

# Lower Extremity Rotational and Angular Issues in Children



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## KEYWORDS

• Angular deformity • Rotational deformity • Femoral anteversion • Tibial torsion

## KEY POINTS

- There is a wide range of normal lower extremity positioning in growing children.
- Angular and rotational status in children tends to follow standard developmental pathways over time.
- Little or no intervention, beyond reassurance, is necessary for most patients, and their parents, who present with concerns regarding rotational or angular issues in children.

## INTRODUCTION/OVERVIEW

Parental questions and concerns regarding lower extremity rotational and angular status are some of the most common musculoskeletal issues facing primary care physicians and pediatric orthopedic surgeons.<sup>1</sup> As such, it is important that all physicians providing care for children have a thorough understanding of appropriate methods of examination and of the natural history of these physical findings. In most patients, the natural history is benign, with self-resolution without the necessity of any active treatment as the general rule. However, there are rare patients who require further evaluation, and in some cases orthopedic management, to reach the end of skeletal development and growth with a normal rotational and/or angular profile of the lower extremities.

## THE MUSCULOSKELETAL EVALUATION/PHYSICAL EXAMINATION

An appropriate musculoskeletal evaluation in children includes both a comprehensive history and physical examination. The parents should be questioned regarding birth history, issues during pregnancy, development, and attainment of motor milestones.

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Disclosure: None.

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In addition, it is important to determine whether there is any family history of orthopedic or musculoskeletal disorders, particularly those that may cause pathologic rotational or angular deformities. In addition, it is valuable to ascertain whether the perceived abnormality is affecting the child's function or development in any way, such as causing gait problems, shoe wear issues, or tripping/falling. Overall, it is imperative to begin to differentiate those patients who are in the wide range of normal variants from those with significant developmental or structural abnormalities. Most patients are within the wide range of normal, but it is necessary to be aware of the possibility of true disorder. Children with significantly abnormal rotational or angular deformities, in conjunction with apparent positive familial or development history, should be referred for specialized musculoskeletal evaluation.

In addition to the patient history, it is essential that a detailed, but focused, musculoskeletal physical examination be performed on all patients with parental concerns. The examination should be performed in a standardized fashion, and should address all sites of potential abnormality. It is important that all primary care physicians taking care of children are capable of performing this examination, and attainment of this skill set must be part of any primary care training program. It is not acceptable simply to refer all musculoskeletal evaluations and questions to a specialist, because most of these parental issues and concerns are of a benign nature, are part of normal development, and require little more than knowledgeable reassurance.

The musculoskeletal examination does not need to be time consuming or lengthy, but does need to be thorough. A complete examination requires evaluation of the static and dynamic status of the lower limbs. It is important to look at the overall position of the limbs while the child is at rest, and, if the child has reached walking age, during standing and gait. The child must be undressed, or at least placed in a gown or disposable shorts to perform a proper examination (Fig. 1). Watching the child walk around the room may be acceptable, but with older or bigger children it may be best to view patients while they are walking away from and toward the examiner in a hallway or corridor. In addition, the general overview should include review of height and weight, stature, skin condition or lesions, limb girth, and appropriateness of development for chronologic age. All normal and abnormal findings should be documented in the medical record.

Staheli and colleagues<sup>2</sup> described and elucidated the concept of the child's rotational profile in 1985. These investigators evaluated 1000 normal children and adults, assessing lower extremity passive range of motion and rotational positioning of the



Fig. 1. A child standing in appropriately sized disposable shorts.

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