



Dropped head syndrome after bilateral cervical radiofrequency ablation. A case report and literature review

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ABSTRACT

Introduction: Cervical medial branch radiofrequency ablation is an effective treatment for cervical facet joint pain. It is considered a safe procedure, and permanent complications are very rare. We report a case of a patient who developed dropped-head syndrome (DHS) after bilateral treatment.

Case report: An 86-year-old man was referred to our pain clinic because of neck pain. One year before, he underwent bilateral multi-level cervical medial branch radiofrequency ablation. Within the next 24 hours, he experienced progressive neck extensor muscle weakness. After a comprehensive examination, he was diagnosed with dropped head syndrome as a complication of the radiofrequency procedure. Conservative management was chosen, resulting in partial improvement of the muscular weakness.

Conclusion: The present case, along with others reviewed in this article, supports the recommendation against performing bilateral and multilevel cervical medial branch radiofrequency ablation.

1. Introduction

Cervical facet joints are considered the primary source of pain in 27–70% of patients with chronic neck pain and in 54–60% of neck pain following whiplash injury [1]. Cervical medial branch radiofrequency ablation (RFA) is an effective treatment for cervical facet joint pain, showing moderate degree of evidence for pain relief in six months reported in various systematic reviews [2–4]. In case of pain recurrence, the procedure can be repeated with reproducible chance of success [5].

An accepted method for diagnosing facet joint pain is the positive response with local anesthetic blocks of facet joint nerves, also known as medial branch blocks [6].

Cervical medial branch RFA is considered a safe procedure, and permanent complications are very rare. Common and transient adverse effects include post-procedural pain, cutaneous numbness, dysesthesias and dizziness, lasting a few days to weeks [7,8]. Major complications may occur, such as direct trauma to the ventral ramus or spinal cord, vertebral artery injury, or infection [9,10].

Here, we report a case of a patient who developed Dropped-Head Syndrome after bilateral cervical medial branch RFA.

2. Case report

An 86-year-old man was referred to our pain clinic with a history of chronic neck pain. The patient's medical and surgical history includes former smoker, hypertension, dyslipidemia, migraine, cholecystectomy, and prostatectomy due to a prostate cancer in remission.

One year before he visited us, because of a chronic nociceptive cervical pain of mild-severe intensity nonresponsive to conservative management, the patient underwent bilateral cervical medial branch radiofrequency ablation (RFA) at an external institution. According to records from that institution, they performed bilateral C3 to C6 medial branch ablations guided by fluoroscopy, under conscious sedation. Medial branch block was not performed before to confirm the diagnosis of cervical facet pain. Further details were not provided. About 24 hours after the procedure, the patient started with neck extensor muscle weakness, condition that was worsening during the next days. This situation motivated a consultation to the emergency department, and he was diagnosed of Dropped-Head Syndrome (DHS). They provided a soft cervical collar and was referred to physical therapy and for further study.

A cervical magnetic resonance imaging (MRI) was performed 2 weeks after the RFA procedure and did not reveal any acute

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Fig. 1. Lateral X-Ray in neutral position (a), flexion (b) and extension (c) of the neck.



Fig. 2. Patient's head position.

complications nor signs of medullar myelopathy. An electromyography (EMG) performed 8 months after the RFA reported signs of chronic axonal loss at the level of the paraspinal muscles with signs of reinnervation. X-Ray in neutral position, flexion and extension of the neck are showed in Fig. 1.

Additional examination, including corporal MRI and complete laboratory test, was made to rule out neurological and neuromuscular causes. In the end, the patient was diagnosed with DHS as a complication after bilateral cervical medial branch RFA. He also was evaluated by the neurosurgery and trauma service, ruling out the indication for surgery.

When we first visited the patient, one year after the RFA procedure, he was complaining of posterior cervical pain, radiating to the occipital and retro-orbital region, suggesting bilateral greater occipital nerve compromise.

The physical examination showed a passive flexion of the neck in neutral position, needing to raise the head to direct the gaze horizontally (Fig. 2). When standing, the neck hyperflexion increased until the chin touched the chest. It was detected a bilateral trapezius muscle atrophy and difficulty for cervical extension. Some progressive improvement of the muscular weakness was detected along the time after the RFA, being he able to elevate the head a maximum of 30° , but he still needed to use cervical collar. He had no sensory or motor deficits in the upper extremities and osteotendinous reflexes were present and symmetrical. There were no signs suggestive of cervical myelopathy. We recommended to continue the conservative treatment, consisting on physical therapy and pharmacologic analgesic treatment.

3. Discussion

Severe complications after cervical medial branch RFA are very uncommon. The risk of complications may increase if the procedure is performed by poorly trained personnel, if it is performed bilaterally or at multiple levels, or under heavy sedation [10].

In 1999 McDonald et al. commented that RFA denervates 20% of the local musculature, and therefore, discouraged bilateral or multilevel RFA in a single procedure [11].

Furthermore, according to the Consensus practice guidelines on

interventions for the cervical spine published in 2021 [1], bilateral or multi-segment (>2 levels) RFA are not recommended due to safety concerns.

DHS is a condition characterized by severe weakness of the cervical paraspinal muscles that results in a chin-on-chest deformity that is typically passively correctable. The patient's head falls forward when the body is in standing or in sitting position, resulting in neck pain, gait disturbances, trouble eating due to neck flexion, and difficulties with horizontal gaze, all these conditioning significant implications on the patient's health and quality of life [12,13].

It is a condition that is more common in the elderly population, and it can be associated with neurological, neuromuscular or muscular disorders, such as amyotrophic lateral sclerosis, Parkinson disease, multiple system atrophy, myasthenia gravis, Lambert-Eaton myasthenic syndrome, polymyositis, and other [14].

As for the treatment of the syndrome, the published literature is scarce. Apart from the treatment of any underlying pathology if associated, many authors recommend initial conservative management with cervical orthopedic collar to maintain neck extension, and physical therapy to try to strengthen the paraspinal muscles [15]. Surgical instrumented fusion including cervical arthrodesis with or without thoracic extension is suggested when conservative treatment is not enough or there is cervical instability with associated myelopathy [16, 17]. In 2008 Gerling and Bohlman [18] published 9 cases in which posterior fixation was performed. Seven of the nine patients presented complications, mainly two follow-up surgeries (n = 1), camptocormia (n = 2) and dysphagia (n = 2).

To our knowledge, this is the fourth case of DHS associated to cervical medial branch RFA reported in the literature. In 2012 Ahmed MM and colleagues [19] published the first case report of a 46-year-old man with chronic cervical pain, who underwent to RFA of the right cervical medial branches innervating the C2–C3 to C5–C6 levels, followed by ablation of the same left levels one week later. After the second ablative procedure, the patient presented with rapid progressive inability to actively extend the neck to a neutral position or beyond. The EMG findings revealed active denervation of the cervical paraspinal musculature. Over the ensuing years, his neck pain worsened despite conservative treatment. Four years after the ablative procedure, computed tomographic scan of the cervical spine demonstrated a fixed kyphotic deformity, and instrumented surgery was performed involving C3–C4, C4–C5, and C5–C6, with correction of the cervical alignment and significant improvement of the pain. Stocker GE and colleagues [20] published in 2013 a case of DHS in a 54-year-old woman with headaches and cervical chronic pain after an automobile accident, who underwent to left-sided RFA of the third occipital nerve and C2–C4 medial branches. Immediately after the procedure, neck pain and weakness manifested, with progression of the deformity to along the next five months resulting in a dropped head deformity and a near-complete inability to extend the neck. Initial MRI highlights paraspinal edema, and after five months revealed atrophic and degenerative changes in the left semispinalis cervicis and splenius capitis. At this point, surgery was recommended performing an C2-T2 posterior instrumented fusion, with improvement of her cervical alignment and pain. The third case report, published by Harneck SB and colleagues [21] in 2022, reported a DHS in a 77-year-old man with chronic cervical pain and preexisting C4–C5 kyphosis, who underwent bilateral C3–C5 medial branch RFA, using a 16G needle in the left side and 18G needle in the right side. About 6 weeks after the procedure, the patient presented with difficulty to keeping his head erect. The MRI after RFA did not show any abnormal signal intensity of the cervical muscles. The patient was treated in a conservative manner with physical rehabilitation and cervical collar, showing a significant objective improvement approximately 10 weeks later, that allowed discontinuation the use of the cervical collar. Further improvement of the strength was observed. All three cases published before were performed after positive medial branch blocks. In our case previous medial branch block was not performed, this might avoid an

Table 1

Principal characteristics of the published case reports.

Author, year	Age, gender	Medial branch RFA	Complementary exams	Treatment
Ahmed MM, 2012	46, man	C2-3 to C5-C6, bilateral	EMG: Denervation of cervical paraspinal musculature	Instrumented surgery C3-C6
Stocker GE, 2013	54, woman	C2-3 to C4-C5 + TON, left	MRI (initial): paraspinal edema. MRI (5 months later): atrophic changes left s. cervicis and s. capitis muscles	Instrumented surgery C2-T2
Harneck SB, 2022	77, man	C3-C5, bilateral	MRI: Anodyne	Conservative

RFA, Radiofrequency Ablation; MRI, Magnetic Resonance Imaging; EMG, Electromyography; TON, third occipital nerve; S.cervicis, semispinalis cervicis; S. capitis, splenius capitis.

unnecessary RFA procedure if negative. Reported cases features are summarized in Table 1.

Of all four cases, three of them presented after a bilateral procedure. In all cases, the muscular debility symptoms were rapidly developed within days or weeks after the ablative procedure. About the treatment, two of them needed surgical fusion, and the other two were managed in a conservative manner.

While the precise physiopathology of DHS after RFA is not completely understood, the more plausible explanation, according with the physiopathology and the published cases, it may be related to denervation of supporting paraspinal musculature, creating a relative imbalance in the neck flexors and extensors. This is consistent with the observation that most cases occurred following bilateral multilevel RFA. Given the potential for motor nerve regeneration, improvement in the condition could be anticipated. As previously discussed, our patient demonstrated some improvement over time, although without complete resolution. Similarly, the patient reported by Harneck SB exhibited significant and progressive improvement in the months following RFA. Other factors like preexisting kyphosis in one case remain as unclear factor that might increase the risk for this complication.

4. Conclusion

In this article, we conclude that DHS is a severe complication of multilevel or bilateral cervical RFA that should not be taken lightly. It is recommended to perform a diagnostic block prior to denervation to diagnose the facet origin of the pain, so that the patient is not subjected to an unnecessary procedure. Furthermore, bilateral ablation should not be performed at the same time to avoid this complication. Multilevel RFA, including more than 2 levels should also be avoided, according with the Consensus practice guidelines mentioned above [1].

Initial management is conservative with physical therapy being the base of the treatment. When this is not enough, surgical consultation may be considered.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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