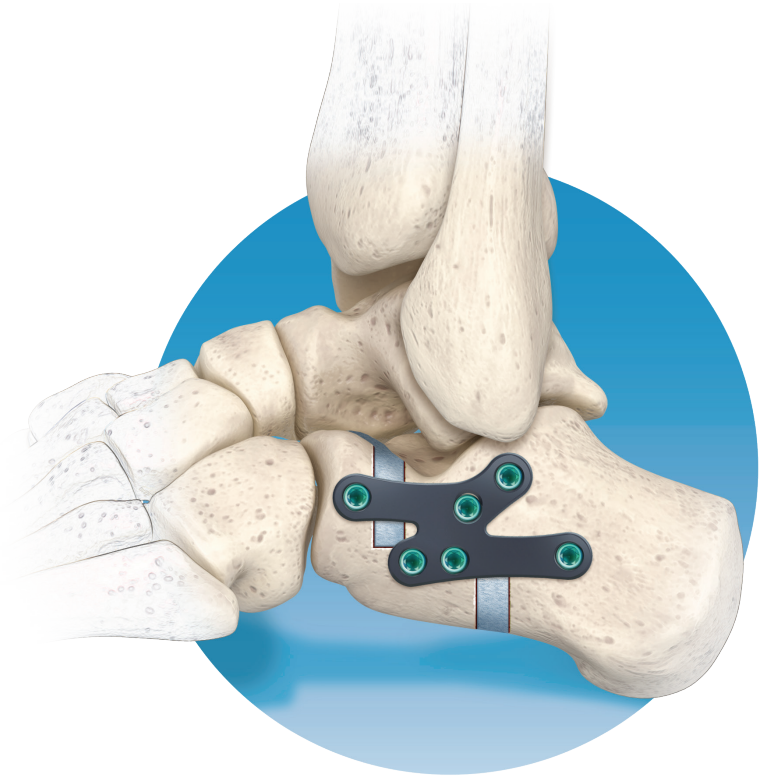
CoLink Cfx Z-Plasty™

TECHNICAL MONOGRAPH



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CoLink Cfx Z-Plasty™

The spectrum of treatment options for painful flatfoot deformity ranges from non-operative treatments to osteotomies, arthroereisis, and arthrodesis; some methods perform better than others. The disease state and surgeon preference dictate the appropriate treatment method. This monograph reviews various treatment options for flatfoot deformity and describes the advantages and key features of the CoLink Cfx Z-Plasty™ system from In2Bones.

Background

As detailed by Johnson and Strom, the four stages of Adult-Acquired Flatfoot Deformity (AAFD) start with stage I, categorized as mild posterior tibial tendon (PTT) dysfunction and no deformity.[1] At stage II, flexible deformity and PTT degeneration are introduced.[1] Stage III progresses to a rigid deformity with PTT disruption, and is followed by stage IV which is defined by a fixed deformity in the ankle and foot with tibiotalar valgus.[1, 2]

Regardless of the stage presented, operative treatments come with inherent risks, ranging from neurovascular complications at the operative site to the possibility of the need for another surgical intervention at a later time, which must be weighed against the potential benefit to the patient.

Treatment Options

While operative methods are available for the treatment of flatfoot deformity, there are non-operative routes which may be utilized, depending on the stage of deformity; these range from the use of custom orthotics, to the implementation of structured physical therapy, with success and satisfaction rates indicating that a non-operative approach is an effective method for treatment of stage I or II AAFD.[3, 4]

As the severity increases from stage II to III, and beyond, and if conservative, non-operative treatment options fail, surgical corrections including arthroereisis, osteotomies, and arthrodesis may be considered.

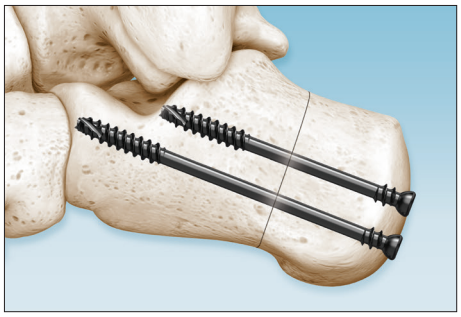
Arthroereisis presents a minimally invasive option for the correction of a flexible deformity, in which an implant is placed in the sinus tarsi of the subtalar joint. This procedure helps to correct hindfoot valgus and gain the medial arch's support and can sometimes be used in isolation, especially in younger patients, but is also often combined with other procedures.

In2Bones offers the PitStop® Subtalar Implant (**Figure 1**), made of radiolucent, biocompatible, PEEK material, and featuring an anatomical shape designed to improve stress distribution while facilitating the correction of pes plano valgus deformity.

1. In2Bones PitStop® Subtalar Implant

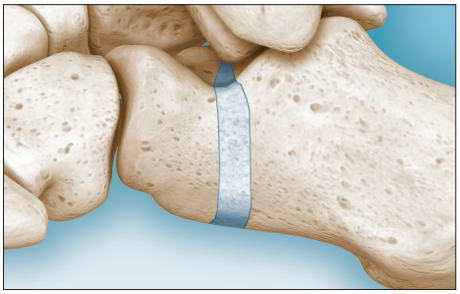
Moving further into surgical treatment options, calcaneal osteotomies are standard practice for operative treatment of flatfoot deformity, intending to realign the calcaneus and associated structures' positions to restore the foot's native arch.

Medializing displacement calcaneal osteotomies (MDCO) are frequently employed to correct hindfoot valgus deformity.[3] For this procedure, the osteotomy is placed through a lateral approach, after which the posterior segment is shifted medially (**Figure 2**).



2. MDCO with In2Bones CoLag® Screws

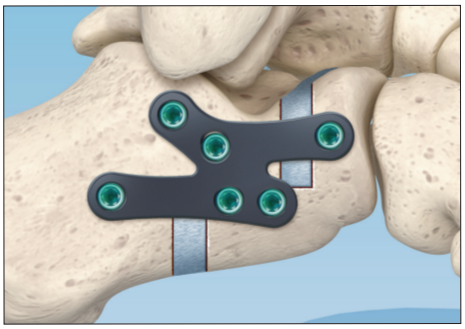
The lateral column lengthening (LCL) osteotomy (**Figure 3**), first described in 1975,[5] is one of the most commonly utilized osteotomies for the correction of AAFD. Designed to lengthen the lateral column and result in correction through the talonavicular joint,[6] the LCL may be used with the MDCO but often is powerful enough to be used by itself. The LCL has a retrograde effect, correcting both hindfoot valgus and transverse plane deformity at the TN joint. In some long-standing flatfoot cases, the forefoot will adapt to the flattened hindfoot posture. Once the hindfoot is addressed by the LCL, an additional medial column procedure, such as a Cotton osteotomy at the medial cuneiform or a Lapidus fusion of the 1st



3. LCL Osteotomy with In2Bones Evans Wedge

TMT joint, may be performed to correct residual forefoot supination deformity.

Alternatively, a Z-type, step-cut, LCL osteotomy, as first detailed by Vander Griend[7] is utilized with the CoLink Cfx Z-Plasty™ Plate (**Figure 4**). This procedure provides the powerful correction of the traditional LCL with the greater inherent stability of the "Z" style osteotomy. In addition, the low-profile design of the Z-Plasty Plate can provide fixation and reduce soft tissue irritation from hardware prominence.



4. In2Bones CoLink Cfx Z-Plasty™ Plate with wedges

Arthrodesis is generally indicated for patients with rigid deformity, deformity with associated arthritis, or highly unstable deformity that needs the stability of a fusion.[2] Arthrodesis of one or more joints may be used in combination with other osteotomies and soft tissue procedures, as necessitated by each specific case. Common fusions include the talonavicular joint, subtalar joint, naviculocuneiform joint, 1st TMT joint, and sometimes the calcaneocuboid joint, to create a stable plantigrade foot.[4]

What Does the Literature Say?

The Z-osteotomy is a more current iteration of the LCL and has promising results from existing research, which compares directly with other LCL osteotomy procedures. Among the results of those studies, the following data emerged:

- Smaller graft needed[8,9]
- Reduced healing time[8]
- Reduced non-union rate[8]
- Reduced reoperation rate[8, 9]
- Potential for greater correction[8]
- Improvement in talonavicular coverage[8]

In two separate studies, which followed patients undergoing procedures involving the utilization of a Z-osteotomy, the post-operative union rates were noted to be 100% for the cohorts,[10, 11] while one indicated that the talonavicular coverage significantly improved following the procedure.[11]

Demetracopoulos et al also documented significantly improved FAOS pain, FAOS Quality of Life, and SF-36 scores, when using a Z-osteotomy for lateral column lengthening and flatfoot deformity correction, as well as no instances of delayed union or bone graft collapse.[10]

Key Features of the CoLink Cfx Z-Plasty™ System

- Guided placement of osteotomy through a captured cutting slot
- Spreader instrument for wedge placement
- Side specific (left/right) graft spanning plate design
- Low-profile construct
- Compatible with 3.5mm locking and non-locking cortical screws, as well as 4.0mm cancellous non-locking screws
- Pre-sterilized plates and screws

Conclusion

Guiding the Z-osteotomy placement by referencing the patient's native anatomic structures, the In2Bones CoLink Cfx Z-Plasty™ is designed to provide a reproducible procedure for the treatment and correction of flatfoot deformities while using an anatomically designed plate.

As an alternative to other existing osteotomy techniques, the Z-step osteotomy has demonstrated the ability to result in reduced non-union[8] and delayed union[10] rates, as well as provide the potential for greater correction[8] and improved pain scores.[10]

Technique Summary

The Z-Plasty Plate is implanted using guided instrumentation for optimal placement.

Once located, the guide is fixed in place Ⓐ, and the horizontal osteotomy is executed via the slot.

After creating the initial osteotomy, the Olive Wires and guide are removed. The resulting holes are used as references when extending the superior and inferior osteotomies.

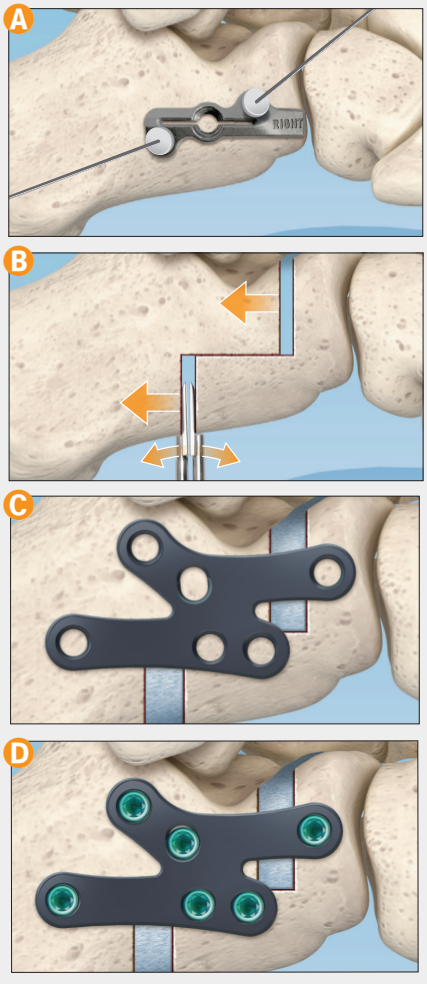
The instrument set includes a Z-Plasty Spreader which is used to lengthen and distract the osteotomy to the desired correction. Ⓑ Fluoroscopic imaging to assess TN coverage is often used as a guide in determining the amount of correction needed.

Bone or wedge grafting of the lengthening site is recommended.

Once grafted, the final Plate is trialed Ⓒ and secured to the bone with screws. Ⓓ

Close by preferred methods.

Refer to the Z-Plasty Surgical Technique for more detailed steps



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