Transseptal puncture in left atrial appendage closure guided by 3D printing and multiplanar CT reconstruction

Abstract

Introduction: The presented study investigates the application of bi-atrial 3D printed models to guide transseptal puncture (TSP) in left atrial appendage occlusion (LAAC). The objectives are to (1) test the feasibility of 3D printing (3DP) for TSP guidance, (2) analyse the distribution of the optimal TSP locations, and (3) define a CT-derived 2D parameter suitable for predicting the optimal TSP locations.

Methods: Pre-procedural planning included multiplanar CT reconstruction, 3D segmentation, and 3DP. TSP was pre-procedurally simulated *in vitro* at six defined sites. Based on the position of the sheath, TSP sites were classified as optimal, sub-optimal, or non-optimal. The aim was to target the TSP in the recommended position during the procedure. Procedure progress was assessed post hoc by the operator.

Results: Of 68 screened patients, 60 patients in five centres (mean age of 74.68 ± 7.64 years, 71.66% males) were prospectively analysed (3DP failed in one case, and seven patients did not finally undergo the procedure). In 55 patients (91.66%), TSP was performed in the optimal location as recommended by the 3DP. The optimal locations for TSP were postero-inferior in 45.3%, mid-inferior in 45.3% and antero-inferior in 37.7%, with a mean number of optimal segments of 1.34 ± 0.51 per patient. When the optimal TSP location was achieved, the procedure was considered difficult in only two (3.6%) patients (but in both due to complicated LAA anatomy). Comparing anterior vs. posterior TSP in 2D CCT, two parameters differed significantly: (1) the angle supplementary to the LAA ostium and the interatrial septum angle (160.83° ± 9.42° vs. 146.49° ± 8.67°; $P = 0.001$), and (2) the angle between the LAA ostium and the mitral annulus (95.02° ± 3.73° vs. 107.38° ± 6.76°; $P < 0.001$), both in the sagittal plane.

Conclusions: *In vitro* TSP simulation accurately determined the optimal TSP locations for LAAC and facilitated the procedure. More than one-third of the optimal TSP sites were anterior.

Previous antithrombotic therapy does not have an impact on the in-hospital mortality of patients with upper gastrointestinal bleeding

Abstract

Introduction: The association between antithrombotics and the risk of gastrointestinal bleeding is well known; however, data regarding the influence of antithrombotics on outcomes are scarce. The goals of this study are: (1) to assess the impact of prior antithrombotic therapy on in-hospital and six-month outcomes and (2) to determine the re-initiation rate of the antithrombotics after a bleeding event.

Methods: All patients with upper gastrointestinal bleeding who underwent urgent gastroscopy in three centres from 1 January 2019 to 31 December 2019 were retrospectively analysed. To assess the potential predictors of mortality, multivariate logistic regression with propensity score matching (PSM) was used.

Results: Among 333 patients (60% males, mean age 69.2 ±17.3 years), 145 (44%) were receiving antithrombotics. In multivariate logistic regression no association between antithrombotic treatment and worse in-hospital outcomes was observed. Development of haemorrhagic shock led to worse survival (OR 4.4, 95% CI 1.9 to 10.2, $p<0.001$; after PSM: OR 5.3, 95% CI 1.8 to 15.7, $p=0.003$). During six-months follow-up, higher age (OR 1.0, 95% CI 1.0 to 1.1, $p=0.002$), higher comorbidity (OR 1.4, 95% CI 1.2 to 1.7, $p<0.001$), a history of cancer (OR 3.6, 95% CI 1.6 to 8.1, $p<0.001$) and a history of liver cirrhosis (OR 2.2, 95% CI 1.0 to 4.4, $p=0.029$) were associated with higher mortality. After a bleeding episode, antithrombotics were adequately re-initiated in 73.8%.

Conclusions: Previous antithrombotic therapy does not worsen in-hospital outcomes after upper gastrointestinal bleeding. Development of haemorrhagic shock predicted poor prognosis. Higher six-month mortality was observed in older patients, patients with more comorbidities, with liver