripheral neurotransmitters, including dopamine, serotonin, γ-aminobutyric acid (GABA), epinephrine, and histamine[1-2].

Compound betamethasone, a long-acting glucocorticoid widely administered via local injection for anti-inflammatory and analgesic purposes in interventional pain management, can be absorbed into the systemic circulation following perineural delivery. Subsequent penetration of the blood-brain barrier reduces the inhibitory threshold of brainstem GABAergic synapses, resulting in hyperexcitability of the hiccups reflex center and eliciting paroxysmal diaphragmatic spasms[3].

The etiological spectrum of hiccups is broad and heterogeneous, encompassing central nervous system pathologies, electrolyte imbalances, perioperative stress, chemotherapeutic agents, gastrointestinal disorders (most notably gastroesophageal

reflux disease [GERD] and Helicobacter pylori infection), and systemic corticosteroid therapy (e.g. dexamethasone and prednisolone)[1,3,5].

Existing literature predominantly documents hiccups secondary to systemic corticosteroid administration[4], whereas evidence regarding hiccups induced by local injection of compound betamethasone during ultrasound-guided nerve block procedures remains sparse. The two cases presented herein identify patients with pre-existing gastrointestinal comorbidities as a key high-risk subgroup for prolonged post-block hiccups[1].

Baseline GERD drives chronic activation of vagal afferent fibers, which exerts a synergistic effect with corticosteroid-mediated excitation of brainstem reflex circuits, thereby extending the duration of hiccup episodes. Patient 2 had well-controlled reflux symptoms with regular omeprazole therapy prior to intervention, yet developed persistent hiccups lasting 7 days post-injection, with no symptomatic improvement following baclofen administration and acupuncture treatment. This clinical course corroborates that underlying gastrointestinal dysfunction acts as a critical aggravating factor, rather than the primary inciting cause, of steroid-induced hiccups.

Accordingly, clinicians should routinely screen for GERD and H. pylori infection prior to cervical sympathetic, paravertebral, or fascial plane block procedures, and provide comprehensive counseling regarding the potential risk of persistent hiccups in high-risk patients.

Clinical Manifestations and Differential Diagnosis

Steroid-associated hiccups following nerve block exhibit a characteristic temporal pattern that serves as a cornerstone for differential diagnosis. In both presented cases, hiccups first appeared uniformly on the first post-procedural day, consistent with the delayed systemic absorption and pharmacokinetic profile of long-acting compound betamethasone. Patient 1, who had no active gastrointestinal pathology, developed transient hiccups that resolved spontaneously within 12 hours without any targeted anti-hiccup intervention. In contrast, Patient 2, who had pre-existing gastroesophageal reflux disease (GERD), experienced severe, diurnally predominant hiccups that disrupted sleep architecture and persisted for seven

consecutive days, proving refractory to standard conservative therapies. To differentiate drug-induced hiccups from other causes, we systematically excluded alternative organic etiologies: serum electrolyte panels were unremarkable, and neither patient exhibited new-onset neurological, thoracic, or abdominal lesions that could account for the symptoms. The unambiguous temporal association between the compound betamethasone injection and symptom initiation, coupled with spontaneous resolution aligned with the pharmacological duration of action of long-acting glucocorticoids, strongly supports a diagnosis of an adverse drug reaction[4].

Notably, GERD and Helicobacter pylori infection represent common confounding etiologies[1,5]; however, the stability of baseline gastrointestinal symptoms before the block combined with the de novo onset of hiccups following the procedure reliably distinguishes steroid-triggered hiccups from those of primary gastrointestinal origin.

Stratified Treatment Strategies and Clinical Recommendations

In accordance with established clinical consensus, management strategies for hiccups are stratified according to symptom duration and severity[1,3]. For transient hiccups (duration <48 hours), first-line management consists of physical maneuvers (e.g. breath-holding, cold water ingestion) combined with oral baclofen monotherapy[1,3]. For persistent hiccups (duration of 48 hours to 1 month, consistent with the clinical presentations in our case series), combination therapy with baclofen and metoclopramide is recommended, alongside intensified proton pump inhibitor therapy for patients with underlying GERD to attenuate vagal afferent stimulation[1,3]. For intractable hiccups (duration >1 month or cases refractory to pharmacotherapy), interventional rescue therapies such as stellate ganglion block or bilateral phrenic nerve block are indicated to interrupt the hiccup reflex arc[1-3,6].

Building on the clinical observations from these two cases, we propose three actionable clinical recommendations for interventional pain practice.

First, standardized preoperative informed consent: clinicians must explicitly disclose the rare complication of persistent hiccups prior to the administration of compound betamethasone via sympathetic or paravertebral nerve blocks. Second,

risk-adapted pharmacologic selection: for patients with documented GERD, the dosage of compound betamethasone may be appropriately reduced, or short-acting glucocorticoids may be considered as an alternative to mitigate the risk of prolonged hiccups. Third, prompt early conservative intervention: upon the onset of hiccups in patients with baseline reflux, proton pump inhibitor dosage should be promptly escalated to shorten the duration of symptoms. Collectively, preoperative risk stratification, adequate patient education, and hierarchical conservative management can effectively reduce the morbidity associated with steroid-induced post-block hiccups in patients undergoing interventional pain procedures.

Limitations

This is a single retrospective case report. Large-sample prospective cohort studies are still needed to clarify the incidence and independent risk factors of singultus occurring after cervical sympathetic ganglion block performed with compound betamethasone.

Declarations

Ethics and consent to participate

This retrospective case report was exempted from institutional review board ethical approval in accordance with hospital regulations. All interventional procedures were performed strictly in compliance with the Declaration of Helsinki. Written informed consent was obtained from both patients before treatment. All participants voluntarily agreed to clinical follow-up, clinical data collection and research observation.

Consent to Publish

Signed written consent for publication was obtained from each patient. All personally identifiable information, including clinical ultrasound images, medical records, and follow-up data, was fully anonymized in the manuscript. Patients were informed that their de-identified clinical materials would be used for academic publication without additional compensation.

Availability of data and materials

All clinical raw data, ultrasound images, laboratory results and follow-up records generated in this study are securely stored in the electronic medical record system of the Department of Anesthesiology, Peking University First Hospital. Restrictions apply to data release to protect patient privacy. Qualified academic researchers may request de-identified supporting data from the corresponding author with valid formal applications.

Competing interests

All authors declare that there are no financial or non-financial competing interests associated with this manuscript. No pharmaceutical companies, medical device manufacturers or commercial institutions provided any funding, consulting fees or other benefits relevant to this research.

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Authors' contributions

Xin Xin: Clinical data sorting, literature retrieval, original manuscript drafting and revision;

Lin Zeng mao*: Study design, pathological and differential diagnosis analysis, revision of the Discussion section, corresponding author responsible for manuscript submission;

Zhang Feng*: Intraoperative ultrasound operation, long-term patient follow-up, revision of the Case Presentation part, co-corresponding author;

All authors have read and approved the final submitted manuscript and take full responsibility for all content of this work.

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