



CARDIAC CT AND LEFT ATRIAL APPENDAGE OCCLUSION: A PICTORIAL ESSAY



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OBJECTIVE:

Left atrial appendage occlusion (LAAO) is increasingly used in patients with non-valvular atrial fibrillation for stroke prevention, who are at high risk of stroke, and are intolerant or contraindicated to oral anticoagulants. Cardiac computed tomography (CT) is able to give important information on the anatomy, morphology, suitability and device selection for preoperative assessment. This pictorial essay gives an overview of cardiac CT utilization for LAAO planning.

MATERIALS AND METHODS:

Retrospective review of preoperative cardiac CT performed for patients undergoing LAAO at Queen Elizabeth Hospital (QEH) over an eighteen-month period between April 2017 and October 2018. For each patient, left atrial appendage (LAA) anatomy and morphology (including dimension, type, shape of ostium, associated vascular anomaly), presence of thrombus within left atrium (an absolute contraindication for LAAO) and intra-atrial septal anomaly were recorded.

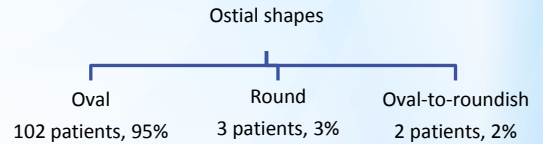
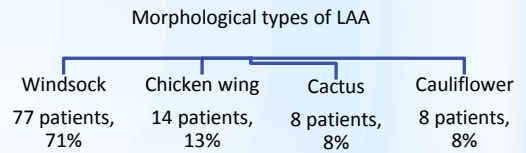
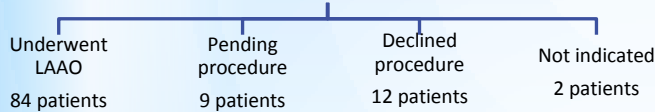
IMAGING TECHNIQUES:

All studies were performed using the following scanning protocol: Siemens SOMATOM Definition Flash 128-row detector, detector collimation 128x0.6mm, tube current controlled by Siemens Care dose technique with reference mA set at 300mA, tube voltage fixed at 120kV, spiral mode ECG-gated with dose modulation applied from 0 to 100% RR interval. Intravenous contrast (Omnipaque 350) injected via pump injector into a 18G IV cannula in antecubital fossa. Test bolus technique to calculate the total volume of contrast and delay time of the scan. Delayed image 1 minute post contrast administration at level of LAA. Multiplanar reformation performed on dedicated work station.

RESULTS:

Patients recruited: 107

mean age 76.6 years; range 46-96 years, gender M:F 1.3:1



Two patients were found to have septal anomaly: atrial septum aneurysm (1) and secundum atrial septal defect (1). Seven patients were found to have intra-atrial thrombus on CT.



Fig 1

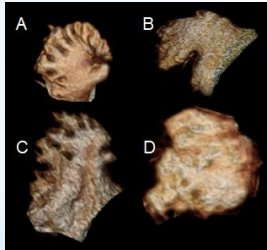


Fig 2

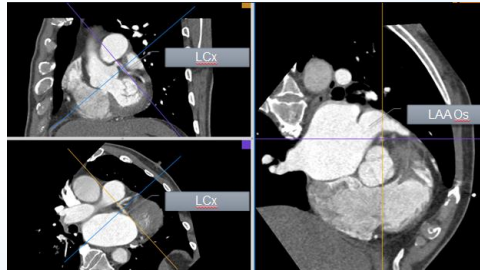


Fig 3

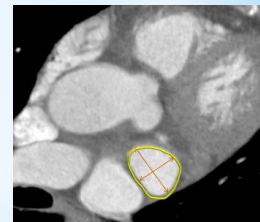


Fig 4: LAA orifice.



Fig 5



Fig 6

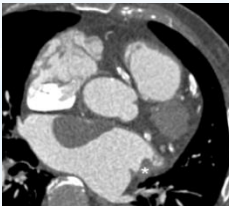


Fig 7



Fig 8

Fig 2: LAA morphology. A. Chicken wing. B. Windsock. C. Cactus. D. Cauliflower.

Fig 3: LAA measurements at double orthogonal planes.

Fig 4: Final LAA os diameter & perimeter measurements.

Fig 5: LAA os diameter (orange arrow) & usable length (blue arrow). Fig 6: Left superior pulmonary artery superior to LAA os(*). Fig 7: Thrombi in left atrium and LAA(*). Fig 8: Common LAAO device used in QEH: Amplatzer Amulet (St. Jude Medical) (top) & Watchman (Boston Scientific) (bottom).

CONCLUSION:

Cardiac CT provides excellent anatomical and morphological information for preoperative assessment of LAAO, which are crucial for device selection.