1  3D Preoperative Virtual Planning in Derotational Proximal Femoral Osteotomy

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3  **Supplementary File 1**

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5  **1.       3D Slicer software**

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7  **1.1.**     How to obtain the biomodel, step by step (**Supplementary Figure S1**)

8 **1.2.** How to create the biomodel

9

10 **1.2.1.** As described in protocol step 2.3.2, in the dropdown menu, choose the **Legacy |**
11 **Editor** option (**Supplementary Figure S2**).
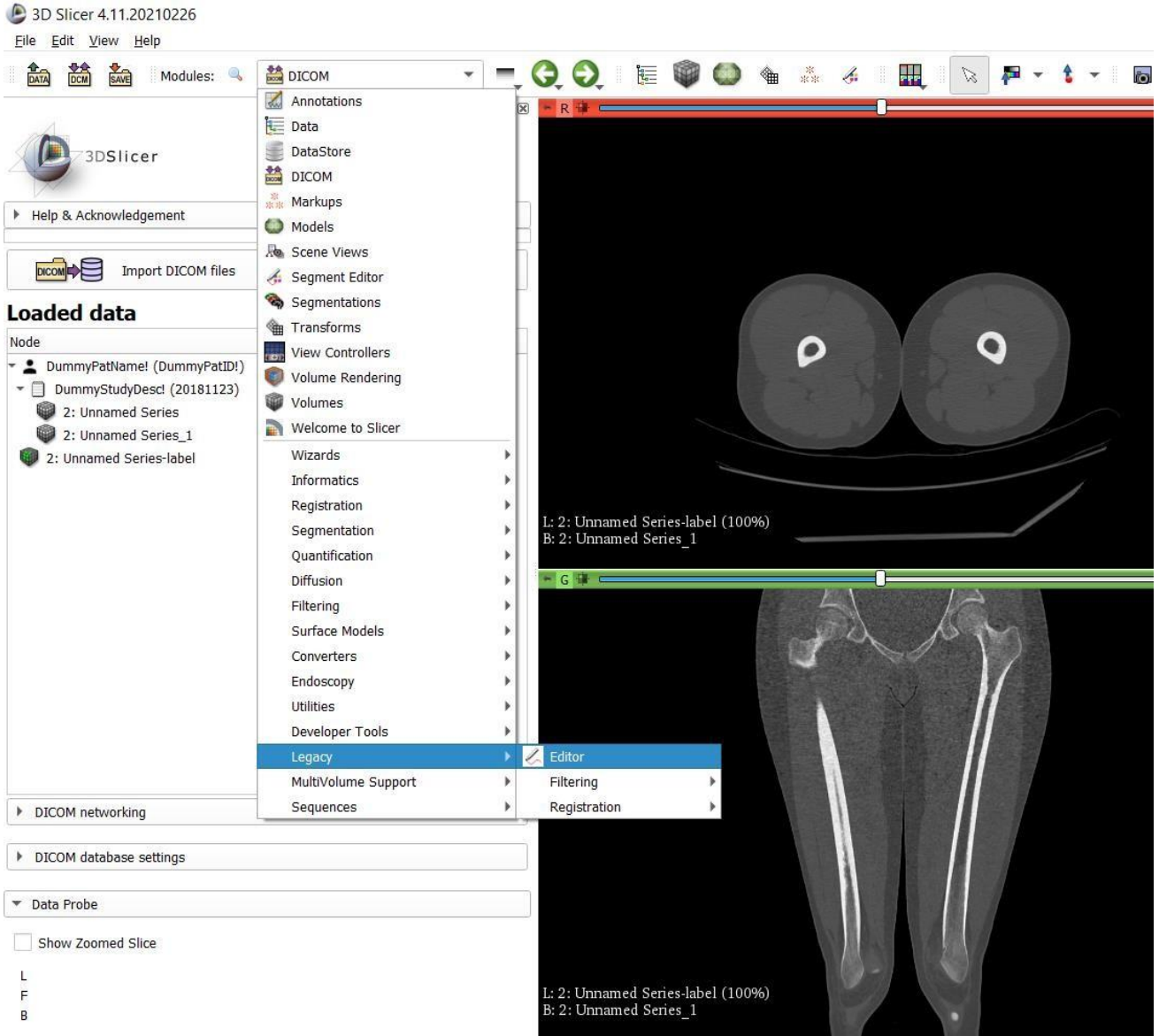


12

13 **1.2.2.** Select the **Threshold Effect** icon (**Supplementary Figure S3**). Move the bar in the
14 lower box until only the bone is painted in the images on the right (as shown in the image).
15 Click on **Apply**.
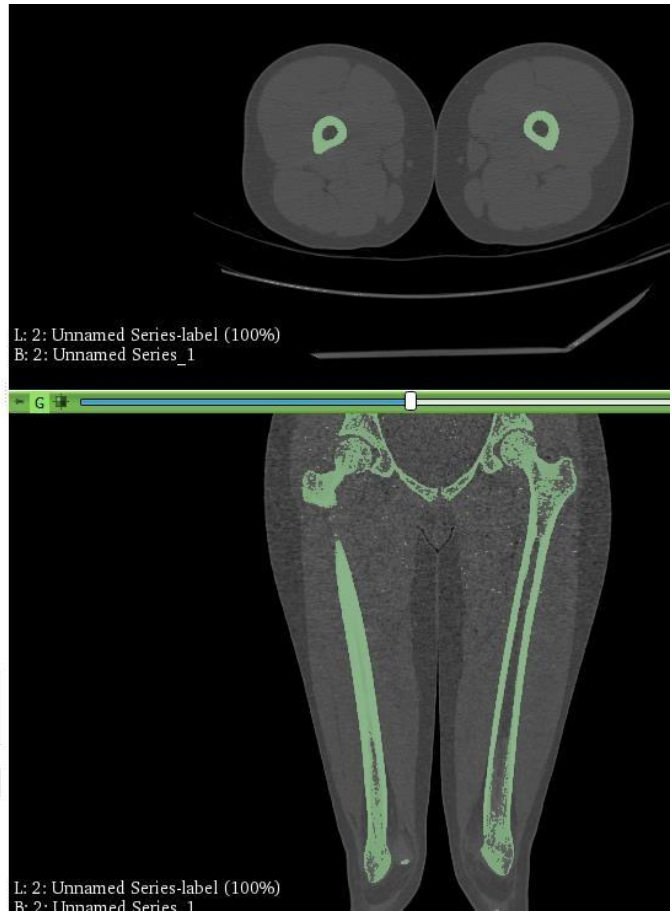


16
17 **1.2.3.** Select **Make Model Effect | Apply** (**Supplementary Figure S4**)



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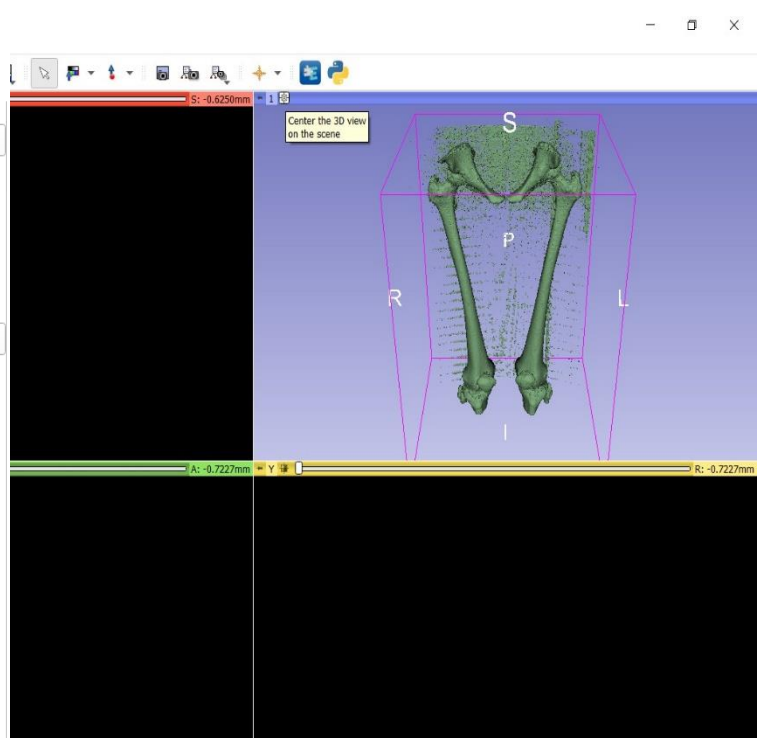
19 **1.3.** Select only the file "**tissue**" (**Supplementary Figure S5**). Save in STL format.

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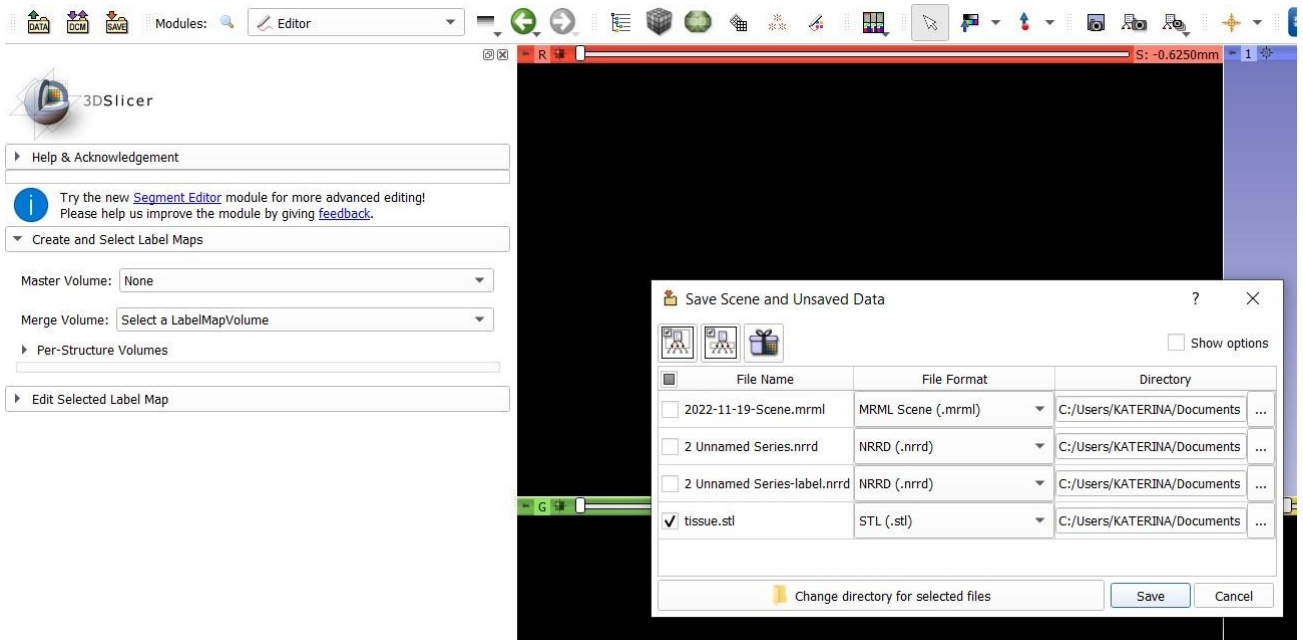
22 **2. MeshMixer software**

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24 **2.1.** Import the STL image by selecting **Import** (**Supplementary Figure S6**)
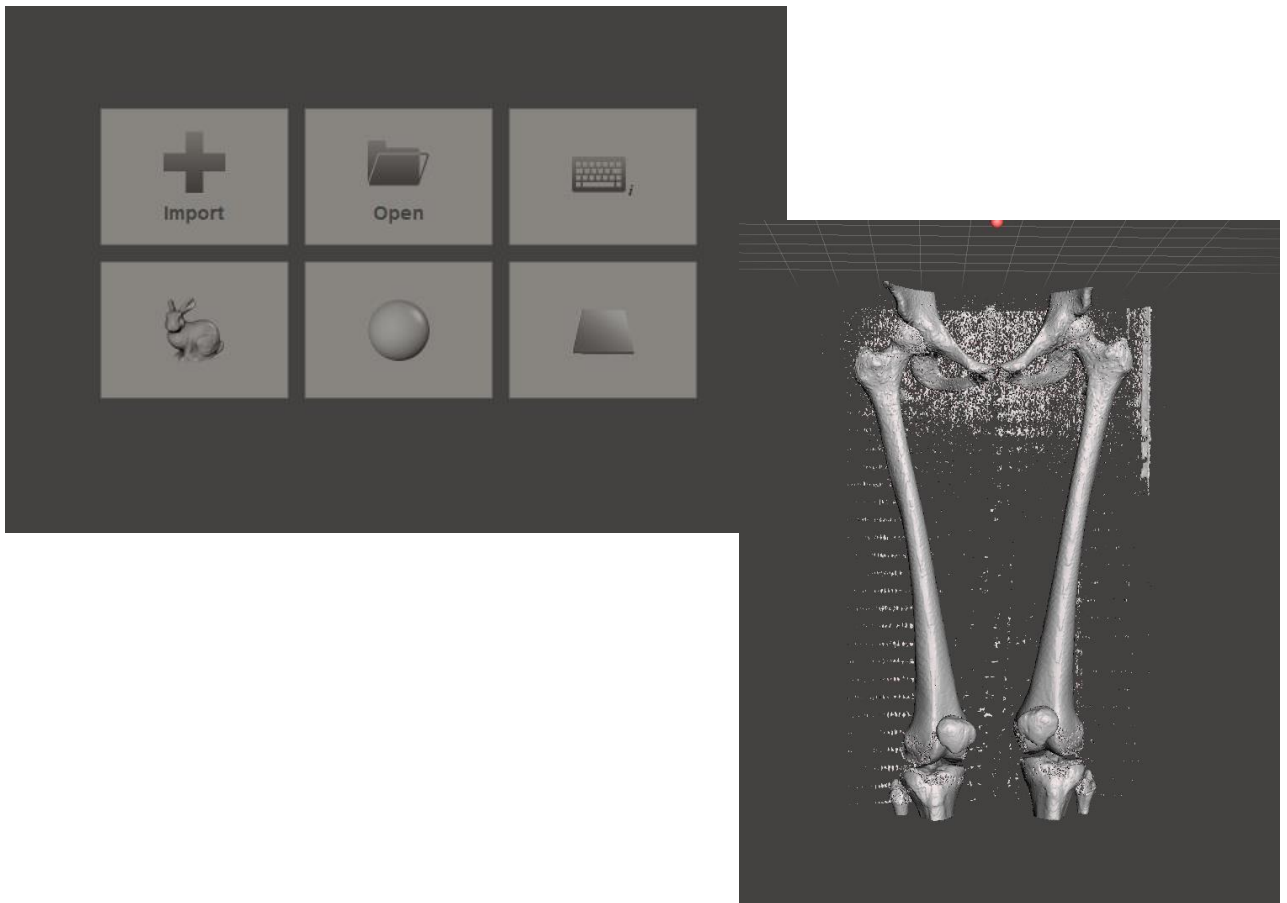
**2.2.** Click **Select**, select the thickness of the brush, and double-click on the femur (**Supplementary Figure S7**). In this case, it is not possible to separate only the femur (the femur is selected with the pelvis).

39 **2.3.**   Select the tool **Edit | Generate face Groups**. Use **Angle Threshold** to move the bar
40 until the different structures have a different color—the pieces have been recognized as
41 separate (**Supplementary Figure S8**).
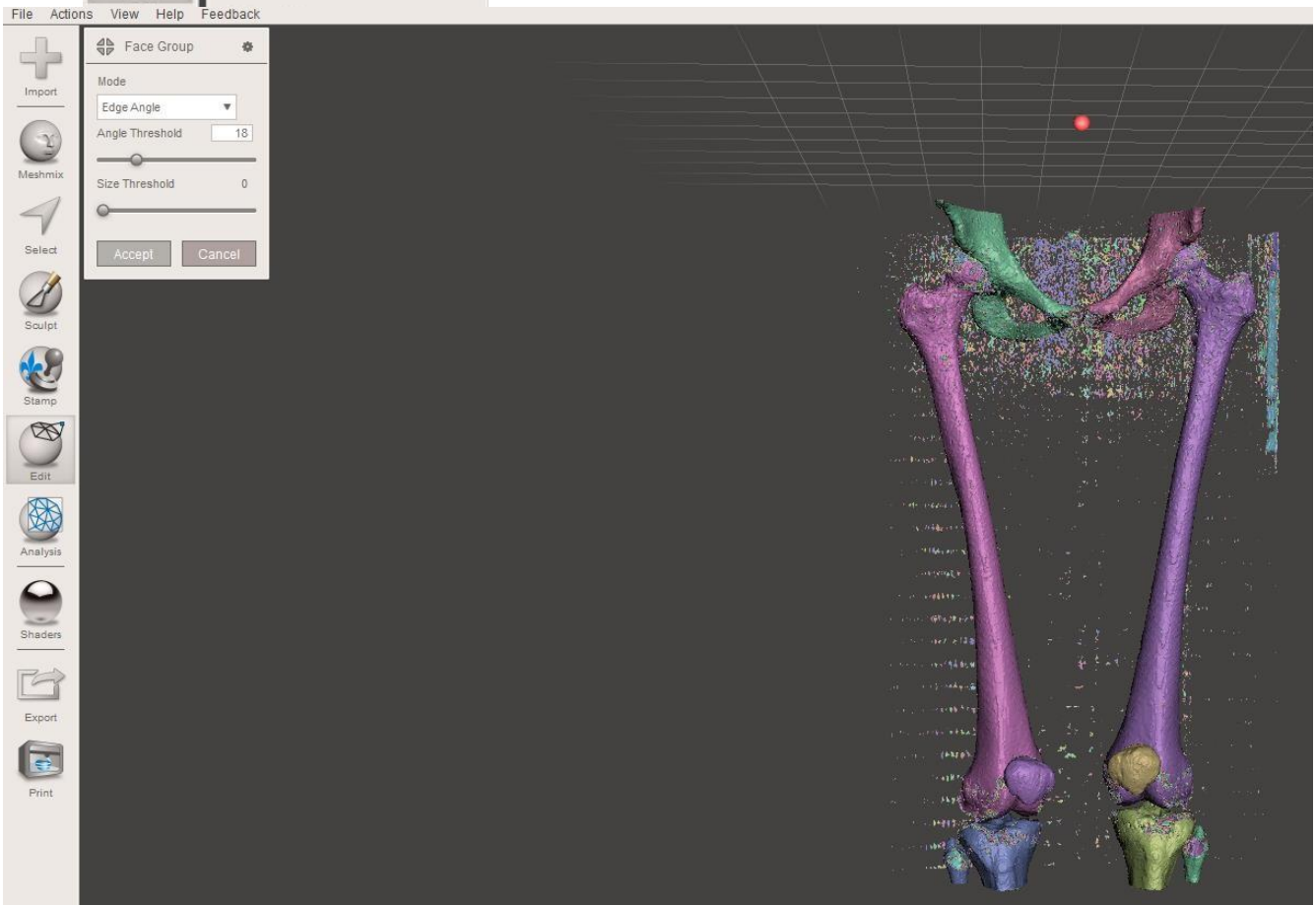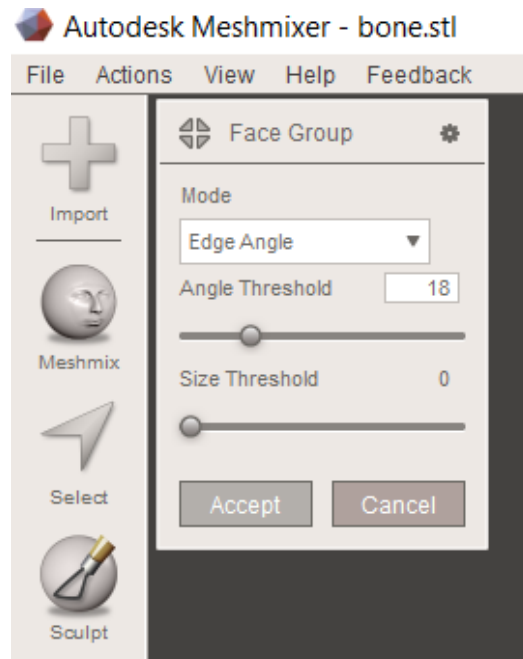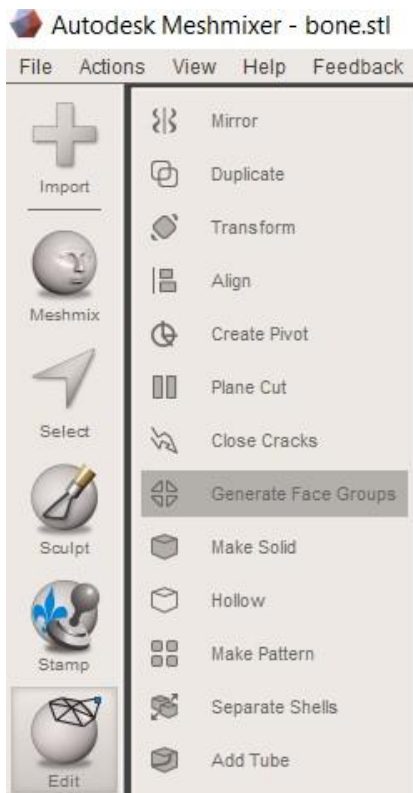
**2.3.1.** How to invert and delete (**Supplementary Figure S9**):

**2.3.2.** Use the **Select** tool to select the part of interest. Look for the **option Select | Modify | Invert** in the side menu and press **Delete** (**Supplementary Figure S9**) to delete the unselected parts (Step 3.3.2). At this juncture, the biomodel of the clean femur is obtained.
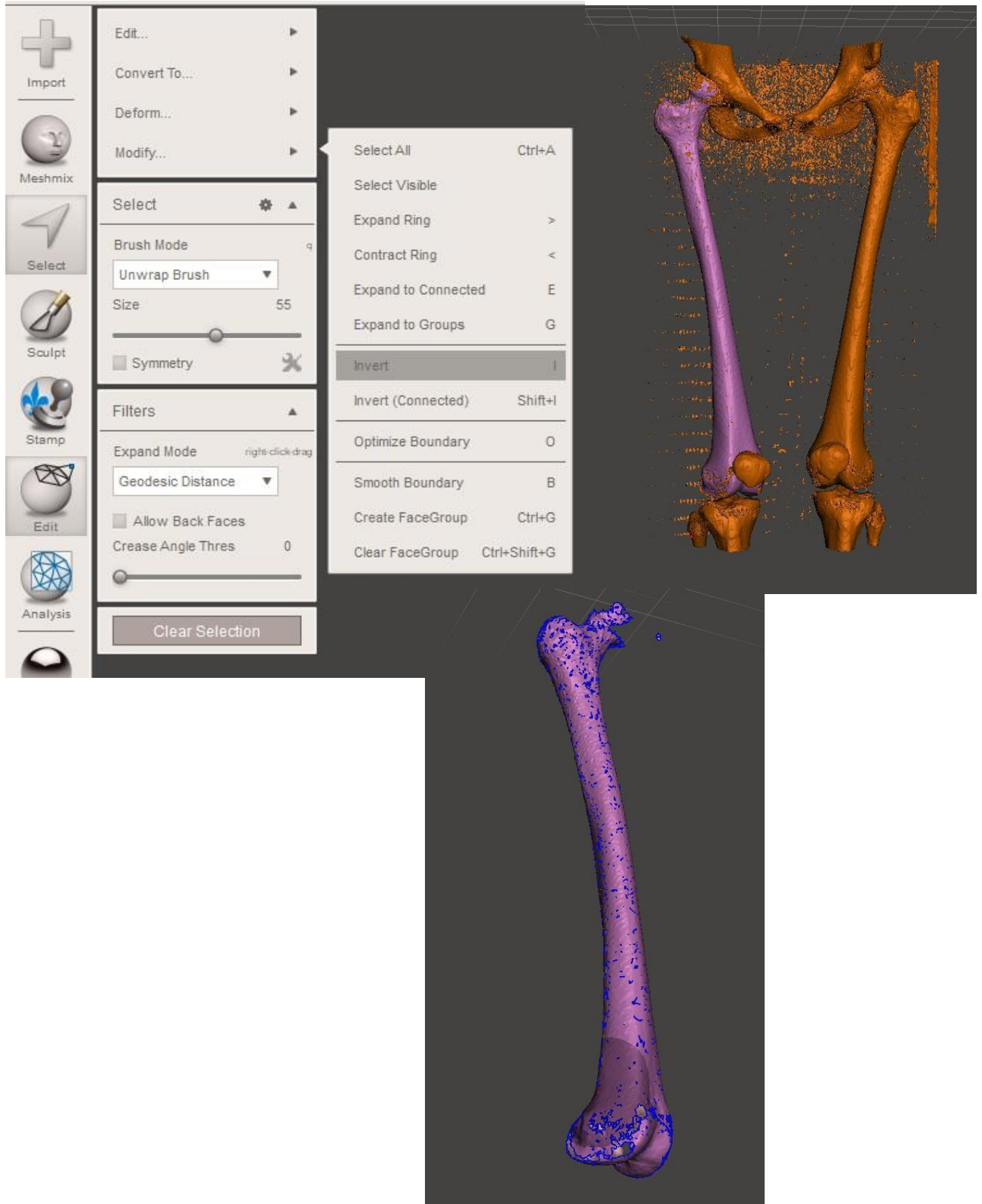
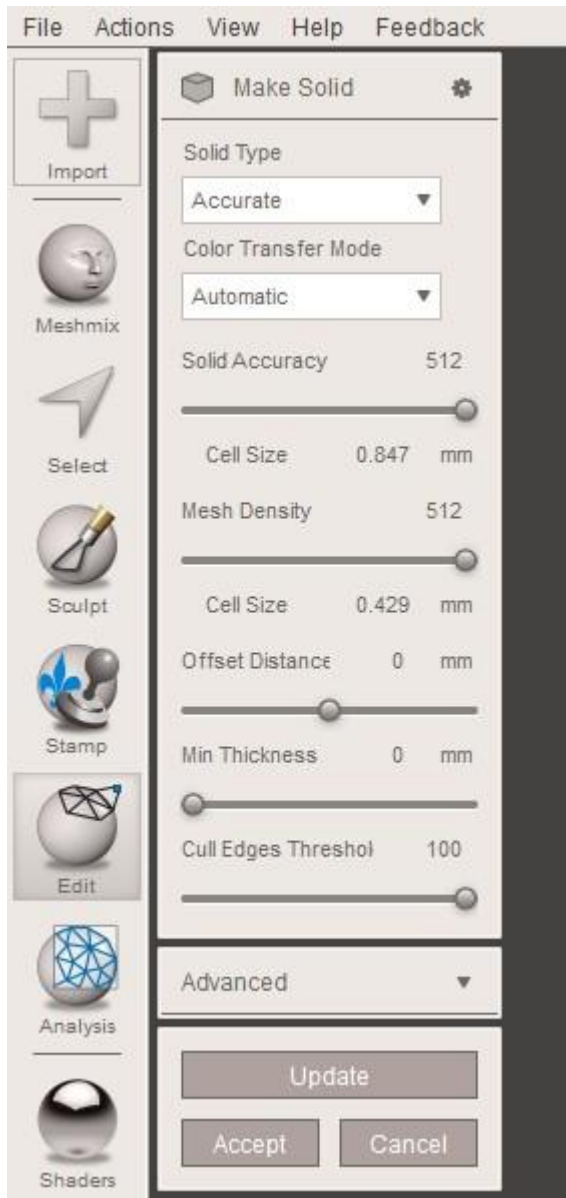48  **2.4.**    How to make a solid model (**Supplementary Figure S10**):
49
50  **2.4.1.** Navigate to Edit | Make Solid | Solid Type| Accurate (Step 3.4.1). Maximize Solid
51  Accuracy and Mesh Density values (Step 3.4.2).
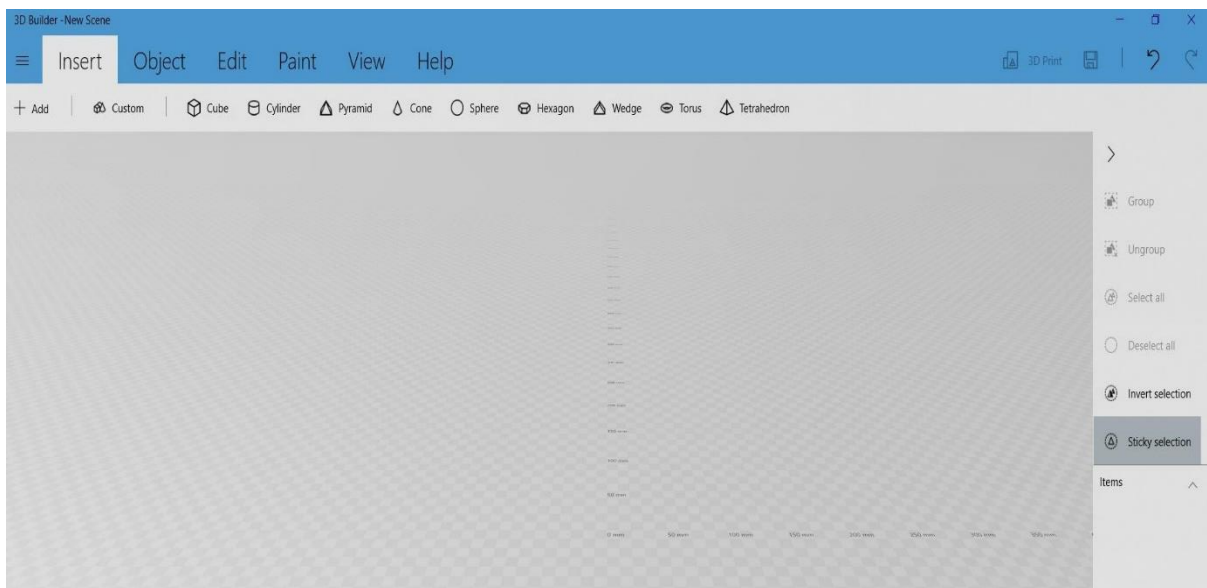52



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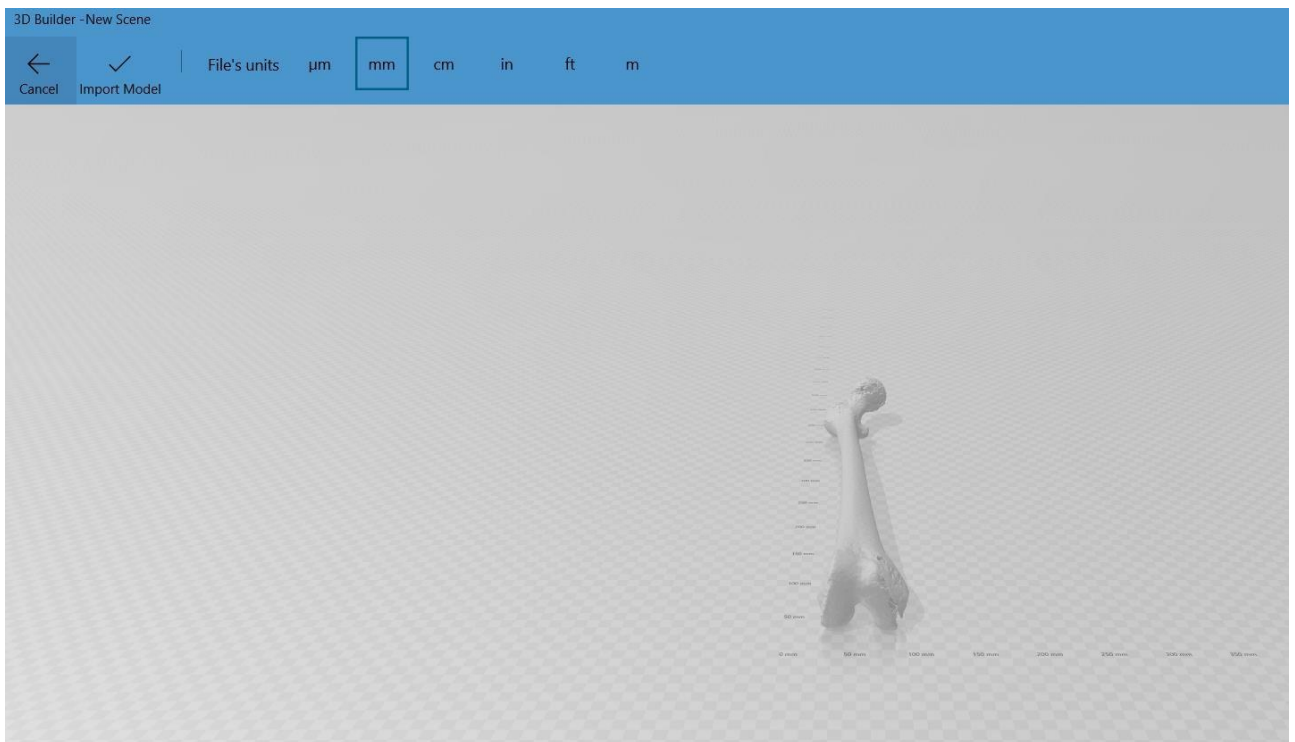56
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## 3.     3D Builder software

**3.1.**     Insert the biomodel (**Supplementary Figure S11**).



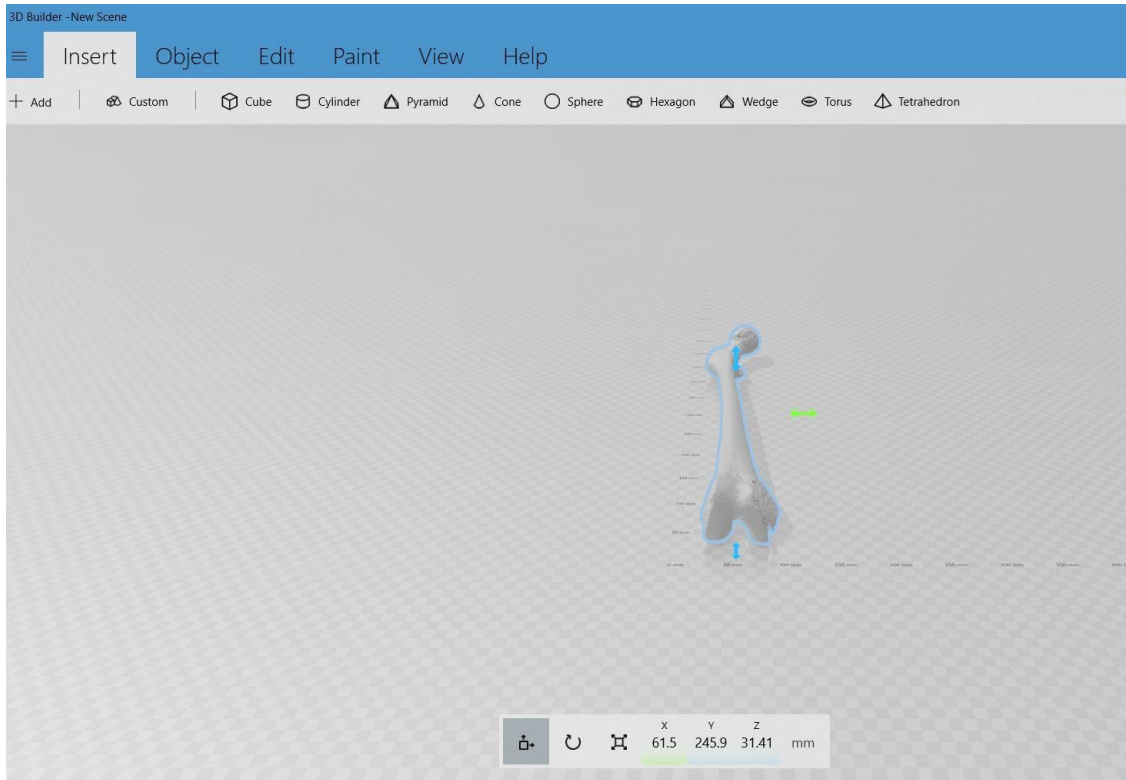**3.2.**     Import the biomodel (**Supplementary Figure S12**).

76 **3.3.** The object rests on the femoral condyles and the trochanter. It is parallel to the *y-*
77 *axis* and perpendicular to the *x-axis* (**Supplementary Figure S13**).



78 **3.4.** How to split the femur (**Supplementary Figure S14**): Click on **Edit | Split** from the top
79 menu. When a rectangular cut plane appears, select **Keep Both**
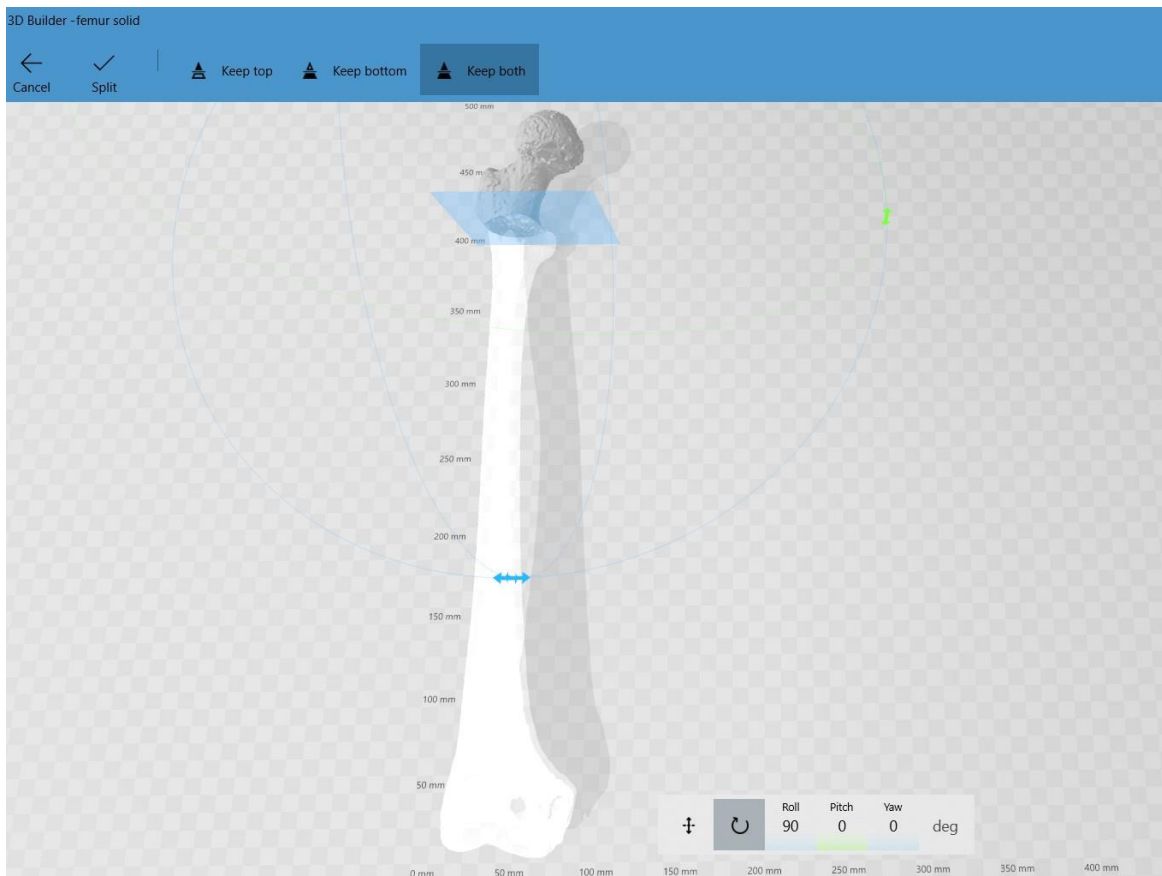
80    **3.5.**     Perform the femoral osteotomy (keeping both parts of the femur) (**Supplementary**
81    **Figure S15**).
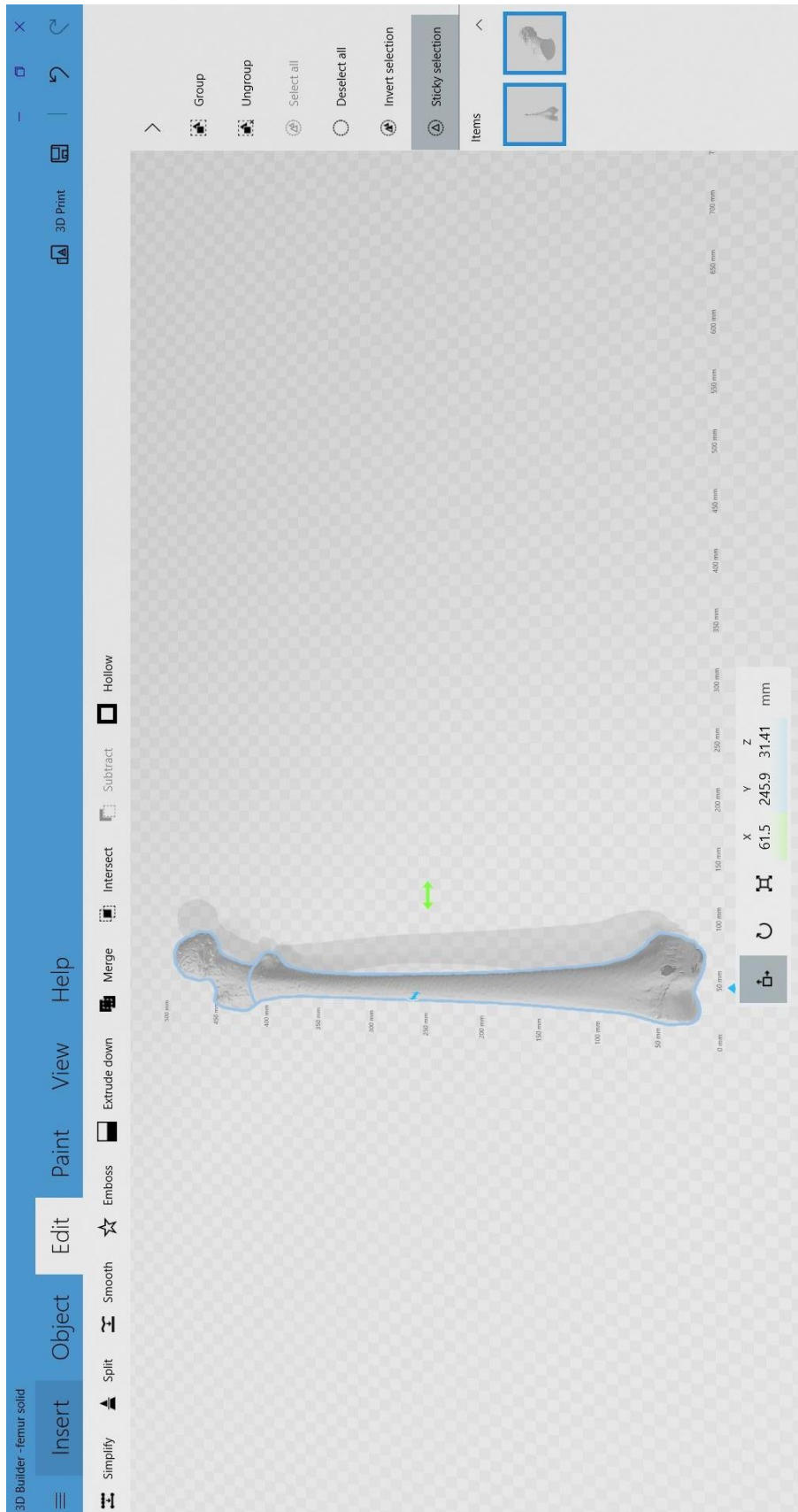


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83 **3.6.** The guides make it possible to establish the reference points to measure the femoral
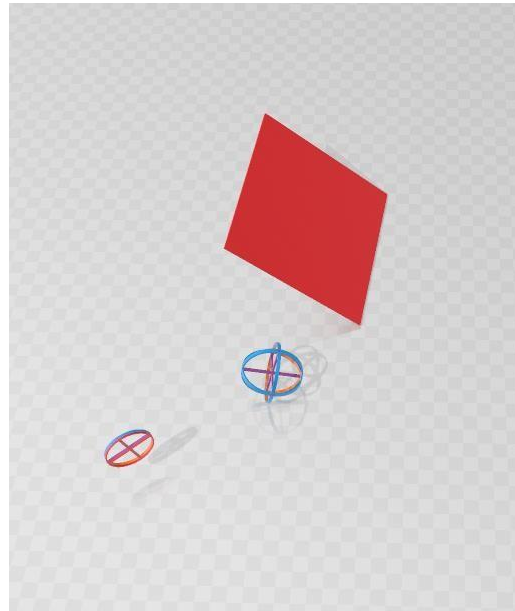84 anteversion in the 3D environment in accordance with Murphy's method. **Red circular**
85 **guide; Purple circular guide; Sphere; Red plane** (**Supplementary Figure S16A,B**).
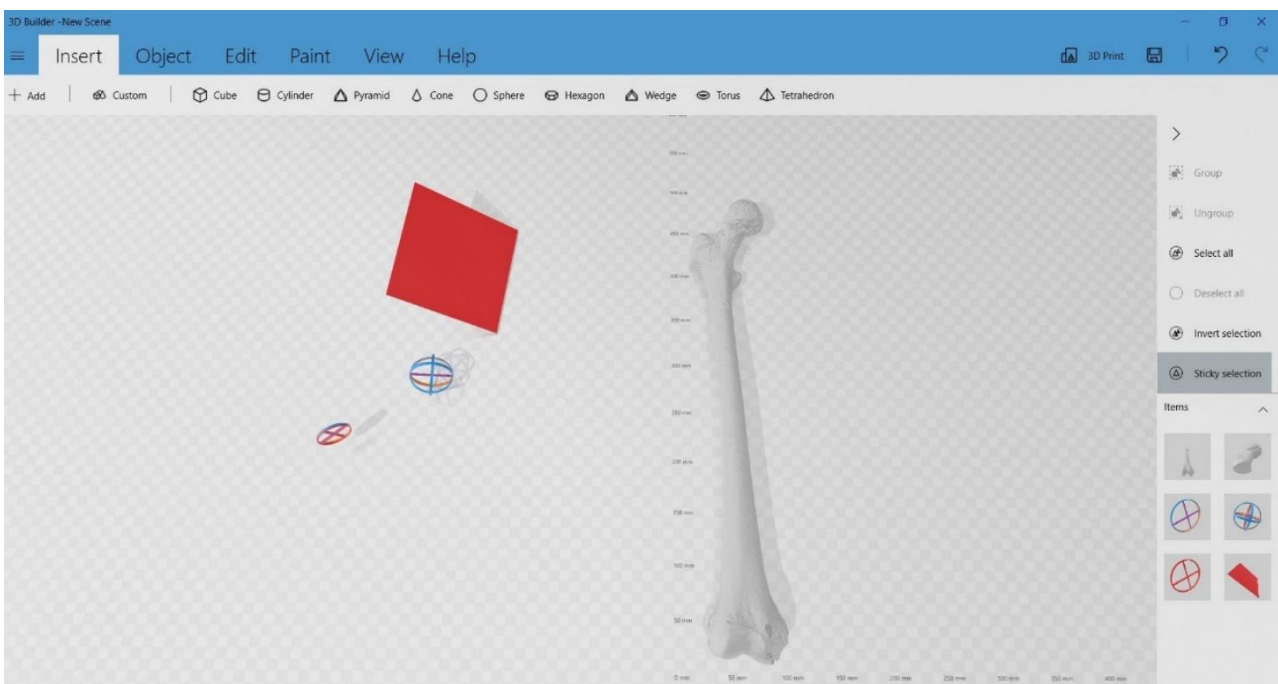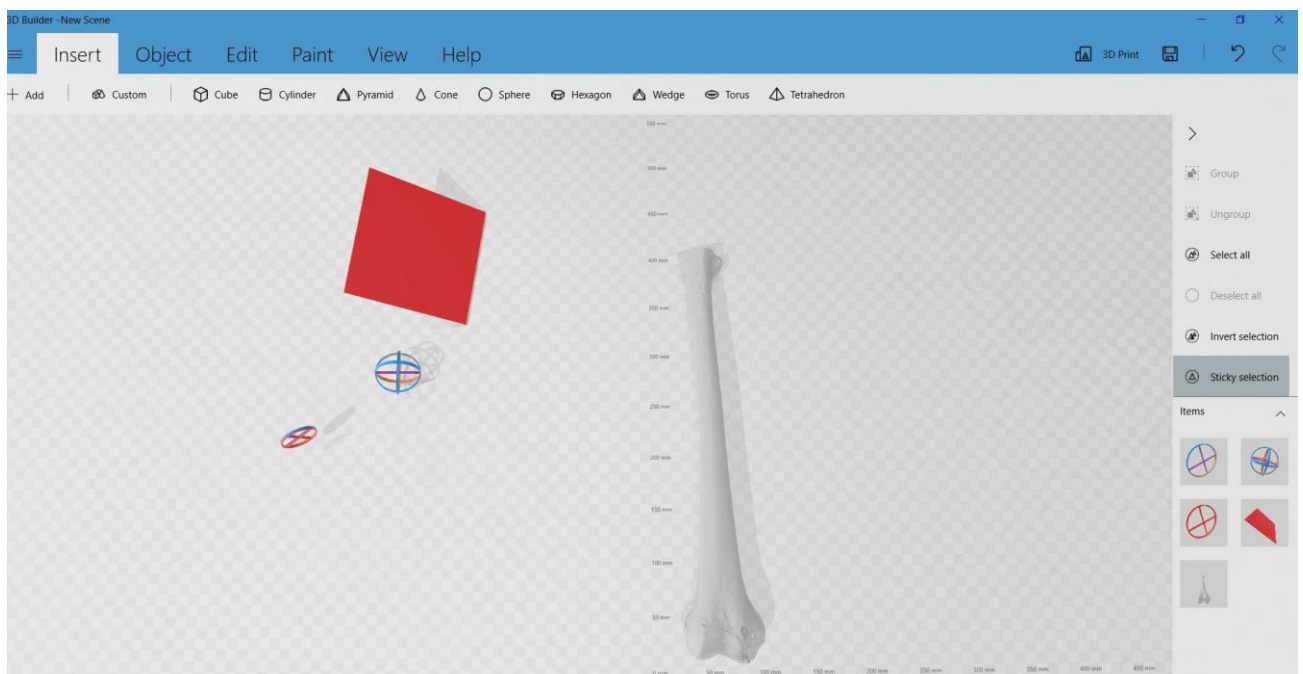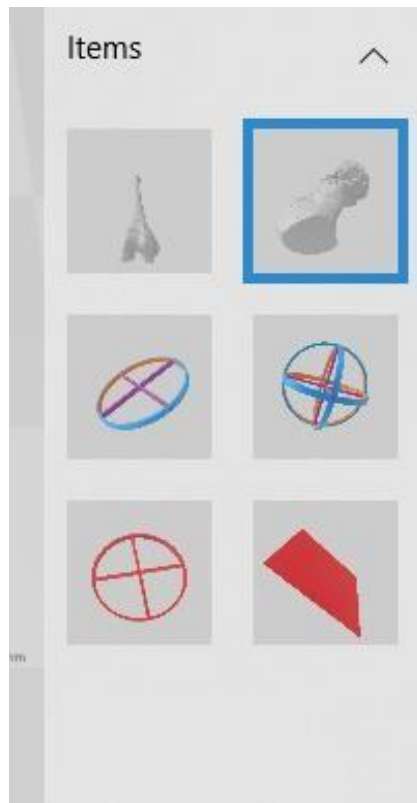
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96    **3.7.**    How to cut the proximal femur (**Supplementary Figure S17**):

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98    **3.8.**    Select **only** the proximal part of the femur and click on **CTRL + X** to cut the selection.

99    This is how the femoral diaphysis turns out.
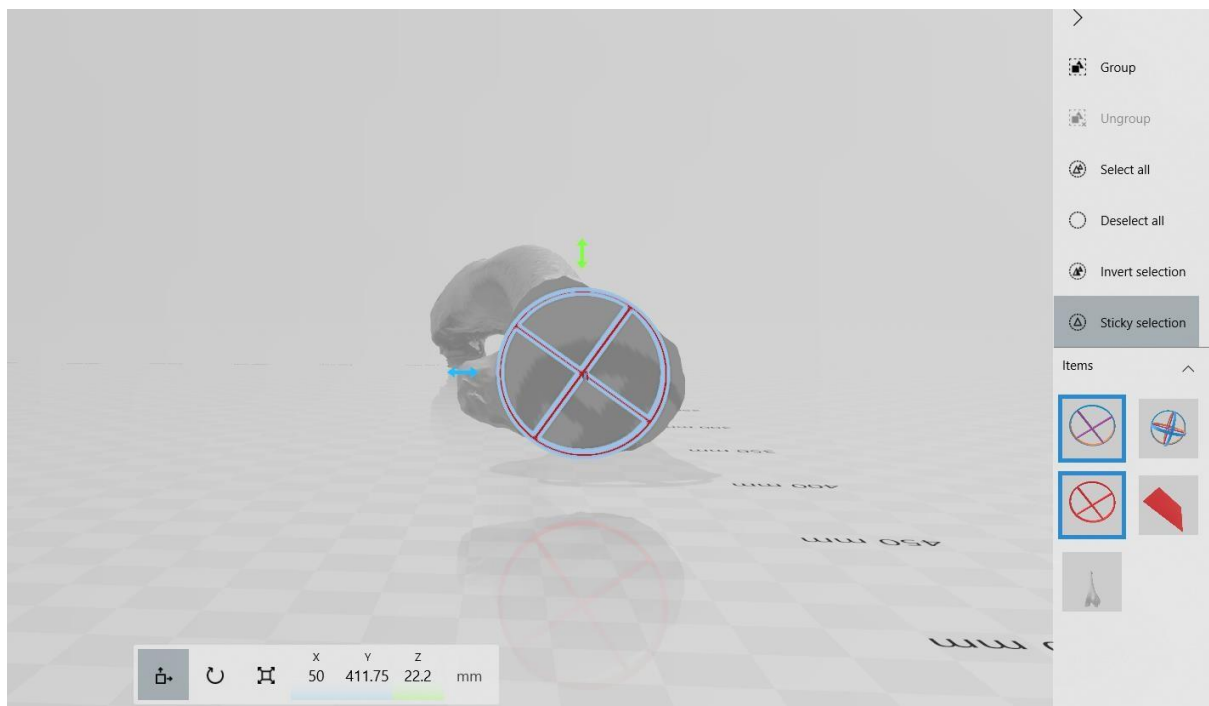




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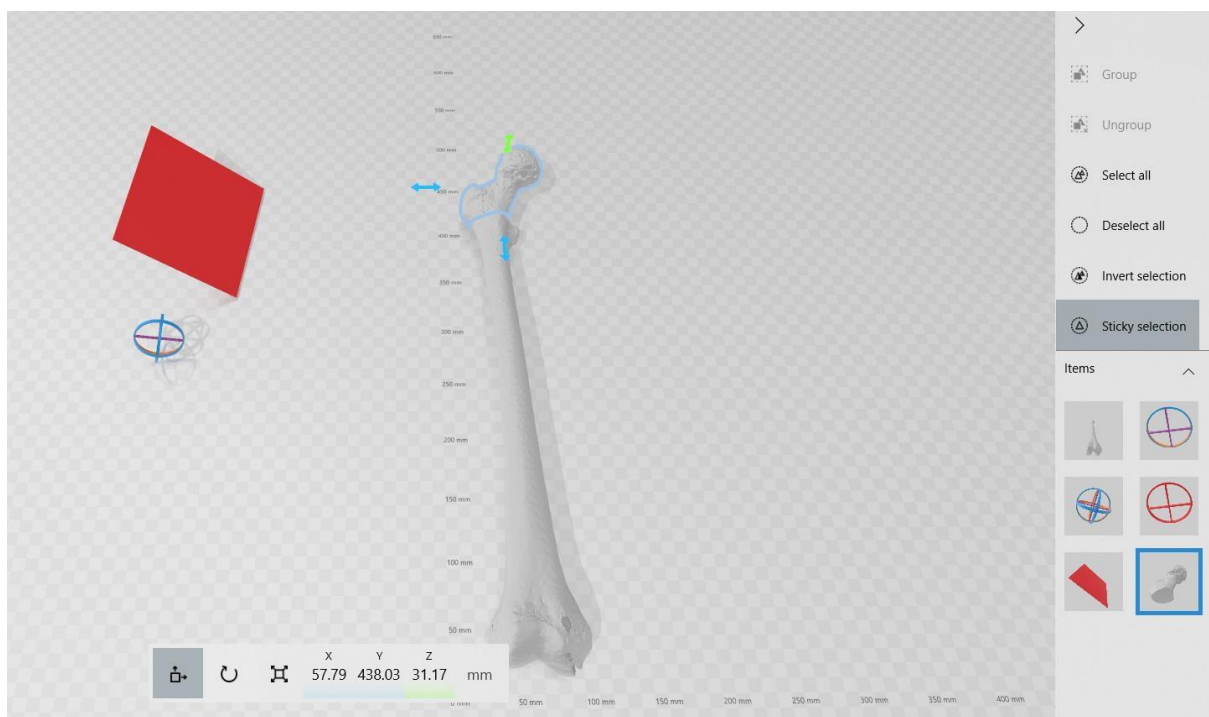104 **3.9.** How to calculate femoral anteversion:
105
106 **3.9.1.** Select the red circular guide and the purple circular guide together. Position the
107 guides in the center of the femoral diaphysis (**Supplementary Figure S18**).
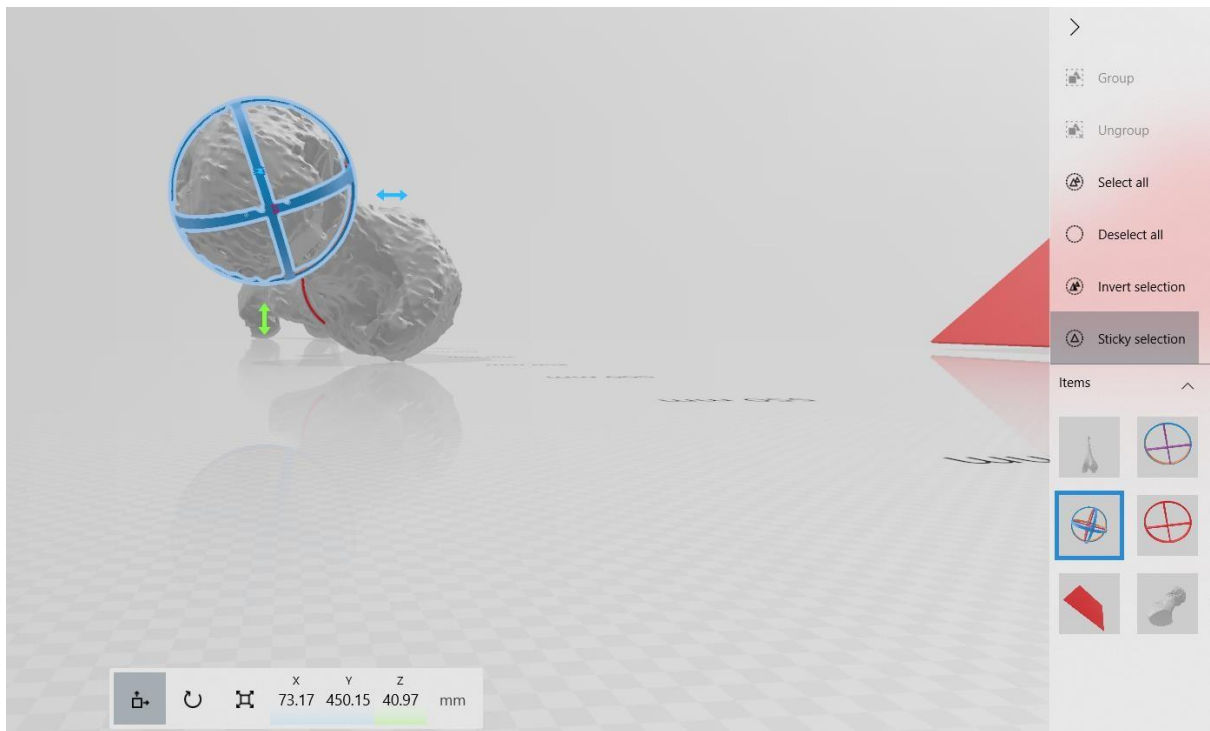


108
109 **3.9.2.** Press **CTRL+ V** to paste the proximal femur again (**Supplementary Figure S19**).



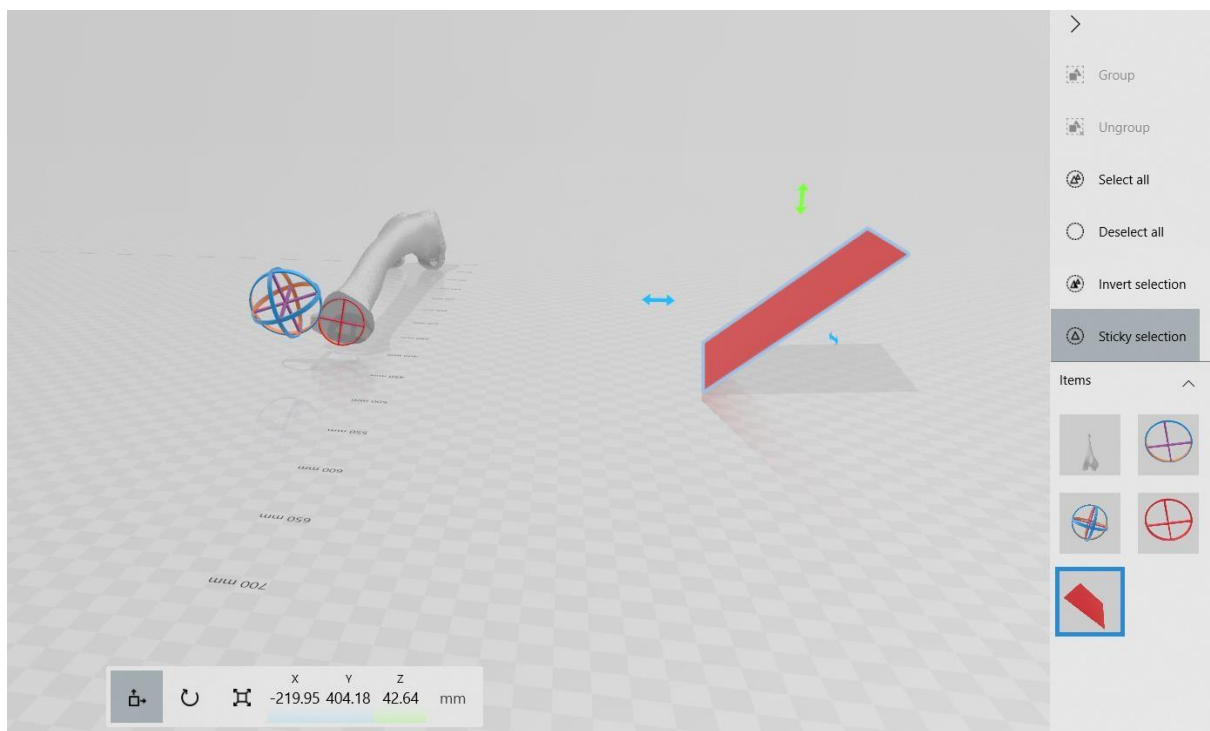110
111

**3.9.3.** Select only the **sphere**. Adjust the size, including all the edges touching the cortical bone (**Supplementary Figure S20**).



**3.9.4.** Cut the proximal femur and select the **red plane** on the right side of the screen (**Supplementary Figure S21**).

121 **3.9.5.** Select only the **red plane** move and place it so that it passes through the center of
122 the sphere and through the center of the circular guides (**Supplementary Figure S22A,B**).
123 The degrees marked by the panel in the lower margin correspond to the pathological
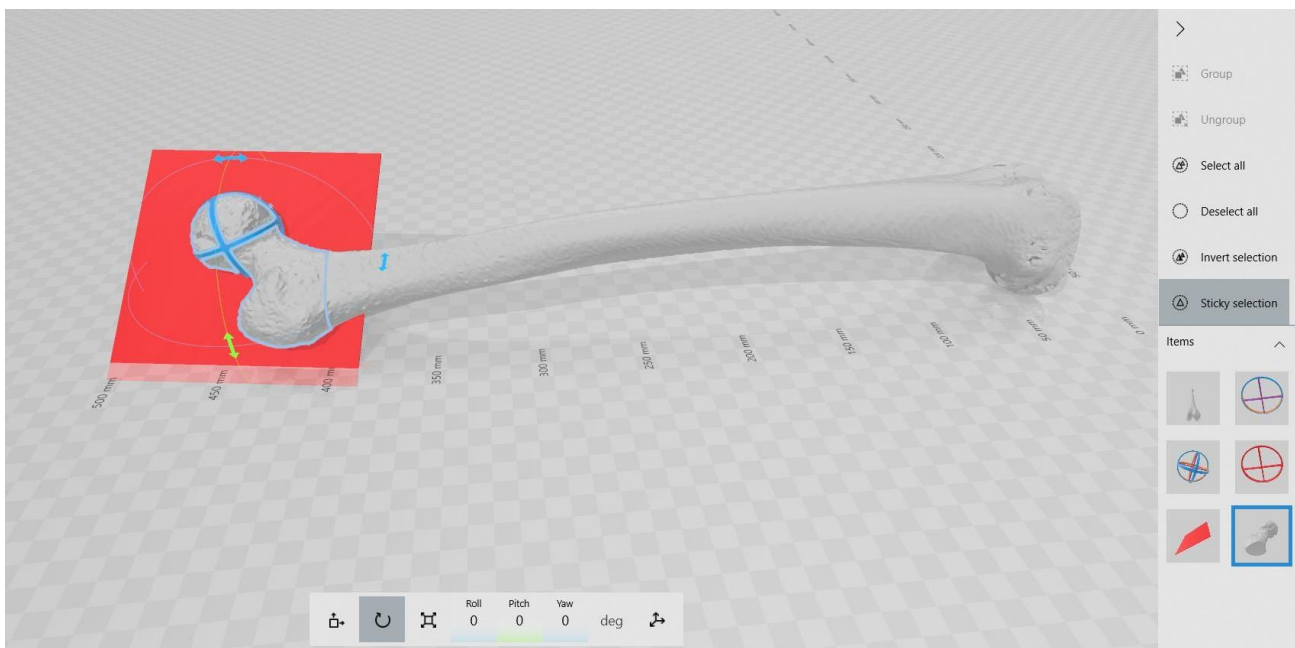124 femoral anteversion calculated in the CT, using Murphy's method. In this case, it was **37.83°**.
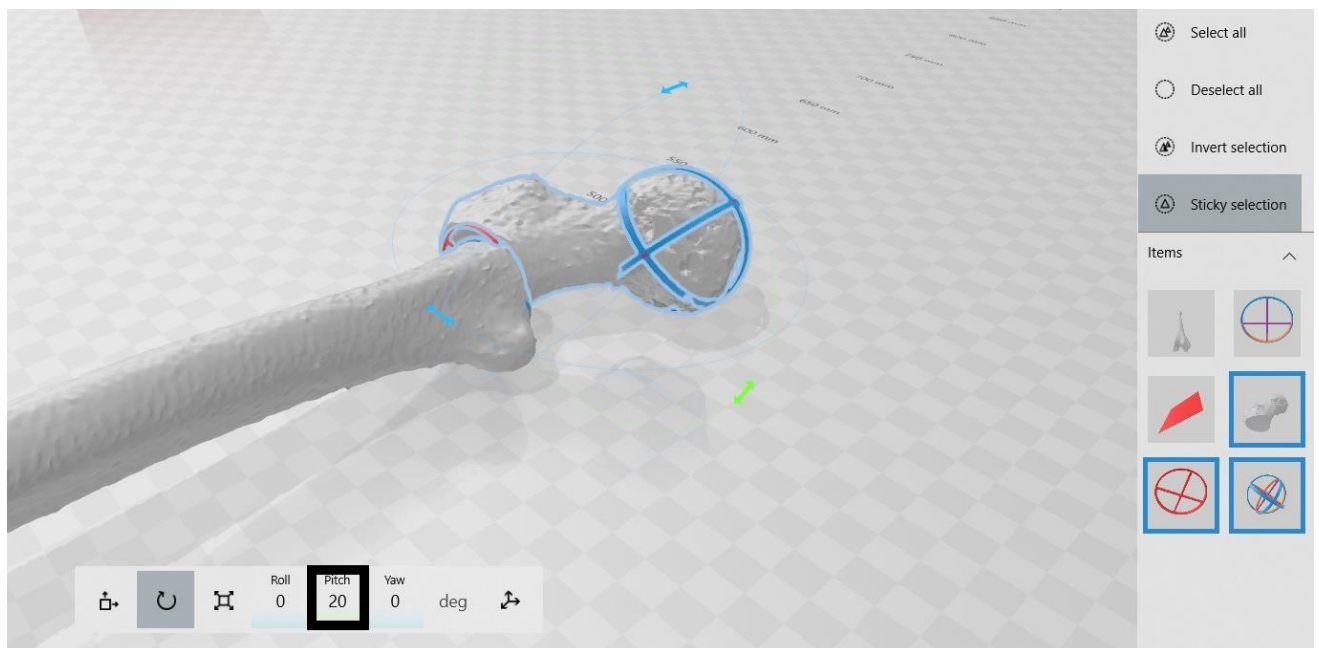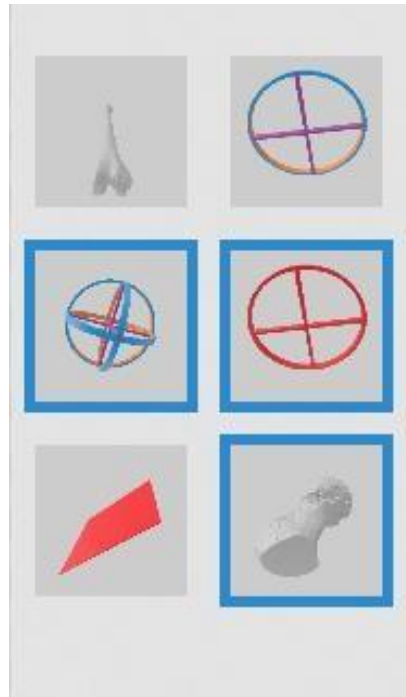125



128
129
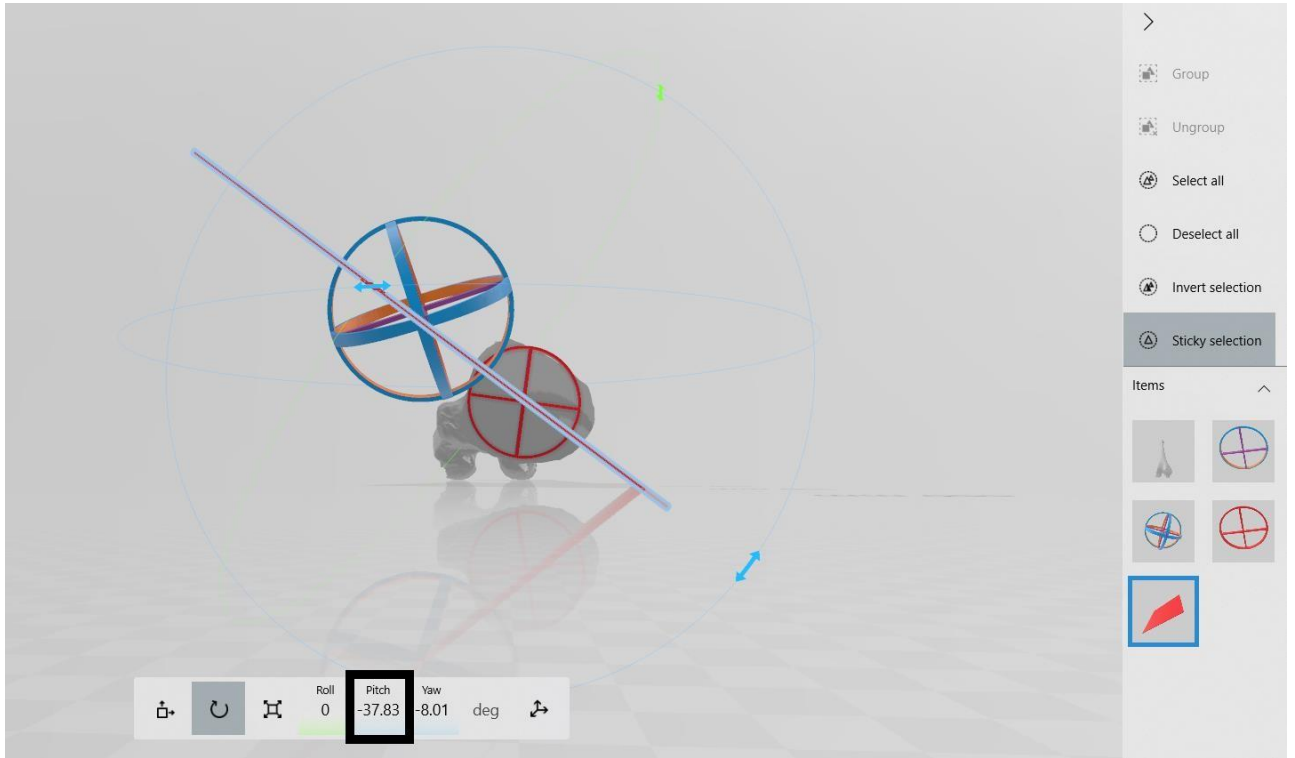
131    **3.10.**  Perform rotational osteotomy of the proximal femur **(internal rotation of 20°,**
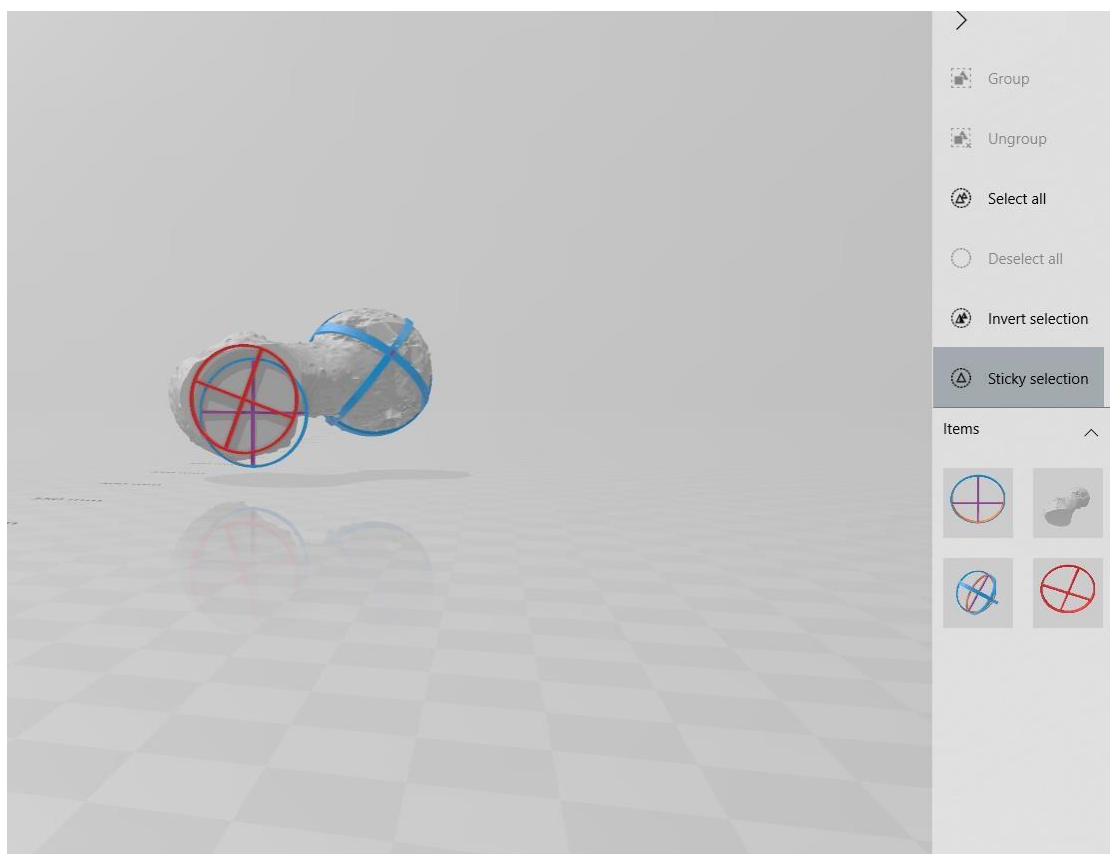132    **Supplementary Figure S23**).



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140    **3.11.**  Observe the new femoral anteversion after rotational osteotomy of the proximal
141    femur (**Supplementary Figure S24**)—**24.37°**, after a rotation of 20 degrees. The final
142    correction does not coincide with the planned correction.
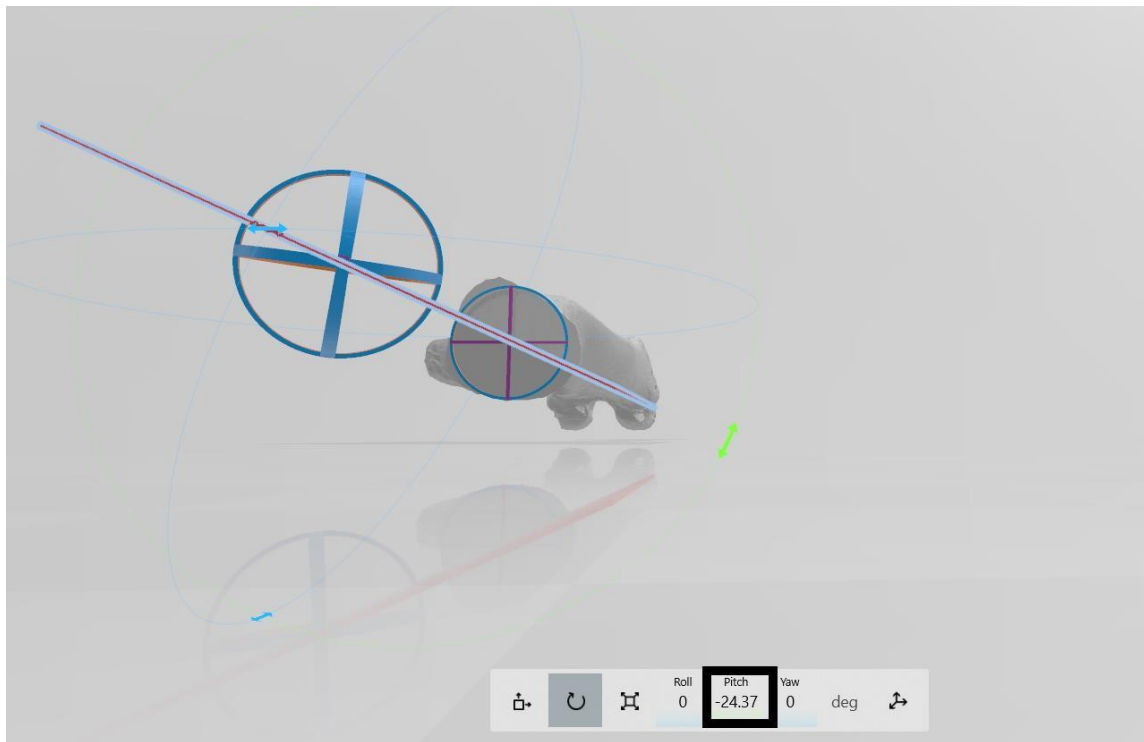


143
144    **3.12.**  Observe that the **guides** do not match (**Supplementary Figure S25**). For this reason,
145    it is necessary to perform an adjustment of the osteotomy.

146    **3.13.**    Now the center of the red circumference matches with the center of the **purple**
147    **circumference (Supplementary Figure S26).**
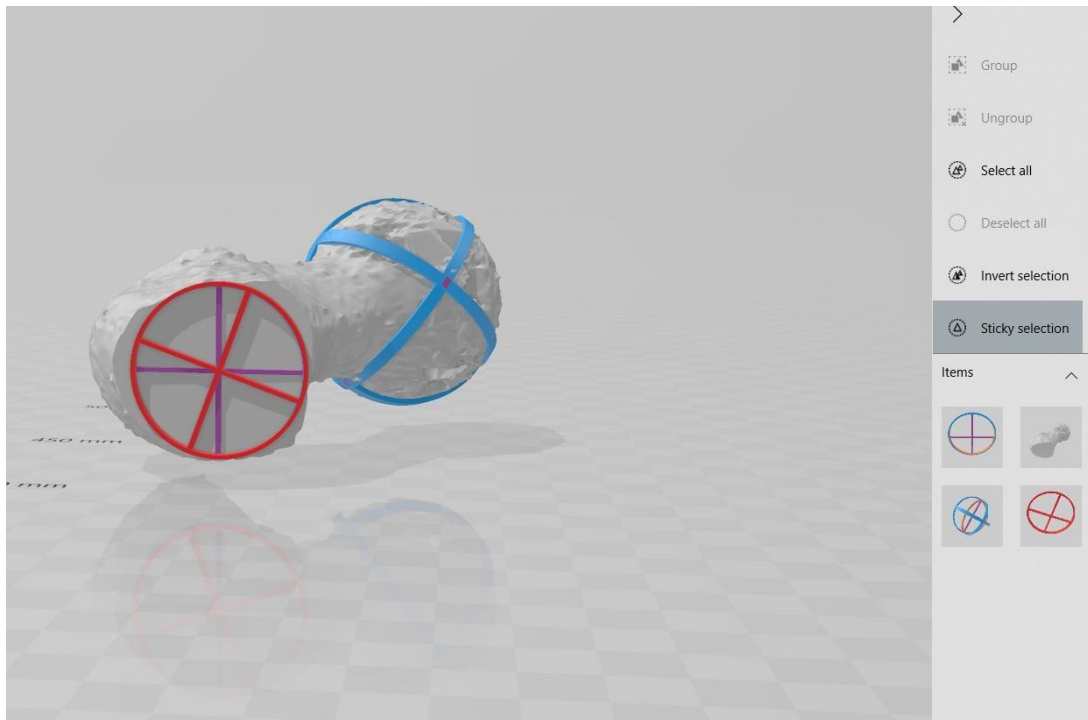


148

149    **3.14.**    Recalculate    the    new    femoral    anteversion    with    the    adjustment    made
150    (**Supplementary Figure S27**). It is **17.99°. The final correction coincides with the planned**
151    **correction (37.83°–20°).**