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Automated planning approaches for non-invasive cardiac valve replacement procedures from CT angiography

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Propositions

Automated planning approaches for non-invasive cardiac valve replacement procedures from CT angiography

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1. Alain Cribier (the first cardiologist to perform TAVI) predicted that “although work still needs to be done to improve techniques and outcomes further, the future of TAVI looks bright”. The work in this thesis supports this prediction.
2. Over- or under-estimating the dimensions and morphology of the vascular access and the aortic root may result in severe post-TAVI complications.
3. A fully automatic and accurate methodology can minimize the time and effort needed by the physicians to determine the treatment plan while semi-automatic correction option will leave the ultimate decision to the physician.
4. Aortic valve calcium quantification plays an important role in the prognosis of coronary and cardiovascular disease. The extent of calcium is also correlated to the occurrence of paravalvular regurgitation after TAVI.
5. Compared to other imaging modalities, CT with its 3D imaging capabilities provides robust assessment of annular and aortic root morphology and dimensions, which provides critical incremental information. The measurements in this thesis are based on CT.
 - This thesis, Chapter 1
6. Pre-operative imaging is necessary to evaluate the aorto-femoral vascular access route and the condition of the aortic root to support the treatment selection of TAVI.
 - This thesis, Chapters 3 and 5
7. Atlas-based segmentation is a suitable automatic algorithm to integrate manual annotation of aortic root into TAVI planning procedures.
 - This thesis, Chapter 4
8. The Fast marching algorithm is a segmentation tool with the flexibility to define a cost function according to the user-specific image. The cost function has a big influence on the result. The subdivision surface fitting algorithm has similar features.
 - This thesis, Chapter 2 and 4
9. Directness is the most efficient and honest way of communication. Too much words can blur the focus.
10. Learning is not only to accumulate knowledge, but also to train the ability to think deeply.
11. Management is the combination of encouragement and control. Good management is to use suitable combination under certain situation, which needs high flexibility. The management here is a general term which can be about personal life, work, people and so on.
12. Each moment of life is special and worthy to be treasured, for it will never recur.