

Foot Drop: A Rare Neurological Complication of Coronary Artery Bypass Surgery

Düşük Ayak: Koroner Arter Bypass Cerrahisinin Nadir Bir Nörolojik Komplikasyonu

Koray Aykut¹, Mehmet Guzeloglu², Gokhan Albayrak¹, Gulden Tan³, Eyup Hazan⁴

¹ Assoc.Prof.Dr., Izmir University, Faculty of Medicine, Department of Cardiovascular Surgery, Izmir, Turkey

² Asst.Prof.Dr., Izmir University, Faculty of Medicine, Department of Cardiovascular Surgery, Izmir, Turkey

³ Asst.Prof.Dr., Izmir University, Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Izmir, Turkey

⁴ Prof.Dr., Izmir University, Faculty of Medicine, Department of Cardiovascular Surgery, Izmir, Turkey

Abstract

Although improvements in surgical and anesthetic techniques have reduced morbidity and mortality related to cardiovascular procedures, neurologic disorders belong among the most common and serious complications of cardiac surgery. A case of foot drop due to common peroneal nerve injury which is a very rare neurologic complication following coronary artery bypass surgery was reported. The paralysis in the left foot gradually improved with intensive physiotherapeutic treatment in a few months after the operation.

Key words: Cardiac surgery; peripheral nerve injuries; peroneal nerve; rehabilitation

Özet

Her ne kadar cerrahi ve anestezi tekniklerindeki gelişmeler kardiyovasküler prosedürler ile ilişkili morbidite ve mortaliteyi azaltsa da; nörolojik bozukluklar halen kardiyak cerrahinin en sık görülen ve ciddi komplikasyonları arasında yer almaktadır. Koroner arter bypass cerrahisi sonrası çok nadir görülen bir nörolojik komplikasyon olan ve peroneal sinir yaralanması sonucu oluşan bir düşük ayak vakası sunulmuştur. Sol ayaktaki paralizisi, operasyondan sonra yoğun psikoterapi tedavisi ile birkaç ay içerisinde kademeli olarak düzelmiştir.

Anahtar kelimeler: Kardiyak cerrahi, periferik sinir yaralanmaları, peroneal sinir, rehabilitasyon

Kabul tarihi:18.01.2013

Introduction

Coronary artery bypass grafting (CABG) is the most commonly done cardiac operation worldwide (1). It is well recognized that cardiac surgery with cardiopulmonary bypass can potentially induce a wide spectrum of neurological disorders (2,3).

The presence of neurologic sequelae significantly increases the likelihood of requiring long-term care (4). Stroke, cerebrovascular events, cognitive impairment and peripheral nerve injuries are the major neurological problems following open heart surgery (5). Reported nerve injuries generally concern brachial plexus, phrenic nerve, recurrent laryngeal, and facial nerve (6,7). Common peroneal nerve injury is detected rarely, only 0.19% of the patients undergoing cardiothoracic operations (8).

Case report

A 68-year-old man was admitted to our hospital with exertional chest pain. He was a heavy smoker with high blood pressure. He had been suffering from hypercholesterolemia for five years. His physical examination was normal and he had no history of any neurological disease. A 12-lead electrocardiogram at rest was normal, but the treadmill exercise test proved positive. Cardiac catheterization and angiography showed anterolateral and inferior hypokinesia of left ventricle with significant four vessel disease involving left anterior descending (LAD) with its first diagonal branch (D1), left circumflex (LCx) with its first obtuse marginal branches (OM1) and right coronary artery (RCA). Thus, CABG surgery was performed. The left internal mammarian artery was anastomosed to the left anterior descending artery and separate saphenous vein grafts were connected to the other

coronary arteries. Saphenous veins were harvested from the right leg. The total cardiopulmonary bypass (CPB) time was 85 mins and with an aortic cross clamp time of 49 mins. The patient stayed in our intensive care unit only one day. There was foot drop on the postoperative third day physical examination. The muscle strengths were 0/5 on dorsiflexion and 1/5 on eversion. Mrc revealed sensory loss at the fibular nerve territory. Popliteal and more distal pulses were palpable. Arterial doppler ultrasound showed normal triphasic flow in the lower extremity arteries. He was immediately consulted by a physiatrist. Physical examination revealed paralysis of the tibialis anterior muscles, the extensor hallucis longus and the extensor digitorum longus muscles. Lumbar magnetic resonance imaging (MRI) showed no lumbar nerve compression. Diagnosis of common peroneal nerve palsy (CPNP) was confirmed by needle electromyography (EMG). On the 7th day left lower extremity EMG indicated fibular motor and sensory conduction loss. Needle EMG showed minor denervation in the muscles innervated by the fibular nerve. There was motor unit potential loss with intentional contraction. Otherwise the other nerves and EMG examinations were normal. The findings indicated fibular nerve injury at the head of the fibula and secondary total axonal degeneration at the distal segment.

There was not a prominent improvement except minimal foot eversion after two months. Control EMG showed near total axonal injury at the fibular nerve; however, needle EMG indicated signs of regeneration. The clinical and laboratory findings were suggestive of minimal improvement of the fibular nerve.

The patient was treated by physiotherapists with ankle-foot orthosis (AFO) and intensive physiotherapy including active range of motion, stretching exercises and electrical stimulation for 4 weeks. Home exercises continued for several months. Six months later, paralysis improved significantly confirmed by needle EMG showing reinnervation of motor units.

Discussion

Peroneal nerve passes lateral to the surgical neck of the fibula and it's frequently injured at this level because of its superficial location (9). Stretching or compression of the nerve in anesthetized patients causes peripheral nerve ischemia. During CABG surgery, legs are flexed and externally rotated on a knee roll to make saphenous vein harvesting easier.

Direct compression of the nerve is thought to be the main mechanism for ischemia, but it's widely known that atherosclerosis, diabetes mellitus and CPB make nerves more susceptible to ischemia (8,10). Differentiation of CPNP and acute L5 radiculopathy is important in patients with foot drop. Plegia of dorsiflexion with no history of pain is most likely due to a lesion of the common peroneal nerve. Evaluation of the posterior tibial muscle with needle EMG is enough to make differentiation, as its innervation runs via the tibial nerve, not the peroneal nerve.

Conclusion

Common peroneal nerve palsy is a rare neurological complication of cardiac surgery. Electromyography is useful for diagnosis. Surgical team should always remember that peripheral nerve injury can easily occur in anesthetized patients and they should be careful during the mobilization and the positioning of the patient. Intensive physiotherapy is essential for better recovery.

References

1. Strenge H, Lindner V, Paulsen G, Regensburger D, Tiemann S. Early neurological abnormalities following coronary artery bypass surgery, a prospective study. *Eur Arch Psychiatry Neurol Sci* 1999;239(4):277-81.
2. Baker RA, Andrew MJ, Knight JL. Evaluation of neurological assessment and outcomes in cardiac surgical patients. *Semin Thorac Cardiovasc Surg* 2001;13(2):149-57.
3. Canbaz S, Turgut N, Halici U, Sunar H, Balci K, Duran E. Brachial plexus injury during open heart surgery--controlled prospective study. *Thorac Cardiovasc Surg* 2005;53(5):295-9.
4. Roach GW, Kanchuger M, Mangano CM, Newman M, Nussmeier N, Wolman R, et al. Adverse cerebral outcomes after coronary bypass surgery. Multicenter Study of Perioperative Ischemia Research Group and the Ischemia Research and Education Foundation Investigators. *N Engl J Med* 1996;335(25):1857-63.
5. Newman MF, Wolman R, Kanchuger M, Marschall K, Mora-Mangano C, Roach G, et al. Multicenter preoperative stroke risk index for patients undergoing coronary artery bypass graft surgery. *Circulation* 1996;94(9 Suppl):74-80.
6. Chong AY, Clarke CE, Dimitri WR, Lip GY. Brachial plexus injury as an unusual complication of coronary artery bypass graft surgery. *Postgrad Med J* 2003;79(928):84-6.
7. Sharma AD, Parmley CL, Sreeram G, Grocott HP. Peripheral nerve injuries during cardiac surgery: risk

- factors, diagnosis, prognosis, and prevention. *Anesth Analg* 2000;91(6):1358-69.
8. Vazquez -Jimenez JF, Krebs G, Schiefer J, Sachweh J, Liakopoulos O, Wendt G, et al. Injury of the common peroneal nerve after cardiothoracic operations. *Ann Thorac Surg* 2002;73(1):119-22.
 9. Parks BJ. Postoperative peripheral neuropathies. *Surgery* 1973;74(3):348-57.
 10. Keates JR, Innocenti DM, Ross DN. Mononeuritis multiplex: a complication of open heart surgery. *J Thorac Cardiovasc Surg* 1975;69(5):816-9.

İletişim:

Doç.Dr. Koray Aykut
İzmir Üniversitesi Tıp Fakültesi
Kalp Damar Cerrahisi Anabilim Dalı, İzmir, Türkiye
Tel: +90.532.6105269
Fax: +90.232.3750397
E-mail: drkaykut@hotmail.com