35.b Ağrı Tedavisinde Periferik Sinir Stimülasyonu

Fatma NAZLI ÜNKAZAN[1]

Giriş

Ağrı pek çok şekilde ifade edilmekle beraber Uluslararası Ağrı Araştırmaları Birliği (IASP) tarafından 'gerçek veya potansiyel doku hasarı ile ilişkili olan veya olduğu düşünülen, hoş olmayan bir duyusal ve duygusal deneyim' olarak tanımlanmaktadır (1). Ağrı biyolojik, psikolojik ve sosyal faktörlerden etkilenen kişisel bir deneyimdir.

Ağrı süresine, etkilediği vücut bölgesine, şiddetine, etiyolojisine, nörofizyolojik mekanizmalarına göre değerlendirilebilir.

Deri ve diğer dokularda bulunan ağrı reseptörleri serbest sinir sonlanmalarından oluşmakta olup mekanik, kimyasal ya da termal uyaranlar ile uyarılabilirler (2). Serbest sinir sonlanmaları tarafından oluşturulan sinyaller merkezi sinir sistemine Aδ (hızlı-kesin) ve C tipi (yavaş-kronik) sinir lifleri ile iletilir. Bu lifler dorsal spinal köklerden girdikten sonra omurilikte lamina marginalis (lamina 1), substansia gelatinosada (SG) (lamina 2 ve 3) sonlanarak, modülatör etkisi olan kısa lifli nöronlar ve ikinci sıra nöronlar ile bağlantı kurarlar. İkinci sıra nöronlar ise neospinotalamik ve paleospinotalamik yollar aracılığı ile medulla, pons, mezensefalon, periakuaduktal gri alan ve talamus gibi üst yapılara projekte olurlar (2).

Periferik sinir sistemi ve merkezi sinir sisteminin bağlantı kurduğu dorsal kolon ile ilgili bilinmesi gereken bir diğer husus, 1965 yılında Wall ve Melzack tarafından keşfedilen ve ağrının modülasyonuna ışık tutan kapı kontrol teorisidir (3). SG hücreleri 'kapı hücreleri' olarak adlandırılır. Nosiseptif duysal uyaranlar lamina 5'te bulunan transmisyon nöronları üzerine uyarıcı, SG hücreleri üzerine inhibitör etki göstererek ağrının iletilmesini sağlarken, non nosipetif duysal uyaranları taşıyan Aβ lifleri SG nöronları uyararak ve SG hücrelerinin transmisyon hücrelerini inhibe etmesini sağlayarak 'kapı'yı kapalı tutar ve analjezi oluşmasını sağlar. Bu keşif, ağrıya yaklaşımda bir mihenk taşı olurken nöromodülasyon uygulamarının temelini oluşturmuştur.

Nöromodülasyon; spesifik nörolojik hedeflere elektriksel, manyetik ya da kimyasal uyaranlar uygulanması yolu ile nörolojik fonksiyonun, nöronal ve glial hücre aktivitesi düzeyinde, modifiye edilmesini tanımlamaktadır (4). Kimyasal uyaranlar; intratekal, intraspinal, intrasisternal/intraventriküler uygulamalar yoluyla klinik pratikte kullanılmaktadır (5,6). Elektriksel stimulasyona baktığımızda ise, motor korteks, serebral korteks uygulamaları, derin beyin stmilasyonu (DBS), spinal kord stimülasyonu (SKS), dorsal kök stimülasyonu, periferik ve kranial sinirlerin stimülasyonu gibi santral sinir sisteminden periferik sinir sistemine pek çok anatomik yapının nöromodülasyon uygulamalarında kullanıldığını görürüz (7).

Elektriksel stimülasyonun tedavide kullanılmasının ilk örneği, antik çağlarda Romalı doktor Scribonius Largus'un 'Compositiones Medicae' isimli eserinde karşımıza çıkmaktadır (8). Henüz 1830'larda Michael Faraday tarafından elektrikli yılan balığı ile ilgili çalışmalar ortaya konmamışken, Scribonius gut ve baş ağrısı hastalarında torpido balığı ile fiziksel temasları ya da torpido balığının bulunduğu suya ayaklarını sokmaları

[1] Dr. Öğr. Üyesi, Kırklareli Üniversitesi Tıp Fakültesi Fiziksel Tıp ve Rehabilitasyon Anabilim Dalı, fatmanazzli@hotmail.com

açısından faydalı olacaktır. Elektrot ve kablolarının implantasyonu esnasında büyük eklemlerin ve uzun tünellerin katedilmesinin gerektiği durumlarda migrasyon ya da materyal yorgunluğuna bağlı olarak materyalde kırık gelişmesi ihtimali artmaktadır. Komplikasyon oranları yüksek olarak değerlendirilebilecek olmasına rağmen morbidite oranı düşüktür. PSS ilk dönemlerinde SKS için üretilen implantların kullanılması ile teknik komplikasyon oranları daha yüksek iken gelişen, değişen teknolojiler ve klinik deneyim ile komplikasyon oranları azalmaktadır.

Sonuç

Periferik sinir stimülasyonu; subkutan ya da perkutan uygulama ile ağrılı sinir ve/veya bölgeye stimülasyon uygulanması yöntemi ile tedaviye dirençli pek çok ağrılı klinik durumda etkisi gösterilmiş bir nöromodülasyon yöntemidir. Periferik nöromodülasyon uygulamaları gelişen yeni cihaz teknolojileri ve USG eşliğinde uygulanan minimal invaziv implantasyon teknikleri ile gelişmeye devam edecektir. Daha büyük vaka gruplarında randomize kontrollü çalışmalara ihtiyaç devam etmektedir.

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