

## Peer Review File

Article information: <http://dx.doi.org/10.21037/atm-20-7621>

### Reviewer A

**Comment 1:** I would suggest that the authors consider limiting the amount of detail and emphasizing the purpose of this piece.

**Response 1:** Thank you. Please see responses to comments below. We have edited this section to include an emphasis on the purpose of the piece.

**Comment 2:** With respect to detail, could consider eliminating the Paley guiding principles. These are detailed in the main text. Could highlight instead that treatment is guided by assessment of joint congruency and presence/absence of osseous deformity.

**Response 2:** Thank you. The section has been edited to read “Indications for soft tissue release and osteotomies to aid in correction of clubfoot deformity with Ilizarov and Hexapod fixators are not standardized and are guided by the patient age, joint congruity, soft tissue suppleness, and osseous deformity.”

Manuscript Change with Line Numbers: Lines 49-51 “Indications for soft tissue release and osteotomies to aid in correction of clubfoot deformity with Ilizarov and Hexapod fixators are not standardized and are guided by the patient age, joint congruity, soft tissue suppleness, and osseous deformity.”

**Comment 3:** Could also consider eliminating the “27-30 day” range (line 59) and instead summarize as: correction times vary depending on severity of deformity

**Response 3:** Thank you. The sentence has been edited and now reads “Correction time varies according to clubfoot deformity severity.”

Manuscript Change with Line Numbers: Line 52 “Correction time varies according to clubfoot deformity severity.”

**Comment 4:** Assuming many readers look at the abstract first, I would encourage the authors to expand on their “why” for writing this piece. What is the purpose? Why should the reader continue reading? Is it that the literature is poor, or hard to decipher? Is it that TSRH has a unique treatment algorithm to propose?

**Response 4:** Thank you. We have removed some of the more detailed information from the abstract and including the following concluding sentence.

Manuscript Change with Line Numbers: Lines 59-62 “The purpose of this article is to summarize the relevant literature related to circular external fixator

treatment of recurrent clubfoot deformity and outline our approach to the segmental deformities of the foot and ankle in this patient population..”

**Comment 5:** Introduction: Well-written

As mentioned above, I think it will be helpful to expand upon the purpose of this narrative summary. Additionally, I would expand lines 103-106 to give the reader a more thorough sense of the outline for the upcoming paper. I would mention the upcoming sub-headings, e.g. fixator configurations, procedures, complications, etc.

**Response 5:** Thank you. We have added an additional section to provide the reader with a better sense of the review organization.

Manuscript Change with Line Numbers: Lines 83-88 “In the following section we review the literature regarding circular external fixator treatment of clubfoot deformity, including circular fixator configurations, soft tissue releases and osteotomies, functional outcome and correction results, and complications. We conclude with an outline of our approach to the segmental deformities present in the recurrent clubfoot, which includes our indications for circular fixator treatment and fixator configurations, acute and gradual correction techniques, and case examples.”

**Comment 6:** Methods: Well-written. Were there any specific exclusion criteria?

**Response 6:** Thank you. There were no strict exclusion criteria.

**Comment 7:** Discussion

Fixator configurations: pros/cons of one vs the other? Or just surgeon preference?

Soft tissue releases: could consider reorganizing to bring greater clarity to this section.

**Response 7:** Thank you. We have added a sentence to comment on surgeon preference and frame use.

Manuscript Change with Line Numbers: Lines 101-102 “The decision to use an Ilizarov or hexapod circular fixator is determined predominantly by surgeon preference”

**Comment 8:** Correction and Outcomes: good

Complications: Line 237-9: 77% had good results and 37% required arthrodesis – so, some of the arthrodesis patients were a good result? (14%)

**Response 8:** Thank you. This section has been edited to clarify the results of the

referenced article. We have included the definition of “good” utilized by the authors, which clarifies how some patients classified as having a good result underwent arthrodesis at a later date.

Manuscript Change with Line Numbers: Lines 221-225 “While 77% of patients reported a good result, which was defined as a painless foot and ankle, patient capacity walk on a plantigrade foot and wear conventional shoes, and the absence of significant recurrence for at least two years, the result was not durable in all. 37% of patients in their cohort required a subsequent arthrodesis for disabling arthritis or recurrent deformity at an average of 21 months from Ilizarov treatment[7]”

**Comment 9:** Line 89 – insert “of” between degree and soft tissue;

**Response 9:** Thank you. We have inserted “of” to correct the sentence.

Manuscript Change with Line Numbers: Line 68 “...frequently have some degree of soft tissue envelope compromise”

**Comment 10:** Line 93: “alternations” should be “alterations”

**Response 10:** Thank you. We have corrected the sentence.

Manuscript Change with Line Numbers: Line 72 “Permanent alterations...”

**Comment 11:** Line 97: consider starting new paragraph at “gradual correction

**Response 11:** Thank you. We created a new paragraph.

Manuscript Change with Line Numbers: Line 77 “Gradual...”

**Comment 12:** Line: 212: may have been

**Response 12:** Thank you. We have corrected the sentence

**Comment 13:** TSRH Approach: Thorough, thoughtful, informative and well-done. As mentioned above, it would be helpful for the reader to have an expanded outline (in sentence format) for the sections ahead. This is a lengthy section, and knowing the outline would be helpful for the reader. Something along the lines of: in this section, we will discuss each of the major relevant deformities separately, including ankle equinus, hindfoot varus, midfoot cavus, and forefoot adductus. For each deformity, we will examine indications and approaches for acute correction, gradual correction, etc. ...

**Response 13:** Thank you. We have re-organized the introduction to this section to provide the reader with an outline.

Manuscript Change with Line Numbers: Lines 227-246

## Approach to Circular Fixator Treatment of Clubfeet at Scottish Rite for Children

Successful management of the recurrent clubfoot is predicated on appropriate patient selection and accurate assessment of the segmental deformities of the foot and ankle. Given the duration of treatment and potential complications, the decision to proceed to circular fixator assisted correction of clubfoot deformity is a shared choice between the surgeon and the patient and made after extensive discussion. In general, we offer circular external fixator assisted correction of clubfeet to older children (>8 years of age), adolescents, and young adult patients with severe, stiff deformities who have failed one or more attempts of treatment via the Ponseti method, and in patients who have undergone extensive or multiple soft tissue release with a nonpliable or compromised soft tissue envelope.

After the decision has been made to utilize circular external fixation, the ankle, hindfoot, midfoot, and forefoot deformities must be determined by their deviation from normal parameters and understood in relation to each other to develop an efficient and complete correction plan. We assess deformity with physical examination, radiographs, and gait analysis. We rarely utilize advanced imaging. If our initial estimation of deformity is inaccurate, we adjust our circular fixator prescription until an acceptable clinical result is achieved at the conclusion of strut turns. In the untreated or recurrent clubfoot, the relevant deformities are ankle equinus, hindfoot varus, midfoot cavus, and forefoot adductus. In this section discuss each segmental deformity separately and outline our considerations and approaches for gradual and acute correction of the relevant soft tissue and osseous structures.”

**Comment 14:** Would it be possible to pull together a treatment algorithm figure for this? (might be too complex...)

**Response 14:** Thank you. We feel that patient factors and deformity complexity make creating such an algorithm difficult. As such, we did not include an algorithm in this review. Rather, we hope the outlined correction techniques provide the audience with comprehensive set of tools to treat the patient.

**Comment 15:** Pre-operative considerations: what do you use to obtain that thorough account of the segmental deformities? XR alone? Advanced imaging? Segmental foot data via motion analysis?

**Response 15:** We have added a section to explain our preferred approach for deformity analysis.

Manuscript Change with Line Numbers: Lines 255-258

“We assess deformity with physical examination, radiographs, and gait analysis. We rarely utilize advanced imaging. If our initial estimation of deformity is inaccurate, we adjust our circular fixator prescription until an acceptable clinical result is achieved at the conclusion of strut turns.”

**Comment 16:** Figure 4: any post-op images?

**Response 16:** Thank you. We have added a post-operative image to this figure.

**Comment 17:** Figure 5: references panels A-I, but only shows A-H

**Response 17:** Thank you. We have added image H to the figure. We believe this was inadvertently in the initial submission.

**Comment 18:** Figure 6: any post-Gigli osteotomy images?

**Response 18:** We intentionally did not include a post gigli saw osteotomy

**Comment 19:** Could consider summarizing standard TSRH post-op protocols: when to cast, when to WB, who needs therapy, when to brace (and for how long), etc.

**Response 19:** Thank you. We have added a section on post-operative considerations. Manuscript Change with Line Numbers: Lines 435-444 “Once deformity correction has been achieved in the circular fixator we typically stabilize the correction by maintaining the fixator in a static position for an additional 6 weeks. If an osteotomy was performed, healing of the osteotomy site may require a lengthier stabilization period and is monitored on serial radiographs. We permit weight bearing in the fixator during the stabilization period by adding rocker rails to the most distal ring(s). Following frame removal, patients are transitioned to a weight bearing cast for 6 weeks and subsequently transitioned to an ankle foot orthosis (AFO) for 6 months. If patients require a tibialis anterior tendon transfer to the lateral cuneiform to maintain deformity correction in the long term, we prefer to perform such a procedure after the resolution of any frame induced osteopenia to avoid tendon transfer failure and/or iatrogenic fracture.”

**Comment 20:** Summary: any need for future research? Future directions?

**Response 20:** Thank you. We have added a sentence to the concluding paragraph re: future research efforts.

Manuscript Change with Line Numbers: Lines 454-456 “Future research efforts should investigate the effectiveness of minimally invasive soft tissue releases and

osteotomies as well the potential benefits of combined acute and gradual correction techniques.”

**Comment 21:** Nicely done. Thank you for this meaningful contribution.

**Response 21:** Thank you for your review and thoughtful comments.

**Reviewer B**

**Comment 1:** The text body is thorough and well-organized. No significant edits for content. My suggestion for Figure 1 would be to include an intraoperative or immediate postoperative fluoro/xray view (to accompany the clinical picture of the frame) to demonstrate the v-osteotomy.

**Response 1:** Thank you. The immediate post-operative images are almost completely obscured by the fixator. As such we did not include the image in the text.

**Reviewer C**

**Comment 1:** Your manuscript is well written, a clear language and very well organized. Provides a broad overview of the described technique and complications of clubfoot. Please correct the format of line 442 to suit the rest of the references. Thanks for your manuscript.

**Response 1:** Thank you. The formatting has been corrected.