Chronic Total Occlusion – What is likely to work?

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Percutaneous coronary interventions remain of limited value for the treatment of chronically occluded coronary arteries because of high restenosis rates (upto 50%). In order to reduce these rates it is important to have a better understanding of the morphology of the totally occluded arteries. The duration of total occlusion and the length of total occlusion determine the morphology of the chronically occluded arteries. Following plaque rupture a luminal thrombus forms which often results in total occlusion of the lumen and the patient may or may not be symptomatic. The thrombus begins to heal with inflammatory cell infiltration, which liberate cytokines and growth factors that result in neovascularization and infiltration by smooth muscle cells that form the extracellular matrix. The greater the inflammation the greater the neoangiogenesis however, the factors that control the extent of inflammation following acute thrombotic occlusion remain unknown. It has been shown that healing is rapid and maximum at the proximal end of the total occlusion. The length of the total occlusion determines the rate at which the mid-portion of the totally occluded artery will heal and it is not unusual to find fibrotic occlusion at the ends, but the mid-portion may still show presence of an organizing fibrin thrombus. None the less as the vessel heals with greater amounts of type I collagen deposition, the totally occluded arteries show negative remodeling, i.e., the area enclosed by the internal elastic lamina begins to decrease secondary to collagen polymerization. Therefore in late total occlusions to get good results from PCI may be difficult especially without stenting and modalities of collagen degradation are being tried as a novel method of treating CTOs.

We have examined at autopsy 4 chronically occluded arteries that had undergone balloon angioplasty and stent placement at least 3 months prior to death. Morphologic examination of the arteries revealed that the maximum narrowing was observed in those segments where the stent was in the false lumen. Also the length of total occlusion and the length of the artery stented are also important in the success and failure of opening of the CTO artery. Underlying inflammation within the arterial plaque may also play an important role in the success or failure of PCI.