

# Le cone beam orthopédique dans la planification chirurgicale sur mesure

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## Résumé

Les corrections chirurgicales des anomalies de positionnement du membre inférieur sont des interventions qui ont prouvé leur efficacité. Avant d'incorporer une technique innovante dans notre arsenal de planification, nous devons la valider. Nous savons que notre corps cherche à atteindre une position neutre par rapport à la surface de support dans le membre inférieur. Cela a été démontré grâce à une étude réalisée avec la tomодensitométrie Cone Beam.

Nous avons également étudié la relation dans le plan coronal entre la cheville et l'articulation du genou et avons pu conclure que la présence d'une ostéarthrose valgus à la cheville induit une tendance à la varisation de l'articulation du genou, et vice versa. Cela confirme une fois de plus que le membre inférieur cherche à atteindre une position neutre.

À partir de là, nous avons examiné comment réaliser une meilleure planification préopératoire pour les corrections de déformités, en utilisant des images 3D volumétriques générées à partir de la tomодensitométrie Cone Beam. Pour ce faire, nous avons développé un système de plan volumétrique sur les axes X, Y et Z. Ensuite, nous avons déterminé les différents axes et angles.

La plus-value réside dans le fait que ce sont des enregistrements sous charge, où la force de réaction au sol est présente, ce qui fait défaut dans une tomодensitométrie conventionnelle. Cela nous permet d'effectuer un calcul plus précis lors de la planification préopératoire virtuelle.

À partir de là, nous créons des guides PSI avec un guide de réduction pour parvenir à une correction d'axe accurate et spécifique au patient, en prenant en compte la dimension de de mis en charge du patient.

## Mots clés

- WBCT
- Correction membre inférieur
- planification 3D
- ostéotomie virtuelle

## Abstract

Surgical correction of lower limb alignment deviations is a proven intervention. Before incorporating an innovative technique into our planning arsenal, we must validate it. We know that our body strives for a neutral position relative to the support surface in the lower limb. We have demonstrated this through a study using cone beam CT scans.

We have also studied the relationship in the coronal plane between the ankle and the knee joint and have been able to conclude that if there is valgus osteoarthritis present in the ankle, the knee joint tends to varus, and vice versa. This once again proves that our lower limb aims for a neutral position.

From here, we examined how to achieve a better pre-operative planning for deformity corrections, based on volumetric 3D images generated from the Cone Beam CT scan. For this purpose, we developed a volumetric plane system on the X, Y, and Z axes. Subsequently, we determined the various axes and angles.

The added value lies in the fact that these are loaded recordings, where the ground reaction force is present, which is lacking in conventional CT scans. This enables us to perform a more accurate calculation during pre-operative virtual planning.

Based on this, we then create PSI guides with a reduction guide to achieve an accurate, patient-specific axis correction, taking the weightbearing dimension in our calculation.

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