

Three-dimensional determining the midsagittal plane of the facial skull on CBCT volume tomogram

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This study was performed with the approval of the ethical committee of Semmelweis University (TUKEB 2/2008). The measurements were carried out using cone beam computed tomography: iCAT Classic CBCT (Xoran Tehnologies, Ann Arbour Michigan, USA). The exposure conditions were set to 120 kV and a 0.4 mm voxel size, and the field of view (FOV) was set to 220 x 160 mm. 60 subjects were selected randomly - 26 males and 34 females, the age ranging from 29 to 57 years, the mean age being 34.6. The image data obtained from CBCT were analysed using the computer program CranioViewer.

The subjects satisfied the following criteria:

- ▶ They were aged between 18 and 60 years;
- ▶ The scans were recorded in the year of 2011;
- ▶ The patients had no striking skeletal deformity
- ▶ Patients had no malocclusion
- ▶ The CBCT recordings were prepared for unknown purposes. The images were selected at the radiological laboratory. After denomination they were given to us; and
- ▶ We do not have any photos of the patients

THE EXAMINED POINTS

▶ I: The paired points on the upper face:

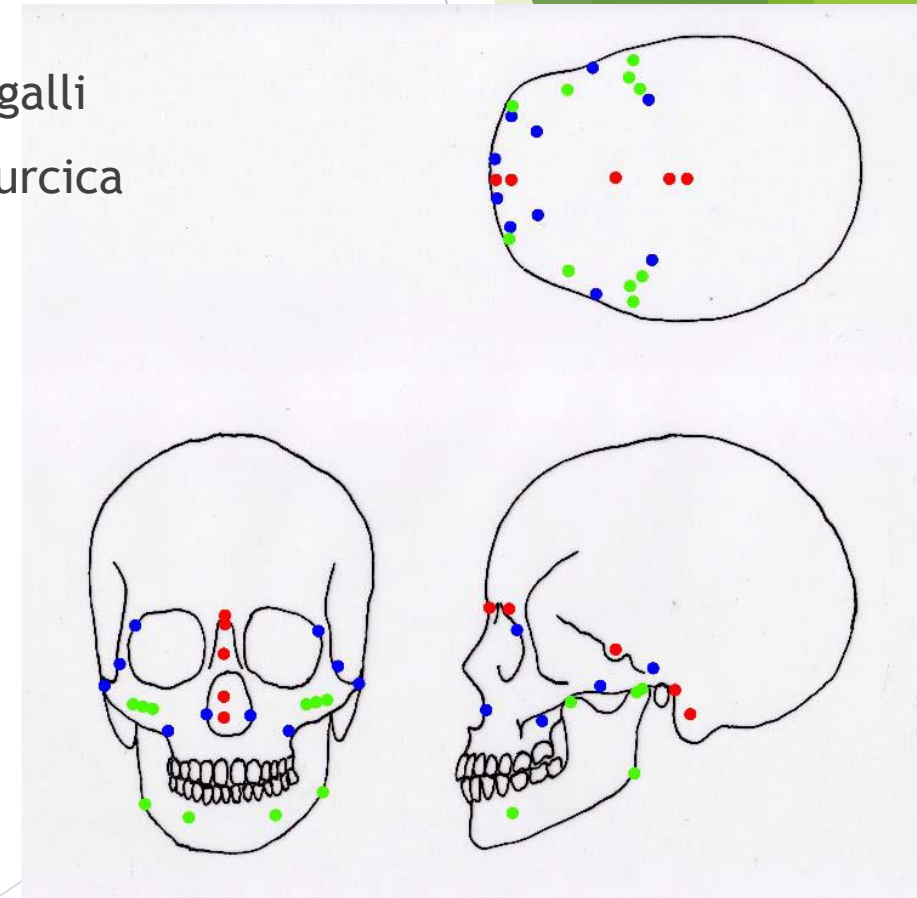
- ▶ 1. Pterygomaxillare (left and right)
- ▶ 2. Canalis semicircularis anterior (left and right)
- ▶ 3. Arcus zygomaticus (left and right)
- ▶ 4. Sutura zygomaticofrontalis medialis (left and right)
- ▶ 5. Apertura pyriformis lateralis (left and right)

▶ II: The paired points on the mandible:

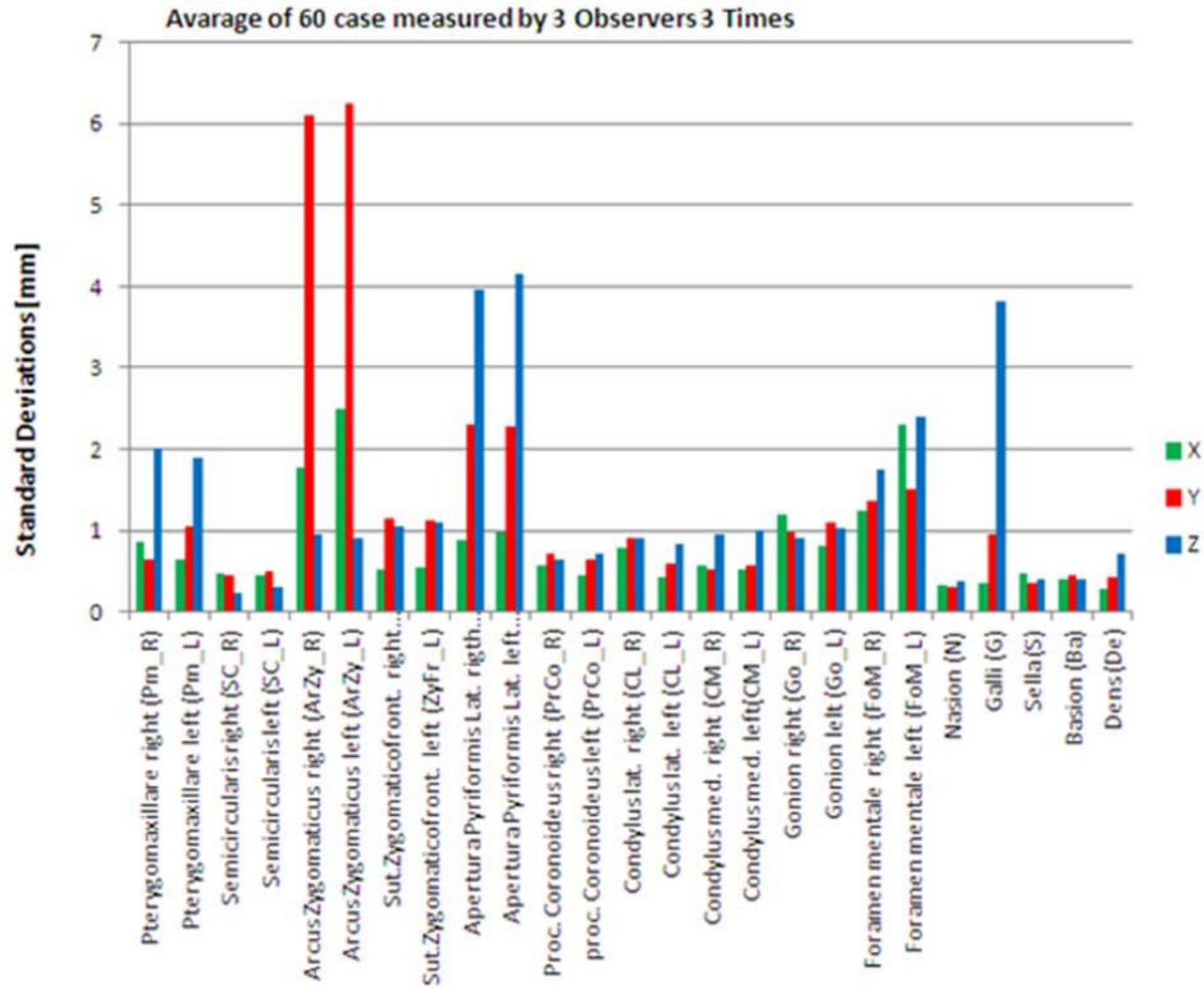
- ▶ 1. Processus coronoideus (left and right)
- ▶ 2. Condylus lateralis (left and right)
- ▶ 3. Condylus medialis (left and right)
- ▶ 4. Gonion (left and right)
- ▶ 5. Foramen mentale (left and right)

▶ III: The points in the midplane:

- ▶ 1. Nasion
- ▶ 2. Crista galli
- ▶ 3. Sella turcica
- ▶ 4. Basion
- ▶ 5. Dens



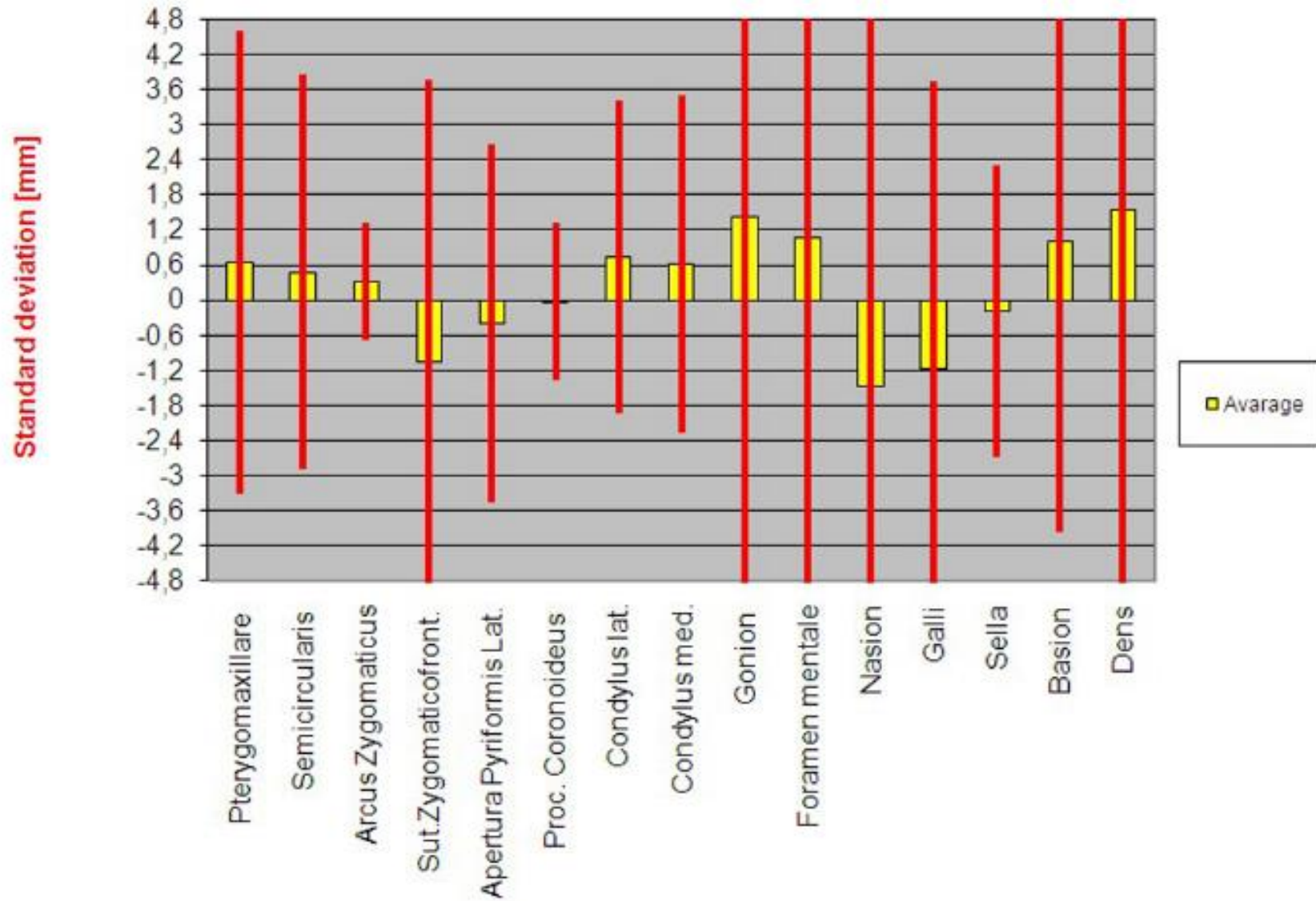
Inter- and intra-examiner test:



Methods

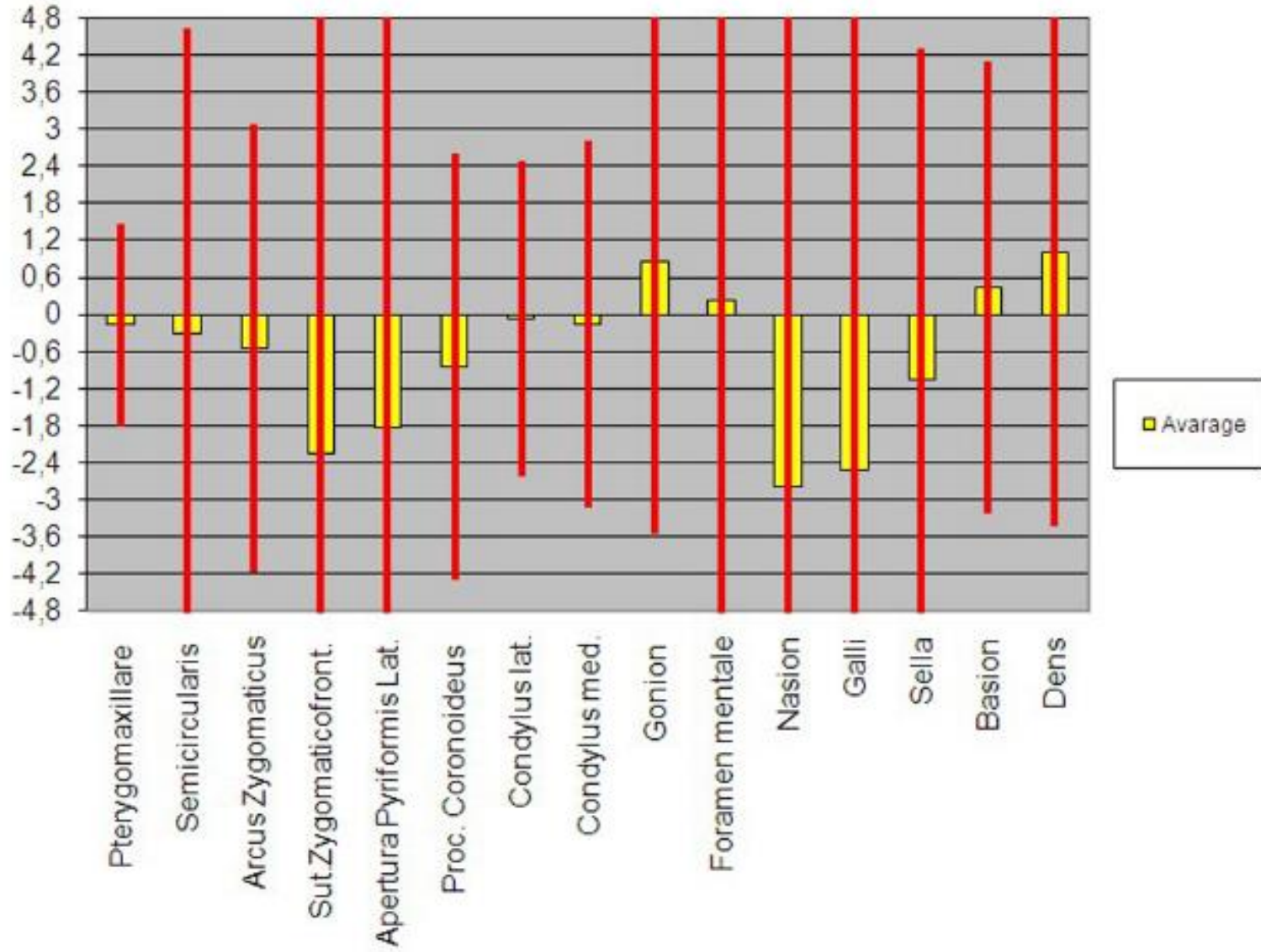
- ▶ A regression plane was fitted to the unpaired points in the central line, and another to the midpoints of the bilateral points; this is the plane from which the total square distance of the points is minimum. We calculated the mean distance and standard deviation of each point from the regression plane generated from the groups I., II. and III., and compared them with the help of descriptive statistics.

Distance of the points from the regression plane generated from the paired points of the upper face



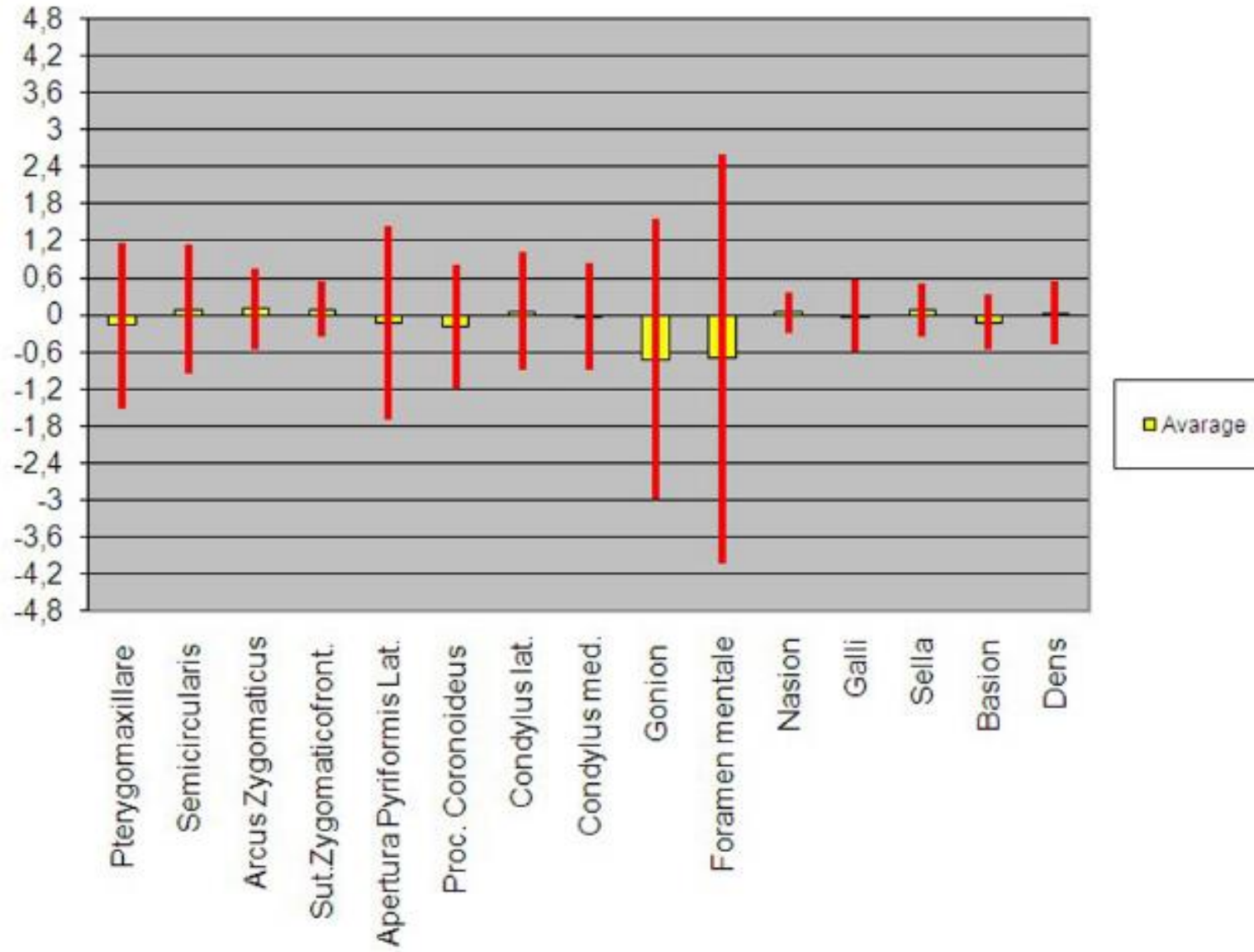
Distance of the points from the regression plane generated from the paired points of the mandible

Standard deviation [mm]



Distance of the points from the regression plane generated from the points in the middle

Standard deviation [mm]



CONCLUSION

- ▶ The midline points are suggested in the determination of the midsagittal plane, as they can be determined anatomically easily, thus the standard deviation of the position is low, and they are damaged only rarely (except for the Nasion point).
- ▶ Nasion can be substituted with Crista Galli, and Basion with Dens, if necessary, in case of damage, or substantial deformation.

Thank you for your kind attention!