Background

- Cushing’s syndrome (CS) often remains undiagnosed for extended periods of time causing serious harm to the body. Distinguishing CS patients from patients that show similar features without true hypercortisolism remains a challenge in clinical practice.
- CS causes typical changes of the face that show a morphological similarity to the metabolic syndrome. Pilot studies regarding the use facial image analysis software as a novel diagnostic tool in acromegaly and CS have shown promising results.
- In this follow-up study we evaluated the use of a facial image analysis tool in the diagnosis of CS with a larger cohort and included control subjects matched by BMI.

Methods

- Inclusion of n=82 (22 m., 60 f.) patients with confirmed CS (45 Cushing’s disease, 21 adrenal CS, 12 iatrogenic CS, 4 ectopic CS)
- Inclusion of n=98 (32 m., 66 f.) control subjects matched by age, gender and BMI, with typical clinical signs (e.g. hypertension, diabetes, obesity) but biochemically excluded CS.
- Standardized frontal and profile facial photographs were acquired using a regular digital camera.
- Placement of 36 nodes on disease-relevant facial structures and analysis with the software tool FIDA (facial image diagnostic aid), using a combination of Gabor wavelet transformation and geometry analysis and a maximum likelihood classifier.
- Classification accuracies were calculated using a leave-one-one cross-validation procedure.

Conclusions

- Regarding the advanced problem of detecting CS patients within a BMI-matched cohort, we have found a satisfying overall classification accuracy by facial image analysis.
- Classification accuracy was better for women and in the subgroup of iatrogenic CS cases, and worse for male patients with adrenal CS. This is most likely due to a varying severity of CS symptoms by etiology.
- Classification accuracy is most likely significantly higher in a study cohort with healthy control subjects.
- Further studies might pursue a different combination of nodes and equations used in the analyses for improving the method.