Reconstruction and evaluation of acetabular defects using statistical shape modeling

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Research goal
Investigate the morphology and reconstruction of acetabular defects using statistical shape models

Clinical background
• The demand for hip revision surgery is predicted to increase as a consequence of longer life expectancy [1].
• Bone defects are present in 44% of patients where the acetabular component is removed [2].
• The surgeon aims to restore the pre-diseased anatomy and, more specifically the hip joint centre [3]. In patients with large bone defects this is challenging as they often present with a bilateral condition.

Shape model construction
CT Scans
Subject 1
Subject 2
Subject X
Subject 150

Rigid Registration
Non-Rigid Registration
Mean Shape Calculation

Principal Component Analysis
3σ
PC: 1
-3σ

Prediseased shape reconstruction
Segmented CT
Diseased parts removed

Optimise position
Optimise Shape

Defect evaluation
Case 1
Paprosky defect type: 2b

Case 2
Paprosky defect type: 3a


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