A new improved method for assessing brain deformation after decompressive craniectomy

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Appendix S1. Gantry tilt correction.

Gantry tilt describes the orientation angle of the CT scan detector gantry. This is sometimes non-zero in order to minimise radiation to vital organs, as illustrated in Figure 1A and B. A scan with a non-zero gantry tilt angle will be sheared as illustrated in Figure 1C. Gantry tilt angle was corrected by applying a shear transformation in the same manner as [1, 2]. Each slice of the sheared volume is transformed by an affine transformation matrix $T$, which is of the form:

$$
T = \begin{bmatrix}
1 & 0 & 0 \\
0 & 1 & 0 \\
0 & s \tan(\alpha) & 1 \\
\end{bmatrix}
$$

(1)

where $s$ is the slice thickness and $\alpha$ the gantry angle as defined in Fig. 1B. The output from the transformation is a sheared volume which is corrected for gantry tilt, but with "axial" slices on an inclined plane to the true axial orientation, see for examples the corrected image of Fig. 1D.

References


Figure 1. Illustration of the effect of gantry tilt. A Imaging with zero gantry angle; B imaging with a gantry tilt angle $\alpha$; C a CT scan uncorrected for gantry tilt; D scan corrected for gantry tilt.