

# Why Ultrasonic Plaque Characteristics Predict Restenosis of Superior Femoral Artery Lesions: What to Do about Lesions with a High Chance of Restenosis

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## **Purpose**

Restenosis following percutaneous transluminal angioplasty (PTA) in the superficial femoral artery is very common. Our team has attempted to determine whether plaque characterization can predict restenosis after PTA.

In 53 patients, 72 lesions (13 iliac and 59 femoropopliteal) with >70% stenosis (<5 cm in length) were studied serially with duplex before and after PTA. A peak systolic velocity ratio (PSVR) >2.0 was used to indicate restenosis. Images of plaques were digitized and normalized for gray scale using two reference points (blood = 0 and adventitia = 190). Ultrasonic measurements were made of plaque thickness, luminal diameter, adventitia to adventitia (AA), and PSVR, with plaque echodensity being determined by the gray scale median (GSM).

The incidence of restenosis was 42% at 1 year, with 32% of recurrences before 6 months. Increase in the AA distance was greater with hyperechoic lesions (GSM >30) than hypoechoic lesions, indicating that stretching of the vessel wall was the main method of increasing the lumen in fibrous plaques. Compression of the plaque material was the method of enlarging the lumen in hypoechoic plaques (GSM <30;  $p < .0001$ ). Kaplan-Meier survival curves demonstrated a cumulative restenosis rate of 80% in plaques with GSM >30. The cumulative restenosis rate was 20% in plaques with GSM <30 ( $p < .00001$ , log-rank test). In 11 plaques with GSM >50, the restenosis rate was 100%.

## **Results**

The results indicate that image normalization and measurement of GSM can predict restenosis. Such measurements make it possible to determine the risk of restenosis before PTA. Patients with GSM >30 should be considered for primary stenting. The results also indicate that a randomized controlled study is needed of PTA alone versus PTA plus stenting in patients with echogenic stenotic plaques.