



Diffuse Idiopathic Skeletal Hyperostosis (Forestier's Disease): A Concise Narrative Review with Physiotherapy Management

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ABSTRACT :

Background: Diffuse idiopathic skeletal hyperostosis (DISH), also known as Forestier's disease, is a systemic skeletal condition characterized by excessive bone formation at entheses and flowing ossification along the anterolateral aspect of the spine. Although frequently asymptomatic, it may cause spinal stiffness, restricted mobility, pain, dysphagia, and neurological complications.

Objective: To summarize the current understanding of the epidemiology, pathophysiology, clinical presentation, diagnostic criteria, and conservative management of DISH, with particular emphasis on physiotherapy and rehabilitation.

Methods: This narrative review synthesizes established diagnostic criteria and selected peer-reviewed literature addressing the clinical, radiological, and rehabilitation aspects of DISH.

Results: DISH is associated with advancing age, male sex, obesity, diabetes mellitus, and other metabolic abnormalities. Diagnosis traditionally relies on the Resnick and Niwayama radiographic criteria. Management is primarily conservative, incorporating education, individualized therapeutic exercise, mobility training, and treatment of associated musculoskeletal impairments. Particular caution is necessary because spinal ankylosis increases the risk of unstable fractures following relatively minor trauma.

Conclusion: Early recognition and individualized rehabilitation may help maintain functional independence and manage symptoms in people with DISH. Further research is required to establish disease-specific physiotherapy protocols and evaluate their long-term effectiveness.

Keywords: Diffuse idiopathic skeletal hyperostosis; Forestier's disease; spinal hyperostosis; enthesopathy; physiotherapy; rehabilitation.

INTRODUCTION

Diffuse idiopathic skeletal hyperostosis (DISH) is a non-inflammatory skeletal disorder characterized by abnormal ossification and calcification of ligaments, entheses, and other connective tissues. It was historically described by Forestier and Rotes-Querol and is therefore commonly referred to as Forestier's disease [1,2].

The thoracic spine is the most frequently affected region, although the cervical and lumbar spine and extraspinal sites may also be involved. The condition is particularly relevant to physiotherapists because affected individuals may develop spinal stiffness, restricted movement, impaired postural control, and limitations in daily activities [3].

DISH is clinically important even when discovered incidentally. Extensive spinal ankylosis increases susceptibility to unstable spinal fractures, while cervical hyperostosis may produce dysphagia or, less commonly, airway compromise [3,4].

EPIDEMIOLOGY AND RISK FACTORS

DISH predominantly affects middle-aged and older adults and is reported more frequently in men. Prevalence varies considerably according to age, population characteristics, and imaging methods. A 2025 systematic review and meta-analysis estimated the pooled prevalence in general populations at approximately 11.92%, although substantial variation between studies limits the application of this figure to individual populations [5].

The exact cause remains uncertain. However, several factors have been associated with the condition:

- Advancing age and male sex.
- Obesity and increased body mass index.

- Type 2 diabetes mellitus and hyperinsulinaemia.
- Metabolic syndrome and dyslipidaemia.
- Hypertension and other associated cardiometabolic abnormalities.

These associations suggest a relationship between metabolic dysregulation and abnormal bone formation, but they do not establish that any single factor directly causes DISH [3,5].

PATHOPHYSIOLOGY

The defining pathological feature of DISH is excessive bone formation at ligamentous and tendinous attachment sites, particularly along the anterior longitudinal ligament of the spine. Progressive ossification can produce large, flowing bony bridges between adjacent vertebral bodies.

The underlying mechanisms are incompletely understood. Altered bone-forming activity, growth-factor signalling, metabolic abnormalities, and changes in enthesis biology have been proposed as contributing mechanisms [3,6].

Extraspinal manifestations include enthesophytes and ossification around the pelvis, calcaneus, patella, and elbow. These changes may be incidental or associated with pain, stiffness, and reduced functional tolerance.

CLINICAL MANIFESTATIONS

The clinical presentation ranges from an incidental radiological finding to substantial musculoskeletal and neurological disability.

1. Spinal manifestations

Common manifestations include:

- Thoracic or lumbar stiffness.
- Reduced spinal range of motion.
- Mechanical back or neck pain.
- Restricted trunk rotation and extension.
- Difficulty with prolonged standing, walking, or particular daily activities.

The presence of DISH on imaging does not necessarily establish that it is the cause of a patient's pain. Coexisting degenerative spinal disease and other musculoskeletal disorders should also be considered.

2. Extraspinal manifestations

Peripheral enthesopathy may affect the heels, knees, elbows, and pelvis. Patients may experience localized tenderness, reduced flexibility, or discomfort during loading activities.

3. Cervical and neurological complications

Anterior cervical osteophytes may cause dysphagia, a sensation of food sticking, hoarseness, or, rarely, airway obstruction. Neurological complications may arise from associated spinal canal compromise or fractures following trauma [4,7].

Clinical warning: New weakness, altered sensation, gait deterioration, bowel or bladder dysfunction, severe spinal pain following a fall, or new swallowing or breathing difficulties requires prompt medical assessment.

DIAGNOSIS AND RADIOLOGICAL FEATURES

Diagnosis is based primarily on characteristic imaging findings and clinical assessment.

1. Resnick and Niwayama diagnostic criteria

The traditional criteria established by Resnick and Niwayama are [2]:

1. Flowing ossification along the anterolateral aspect of at least four contiguous vertebral bodies.
2. Relative preservation of intervertebral disc height, without extensive degenerative disc disease at the affected levels.
3. Absence of apophyseal joint ankylosis and absence of erosive, sclerotic, or fused sacroiliac joint changes characteristic of inflammatory spondyloarthropathies.

These criteria are widely used but may identify predominantly established disease. Research has proposed imaging criteria for earlier stages of DISH [8].

2. Imaging investigations

Plain radiography: Usually demonstrates flowing anterolateral spinal ossification and helps establish the diagnosis.

Computed tomography (CT): Provides detailed assessment of ossification and is particularly valuable when a fracture is suspected.

Magnetic resonance imaging (MRI): May be indicated when neurological deficits, spinal cord compression, or other soft-tissue and neural complications are suspected.

Radiological interpretation should distinguish DISH from ankylosing spondylitis and ordinary degenerative spondylosis [2,7,9].

DIFFERENTIAL DIAGNOSIS

Important differential diagnoses include:

- Ankylosing spondylitis and other axial spondyloarthropathies.
- Degenerative spondylosis with prominent osteophytes.
- Degenerative enthesopathy.
- Other disorders associated with abnormal skeletal ossification.

The distribution and appearance of ossification, disc preservation, sacroiliac joint findings, and clinical history help establish the appropriate diagnosis [2,9].

MANAGEMENT

There is currently no established treatment that reliably reverses the mature spinal ossification characteristic of DISH. Management therefore focuses on symptom relief, preservation of function, management of associated metabolic conditions, and prevention of complications.

1. Medical management

Conservative medical care may include appropriate analgesic or anti-inflammatory medication, where clinically indicated, alongside management of diabetes, obesity, hypertension, and other associated conditions.

Surgical assessment may be necessary for severe dysphagia caused by cervical osteophytes, significant neurological compression, or unstable spinal fractures [3,4].

2. Physiotherapy management

Physiotherapy should be individualized according to symptoms, mobility, comorbidities, functional limitations, and fracture risk. The following interventions are clinically reasonable, although high-quality DISH-specific rehabilitation trials remain limited.

A. Initial assessment

The physiotherapist should assess:

- Pain characteristics and functional limitations.
- Spinal and peripheral joint mobility within safe limits.
- Posture, balance, gait, and fall risk.
- Muscle strength and endurance.
- Respiratory function when clinically indicated.
- Ability to perform activities of daily living.
- Neurological symptoms and relevant cardiometabolic comorbidities.

Standardized outcome measures, such as the Numeric Pain Rating Scale, Oswestry Disability Index, gait speed, and Timed Up and Go test, may be selected according to the patient's presentation.

B. Therapeutic exercise

A supervised exercise programme may incorporate:

- Gentle, controlled mobility exercises for unaffected or safely mobile regions.
- Strengthening of the trunk and extremity muscles.
- Progressive lower-limb strengthening.
- Aerobic activity adapted to the patient's tolerance.
- Balance and functional training when appropriate.

Exercises should aim to maintain available movement and improve function rather than attempt to mechanically reverse established ossification.

C. Postural and functional training

Education regarding comfortable positioning, ergonomic adaptation, safe transfers, and task modification may help patients manage activity-related limitations. Functional training should address the specific demands of work, household activities, and community mobility.

D. Balance and fall prevention

Older adults with spinal ankylosis may be particularly vulnerable to serious injury following falls. Balance training, appropriate walking aids, environmental modification, and fall-prevention education may be useful after individual risk assessment.

E. Respiratory and cervical considerations

Respiratory exercises may be considered when thoracic restriction or associated respiratory impairment is present. Patients with dysphagia or suspected airway involvement require appropriate medical and, when indicated, speech and swallowing assessment before interventions that could aggravate symptoms.

PRECAUTIONS DURING PHYSIOTHERAPY

Because ankylosed spinal segments behave differently from a normally mobile spine, physiotherapists should avoid unnecessarily forceful spinal movements.

Important precautions include:

- Avoid high-velocity spinal manipulation and forceful end-range mobilization.
- Do not apply aggressive spinal stretching when fracture risk has not been assessed.
- Avoid unnecessary loading or abrupt twisting of a rigid spine.
- Investigate new or unexplained spinal pain, especially after minor trauma.
- Refer urgently if fracture or neurological compromise is suspected.

A fracture may be unstable even when the initial symptoms are relatively mild. Clinical suspicion should prompt appropriate imaging and medical assessment [4,7].

PROGNOSIS AND FUNCTIONAL IMPLICATIONS

The prognosis varies with the extent of ossification, associated metabolic disease, symptoms, and complications. Many individuals remain asymptomatic or experience manageable stiffness, whereas others develop functional limitations or clinically significant cervical or spinal complications. Physiotherapy may support physical capacity, mobility within safe limits, balance, and independence. Nevertheless, the evidence does not establish that exercise prevents progression of spinal ossification or reverses established DISH. Treatment outcomes should therefore be evaluated using pain, mobility, activity, participation, and quality-of-life measures rather than radiographic changes alone.

CONCLUSION

Diffuse idiopathic skeletal hyperostosis is a systemic skeletal disorder characterized by progressive ossification, particularly along the anterior longitudinal ligament of the spine. Its clinical significance extends beyond spinal stiffness to include extraspinal enthesopathy, dysphagia, and an increased risk of unstable spinal fractures. Diagnosis relies on clinical evaluation and characteristic imaging findings. Physiotherapy should emphasize individualized exercise, functional rehabilitation, fall prevention, and patient education, while avoiding forceful spinal interventions. Recognition of red flags and timely referral are essential to safe rehabilitation.

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