Case Study

Orthopedics

Tibial Bar Resection

The use of Axial3D model within theatre to aid in surgical navigation of growth arrest in proximal right tibia.

Abstract

A physical 3D Model of the patient's physeal growth arrest was used to accurately visualise bar location within proximal paediatric tibia. Additional diagnosis of deformation on tibial plateau confirmed with use of the physical 3D model.

Clinician

Mr. James Ballard, Consultant Orthopedic Surgeon

Healthcare Provider

Royal Belfast Hospital for Sick Children, Northern Ireland

> The position and surgical planning were greatly enhanced by the manufacture of a 3D transparent model of the tibia showing the exact three dimensional location of the bar within the tibia. It was used intraoperatively as a guide and safety check as to the position of the surgical bar when the bar was being removed.
>
> **Mr. James Ballard, Consultant Orthopedic Surgeon, Royal Belfast Hospital for Sick Children, Northern Ireland**

Case

Investigations showed a small growth arrest bar in the patient's proximal right tibia and, coincidentally, a similar bar in his left distal femur. CT and MRI scans were performed to try and delineate the extent and exact location of the bar so that surgical excision could be planned accurately through a direct transmetaphyseal window, excising the bar and replacing it with bone cement.

Solution

The surgeon was provided with a full scale model of the proximal tibia and distal femur in a clear resin.

The ossific bar was then segmented and coloured to show and contrast the exact internal position within the anatomy. The surgeon was also equipped with a grey model of the proximal tibia to visualize the surface anatomy.

FIG 1

Posterior aspect of proximal tibia with contrast.

FIG 2

Contrast showing three dimensional location of ossific bar within medial aspect of tibia.

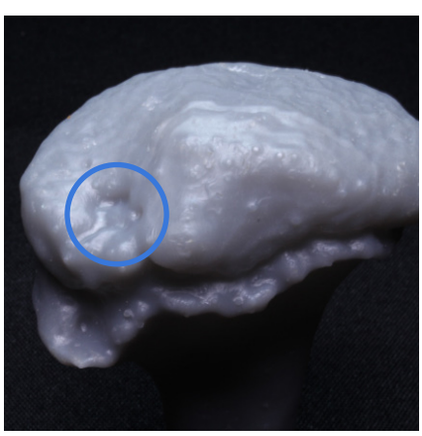

FIG 3

Small osteo deformity found on tibial plateau (blue ring).

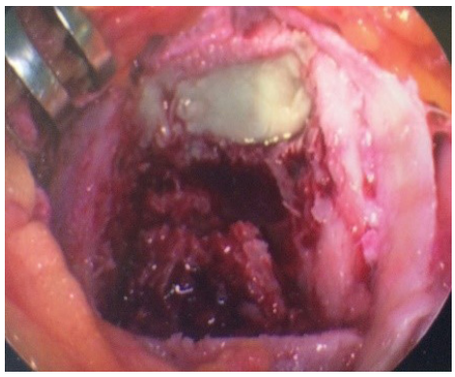

FIG 4 (Left)

Intraoperative image of growth arrest within tibia (blue ring).

FIG 5 (Right)

Cemented tibia following resection of growth arrest.

Result

The position and surgical planning were greatly enhanced using the tibia model showing the exact three dimensional location of the bar within the tibia.

In addition the model also presented another bony deformity on the tibial plateau not seen on conventional imaging. The model was used in surgery as a guide for the position of the growth during resection.

Conclusion

The physical 3D model prints allowed the surgical team to plan the course of treatment for the patient offering a much greater understanding of the location of the pathology within the anatomy. This facilitated the team to plan the surgical location of the operative window to resect the tibial bar more accurately, and provided a guide in theatre during the procedure. The model also provided diagnosis of an additional pathology not found using conventional images.

Benefits

Patient

Elevating Patient Care

- Faster treatment
- Reduced time in theatre
- Improved communication
- Reduced complications

Clinicians

Advancing Surgical Standards

- More accurate diagnosis and pre-operative planning
- Identified additional pathology not found with conventional images
- Useful surgical guide

Healthcare Provider

Improving Standards and Efficiencies

- Increased standards of care
- Reduced risk of complications and infections
- Saved time and money in surgery and post-operative care

Model Specifications

Patient Data:	207 CCT images						
Color:	White	☐	Grey	☒	Clear ☐	Clear with Contrast	☒
Layout:	In-situ	☐	Separate	☒			
Construction:	Solid	☒	Hollow	☐	Split ☐		
Process and Delivery:	48 hours						

Contact Us

contact@Axial3D.com
+4428 9018 3590

Further information

www.Axial3D.com
@Axial_3D

Sign up to start using our secure online order service today:

orders.Axial3D.com