Background: An approach based on QR decomposition, to remove speckle noise from medical ultrasound images, is presented in this paper. Methods: The speckle noisy image is segmented into small overlapping blocks. A global covariance matrix is calculated by averaging the corresponding covariances of the blocks. QR decomposition is applied to the global covariance matrix. To filter out speckle noise, the first subset of orthogonal vectors of the Q matrix is projected onto the signal subspace. The proposed approach is compared with five benchmark techniques; Homomorphic Wavelet Despeckling (HWDS), Speckle Reducing Anisotropic Diffusion (SRAD), Frost, Kuan and Probabilistic Non-Local Mean (PNLM). Results: When applied to different simulated and real ultrasound images, the QR based approach has secured maximum despeckling performance while maintaining optimal resolution and edge detection, and that is regardless of image size or nature of speckle; fine or rough.