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When Bone Pain Is Not Just Growing Pains: A Comprehensive Review of Growing Pains and Pathological Bone Pain in Children

Dr.Venugopal Reddy Iragamreddy

Pediatrician , Author, Researcher and Community Health Advocate, Bangalore, India.

Abstract

Bone pain is a frequent yet challenging complaint encountered in paediatric practice. While most cases are benign and attributable to growing pains, a significant minority may represent serious underlying conditions such as infection, inflammatory disease, metabolic disorders, or malignancy. Growing pains remain a diagnosis of exclusion, and inappropriate reassurance without adequate clinical assessment may lead to delayed diagnosis of life-threatening disorders. Conversely, indiscriminate investigations contribute to parental anxiety and unnecessary healthcare expenditure. This review provides a comprehensive and evidence-based overview of growing pains and bone pain in children, emphasizing epidemiology, pathophysiology, clinical features, red-flag signs, differential diagnoses, rational investigative strategies, and management principles. The aim is to guide paediatricians toward a structured, safe, and cost-effective approach while ensuring early recognition of pathological causes.

Keywords: Growing pains, bone pain, limb pain, paediatrics, musculoskeletal pain, red flags, malignancy

1. Introduction

Bone and limb pain in children is a common reason for outpatient visits and emergency consultations, often provoking considerable concern among parents and caregivers. The term “growing pains” is widely used in both medical and non-medical settings; however, its imprecise application has contributed to diagnostic confusion. Although growing pains are benign and self-limiting, bone pain in children may also be the earliest manifestation of serious systemic disease. The paediatrician’s challenge lies in differentiating physiological pain from pathological pain without either missing a critical diagnosis or subjecting the child to unnecessary investigations.

This review aims to consolidate current knowledge on growing pains and pathological bone pain, providing clinicians with a practical, evidence-based framework applicable to routine paediatric practice.

2. Conceptual Definitions and Terminology

Growing pains are defined as recurrent, non-inflammatory, non-traumatic limb pains occurring in otherwise healthy children, typically in the evening or at night, and resolving completely by morning. Importantly, the pain is not caused by growth itself, despite the misleading terminology.

Bone pain refers to deep, often localized pain arising from osseous structures, in contrast to muscular pain, which is usually diffuse and activity-related. Distinguishing these clinically is essential, as bone pain is more frequently associated with pathological processes.

3. Epidemiology and Demographic Characteristics

Growing pains are among the most common musculoskeletal complaints in childhood, with reported prevalence ranging from 10% to 37%. The condition typically affects children between 3 and 12 years of age, with a peak incidence during early school years. Several studies report a slight female predominance. A positive family history is frequently noted, suggesting a possible genetic or familial predisposition.

Pathological causes of bone pain are less common but increase in significance with age, persistence of symptoms, or presence of systemic features.

4. Pathophysiology: Current Understanding and Hypotheses

The precise pathophysiology of growing pains remains incompletely understood. Multiple hypotheses have been proposed, reflecting the multifactorial nature of the condition.

Mechanical overuse theory suggests that increased physical activity during the day leads to muscular fatigue and microtrauma, resulting in nocturnal pain. This is supported by the higher prevalence of growing pains in physically active children.

Altered pain perception has also been implicated. Children with growing pains may have a lower pain threshold, and associations with other functional pain syndromes such as headaches and abdominal pain have been described.

Bone strength and density differences have been explored, with some studies demonstrating lower tibial bone density in affected children. This raises the possibility of transient skeletal vulnerability during periods of rapid growth.

Psychosocial factors, including anxiety, emotional stress, and sleep disturbances, may modulate pain perception and contribute to symptom severity. Vascular theories proposed historically have largely been discounted due to lack of supporting evidence.

5. Clinical Features of Typical Growing Pains

Children with growing pains characteristically present with intermittent, bilateral pain involving the lower limbs, most commonly the calves, thighs, or shins. The pain typically occurs in the late evening or during the night and resolves completely by morning. Importantly, children are asymptomatic during the day and maintain normal levels of activity without limping or functional limitation.

Physical examination is entirely normal, with no joint swelling, tenderness, erythema, or limitation of movement. Growth parameters are appropriate for age, and systemic symptoms are absent.

6. Clinical Features Suggesting Pathological Bone Pain

Any deviation from the classical presentation of growing pains should prompt further evaluation. Pain that is persistent, progressively worsening, localized to a specific site, or unilateral is particularly concerning. Morning pain or stiffness, pain associated with limping or functional impairment, and pain that consistently wakes the child from sleep warrant careful assessment.

Systemic features such as fever, weight loss, fatigue, night sweats, pallor, bruising, or lymphadenopathy raise suspicion for infection, inflammatory disease, or malignancy. Localized bone tenderness, swelling, or warmth strongly suggests underlying pathology.

7. Differential Diagnosis of Bone Pain in Children

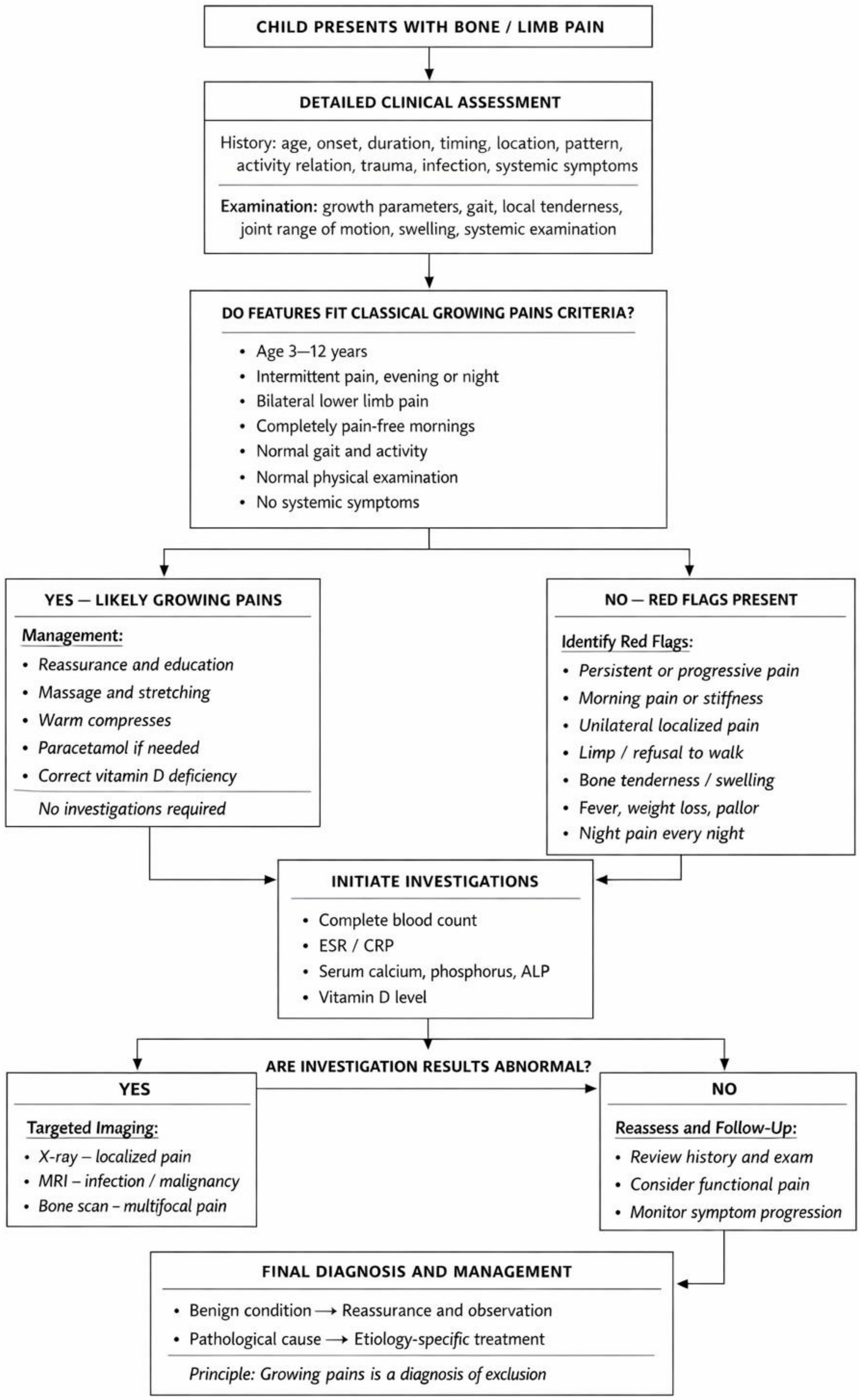
The differential diagnosis of bone pain in children is broad and varies with age. Orthopaedic conditions

such as stress fractures, slipped capital femoral epiphysis, Perthes disease, and traction apophysitis should be considered. Inflammatory and rheumatologic conditions include juvenile idiopathic arthritis, reactive arthritis, and systemic connective tissue diseases.
Infectious causes such as acute osteomyelitis, septic arthritis, tuberculosis, and chronic recurrent multifocal osteomyelitis are important considerations, particularly in children with fever or raised inflammatory markers. Haematological and malignant conditions, including acute lymphoblastic leukaemia and primary bone tumours, must always be excluded in persistent or unexplained bone pain.
Metabolic and nutritional disorders such as vitamin D deficiency, rickets, hypocalcaemia, and hypophosphataemia are common in many regions and may present with generalized bone pain.

8. Clinical Approach to a Child with Bone Pain

A meticulous history is the cornerstone of evaluation. The clinician should elicit details regarding onset, duration, timing, location, and progression of pain, as well as its relationship to activity and rest. Associated systemic symptoms, recent infections, trauma, family history, and psychosocial context should be explored.
Physical examination should include assessment of growth, posture, gait, joint range of motion, localized tenderness, and a thorough systemic examination. Subtle findings such as pallor or bruising may provide critical diagnostic clues.

Figure 1. Stepwise Clinical Approach to Bone Pain in Children



9. Indications for Investigation

Children with classical features of growing pains and a completely normal examination do not require investigations. However, investigations are mandatory in the presence of red-flag features or diagnostic uncertainty.

Initial laboratory evaluation typically includes a complete blood count, erythrocyte sedimentation rate, and C-reactive protein. These tests help identify inflammatory, infectious, or haematological disorders. Biochemical evaluation of calcium, phosphorus, alkaline phosphatase, and vitamin D levels is useful in suspected metabolic bone disease.

Imaging should be guided by clinical findings. Plain radiographs are appropriate for localized pain or suspected orthopaedic pathology. Magnetic resonance imaging is the modality of choice for suspected malignancy, osteomyelitis, or bone marrow pathology.

10. Management of Growing Pains

The management of growing pains is primarily conservative and focuses on reassurance. Parents should be educated regarding the benign and self-limiting nature of the condition and reassured that it does not affect growth or long-term bone health.

Supportive measures such as gentle massage, stretching exercises, warm compresses, and appropriate footwear may provide symptomatic relief. Analgesics such as paracetamol may be used intermittently, while routine use of non-steroidal anti-inflammatory drugs is generally unnecessary.

Correction of nutritional deficiencies, particularly vitamin D deficiency, should be undertaken when identified.

11. Management of Pathological Bone Pain

Management of pathological bone pain is etiology-specific and often requires multidisciplinary involvement. Prompt referral to appropriate specialists is essential when serious pathology is suspected.

12. Prognosis

Growing pains have an excellent prognosis, with most children experiencing resolution of symptoms by adolescence. The prognosis of pathological bone pain depends on early diagnosis and appropriate management.

13. Conclusion

Bone pain in children represents a diagnostic spectrum ranging from benign growing pains to serious systemic disease. A structured clinical approach emphasizing careful history, focused examination, awareness of red-flag signs, and judicious use of investigations allows clinicians to confidently distinguish normal from abnormal. Recognizing growing pains as a diagnosis of exclusion is essential to prevent both missed diagnoses and unnecessary interventions.

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