

ULTRASOUND-GUIDED THIRD OCCIPITAL NERVE BLOCK FOR PAINFUL C1-C2 FIBROUS DYSPLASIA: A CASE REPORT OF NONSURGICAL SUCCESS

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Background: Fibrous dysplasia (FD) affecting the upper cervical spine is exceptionally rare and results in severe cervico-occipital pain and limited neck mobility due to altered biomechanics and irritation of the third occipital nerve (TON). Surgical management is challenging because of the proximity to critical neurovascular structures. In the absence of neurological deficits, targeted TON blocks have shown promise as part of conservative management.

Case Report: A 33-year-old woman presented with a 7-year history of neck and suboccipital pain. Imaging revealed expansile FD at C1-C2 with partial fusion and no neurovascular compromise. An ultrasound-guided right-sided TON therapeutic block was administered, which resulted in immediate and substantial pain relief (Numeric Rating Scale 8/10 reduced to 3/10) and sustained functional improvement for 3 months.

Conclusions: Ultrasound-guided TON block provided meaningful long-term pain relief and avoided high-risk surgical intervention in this rare case of C1-C2 FD.

Key words: Fibrous dysplasia, cervical vertebrae, third occipital nerve block, ultrasound-guided intervention, case report

BACKGROUND

Fibrous dysplasia (FD) is a benign fibro-osseous condition characterized by replacement of normal lamellar bone with immature woven bone within a fibrous matrix (1,2). It accounts for approximately 5% to 7% of benign bone tumors and most commonly involves long bones, ribs, and craniofacial structures, while cervical spine involvement is uncommon and lesions at the C1-C2 level are exceptionally rare (3).

Lesions in the upper cervical spine pose distinct management challenges due to concerns regarding segmental stability and their close anatomical relationship with vital neurovascular structures, including the vertebral arteries and craniovertebral junction (4). Patients typi-

cally present with neck pain, cervico-occipital headache, restricted cervical range of motion, or radicular symptoms, whereas neurological deficits are usually absent unless there is significant canal compromise (2,5,6).

When neurological function is preserved and deformity remains stable, conservative management is generally favored. However, the role of interventional pain procedures in FD involving the craniocervical junction has been infrequently described (5,6). The third occipital nerve (TON), a medial branch of the C3 dorsal ramus, supplies the C2-C3 zygapophyseal joint and is a well-recognized source of cervico-occipital pain (7).

We report a rare case of symptomatic C1-C2 FD presenting predominantly with cervico-occipital pain

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Disclaimer: There was no external funding in the preparation of this manuscript.

Conflict of interest: Each author certifies that he or she, or a member of his or her immediate family, has no commercial association (i.e., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted manuscript.

Patient consent for publication: Consent obtained directly from patient(s).

This case report adheres to CARE Guidelines and the CARE Checklist has been provided to the journal editor.

Accepted: 2026-02-04, Published: 2026-06-30

that was successfully treated using an ultrasound-guided TON block, thereby avoiding high-risk surgical intervention.

CASE REPORT

A 33-year-old woman was referred from neurosurgery with a long-standing history of neck pain that had intensified over the preceding 5 months. The pain radiated to the right suboccipital region and shoulder and was accompanied by difficulty rotating the neck, reduced cervical range of motion, and episodic occipital headaches. Flexion and extension aggravated symptoms. She denied trauma, fever, seizures, paresthesia, limb weakness, gait disturbance, or bowel/bladder dysfunction.

Before referral, the patient had been treated with multiple conservative therapies, including nonsteroidal anti-inflammatory drugs, neuropathic agents (pregabalin, nortriptyline), and muscle relaxants, with minimal symptomatic relief.

On examination, the patient was conscious and oriented. There was a mild deviation of the neck toward the right side, with the chin deviated to the left. Localized tenderness was noted over the C2-C3 region. Active cervical movements were restricted due to pain. Motor strength was full bilaterally (Medical Research Council [MRC] 5/5), and deep tendon reflexes were normal. Hoffmann’s sign was negative, and there were no clinical features suggestive of myelopathy. Cranial nerve examination was unremarkable. Baseline Numeric Rating Scale (NRS-11) pain score was 8/10 (Table 1).

Magnetic resonance imaging of the cervical spine (T1, T2, short tau inversion recovery) demonstrated expansile involvement of the C1 and C2 vertebral bodies and posterior elements, showing heterogeneity on T1 and T2 sequences, consistent with FD (Fig. 1). The C1 and C2 vertebrae appeared partially fused. There was no abnormal postcontrast enhancement and no evidence of epidural, paraspinal, or intradural mass. The spinal cord

was preserved without compression. Straightening of the normal cervical lordosis was also noted. Computed tomography angiography demonstrated no vertebral artery encroachment, stenosis, or vascular malformation (Fig. 2). Dynamic flexion-extension imaging did not reveal instability. These findings were consistent with FD involving the C1-C2 vertebrae without neurological or vascular compromise.

Given the severity of the cervico-occipital pain, intact neurology, and the neurosurgical team’s decision to defer surgical intervention, a right-sided ultrasound-guided TON block was performed (Fig. 3). With the patient in the lateral decubitus position, a high-frequency linear probe was placed in a coronal-oblique orientation along the posterior borders of the C2-C3 articular pillars to identify the TON superficial to the C2-C3 joint line (Fig. 3). The probe was then adjusted to a transverse orientation to confirm the C2-C3 facet complex (8).

A 25G needle was advanced in-plane from lateral to medial beneath the semispinalis capitis muscle toward the target point adjacent to the TON under real-time ultrasound guidance. After negative aspiration, 1 mL of 1% lignocaine combined with a low dose of 2 mg of dexamethasone was injected incrementally near the nerve. The procedure was completed without complications or evidence of vascular uptake (8).

Immediately following the block, the patient reported a reduction in pain from an NRS-11 of 8/10 to 3/10, along with improved cervical rotation and extension. No adverse events were observed. She experienced sustained pain relief for approximately 3 months following the procedure, with significant improvements in daily activities, including head movements, self-care, and household chores. At the most recent follow-up visit, no severe recurrence of pain was reported (NRS-11 ranged between 2/10 and 4/10), and her neurological examination remained unchanged (Table 1). She continued on low-dose pregabalin for symptom modulation, with

no need for opioid therapy. In view of stable radiological findings and sustained clinical improvement, the neurosurgical team continued with nonoperative management.

DISCUSSION

While most FD cases affect the long bones, craniofacial skeleton, and ribs, vertebral involvement is uncommon, and lesions at C1-C2

Table 1. Clinical outcome (summary).

Parameter	Preprocedure	Postprocedure	1 Mo	3 Mo
NRS-11 pain score	8/10	2/10	2/10 to 4/10	2/10 to 4/10
Cervical rotation	Severely restricted	Improved	Only mild restriction	Only mild restriction
Daily function	Impaired	Markedly improved	Sustained improvement	Sustained improvement
Neurology	Intact	Intact	Intact	Intact

Abbreviations: NRS-11, Numeric Rating Scale; Mo, month.

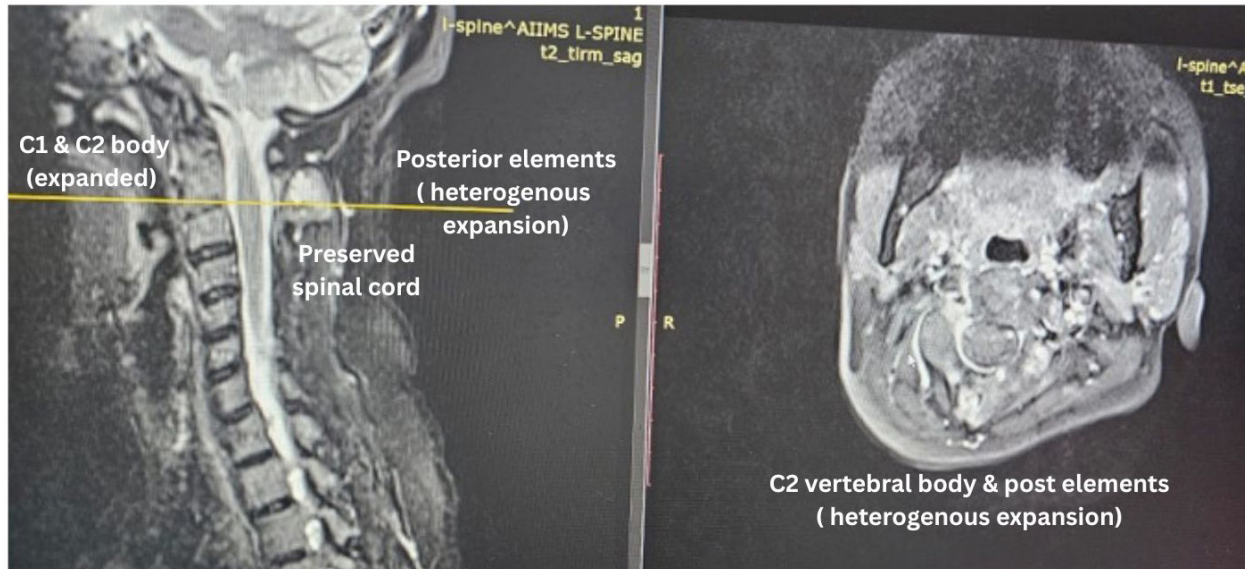


Fig. 1. Sagittal and axial MRI of the craniocervical junction. Sagittal T2-weighted MRI (left) shows hypointense expansion of the C1 and C2 vertebral bodies and posterior elements without spinal cord compression. Axial MRI (right) demonstrates heterogeneous expansion of C2 with preserved spinal canal dimensions. These findings support the diagnosis of FD at the C1–C2 level. Abbreviations: MRI, magnetic resonance imaging; FD, fibrous dysplasia.

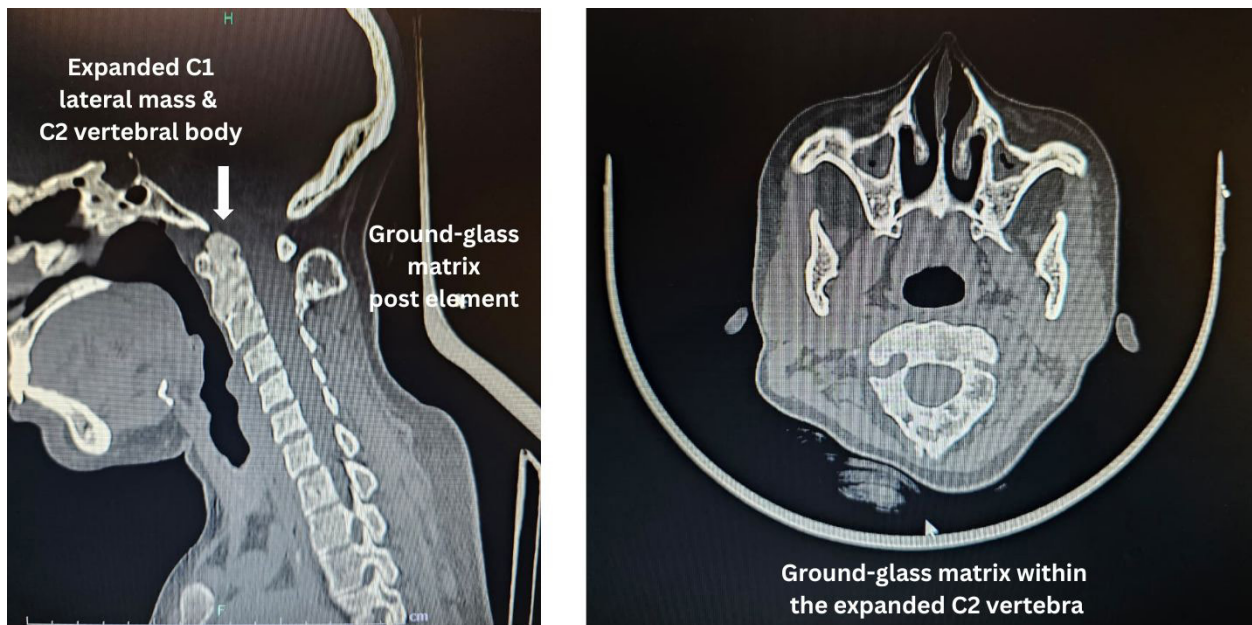


Fig. 2. Sagittal and axial CT images of the upper cervical spine. Sagittal CT (left) demonstrates expansile fibro-osseous thickening of the C1 lateral mass, C2 vertebral body (arrow), and ground-glass opacity in the posterior element. Axial CT (right) shows a characteristic ground-glass matrix within the expanded C2 vertebra, typical of FD, with preserved bony spinal canal. Abbreviations: CT, computed tomography; FD, fibrous dysplasia.

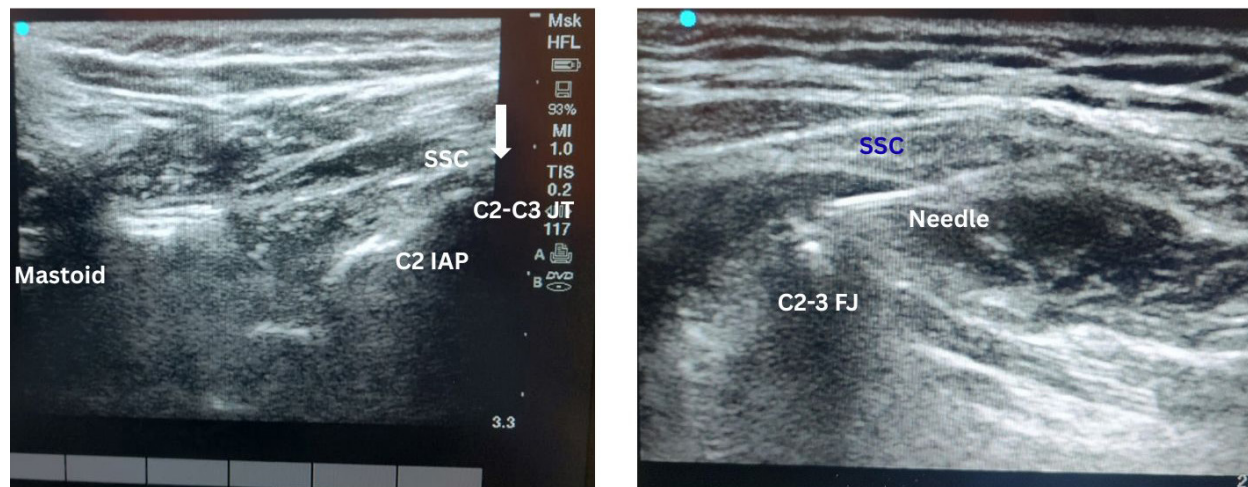


Fig. 3. Ultrasound images of the C2-C3 facet complex demonstrating the TON injection target.

A. Parasagittal (coronal-oblique) ultrasound view obtained with the probe aligned along the facet column showing the SSC, C2 IAP, and the C2-C3 JT, the expected course of the TON (arrow).

B. Transverse (axial) ultrasound view at the C2-C3 level showing the SSC and C2-C3 facet joint, confirming probe position with proper needle advancement.

Abbreviations: IAP, inferior articular process; JT, facet joint line; SSC, semispinalis capitis.

are particularly rare (1,5,6). Although FD may be monostotic or polyostotic, spinal involvement is only sporadically reported in the literature, and involvement of the craniovertebral junction is considered exceptional (3,5). The scarcity of reported cases in the upper cervical region underscores the clinical significance of this presentation.

Management of lesions at the C1-C2 level is further complicated by the proximity of critical anatomical structures, including the vertebral arteries, upper cervical nerves, and the cervicomedullary junction. This complex regional anatomy contributes to diagnostic uncertainty and increases the risk associated with surgical intervention. The presence of such vital neurovascular structures makes both surgical and interventional planning particularly challenging in this region (4,9,10).

Pain in upper cervical FD is likely multifactorial. Expansion and structural distortion of the C1-C2 vertebrae can result in local mechanical pain (1). Altered craniovertebral biomechanics may increase stress on the C2-C3 zygapophyseal joint, a recognized source of cervico-occipital pain. The TON, which innervates the C2-C3 zygapophyseal joint, plays a central role in cervico-occipital pain syndromes. In addition, secondary spasm of the suboccipital musculature may further contribute to symptom severity (7-9,11,12).

The TON arises from the dorsal ramus of C3 and pro-

vides sensory innervation to the C2-C3 zygapophyseal joint and adjacent posterior cervical tissues. Blocking this nerve can reduce pain arising from both articular and myofascial sources (7,8). In this patient, dysplastic involvement at C1-C2 likely altered biomechanics at the C2-C3 segment, making the TON a logical therapeutic target. Greater occipital nerve block was not selected because her pain pattern and tenderness localized specifically to the C2-C3 distribution (7,12).

Furthermore, a C2-C3 medial branch radiofrequency ablation (RFA), while a potential definitive treatment for facetogenic pain, was deferred in the initial management due to the high-risk anatomy surrounding the C1-C2 FD lesion; the diagnostic/therapeutic block was therefore the preferred first-line interventional strategy. RFA remains our plan for definitive treatment if the patient experiences a severe relapse of pain. Rather than treating generalized neck pain, this approach addressed the specific neural pathway transmitting pain from the affected upper cervical structures (7,12).

To our knowledge, no prior reports describe using a TON block to treat pain attributed to C1-C2 FD. Published literature on cervical spine FD predominantly focuses on surgical decompression, stabilization, vertebroplasty, or radiological surveillance. In the absence of neurological deficits or radiographic instability, conservative management has been recom-

mended, with operative intervention reserved for progressive deformity, instability, or cord compression (1,3,5,6).

CONCLUSIONS

Our case highlights the potential role of targeted interventional pain management strategies in patients

with upper cervical FD. Ultrasound guidance enhances procedural safety through real-time visualization of vascular and osseous landmarks while avoiding ionizing radiation. Selective TON blockade provided sustained pain relief, functional improvement, and avoidance of surgical intervention in this anatomically complex and surgically high-risk region.

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