Patient Specific Optimal Catheter Selection for the Left Coronary Artery

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Abstract: During coronary artery angiography, a catheter is used to inject a contrast dye into the coronary arteries. Due to the anatomical variation of the aorta and the coronary arteries in different humans, one common catheter cannot be used for all patients. The cardiologists test different catheters for a patient and select the best one according to the patient's anatomy. To overcome these problems, we propose a computer-aided catheter selection procedure. In this paper we present our approach for patient specific optimal catheter selection for the angiography of the left coronary artery (LCA). It involves segmentation of the aorta and coronary arteries, finding the centerline and computing some geometric parameters. These parameters include curve angle of the LCA, LCA contralateral wall curve length, and the aorta cavity length. We then consider catheters for the LCA and compute the angles and lengths of the two curves as well as the distance between these curves. We suggest a catheter that is the closest one to the patient's arteries geometry. This solution avoids testing of many catheters during catheterization. The cardiologist already gets a recommendation about the optimal catheter for the patient prior to the intervention.