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Case Report

Fibrous Ankylosis in Cervical Spine: Late Complication of Tuberculosis

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Abstract

Background: Fibrous ankylosis of the cervical spine represents a rare yet severe complication arising from tuberculosis, which can result in considerable neck pain and restricted movement. This condition manifests when the body's immune response to the tuberculosis infection leads to excessive fibrosis and the fusion of cervical vertebrae. The consequent rigidity and limited mobility can significantly diminish an individual's quality of life, frequently resulting in chronic headaches and challenges in performing daily tasks.

Case report: The patient was a 34-year-old female presenting with intense headaches, neck pain, and restricted head movement in all directions. She had a history of tuberculosis in childhood, which was managed conservatively for 39 months without surgical intervention. Investigations for autoimmune and inflammatory conditions yielded no significant findings. The patient was treated with analgesics for two weeks, accompanied by a brief course of corticosteroids, followed by a regimen of intensive physiotherapy. Notably, the patient exhibited substantial improvement in her symptoms.

Conclusion: Enhancing awareness and developing a thorough understanding of fibrous ankylosis as a delayed complication of spinal tuberculosis are critical for improving patient management. By utilizing emerging research and innovative treatment approaches, we can aim for better outcomes for affected individuals, ultimately aiding them in restoring their quality of life.

Keywords: *Neck Pain, Tuberculosis, Ankylosis, Fibrous*

Introduction

Spinal tuberculosis (TB), also known as Pott's spine, is an extra-pulmonary form of TB caused by Mycobacterium tuberculosis. It primarily affects the intervertebral disks and adjacent vertebral bodies, leading to progressive collapse, kyphosis, and potential neurological deficits. As a late complication of spinal TB, fibrous ankylosis can develop in the affected spinal segments. [1-7]

The development of fibrous ankylosis in spinal TB is a result of the body's response to the chronic inflammatory process. As the infection progresses, the immune system attempts to contain and heal the affected area. This healing process involves the formation of fibrous tissue, which can lead to the fusion of adjacent vertebrae. The fibrous tissue replaces the normal joint structure, resulting in limited mobility and stiffness in the spine. [8, 9]

Fibrous ankylosis is a condition characterized by the formation of fibrous tissue within a joint, resulting in limited range of motion. This type of ankylosis, also known as false ankylosis, affects the fibrous connective tissue surrounding the joint, causing a reduction in mobility. Unlike bony ankylosis, where osseous tissue fuses the joint, fibrous ankylosis involves the development of dense fibrous tissue that restricts joint movement.[10]

The pathophysiology of fibrous ankylosis often begins with the formation of an intra-articular hematoma, which can occur due to physical trauma or infection. As the body attempts to heal the damaged blood vessels, mesenchymal stromal cells (MSCs) differentiate into various cell types to repair the affected area. In the case of an injury, these cells may transform into osteoblasts to promote bone health by adding new bone matrix. For infections, the MSCs may focus on repairing blood capillaries by inducing growth factors.[11]

In some cases, fibrous ankylosis may be considered a precursor to bony ankylosis, where osseous bone tissue eventually fuses the affected joint, causing an even greater reduction in mobility. However, it's important to note that not all cases of fibrous ankylosis progress to bony a While both fibrous and bony ankylosis result in reduced joint mobility.

Case Presentation

The patient was a 34 years old female with severe headache, neck pain, limitation of movements in all directions for last 7 months before medical examination. She rated his neck pain as 9.5 out of 10 and noted that it worsened with movement in any direction. The headache, neck pain and stiffness limited many of his activities, such as using computer in her work. The patient has infectious squeal in childhood, she was treated conservatively as case of pulmonary tuberculosis for 39 months, and didn`t took any medication after that with no any complain. No any other medical history in present time. She was treated in last 5 months as case of cervical pain by mediation, cervical collar, but not gets any benefits.

On physical examination there was a severe limitation in range of motion in all directions. Spasm of the SCM bilaterally was present, with some moderate spasms on the posterior regions of the neck. Palpation of the cervical spine (C1 to C6) produced pain both sides. Generalized tenderness of the posterior and lateral aspects of the neck was also noted. There was no evidence of joint tenderness or swelling in the fingers, wrists, elbows, shoulder, knees, or feet. The oral mucosa was also examined, and there was no pharyngeal erythema or enlarged tonsils. No any neurological signs will be found, Vital signs were within normal limits. Initial laboratory studies, provided in Table 1, were unremarkable.

Cervical X-rays were taken anteroposterior and lateral and open-mouth views (Figure1,2,3) was reveal narrowing of the joint space, which is characteristic of fibrous ankylosis, the opposing articulating surfaces may appear irregular and fit together in a jigsaw puzzle fashion.[11-13] Magnetic resonance imaging (MRI) (Figure 4) soft tissue involvement and detecting inflammatory changes, synovial thickening, which typically appears as intermediate to hypointense or hyperintense on T2-weighted images. The synovium may show intense homogenous post-contrast enhancement. [14, 15]

Table 1

Lab	Value	Reference
White blood count	7.3x	4.0-10.5× 10–3/mL
Hemoglobin	11,2g/dl	14-18 g/dL
Red blood count	5.6	4.70-6.10×10–6/mL
Hematocrit	47	42.0-52.0%
MCV	86	80-95 fL
Platelet	356	140-415×10–3/mL
CRP	9mg/l	<10mg/L
ESR	40mm/h	0-22 mm/h
Rheumatoid factor (quantitative)	2IU/ml	<14IU/ml
Anti CCP Abs	5<U/m	0-5 U/m
tuberculin skin tests	Positive	positive
interferon-gamma release assays,	positive	Positive

Figure 1. *Cervical AP view.*

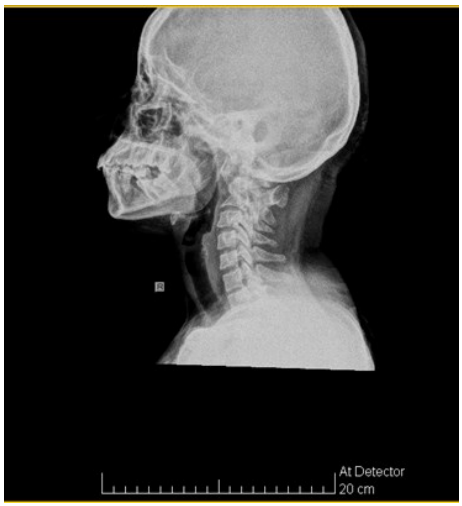

Figure 2. *Cervical lateral view.*

Figure 3. *Cervical open mouth views.*

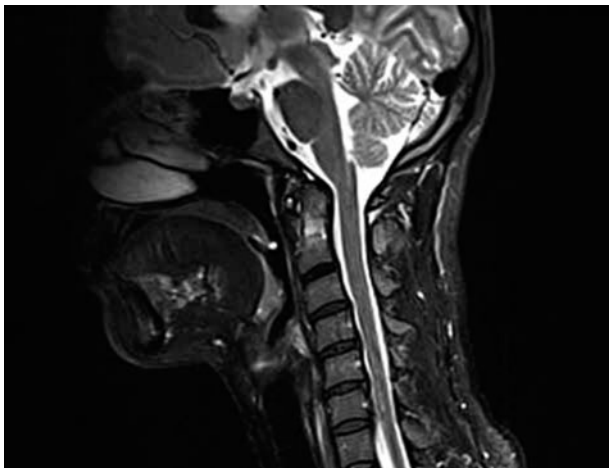

Figure 4. *M.R.I. of cervical spine demonstrated soft tissue involvement and detecting inflammatory changes, synovial thickening, which typically appears as intermediate to hypointense or hyperintense on T2-weighted images.*

Figure 1,2,3, cervical spine show narrowing of the joint space, which is characteristic of fibrous ankylosis, the opposing articulating surfaces appear irregular and fit together in a jigsaw puzzle fashion.

Treatment

Following the confirmation of the diagnosis through tuberculin skin tests, interferon-gamma release assays, and blood cultures, a treatment plan was initiated that included a short course of corticosteroids for two weeks. [16, 17] Subsequently, non-steroidal anti-inflammatory analgesics were administered to alleviate pain and inflammation. As a result, the pain score decreased from 9.5 to 7.0 one month after the commencement of treatment.[18] an intensive physiotherapy regimen was implemented, consisting of three sessions per week, aimed at increasing the range of motion (R.O.M.) of the cervical spine. A well-structured exercise program was designed to enhance flexibility, strengthen neck muscles, and improve overall function. Stretching exercises and gentle range-of-motion activities were incorporated to maintain mobility and prevent further stiffness. Three months into the treatment, the patient reported feeling significantly better, with a pain score of 5.5 and improved R.O.M. in lateral rotation, lateral flexion, and flexion-extension, despite experiencing episodes of pain after using a computer for more than six hours daily. The patient received postural education and ergonomic adjustments to manage symptoms and mitigate the risk of exacerbating the condition. Additionally, the use of assistive devices and modifications to the home or work environment were recommended to accommodate any remaining limitations in neck mobility.

Discussions

When assessing a patient with a potential diagnosis of fibrous ankylosis in the cervical spine attributed to tuberculosis, it is essential to take into account other conditions that may exhibit analogous symptoms.[19].

1. Distinctions from bony ankylosis Although both fibrous and bony ankylosis lead to a decrease in joint mobility, several significant distinctions exist between these two conditions: [1]. Tissue composition: Fibrous ankylosis is characterized by the development of fibrous connective tissue within the joint, in contrast to bony ankylosis, which involves the proliferation of osseous tissue that results in joint fusion.[20]

2. Extent of immobility: Fibrous ankylosis generally permits some degree of limited movement, albeit constrained, whereas bony ankylosis leads to total fusion and immobility of the affected joint.

3. Potential for reversibility: Fibrous ankylosis may exhibit a greater likelihood of reversibility or improvement with timely and appropriate treatment. In contrast, bony ankylosis is typically regarded as irreversible once complete fusion has taken place.

4. Radiographic characteristics: On imaging studies, fibrous ankylosis may reveal a narrowing of the joint space and irregularities in the articulating surfaces, while bony ankylosis is characterized by a total obliteration of the joint space accompanied by osseous bridging. [21]

5. Treatment strategies: The management of fibrous ankylosis often emphasizes the prevention of further progression and the maintenance or enhancement of joint mobility through conservative or surgical methods. Conversely, bony ankylosis frequently necessitates more invasive surgical interventions if functional improvement is sought.

The differential diagnosis encompasses the following conditions:

I. Rheumatoid Arthritis: This autoimmune disorder may impact the cervical spine, resulting in pain and stiffness. However, it is characterized by involvement of multiple joints and specific serological markers.

II. Ankylosing Spondylitis: Although primarily affecting the sacroiliac joints and lower spine, this condition can also extend to the cervical region. The distinct pattern of involvement and accompanying symptoms are crucial for differentiating it from tuberculosis-related fibrous ankylosis.

III. Degenerative Disk Disease: A prevalent condition that can lead to neck pain and stiffness, degenerative disk disease typically exhibits a different progression pattern and imaging characteristics when compared to fibrous ankylosis.

IV. Cervical Spondylitis: The age-related degeneration of the cervical spine may present symptoms similar to those of fibrous ankylosis; however, it generally does not display the specific imaging findings associated with tuberculosis.

V. Other Infectious Arthritis Causes: A range of bacterial or fungal infections can result in arthritis affecting the cervical spine, necessitating thorough clinical and laboratory assessments to differentiate these infections from tuberculosis. [22, 23]

All prior references were ruled out based on clinical evaluation, findings from cervical X-rays and MRI, as well as blood test results. This assessment considered the individual's childhood history of lung tuberculosis, along with positive outcomes from tuberculin skin tests, interferon-gamma release assays, and blood cultures or PCR-based tests aimed at detecting Mycobacterium tuberculosis.

Conclusion

The occurrence of fibrous ankylosis in the cervical spine as a late consequence of tuberculosis presents significant difficulties for patients and healthcare practitioners. This condition severely diminishes an individual's quality of life, resulting in ongoing pain and restricted neck mobility. It is vital to understand its evolution, clinical features, and the management options available to deliver effective care. A variety of treatment modalities, including conservative measures and surgical procedures, exist to aid patients in regaining functionality and reducing symptoms.

Ongoing research and advancements in medical technology are promising for enhancing the diagnosis and treatment of this complex condition. Healthcare professionals should remain vigilant regarding the latest developments to ensure the highest standard of care. By promoting awareness and fostering a comprehensive understanding of fibrous ankylosis, we can aim for better outcomes for those affected by this late complication of spinal tuberculosis.

Conflict of Interest

The authors declare no conflict of interest.

Acknowledgement

None

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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