**Biomechanics and principles of assessment of pediatric foot deformities**

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Biomechanics #1: “The foot is not a joint!” In all congenital and developmental deformities of the child’s foot, there are at least 2 segmental deformities that are often in rotationally opposite directions from each other, “as if the foot was wrung out”

Biomechanics #2: One must understand subtalar joint positions and motions in a manner that supersedes the confusing and inconsistent terminology in the literature.

Biomechanics #3: The concept of the acetabulum pedis. Understand the similarities between the hip joint and the subtalar joint.

Biomechanics #4: Deformity correction will not correct muscle imbalances. If muscle imbalances created the deformity, persistence of the muscle imbalances will recreate the deformity, despite adequate deformity correction.

Biomechanics #5: Tendon transfers will not correct structural deformities, but will correct dynamic deformity, will likely prevent or delay structural deformity, and the balanced muscles will maintain deformity correction, except perhaps in progressive neuromuscular disorders.

Biomechanics #4/5: Correct deformities AND balance muscle forces. Deformity correction without muscle balancing - risk of recurrent deformity. Muscle balancing without deformity correction - well balanced deformity!

Biomechanics #6: A thorough and working knowledge of the BIOMECHANICS of the foot and of the subtalar joint complex (in particular) during walking, is mandatory for accurate assessment and management of foot deformities in children.

Biomechanics #7: Preserve joint motion (particularly subtalar joint motion) by utilizing soft tissue releases/plications and osteotomies instead of arthrodeses.

Assessment Principle #1: Clinical evaluation of the child’s foot begins with a clinical evaluation of the child.

Assessment Principle #2: Physical evaluation of the child’s foot begins with a physical evaluation of the child.

Assessment Principle #3: If pain is a complaint, ask the child to point to the exact location(s).

Assessment Principle #4: Signs and symptoms must match the presumed pathology, so ensure that you have enough information before focusing on a radiographic finding.

Assessment Principle #5: Assessment of each of the segmental deformities of the foot and ankle is imperative before planning treatment.

Assessment Principle #6: Each segment of the foot should be evaluated for shape/deformity, flexibility, skin integrity. Be specific!

Assessment Principle #7: The presence of a gastrocnemius or an Achilles contracture must be identified and differentiated from each other.

Assessment Principle #8: The foot must be clinically assessed in weight-bearing,

not just on the exam table.

Assessment Principle #9: All standard initial and screening radiographs for assessment of foot deformities should be obtained in weight-bearing, or simulated weight-bearing.

Assessment Principle #10: The foot-CORA method should be used pre-, intra-, and postoperatively for the most objective evaluation of foot deformities and malformations.

Assessment Principle #11: CT scan in all 3 planes & with 3-D reconstruction is the best imaging modality for more detailed assessment of complex foot deformities and malformations. It is the definitive imaging study for the diagnosis and management of tarsal coalitions.

Assessment Principle #12: MRI is rarely helpful or indicated for assessment of deformities and malformations,

Management Principle #1: The decision (to operate) is more important than the incision (i.e. the surgical technique).

Management Principle #2: You can’t un-operate on anyone. Foot deformities and malformations are never lethal.

REFERENCE:

Mosca VS. Principles and management of pediatric foot and ankle deformities and malformations. Wolters Kluwer/Lippincott Williams & Wilkins, 2014.