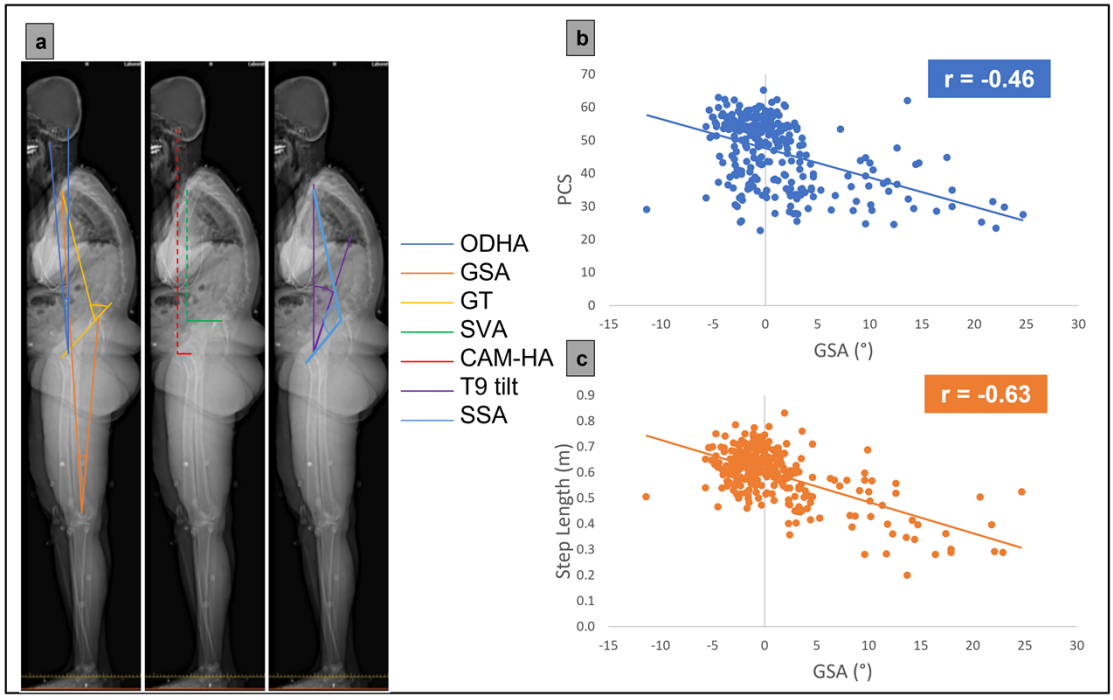
Introduction:
ASD patients are known to have deteriorated quality of life (QOL) due to functional impairments. Classical evaluation is usually based on quality of life (QOL) outcomes as well as radiographic spinopelvic and global alignment parameters. The large number of existing postural parameters to assess global malalignment in ASD can be confusing for spine surgeons in clinical routine. More recently, the use of functional assessment in ASD is increasing in both clinical practice and research based on movement analysis that allows objective quantification of kinematic impairments. Purpose: To determine which global alignment parameters are the most clinically and functionally relevant.
Methods:
300 subjects (155 ASD & 145 controls, mean age 42y) underwent biplanar X-rays from which classical spinopelvic and the following global alignment parameters were calculated in 3D: odontoid to hip axis angle (ODHA), global sagittal angle (GSA: C7-knee-sacral plate), global tilt (GT: angle between C7-sacral plate with hip axis-sacral plate), sagittal vertical axis (SVA:C7 to sacral plate plumbline), CAM-HA (center of auditory meatus to hip axis plumbline), spinosacral angle (SSA: C7 with sacral plate angle) & T9 Tilt (fig.1a). Subjects underwent 3D gait analysis from which joint and segment kinematics as well as time-distance parameters were calculated (walking speed, step length). They all filled QOL questionnaires (SF36, ODI and VAS for pain). Stepwise multiple linear regression models were computed to evaluate which global alignment parameter is the most related to both QOL scores and walking kinematic parameters.
Results:
Significant models were found to explain QOL scores and gait parameters among global alignment parameters (adj.R2: varied between 0.16 for VAS and 0.65 for thorax flexion during walking). ODHA angle was only determinant of thorax flexion during walking (β=0.18). GSA was a determinant of physical component of SF36 (PCS) (β=-0.3, fig.1b), VAS (β=0.3), gait deviation index (β=-0.41), walking speed (β=-0.48), step length (β=-0.57, fig.1c) and thorax flexion during gait (β=0.13). GT was only determinant of gait deviation index (β=-0.28). T9 tilt was a determinant of VAS (β=0.25), ODI (β=0.29), gait deviation index (β=-0.15), walking speed (β=-0.2), step length (β=-0.2) and thorax flexion during gait (β=0.57). However, SSA, SVA and CAM-HA were not found to be determinant of any of the dependent variables.
Discussion:
Global sagittal angle and T9 tilt seem to be the most explanatory global alignment parameters of QOL scores and gait. These two parameters summarize trunk shift and knee flexion (GSA) in addition to the center of mass (T9) tilt. Since they are the most clinically and functionally relevant parameters, we suggest that across all global alignment parameters, GSA and T9 tilt should be used in daily practice. Fig.1- Correlation of Global Sagittal Angle with SF36 physical component and step length


a
ODHA
GSA
GT
SVA
CAM-HA
T9 tilt
SSA
b
r = -0.46
PCS
GSA (°)
c
r = -0.63
Step Length (m)
GSA (°)