

Brachial Plexus Injury During General Anesthesia: A Case Report

GENEL ANESTEZİ SIRASINDA GÖZLENEN BRAKİYAL PLEKSUS ZEDELENMESİ: OLGU SUNUMU

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Abstract

Brachial plexus injuries (BPI) appear most commonly in young individuals. The nature of these injuries, with their severe loss of upper extremity function leads to serious consequences to the professional life of the patient.

Stretching, the primary cause of nerve injuries following malposition of patients during general anesthesia, has been implicated as the cause of most BPI. Injuries to the brachial plexus in the operating room involve either the upper or lower portions, depending on the position of the neck, shoulder and arm. Excessive abduction of the arm causes stretching of the plexus. In this case report, we discussed the involved mechanisms of BPI.

Key Words: Brachial plexus, general anesthesia, complications, postoperative

Özet

Brakiyal pleksus zedelenmeleri en sık genç erişkinlerde görülür. Bu zedelenmeler üst ekstremitelerde fonksiyon kaybına yol açarak kişinin mesleki ve özel yaşantısını etkiler.

Genel anestezi sırasında, hastanın yanlış pozisyonunu takiben gözlenen sinir zedelenmelerinin primer nedeni olan gerilmeler, sıklıkla brakiyal pleksus zedelenmelerine neden olmaktadır. Operasyon odasındaki brakiyal pleksus hasarı boyun, omuz ve kolun pozisyonuna bağlıdır. Kolun aşırı abduksiyonu pleksusun gerilmesine neden olur. Bu olgu sunumunda, brakiyal pleksus zedelenmelerinin mekanizmasını tartıştık.

Anahtar Kelimeler: Brakiyal pleksus, genel anestezi, komplikasyonlar, postoperatif

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The aim of optimal positioning for surgery is to provide the best surgical access while minimizing potential risk to the patient. Each position carries some degree of risk and this is magnified in the anesthetized patient who cannot make others aware of compromised positions. Nerve injury is more likely with general anesthesia than regional anesthesia.¹ Ulnar nerve palsy and brachial plexus injury (BPI) was the most common, followed by lumbosacral nerve root injury.

BPI can occur secondary to malposition of the patient during general anesthesia. The injury is usu-

ally caused by stretching, tearing or other trauma to the nerves of the brachial plexus.^{2,3} In this case report, we present that position is very important during general anesthesia because muscle nerve reduce and discuss the involved mechanisms of BPI.

Case Report

A 28-year old, 65-kg man underwent femoral lengthening for shortness of left leg. His medical history included poliomyelitis when he was 9 months old. He had not motor and sensory neurological deficit in his upper extremities. He had muscular atrophy, shortness and deformity on his left leg. The patient's arms were positioned on arm boards at 90 degrees abduction under general anesthesia with a muscle relaxant. His head was maintained in the neutral position and no shoulder pads were used. The operation lasted 3 h and 35 min. The hemodynamic indicators were quite stable

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during surgery and also the surgical procedure was uneventful.

Postoperatively, the patient complained of weakness on the left arm. Detailed examination by orthopedics and neurology staff revealed proximal motor and sensory neurological deficit involving his left arm.

Plain radiographs of upper extremity, chest and spine radiographic evaluations revealed no abnormalities. But magnetic resonance imaging (MRI) wasn't done, because the patient had a ferromagnetic object. There was not a cervical rib or other abnormalities. Computed tomography scan showed plexus root avulsions at C5 minimal, at C6-7-8 middle degree.

The patient was managed with active physiotherapy and support to the left arm. Nonsteroidal anti-inflammatory drug was started. 3 weeks later electromyography (ENMG) was made, function of the left arm was better. Two months later his weakness in the forearm was diminished and he reported improvement in his left arm strength.

Discussion

BPI are nerve injuries in which the nerves and/or the nerve roots of the brachial plexus are damaged. This injury affects the motor and sometimes also sensory functions of the patient's arm and/or hand. The injury is usually caused by stretching, tearing or other trauma to the nerves of the brachial plexus.⁴ BPI secondary to malpositioning is a rare but well-known postoperative complication.

The combination of hyperabduction and extension of the arm can be avoided by maintaining a "safety zone" with abduction no greater than 90 degree and with the elbow in a plane anterior and midaxillary line.³ Excessive abduction of the arm also causes stretching of the plexus.

The pathogenesis of plexus injury had been ischemia to the vasa nervorum. Animal studies have shown cessation of blood flow in the intraneural capillaries and epineural haematoma formation was also seen relatively low grades of stretch.

Myelin disruption occurs, resulting in decrease or failure of conduction. Similarly, in nerve compression, nodal myelin becomes displaced leading to demyelination and conduction block.⁵

There are various comorbidities and perioperative factors that can contribute to nerve injury. These include diabetes, hypovolemia, hypotension, hypothermia and coagulopathy. Anatomical anomalies can result in unexpected stress on the plexus.⁶ BPI frequently causes pain. Often the pain is debilitating for many years. Chronic pain incidence is from 26% to 90% at plexus roots avulsion.⁷

Differential diagnosis of postoperative neurological deficit must include idiopathic brachial neuritis. This syndrome is characterized with patchy weakness and atrophy of the muscles of the shoulder. The patient has usually pain and muscle dysfunction of the proximal group. Recovery is usually more prolonged.

Chin and Poole reported one case of BPI during laparoscopic sigmoid colectomy due to trendelenburg position.⁶ Many case reports of BPI published in the literature involve a patient whose arms were malpositioned in abduction/extension rather than placed at the sides. Romanowski et al reported five cases of BPI, with all five cases being caused by the aforementioned factors.⁸

Cooper et al reported three cases with BPI due to the factors mentioned.⁹ Parks reported 72 patients with peripheral nerve injuries due to intraoperative positioning, and found that 92% of them recovered spontaneously.¹⁰

In our case, cause of BPI was intraoperative malpositioning. It may be due to excessive abduction of the left arm that caused stretching of the plexus. Time to full recovery varies from 2 to 9 months.¹¹ Although, in some cases, recovery took up to 1 year. The patient's left arm sensation and motor function returned to normal in 3 weeks time with intense conservative treatment. So, this case is the first case, which describes the complete remission of BPI after conservative treatment.

During general anesthesia, muscle tone is reduced, especially if muscle relaxants are used. For this reason patients should be placed into physiological positions under general anesthesia. The prognosis for recovery following nerve injury is generally good.

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