Renal Angiomyolipoma Fat Content Estimated on Pretreatment MRI as a Predictor of Response to Embolization

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Purpose: Renal angiomyolipoma (AML) is a benign neoplasm with a propensity to bleed. It is composed of lipid and non-lipid components such as blood vessel and soft tissue. Transarterial embolization prevents hemorrhage by decreasing the angiogenic component of the AML. We sought to determine whether baseline lipid content and vascularity of AML as determined on gadolinium contrast enhanced MRI (CE-MRI) can help predict embolization response, as measured by changes in volume and enhancement.

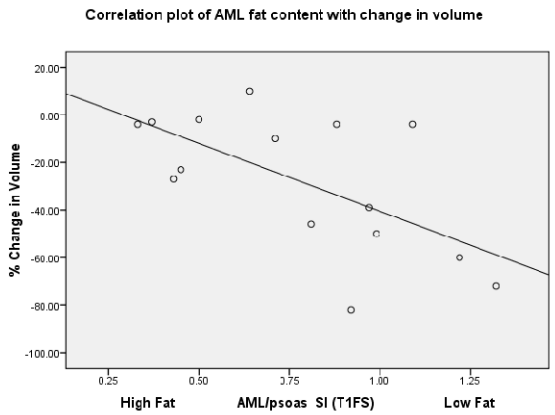
Materials and Methods: A retrospective review using an electronic database, over a consecutive 3 year period, identified 38 AMLs that underwent embolization in 22 patients. 15 AMLs in 7 patients (median age was 29 years, range 21-73) had both the pre and post embolization MR imaging. 13 AMLs occurred in the setting of tuberous sclerosis (TS), and 2 occurred sporadically. Baseline vascularity was measured by placing a large region of interest (ROI) on the index lesion on the pre and post contrast T1 fat saturated acquisition. **% Enhancement** at baseline was calculated as [(maximum SI postcontrast– SI precontrast) / (SI precontrast)] x 100%.

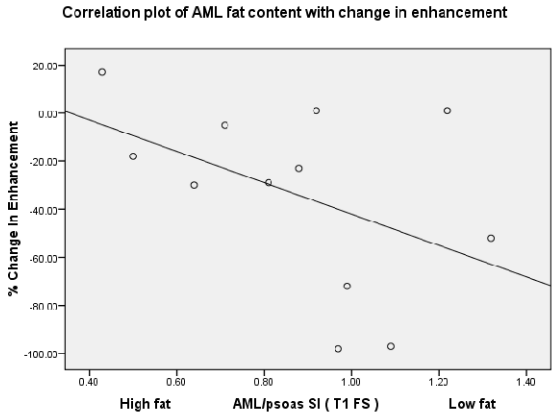
Baseline AML lipid content was estimated by placing large ROI over the lesion and the psoas muscle on axial 3D T1 GRE fat saturated (VIBE) non-contrast acquisition with following parameters: TR/TE 3.27/1.2; slice thickness 2mm; acquisition time 18 seconds. Signal intensity ratio of AML to psoas (**SI AML/psoas) was calculated which served as a surrogate marker of AML lipid content; with higher ratio signifying lower lipid content and larger non-lipid component**.

Response to embolization was calculated as percent change in volume and enhancement after embolization. **Change in volume or enhancement =** (volume or enhancement on follow-up MR – volume or enhancement at baseline)/baseline x 100%.

Pearson correlation was performed between baseline enhancement and lipid content with degree of response as determined by change in volume and enhancement after embolization.

Results: Mean interval between baseline MRI and embolization was 86 days (range 7, 324), and mean interval between embolization to follow-up MRI was 331 days (range 35 to 876 days). Embolization resulted in a mean change in volume of -28% (range -82, +10), and a mean change in enhancement of -41% (range -97, +17). There was no correlation between change in volume and change in enhancement (r=0.104) with embolization. There were poor correlations between baseline enhancement and either the change in volume or change in enhancement. Moderate to good statistically significant (p<0.01) correlations was noted between baseline AML lipid content and change in volume (r=-0.625), and moderate correlation was present between baseline AML lipid content and change in enhancement (r=-0.463). (Figure 1)





Conclusion: Embolization is effective in decreasing AML size as well as vascularity. However, change in volume and change in enhancement were not correlated and were mutually exclusive. Hence these may be considered independent markers of treatment response. AMLs with higher lipid content on MRI are less likely to respond to embolization. Baseline enhancement was not correlated with treatment response. This may be due to relatively long temporal resolution of post contrast acquisition in our study (in order of 30 second) as high temporal resolution perfusion imaging was not performed.

References:

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