

# Bölüm 16

## KARDİYAK MANYETİK REZONANS GÖRÜNTÜLEME

Mehtap YENİ<sup>1</sup>

### TEMEL PRENSİPLER

Günümüzde Kardiyak Magnetik Rezonans (KMR); iskemik kalp hastalığı, perikardial/miyokardial primer yada metastatik kitle-trombüs değerlendirilmesi, konjenital defektlerin tanı ve takibi, kapak hastalıklarında ekokardiyografiye tamamlayıcı olarak ve kardiyomiyopati ayırıcı tanı ve prognoz belirlenmesi gibi bir çok alanda giderek artan bir şekilde kullanılmaktadır. Uzun çekim süresi, koroner lezyonların ve kalsifikasyonların değerlendirilmesinde yetersiz kalması ise KMR'ın dezavantajlarındandır.

### GİRİŞ

Çekim planlanmadan önce hastaya yaklaşık 45 dakika sırtüstü yatacağı bilgisi ve nefes tutma açısından eğitim verilmeli, klostrofobi ve metal cihaz yada protez gibi kontrendike bir durum açısından hasta ayrıca değerlendirilmelidir. Tıbbi implant, material ve cihazlar açısından MRIsafety.com adlı adreste güvenilir, duruma göre değişen yada güvenilir değil şeklinde sınıflama yapılmıştır buradan faydalanılabilir. Ayrıca hastanın glomerüler filtrasyon hızı önceden bilinmelidir. EKG kaydı bozulmaması ve hastanın daha fazla yorulmaması için derin nefes almaması öğütlenir. EKG sinyalinin iyi olması için gerekirse cilt temizlenmeli ve çekimin yarıda kalmaması için en başta EKG şarjı kontrol edilmelidir.

### TEMEL KARDİYAK MR FİZİĞİ

MR sistemi bir magnet, 3 gradient koil ve radyofrekans(RF) transmitterden oluşmaktadır. Ana magnet, güçlü bir manyetik alan sağlar bu değer Tesla ile ölçülür. Bu manyetik güç; gradient koilleri ile kesitleri seçer (z aksı) ve frekans(x aksı) ve faz (y aksı) yönünde sinyalleri kodlar. Yüksek uzaysal çözünürlük; kesit kalınlığında azalma ve frekans-faz sayısında artış ile sağlanabilir. Çekim sırasında RF transmitter belirli bir açıdan (flip angle) dokudaki hidrojen protonlarını uyarır. RF uyarı kesilince protonlar eski yerine ulaşır. z planında hidrojen iyonlarının RF uyarı sonrasında manyetik alandaki uzunlamasına düzlemde (z plan) hareketine dayanan longitudinal relaksasyon T1; yatay düzlemde (xy plan) hareketini temsil eden transvers relaksasyon ise T2 zamanı olarak tanımlanır. Ham data, k-space denilen bir alıcı koil ile toplanır ve hafızaya alınır. Matematiksel bir dönüşüm olan Fourier transformasyonu sonrası görüntü oluşturulur Bir kalp siklusundaki faz sayısı; kaç görüntü alındığı ile ilişkilidir. Anatomik tek bir görüntü alınacak ise tek bir faz alınırken; sine hareketli görüntü için siklus fazlara bölünür.

Programlanmış tekrar eden uyarılar ve oluşan gradientin tekrar yok edilmesine, uyarı sekansı (pulse sekansı) denilir. Spin eko (90° açı ile) ve gradient eko ( 0° ile 90° arasında açı ile) sıklıkla kullanılan uyarı sekanslarıdır. Spin eko anatomik görüntü sağlarken gradient eko işlevsel özelliği

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