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Complete Recovery Chronic Retro-Odontoid Pseudotumor Et HNP with Laminectomy and Cervical Disc Replacement

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Abstract: A rare case found, 54-year-old male patient was experiencing pain in his neck since 20 years ago and had been gradually worsening with weakness of upper and lower extremity. Magnetic resonance images and cervical spine plain photo showed a retro-odontoid pseudotumor and HNP. This lesion behaves as a tumor-like lesion that causes inflammation. HNP cervical related with CX3CL1/CX3CR1 interaction in Rheumatoid Arthritis (RA). The paper aims to report a rare case of a patient with complete recovery chronic retro-odontoid pseudotumor C1 and hernia nucleus pulposus C3-4 C4-5 C6-7. The patient was treated with a two-phase procedure: laminectomy and cervical disc replacement. The patient had paresis and tingling in the upper and lower extremities for the past three months with radiating neck pain for 20 years after the two-phase operation. The patient completely recovered after underwent two phases of procedure and 2-years follow-up evaluation. Chronic retro odontoid pseudotumor C1 et hernia nucleus pulposus C3-4 C4-5 C6-7 can recover completely with laminectomy and cervical disc replacement without symptoms or complaint after two years. HNP cervical can relate to rheumatoid arthritis that causes retro odontoid pseudotumor in this case.

Keywords: hernia nucleus pulposus, retro-odontoid pseudotumor, rheumatoid arthritis.

椎板切除术和颈椎间盘置换术完全恢复慢性后齿状突假瘤

摘要: 一个罕见的案例发现, 54 岁的男性患者从 20 年前开始颈部疼痛, 并逐渐恶化, 上肢和下肢无力。磁共振图像和颈椎平片显示后齿状突假瘤和 HNP。这种病变表现为引起炎症的肿瘤样病变。HNP 颈椎病与类风湿性关节炎 (RA) 中 CX3CL1/CX3CR1 的相互作用有关。本文旨在报告一例罕见的完全康复慢性齿状突后假瘤 C1 和髓核 C3-4 C4-5 C6-7 患者。该患者接受了两阶段手术: 椎板切除术和颈椎间盘置换术。患者术后 3 个月出现上下肢麻痹、刺痛, 放射性颈痛 20 年。经过两期手术和 2 年随访评估, 患者完全康复。慢性齿状突后假瘤 C1 和髓核 C3-4 C4-5 C6-7 可以通过椎板切除术和颈椎间盘置换术完全康复, 两年后无症状或主诉。在这种情况下, HNP 颈椎病可能与导致后齿状突假瘤的类风湿性关节炎有关。

关键词: 髓核疝、牙后突假瘤、类风湿性关节炎。

1. Introduction

Cases of retro odontoid pseudotumor (ROP) are very rare. This mass is an uncommon condition in RA

patients [1]. In 2004-2015, only three cases were found with rheumatoid arthritis from 38 retro-odontoid pseudotumor individuals [2]. There are no case reports

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that report retro-odontoid pseudotumor et causa rheumatoid arthritis patients with cervical HNP. Several theories mention the relationship between cervical HNP and RA, namely the contribution of the CX3CL1/CX3CR1 interaction [3].

In this report, we would like to describe a case of ROP caused by rheumatoid arthritis with cervical HNP over 20 years and complete recovery after two years of follow-up. The surgical intervention was performed by laminectomy and cervical disc replacement.

2. Case Report

A 54-year-old man complained of neck and back of head pain associated with activity disturbance for 20 years. The patient also complained of tingling behind the head, neck, arms, chest, stomach, and legs. The patient experienced a decrease in muscle strength in the upper and lower limbs, so that patients were difficult to walk and using a spoon independently. Patients had difficulty holding a spoon. Weakness in the upper and lower extremities was felt for the last three months before the patient was operated on.

Neurological status of patient show muscle strength based on Medical Research Council Scale Manual Muscle Testing Scale result is upper limb 3/3 and lower limb 3/3. Pathologic reflex Koebner, Babinski, and Clonus are positive. Physiologic reflex ankle reflex and jerk Achilles reflex are increased. Autonomic nerve pathways defecation and clonus were found to be disturbed, but urination was normal. A blood test revealed high CRP, normal full blood count, erythrocyte sedimentation rate, renal function test, liver function test, phosphate level, and alkaline phosphatase level.

Then the patient was conducted by the MRI supporting examination of C1-high stenosis with a mass of retro odontoid tumors. This patient also has Central Type Discus Herniates at C3-4, C4-5, and C5-6. The mass shows hypointense impinging the C1 spinal cord with no contrast enhancement.

Then cervical spine plain photo inspection of dynamic Cervix Plain AP, lateral, flexion, and extension showed no instability and subluxation in C1 and C2 atlantoaxial. In Cervical CT scan showed a retro odontoid tumor with intact bone. The process occurs in soft tissue, but bones are not affected. A diagnosis of retro odontoid pseudotumor with no instability and hernia nucleus pulposus at C3-4, C4-5, and C5-6 regions was made. The diagnosis was established because of patients' symptoms (indicating an inflammatory process), and protrusion of the disc to the spinal cord means herniated disc.

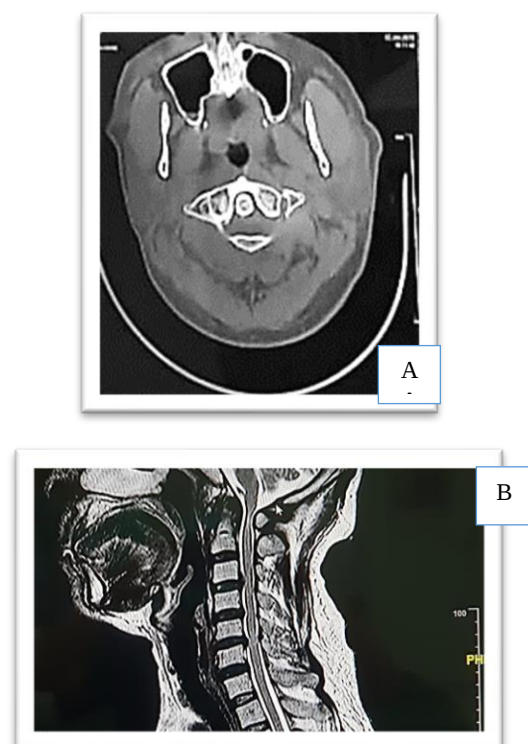


Fig. 1 MRI of the cervical spine in A. Axial plane and B. Sagittal plane show mass of retro odontoid tumor

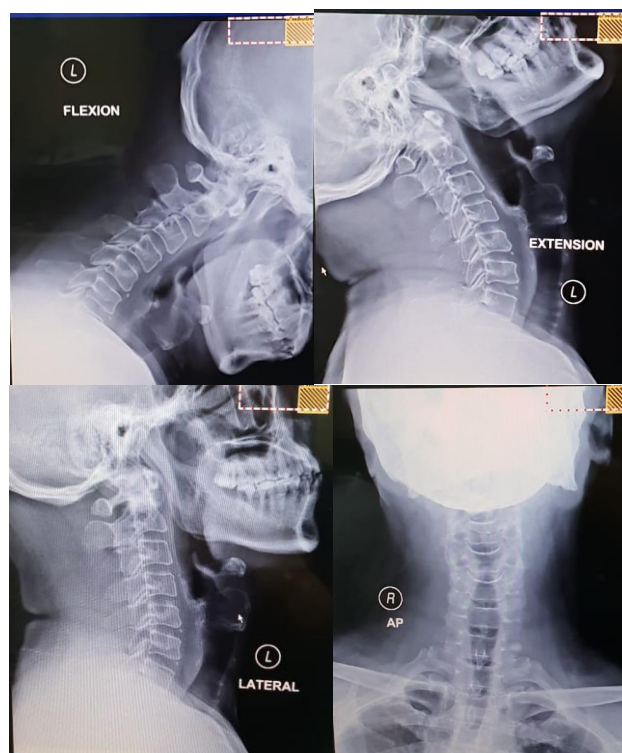


Fig. 2 Cervical spine plain photo inspection of dynamic Cervix Plain AP lateral and dynamic flexion and extension showed no instability and no subluxation in C1 and C2 atlantoaxial



Fig. 3 Cervical CT scan showed a retro-odontoid tumor with intact bone



Fig. 4 Operation Cervical Disc Replacement C3-4 C4-5 C6-7

The surgical intervention is carried out in 2 phases. Stage 1 patient in the prone position, C1 laminectomy was performed for spinal cord decompression, the operation did not do stabilization and fusion because the cervical condition C1 C2 was stable.

An incision is made in the neck of the area to be laminectomy—incision in the back over the affected vertebrae. The muscles are separated from the spine. A

small instrument is used to remove the appropriate lamina. Posterior C1 arches were removed. Therefore, the spinal cord is not decompressed. The spinal cord is decompressed once the bone and other tissues have been removed and discarded. Each nerve root (when appropriate) is identified and carefully decompressed (this is known as a “rhizolysis”).

Furthermore, patients in stage 2 surgery are carried out on the same day and date. The patient is in the spine position. Cervical disc replacement is performed C3-4, C4-5, and C5-6. An incision surgical cut was made on the front of the neck, important structures of the neck were carefully moved to the side until can see the bone vertebrae and cervical disk. Biopsy was done to check histopathology. The cervical disk that was being replaced was removed; the last artificial disk was secured into the empty disk space. The patient used a soft neck collar after surgery to restrict motion.

Histopathological examination confirmed that the mass is rheumatoid arthritis.

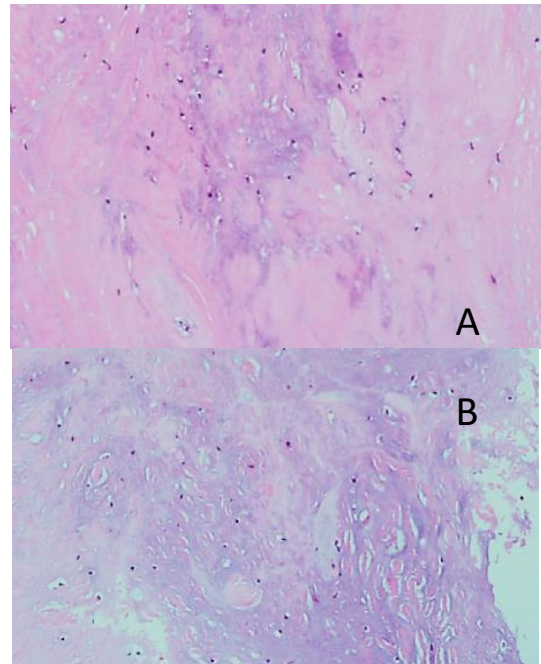


Fig. 5 Histopathological examination (H&E stain) A. Fibroid, collagenous tissue/ degenerated material with myxoid changes; B. fibroid degeneration and cartilaginous metaplasia, inflammatory cell infiltration

The results of the operation were good. The patient removed the stitches on day 10. The patient used a collar brace for six weeks. The motor, sensory, autonomic function returned to normal in the 4th week postoperatively. Two years of follow-up evaluations showed no complaint in motor, sensory and autonomic function.

3. Discussion

Retro-odontoid pseudotumor is a rare case that can cause compression of the spinal cord [4]. The etiology that causes this condition is rheumatoid and non-rheumatoid. Cases of retro-odontoid pseudotumor are often found with atlantoaxial instability [5]. A

pseudotumor discovered by Sze in 1986 represents a mass at the craniocervical junction with an atypical expansive lesion presentation. Lesions in this segment in patients with rheumatoid arthritis are described as pannus [6]. These lesions can cause erosion of the subchondral bone and cartilage of the synovial spaces due to inflammation [5].

Patients with rheumatoid arthritis have a high risk of developing cervical spine ROP in 40% of cases. Many rheumatoid pseudotumor masses form in the anterior atlantoaxial subluxation [7]. However, patients with RA very rarely develop ROP. The disease is unusual, especially if it is not associated with atlantoaxial instability [8].

The pathophysiology underlying the mechanism of ROP in cervical spine RA is the formation of pannus caused by the release of proteases that can destroy the extracellular matrix in cartilage and trigger the proliferation of fibroblast cells [9]. There is also the genesis of tissue deposition in the retro-odontoid space in patients with ROP, especially in the cruciate ligament band.

This patient had symptoms for 20 years, indicating that the pseudotumor growth was expansive, plus the presence of HNP in the patient. HNP has different pathophysiology related to the degeneration of hydrophilic proteoglycans in the nucleus pulposus of the vertebral disc [10]. The vertebral disc is dehydrated, which reduces the water uptake capacity, causing the shock absorption capacity to decrease [11]. Vertebral load compresses the annulus fibrosis causing extrusion of the nucleus pulposus, causing disc herniation/rupture [12]. This compression of the spinal cord causes myelopathy.

The relationship between the presence of retro-odontoid pseudotumor et causa rheumatoid arthritis with cervical HNP in this patient is the role of the CX3CL1/CX3CR1 interaction that contributes to cervical hernia nucleus pulposus [13]. CXCL1 is a signaling chemokine with a CXCR1 receptor, has a role in the recruitment and adhesion of monocytes/macrophages and T cells in atherosclerotic disease, rheumatological disorders, and even HIV without integrin activation [14]. CXCL1 expression was increased in regional disc tissue endothelial cells in cervical HNP. CD4⁺ T cells and NK cells initiate inflammation and cytotoxicity of the rheumatoid arthritis synovium [15]. In addition, the interaction of CX3CL1/CX3CR1 plays an important role in inflammatory cell migration into degenerative herniated disc tissue. The most likely hypothesis is that due to fractalkine up-regulation, CD4⁺ T cells and NK cells migrate toward the inflammatory disc degeneration lesion [16].

This patient underwent Laminectomy and Cervical Disc Replacement surgery, which was described previously. Complete recovery with symptoms lasting

for 20 years can be reversed. The theory that explains this is the theory of cell regeneration.

Denervation supersensitivity means loss of innervation leads to increased sensitivity of the postsynaptic membrane. This is due to an increase in receptor synthesis and a consequent increase in the number of receptors on the postsynaptic membrane or an increase in the sensitivity of G-protein-associated receptors to the receptor complex [17].

Synaptic plasticity is a second increase in the size of the postsynaptic potential after the initial stimulus. This occurs due to the accumulation of calcium in the nerve terminals. In the presence of an action potential at the nerve terminal, calcium enters through voltage-gated calcium channels; a transient increase in calcium concentration triggers the release of transmitters [18, 19].

Long-term potentiation of synaptic plasticity. High-frequency activation at some synapses will last a long time, increasing transmission efficiency. The mechanism involves depolarization of the postsynaptic membrane, caused by the release of glutamate at the presynaptic terminal and activation of the AMPA glutamate receptor. The result will increase the sensitivity of the postsynaptic membrane [20].

Collateral branch plasticity. In response, the axon that is not damaged performs collateral branches on the axon that is affected by the lesion. These axons form contacts that replace the axons affected by the lesion. This mechanism is a compensatory nerve so that it can function again [21].

Regeneration of interrupted axons: after the axon is severed, the distal part undergoes degeneration or what is known as Wallerian degeneration, an irreversible process, and the process takes several days in the peripheral nervous system (PNS), lasting several weeks in the central nervous system (CNS). At the same time, the proximal portion undergoes retraction, depending on location, species, and other factors. After that, the axon tries to regenerate and re-establish the connection to the postsynaptic target [22].

4. Conclusion

The patient, a 54-year-old man, had complaints of neck pain for 20 years with weakness in all four extremities three months before surgery. The patient had a C1 retro-odontoid pseudotumor and C3-4, C45, C56 HNP. The patient's CRP has increased. Rheumatoid arthritis carries a risk of retro-odontoid pseudotumor in rare cases. HNP in this patient is suspected of having a strong relationship with retro-odontoid pseudotumor, the potential contribution of CX3CR1-expressing CD4⁺ T-cells and NK cells in response to inflammation in the pathogenesis of cervical disc degeneration, which may lead to herniation. These diseases in this patient can cause myelopathy, but the patient can recover completely without any symptoms after two years. The theory explains neural cell regeneration denervation

supersensitivity, synaptic plasticity, long-term potentiation of synaptic plasticity, collateral branch plasticity, and regeneration of disconnected axons.

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