Chapter 6

Summary & conclusion
Summary

**Internal thoracic artery:** Internal thoracic artery is an elastic artery though anatomically it is considered a medium-sized artery. Sympathetic nerve fibers exist in the adventitia of the ITA. Thickness of tunica intima is constant, where as thickness of tunica media and number of elastic laminae were decreased during the ageing process. Age-related pathological changes like atherosclerosis, intimal hyperplasia, and medial calcification are not seen in any of ITA samples. Hence, ITA is a ideal graft for the coronary artery bypass surgery. Sympathetic index may be used for the sympathetic nerve fiber related problems of the ITA.

**Posterior intercostal artery:** It can be suggested that posterior intercostal artery is an elastic artery though anatomically it is considered as medium sized artery. Mild intimal hyperplasia/atherosclerosis was observed in elderly cases with no medial calcification. Thicknesses of Tm and number elastic laminae were found to have decreased as age advances. SI index may be used for sympathetic nerve fiber related problems of PIA. PIA may be considered as an alternate reliable conduit in myocardial revascularization.

**Right coronary and Left anterior descending arteries:** Sections through the coronary arteries showed all the features of muscular arteries with prominent internal elastic lamina separating the tunica intima and the media. RCA and LAD showed severe intimal thickening, progressing in severity throughout life. IEL was total disintegrated and disorganized in elderly cases. Thickness of tunica intima was increased with increasing age, where as thickness of tunica media decreased as age advances in both RCA and LAD. Sympathetic nerve fibers were present in tunica adventitia and outer media of both RCA and LAD.
Superficial temporal artery: STA had a muscular artery with ill defined external elastic lamina. STA is supplied by sympathetic nerves which are located in the tunica adventitia and outer media. Sympathetic index may be used in sympathetic nerve fibers related problems of the STA (migraine, vasospasm). Age related pathological changes such as intimal hyperplasia and medial calcification were observed. Hence care should be taken when considering the frontal branch of the superficial temporal artery as a graft for reconstructive/bypass surgeries particularly in elderly individuals.

Middle meningeal artery: Thickness of tunica intima and media were found to be increased with age. Internal elastic lamina was fragmented usually in multiple areas, in samples of G2 and G3. An imperfect and ill defined external elastic lamina is seen in all cases and only strands of elastic fibers were found at the junction of tunica media and adventitia. Age related pathological changes such as intimal hyperplasia and medial calcification were observed. Hence care should be taken when considering the middle meningeal artery as a graft for bypass surgeries. MMA is supplied by sympathetic nerve fibers which are located in the tunica adventitia and outer media. Sympathetic index may be used in sympathetic nerve fibers related problems of the MMA.

Renal artery: We conclude that RA is a musculo-elastic artery. Thicknesses of tunica intima and media were increased with increasing age. Sympathetic index may provide morphological basis for further studies involving the structural basis of altered renal responses in conditions such as hypertension, ageing, diabetes and peripheral neuropathies.
Marginal artery: Intimal thickening/atherosclerosis is observed in all MA samples of G2 and G3 samples. Incidence of fragmentation or discontinuation in IEL and EEL were increased during the ageing process. The sympathetic nerve fibers were present in the adventitia and outer media. SI of MA may be used to study the problems related to the sympathetic nerves of mesenteric segments of marginal artery (inflammatory/irritable bowel syndrome).

Ti/Tm Ratio: The Ti/Tm ratio increased with age in all the arteries. Ti/Tm ratio was highest for the coronary arteries and was much greater than that of other medium sized arteries, i.e., superficial temporal, middle meningeal, marginal, renal, posterior intercostal and internal thoracic arteries.

Sympathetic Index: Less SI was found in internal thoracic artery, left anterior descending artery and right coronary artery. High SI values were found in the posterior intercostal, middle meningeal, renal followed by superficial temporal and marginal arteries (in descending order of index).

Conclusion

1. All the arteries studied were medium sized arteries. Contrary to the current text book description, internal thoracic artery and posterior intercostal artery had the structure of an elastic artery, whereas renal artery showed the structure of musculo-elastic artery and other arteries showed the structure in accordance with the current description.

2. The maximum thickness of tunica intima was found in left anterior descending artery followed by right coronary, superficial temporal, renal, marginal, middle meningeal, posterior intercostal and internal thoracic arteries (in descending order of thickness).
3. The maximum thickness of tunica media was found in renal artery followed by marginal, internal thoracic, right coronary, superficial temporal, posterior intercostal, left anterior descending and middle meningeal arteries (in descending order of thickness).

4. Tunica intima/media ratio increased with age in all arteries studied. Tunica intima/media ratio was maximum in muscular arteries (left anterior descending, right coronary, superficial temporal, middle meningeal and marginal arteries) followed by musculo-elastic artery (renal artery) and least in elastic arteries (posterior intercostal and internal thoracic arteries). This may be attributed to the intimal changes in reaction to pressure and blood flow dynamics.

5. Muscular/musculo-elastic arteries had shown significantly greater incidence of intimal thickness, atherosclerosis, and medial calcification than the elastic arteries. This may be attributed to more resistance to blood flow and trauma to the intima during systole.

6. High sympathetic index was found in posterior intercostal artery, middle meningeal artery, renal artery, superficial temporal artery, marginal artery, followed by right coronary artery, left anterior descending artery and internal thoracic arteries (in descending order of index). High sympathetic index of arteries (posterior intercostal artery, middle meningeal artery, renal artery, superficial temporal artery and marginal artery) were attributed to the cause of high incidence of sympathetic nervous system related diseases.
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7. The present study makes an attempt to build normal data base for the selected medium sized arteries from the human body. This data can be extrapolated for the clinical use. Knowledge about histological characteristics of arterial wall, morphometric values (thickness of Ti, Tm and Ti/Tm) changes with age, sympathetic index obtained in the present study may be useful to the clinicians as they provide anatomical evidence during selecting appropriate arterial grafts (autograft/cadaveric) for the bypass or microvascular reconstructive surgeries and also to compare normal arteries with the diseased arteries. Any discrepancy from theses normal values and image analysis may help the clinician to diagnose the underlying problems of arterial wall diseases and sympathetic nervous system disorders of the medium sized arteries.

Scope for the future work

1. Sympathetic index of arteries described in the present study can be used to evaluate, classify and correlate sympathetic innervation of other medium sized arteries.

2. Tunica intima/media ratio may be helpful in classifying the arteries indicating intima/media changes in reaction to blood flow dynamics.