DISCOURSE AND DIALOGUE

Commentary on “Paediatric Flatfeet: a 2020 Guide for Clinicians to Identify the Boomerangs”

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In “Paediatric Flatfeet: A 2020 Guide for Clinicians to Identify the Boomerangs,” Angela M. Evans, PhD, (http://doi.org/10.7547/20-103) raises many issues about how best to approach the flexible flat foot in the child. The article states that normative foot posture data, and “prospective findings to confirm lessening with flatfeet with age” emerging over the past decade should reframe a rethinking of how we look at pediatric flatfoot. These “prospective findings” to confirm lessening flatfeet with age, referred to in this paper as “boomerangs”, are claimed to be built upon research “identifying the flatfeet likely to be symptomatic, thus requiring intervention” suggesting that clear distinctions can be made to “filter those likely to remain asymptomatic”. Also included is an eight-step strategy, highlighting the three “boomerang” flatfeet factors to delineate potential symptomatic from asymptomatic flatfeet with applicable cut-off levels, presented for practical reference and use by the clinician. While the presence of pain is a clear marker for concern in the flatfooted child, it should be remembered that “symptoms” in the child often take on other forms, reminding us to be vigilant in identifying markers of dysfunction even in the child without overt pain symptoms in the foot. Alternate consequences of faulty foot mechanics to pain, may include tiredness, avoidance of physical activity and prolonged weight bearing, frequent requests to be carried, lethargy, and preference for sedentary activities. The astute clinician
must be on alert to identify the coded ways in which an altered foot posture may be impacting on a child’s quality of life.

DOES FLATFOOT AFFECT FUNCTION?

Aspects of this paper are valuable to aid in identifying those clinical and imaging exam findings which recent evidence in the literature have identified as predictors of flatfeet likely to become symptomatic. However, in so doing, it oversimplifies this complex condition and suggests, to far too great a degree, that cut-offs from the clinical exam, often without the benefit of comprehensive evaluation, can sufficiently identify when treatment is recommended, and when it is best avoided. The paper presents its viewpoint through a look at the literature designed to frame the narrow case presented for limited intervention in very select situations, while minimizing other contributing factors for potential progression to symptoms, and lower extremity dysfunction and disability over time. Further, it fails to acknowledge recent documentation in the literature identifying functional deficits in asymptomatic flatfeet in children, which raise real questions about the need to be concerned about many pediatric flatfeet, well beyond only those marked for likely progression to classic symptoms. In a study by Lin et al (1), children with flat feet, compared with children without, performed physical tasks poorly and walked slowly, as determined by gait parameters.

In a paper entitled “Does excessive flatfoot effect function...” Hosl et al (2) compared children with symptomatic (SFF) and asymptomatic (ASFF) flatfeet with age-matched controls and found pronounced alterations in foot kinematics in flatfeet but no differences between SFF and ASFF. The findings for flatfeet included reduced hind foot dorsiflexion and increased forefoot supination and
abduction. The authors propose that ASFF needed to “absorb more negative ankle joint energy during loading response” which may risk fatigue and overuse symptoms of anterior shank muscles. They conclude that “despite lack of symptoms, flatfoot deformity in asymptomatic flatfeet did affect function” and that symptomatic flatfeet did not show greater deviations in 3D foot kinematics than asymptomatic flatfeet. Further, they suggest that symptom development “may rather depend on tissue wear and subjective pain thresholds.”

Addressing the question of whether flexible flat feet in children are associated with proximal joint problems, Kothari et al (3) classified foot posture of 95 children ages 8-15 using arch height index (AHI). They documented the frequency of knee, hip and back pain and each child underwent 3-D gait analysis. They concluded that “children with a flatter foot posture are more likely to have pain or discomfort at the knee, hip and back, though the mechanism by which this occurs remains unclear”.

In a separate study Kothari et al (4) examined the health-related quality of life in children with flexible flatfeet in a cross-sectional study. They reported that children with pediatric flatfoot (PFF) have significantly impaired health-related quality of life (HRQOL) when compared to typically developing feet. They state that the impairment can be as severe, or worse than published HRQOL for acute and chronically unwell children. The authors go on to say that PFF “cannot be regarded as just a benign normal variant”. They state that “the management of PFF should involve consideration of the symptom profile AND (emphasis mine) HRQOL.

WHEN IS TREATMENT NECESSARY?

The paper relies on statements such as “most children’s flatfeet are painless, developmentally expected flatfeet and are flexible, functional and pain-free”. While some pediatric flatfeet are clearly physiologic,
improving with further growth and development, there are myriad factors which can contribute to a non-physiologic flatfoot, at risk for dysfunction, progression, eventual onset of symptoms or functional changes and altered biomechanics throughout the lower extremity. Among these factors are superstructural influences leading to biomechanical imbalances which are both common, and highly contributory, to at-risk flatfeet and compensatory function.

To support such management principles, the author quotes the Pfeiffer study (5) in the introduction which concludes “...most treatment cited as unnecessary”. This is a controversial study with several methodological problems including a very high threshold to identify deformity when present. To that point, Evans cites that this study “reported that <1% cases were pathological. and yet 10% wore foot orthoses; hence 90% of treatment was deemed unnecessary”. In fact, the Pfeiffer study defined pathologic flatfoot as those children having a valgus heel position of >20 degrees., which is well above the heel valgus threshold suggestive of risk to progress to symptoms of 10 degrees cited elsewhere in the Evans paper, and documented in the literature.

BEYOND SYMPTOMS – FUNCTIONAL LIMITATIONS

In a paper on the “Diagnosis of Flexible Flatfoot in Children: A Systematic Clinical Approach” by Benedetti et al, (6) the authors reported that 65% of patients has some type of foot symptoms, with 54% reporting pain. 68% of flat-footed children had functional limitations, which they describe as “a feature of the non-physiologic flatfoot”, usually manifesting as reduced motor performance during activities of daily living, such as walking, running, or jumping. They also noted that there was a high association between functional limitations and symptoms with 40% having combined symptoms and functional limitations. That leaves another 28% who had functional limitations, affecting motor performance
during ADL, who did not present with foot symptoms. This is a significant contrast from the Pfeffer study quoted by Evans in the ‘Boomerangs’ paper which determined that only 1% of flatfoot cases in their study were deemed pathologic. These functional deficits in asymptomatic flatfeet are evidence that is necessary to consider more than just structural deficits on clinical and imaging exam in determining when to offer a child the potential benefits of treatment.

Evans does acknowledge documented changes in gait in symptomatic flatfeet. Kim et al (7) reported a moment inefficiency of 30% and a power insufficiency of 45% in these feet when compared with feet with preserved medial longitudinal arches. Also cited is the 2015 paper by Tashiro et al (8) that children with flat feet have weaker toe grip than those having a normal arch, suggesting a possible role for intrinsic muscle weakness in development of flat feet.

DOCUMENTED CHANGES IN THE ASYMPTOMATIC

Evans cites the findings of the Kerr et al (9) paper on “Static postural differences between neutral and flat feet in children with and without symptoms” as evidence that high valgus and forefoot abduction are associated with the presence of symptoms. However, she failed to point out that Kerr et al found that hind foot eversion was significantly different between all groups – asymptomatic neutral, asymptomatic flatfeet (finding no difference between asymptomatic mild and asymptomatic flat feet) and symptomatic flatfeet. In addition, though the forefoot was found to be significantly more abducted in symptomatic than asymptomatic groups, there was greater abduction of the forefoot in asymptomatic flatfeet as well when compared to neutral feet. Yan et al, (10) also reported that degree of lateral displacement of the navicular appeared to correlate with the likelihood of pain, suggesting that varying degrees of forefoot abduction may be contributory to sub-clinical levels of symptoms/pain.
BOOMERANG LIMITATIONS

In the author’s section on identifying the problematic flatfoot she states that “if sensible detection of the ‘boomerang’ flatfoot were adopted, identified children could be triaged for further assessment and treatment, and the ‘non-boomerang’ cases reassured accordingly”. This follows a section describing (a) valgus heel (b) talo-navicular (TNJ) coverage angle and (c) ankle dorsiflexion range as the signs of boomerang flatfeet. This presents a view that only when thresholds of heel valgus, abduction of the midfoot or ankle equinus are met should the pediatric flatfoot be considered ‘at-risk, and that all others are “non-boomerang” and should just be “reassured accordingly”.

ON REFERRALS

The author cites a 2012 paper by Carli et al (11) reporting “…normal feet (were) found to account for 39.2% of the specialist referrals for paediatric flatfoot concerns”. This study aimed to identify what they defined as “physiologic pediatric orthopedic referrals” – the paper does not use the term “normal” to categorize them. They defined such a referral as “one in which the patient has a musculoskeletal condition(s) that is within normal physiologic variance, is unlikely to progress into a pathological state and can be followed by the primary care physician on a long-term basis”. This definition, as described in the paper, provides no information on what parameters, exam findings and variables were used to determine which flatfeet fit into this so-called “physiologic” flatfoot referral group. Further, no information is provided about what issues, if any, the child was having to prompt specialist referral. There are no examination findings presented to determine the overall musculoskeletal and lower extremity alignment in these referred flatfeet, which may constitute unidentified contributing factors to potential at-risk, non-physiologic, flatfeet.
In the section on “How can we better manage paediatric flatfoot concerns in the community” the author suggests the use of Foot Posture Index (FPI) normative data to enable the clinician to benchmark the child concerned against same age values, even presenting such data in a parent-friendly format, referred to as the “Ready Reckoner”, providing mean FPI scores (+/- 1SD, +/-2SD) for each year of age. While the FPI may provide a useful tool for categorizing foot type, and degree of deviations from the mean, overreliance on this as a screening tool fosters easy dismissal of certain feet as normal based on this index only, without affording them comprehensive history, biomechanical and gait evaluation, to identify functional deficits and reduced quality of life. This approach has the potential to deny some children specialist evaluation and potential management to improve lower extremity biomechanics and function, reduce gait abnormalities and provide enhanced quality of life.

GUIDELINES ON WHO TO TREAT

The author endorses the use of the paediatric flatfoot proforma (p-FFP) as a tool to direct management for flatfoot cases where FPI > +6 (12). The tool provides some useful guidance to help clinicians identify potential cases of concern among those cases that meet this FPI threshold, but it again encourages a narrow, specific set of findings to signal a so-called “yellow” category, where some intervention may be warranted (13). This approach will identify some who would benefit from intervention and lessons the critical insight a comprehensive assessment of the lower extremity in the context of the well-being of the whole child that a well-trained foot and ankle specialist would provide. Suggesting that such a tool is sufficient to identify when treatment is warranted again reduces the evaluation and decision-making ability of a medical specialist to a rubric will leave too many children with lifestyle limiting, and potential symptom producing, malalignments unaddressed. Further the author restricts her recommendations to
state that these guides should be used for children aged 8-10 years and older, suggesting that children under 8 do not even need proforma evaluation to determine potential for treatment, apparently grouping them all as physiologic and expected to improve without further evaluation. When intervention is recommended, the author suggests “simple inexpensive interventions such as structured footwear, generic foot orthoses, stretching and strengthening exercises”. The biomechanically trained podiatric physician knows the superior ability of a carefully prescribed, expertly designed custom foot orthosis made from a correctly positioned negative cast or scanned image to achieve maximum improvement in alignment of the foot and lower extremity to improve outcomes in many cases. That is not to say that a custom orthosis is always required, but with expert evaluation to identify imbalances requiring custom control to neutralize deformity the clinician can select children for custom orthoses as needed. With optimum control in such cases the clinician can maximize function and reduce tissue stresses that are cumulative over time.

The author points to recent validation (14) of the relaxed calcaneal stance angle as a simple measurement that correlates well with the FPI suggesting it may have a role as simple proxy for FPI, making use of an easily determined angle to potentially guide parents and a range of clinicians. This is a useful advance to have validation of this convenient, simple measurement. However, it once again places the emphasis on simple, single measurements suggesting that those needing management can be easily identified by isolated findings.

The author states that beyond the three signs of ‘boomerang’ flatfeet, that alert should be given to children who present with “foot pain, left-right foot asymmetry, age over 10 years, limps, and is generally unwell, or refuses to weight-bear” (15). To this I would reply that the child with pain, who
limps, is generally unwell or refuses to bear weight would clearly warrant “alert”, but such a high bar for criteria, consistent with a child who has already reached a debilitating level of dysfunction, as the threshold for those we should give our attention to beyond those with the three signs of boomerang flatfeet is one that would leave countless children who could benefit from improved foot position and lower extremity alignment without the benefit of care. I would add that left-right asymmetry, not only of the foot, but of the lower extremities, is quite common in the child with flatfoot, in both asymptomatic and symptomatic cases. Therefore, presence of that finding alone would suggest that far more children who may not fall into the neat categories of boomerangs would benefit from our attention and intervention.

In a section on “wider considerations in the child” the author provides some conditions that present “potentiating factors” for flatfeet in older children. The list includes systemic, syndromic, familial, and developmental conditions. While these should surely signal concern on the part of the clinician, limiting potentiating factors to only those neglects to include biomechanical imbalances in the lower extremity including, but not limited to, such conditions as femoral antetorsion, tibial torsion, equinus at levels other than the ankle, genu valgum, genu and tibial varum, subtalar varus, forefoot varus, forefoot valgus, metatarsus adductus as “wider considerations in the child” that should warrant examination, identification, and management.

Among the documented superstructural influences on flatfeet in children, Benedetti et al (6) reported that internal knee rotation was the most common limb malalignment in 53 children with flatfeet. In fact, 43.6% of patients the presence of internal knee rotation correlated with the presence of foot symptoms. Singh et al (16) made the link between internal tibial torsion and increased hindfoot
malalignment. They went on to say that “the presence of such torsion was directly correlated to severity of long arch collapse”. These findings suggest the importance of evaluating for structural torsion in the femur and tibia as mitigating factors in pediatric flat foot. Oversimplified, boomerang rubrics and simplistic “3qq” assessment tools are not comprehensive enough for the astute clinician to identify clear mitigating factors such as torsion, among other superstructural, and intrinsic foot imbalances.

GAIT ASSESSMENT

Evans endorses the critical importance of gait observation as “the most important aspect of assessment” and that it “compliments a thorough clinical history”. recommending the use of a validated gait assessment, such as the paediatric GALS (p-GALS) to evaluate children’s gait. This is commendable and focuses attention on the importance of functional assessment in the evaluation of flatfoot. Evans mentions that it is “relevant for clinicians to appreciate the angle of gait progression as foot motion in the transverse plane has been demonstrably associated with symptomatic pediatric flatfeet”. This is all well and good, and indeed forefoot abduction is one of the boomerangs, but it misses an opportunity to highlight the importance of identifying other transverse plane imbalances in gait and the role they may be playing in compensations at the foot level, as mentioned in the prior section.

ON TREATMENT GUIDELINES

In “the evidence for intervention for pediatric flatfeet” section the author cites the Cochrane Library systematic review of best available evidence for conservative interventions for pediatric flatfeet. It references the 2010 conclusion that, “in the absence of pain, the use of expensive, custom or bespoke foot orthoses for healthy children had no supporting evidence”.
Offering a broader perspective on the potential role for foot orthoses in improving a variety of measured parameters in children is the systematic review of the effectiveness of non-surgical intervention (foot orthoses) for pediatric pes planus by Dars, Uden et al. (17) which examined 11 studies from 2011-2017. They concluded from the summarized findings that foot orthoses may have a positive impact across a range of outcomes including pain, foot posture, gait, function, structural and kinetic measures. They do go on to say that “current evidence lacks clarity and uniformity in terms of diagnostic criteria, interventions delivered, and outcomes measured for pediatric pes planus”.

Dars, Uden et al. go on to say that “clinical judgment needs to incorporate best available evidence for patient care, as directed by thorough assessment, based on sound history, gait evaluation and individual children’s physiology, social circumstances and general health needs”. These parameters would suggest that, if performed, such a comprehensive approach to the evaluation of the child with flat feet would often reveal significant deficits in history, biomechanical and physical exam, gait evaluation, physiology, social circumstances, and general health needs sufficient to justify regular, judicious interventions. There is mounting evidence that these interventions will return these children to more normal alignment and optimize function and development into adulthood.

In a section entitled “Do we worry too much about children’s flat feet” the author states that “…the temptation to treat, ‘just in case’, may be well-intentioned, but overlooking the ‘harms’ of unnecessary treatment – the least being financial cost, for no benefit”.

This letter has clearly identified many benefits, documented in the literature, to normalizing foot position in many asymptomatic flatfooted children. To repeat the largely discredited trope that “harm” can result from unnecessary treatment of flatfeet is to take us back decades, suggesting an archaic and
baseless effect for foot orthoses. Making matters worse, to suggest that among the “harms” of unnecessary treatment with orthoses, is “financial cost for no benefit” is to dismiss an important, effective treatment option with a damning charge that, evidence to the contrary, is blatantly false.

CONCLUSIONS

Evans states in her conclusion that “Childhood obesity, physical inactivity, and resulting deficits to child health and quality of life, need to be appreciated by every podiatrist who consults in the pediatric healthcare setting”. I wholeheartedly agree and suggest that taking this position to heart will ensure that children with deficits in any of these areas should get evaluation and treatment. Efforts to oversimplify and limit the significant number of children with asymptomatic flatfoot who exhibit deficits in these areas is not in the interest of good public health or preventative pediatric/podiatric care.

Supporting this notion that a broader public health view of conditions such as flat foot is beneficial is Marian T Hannan, DSc, MPH. Dr. Hannan is a noted professor in the Department of Epidemiology at the Harvard/TH Chan School of Public Health. Dr. Hannan has a particular interest in the effect of biomechanics upon physical function and is currently conducting research on risk factors for arthritis and foot disorders and biomechanics among other areas. In keynote remarks at the International Foot and Ankle Biomechanics Conference in April 2018(18), Dr. Hannan stated “the vast population do not use orthoses or medical care until symptoms interfere with activities of daily living, minimizing possible early clinical management”. Hannan continued to say that epidemiology informs us about the public health impact of such conditions and that the potential impact (of foot dysfunction) is huge, stating that “in the population at large, the risk of disability due to foot problems is greater than that from heart problems, dementia or lung disorders”.

Perhaps it is time to step back and look at the big picture. Instead of narrowing our focus of attention to only flat feet that exceed measured thresholds, might we espouse comprehensive history and physical examinations, by trained specialists, to identify children encumbered by the myriad health and lifestyle consequences of flatfoot at an age when we can most influence outcomes to ensure optimum function and quality of life for decades to come?

Financial Disclosure: None reported.

Conflict of Interest: None reported.

REFERENCES


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