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BROWN-SÉQUARD SYNDROME AFTER SURGICAL CORRECTION OF KYPHOSCOLIOSIS

KİFOSKOLYOZUN CERRAHİ KORREKSIYONU SONRASI GELİŞEN BROWN-SEQUARD SENDROMU

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SUMMARY

Brown-Séquard syndrome is a spinal cord injury resulting from unilateral injury, which causes deep sensory loss and motor weakness below the level of injury on the same side, while causing a neurological condition characterized by a loss of pain and temperature sensation on the opposite side to the injury. The most common reason is spinal trauma. In this case study, we aim to present a case of Brown-Séquard Syndrome as a result of disruption of the circulation of the spinal cord after kyphoscoliosis surgical correction.

Key words: Kyphoscoliosis, idiopathic scoliosis, complications, neural deficit, Brown-Séquard syndrome.

Level of evidence: Case report, Level IV.

ÖZET

Brown-Sequard sendromu, medulla spinalisin tek taraflı yaralanması sonucu yaralanma seviyesinin altında, aynı tarafta motor güçsüzlük ve derin duyu kaybı, karşı tarafta ise ağrı ve ısı duyusunun kaybı ile karakterize nörolojik bir durumdur. En sık neden spinal travmalardır. Bu olgu sunumunda kifoskolyoz cerrahisi sonrası korreksiyon bölgesinde medulla spinalisin dolaşımının bozulması sonucu gelişen Brown-Sequard Sendromunu sunmayı amaçladık.

Anahtar Kelimeler: Kifoskolyoz, idiopatik skolyoz, komplikasyon, nörolojik defisit, Brown-Sequard sendromu

Kanıt Düzeyi: Olgu sunumu, Düzey IV

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INTRODUCTION

Brown-Séquard syndrome is a neurological condition characterized by motor weakness and deep sensory loss on the same side as the lesion, and loss of pain and heat sensation on the opposite side under the level of the lesion, after unilateral injury of the spinal cord[4,5,8]. The most common reason is spinal trauma, and other etiologies are radiation necrosis of the spinal cord, spinal metastasis, multiple sclerosis, and infections[1,3].

In the literature, Brown-Séquard syndrome that has developed after scoliosis surgery has been reported rarely. In this study, we aim to present a case of Brown-Séquard syndrome that developed as a result of disruption of the circulation of the spinal cord at the correction site after scoliosis surgery.

CASE REPORT

A male patient aged 20 was admitted to our clinic due to deformity in the back, and lower back and back pain. In the preoperative examination of the patient, he had scoliosis opening in the thoracic region towards the left and kyphosis in the dorsal region. His lumbar lordosis was normal (Figure-1.a,b).

Muscle strength was 5/5 at both lower and upper extremities. The patient had no shoulder or chest asymmetry. The rib hump was measured to be 2 cm. The bilateral deep tendon reflexes were normal and the bilateral Babinski reflex was negative. On evaluation of the radiological examinations, the Cobb angle was 30° and the dorsal kyphosis was 80°. There were no features in the history or family history. T4–L1 posterior instrumentation was planned as the surgical treatment and he received surgery under elective conditions (Figure-1.c and d).

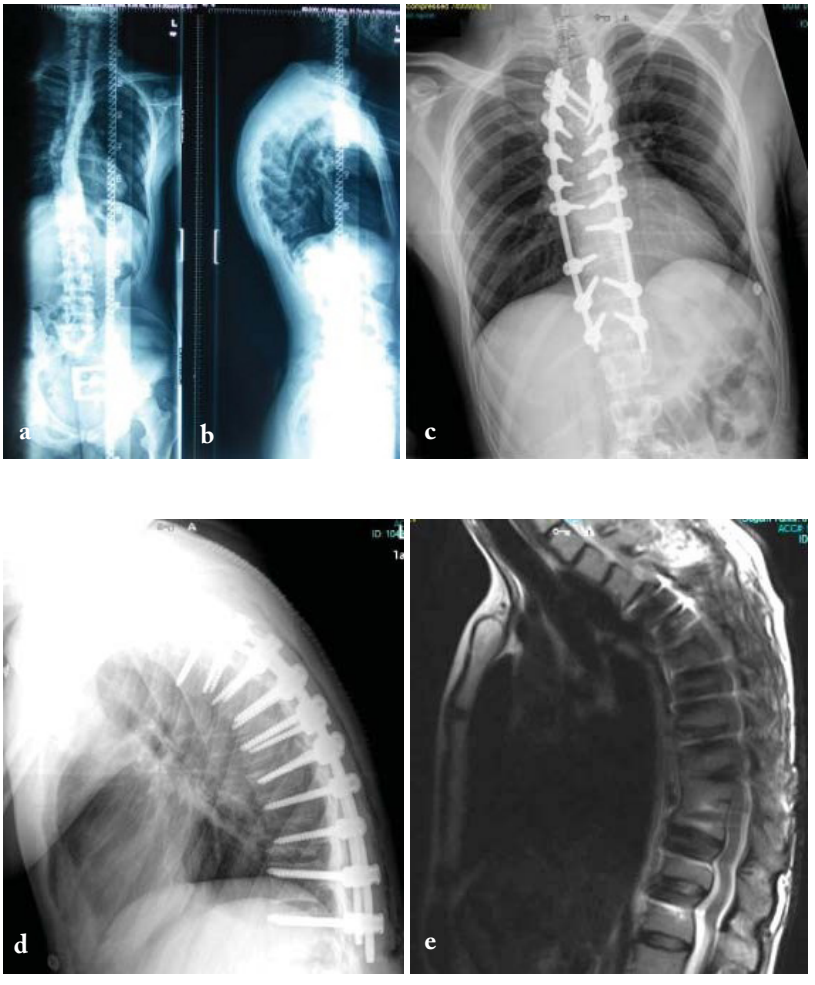

Figure-1. a. Preoperative antero-posterior X-ray of the patient, **b.** lateral X-ray, **c.** postoperative antero-posterior X-ray **d.** lateral X-ray, **e.** postoperative CT image

In the postoperative period, pain in the left lower leg and loss of heat sensation in the right lower extremity developed in the patient. For detection of possible root damage, computerized tomography was taken on the first day postoperatively and it was observed that the screws were localized in the pedicle. On the third day postoperatively, it was detected by MRI that the neural tissues were completely intact (Figure-1.e).

Intravenous corticosteroid infusion was applied to the patient for symptomatic treatment and a PAFO application was performed for the left lower extremity to prevent leg flexion contracture. On the fifth day postoperatively, the left ankle dorsiflexion was relatively regained, but loss of pain and heat sense continued in the right upper extremity. The patient was discharged on the sixth day postoperatively.

In polyclinic follow-up of the patient, it was observed that the lower leg completely returned to normal with physiotherapy at six months postoperatively. The sensory defect did not improve after one year of follow-up.

DISCUSSION

Complications that develop after scoliosis surgery can be grouped into three main groups: general medical complications, technical complications and late complications. General complications include those due to anesthesia, wound infection, and pulmonary and gastrointestinal problems. Technical complications include neurological damage, bone fracture, internal organ injuries, and development of dural ruptures. Late complications can include instrumentation problems, pseudoarthrosis, the loss of lumbar lordosis (flat back deformity), body decompensation, and late infections.

The most problematic complication after the surgical treatment of scoliosis is the development of neurological damage. This is rare, but can cause major problems for both the patient and the surgeon. The most common reason for this is undetected spinal cord compression.

Also, malposition of the transpedicular screws into the canal, displacement of the hook and rods into the spinal canal, and the disruption of spinal cord circulation due to hypercorrection can cause neurological damage[3,10].

Neurological damage can result from obstruction or spasm of the Adamkiewicz artery, and can also be due to overstretching of the spinal cord[3,10]. The published neurological damage rate was 0.60% with the CD (Cotrel–Dubousset) instrumentation system, 0.23% with the Harrington instrumentation system and 0.86% with the use of sublaminar fibers[2,9,10]. Brown-Séquard syndrome that develops after scoliosis surgery performed under elective conditions, as in our case, is rarely seen, although it has been previously reported in the literature. In a study by MacDonald et al., the frequency was reported to be 0.48% (1/206)[6]. Mac-Thiong et al., in a clinical series that included nine cases, reported the development of Brown-Séquard syndrome during prospective follow-up in the second year postoperatively, resulting in removal of the implant[7].

Today, there are two methods to prevent these neurological complications, Stagnara's wake-up test and spinal cord monitorization. Stagnara's wake-up test should be applied during surgery to prevent neurological complications, and if the result is positive, the instrumentation should be immediately removed and the operation should be ended. The aim of spinal cord monitorization is to evaluate real and reliable spinal cord function in potentially dangerous surgical approaches, such as the surgical treatment of scoliosis. Thus, early changes in spinal cord function can be widely detected. There can be false positives with both methods. However, it is important to perform and record monitorization, to provide the medico-legal safety of the surgeon.

It is obvious that scoliosis surgery is open to neurological complications. Complications can be minimized with the development of new technology, a separate evaluation of each patient by an orthopedist, and planning each treatment strategy according to the patient. Perioperative monitorization can be helpful in order to prevent neurological complications.

REFERENCES

1. Devinsky O, Cho ES, Petito CK, Price RW. Herpes zoster myelitis. *Brain* 1991; 114: 1181-1196.
2. Freeman BL. Scoliosis and Kyphosis. In: Canale S.T (Ed.), Campbell's Operative Orthopaedics, 10th Edition. Mosby, Philadelphia, Volume 2, 2003; pp: 1751-1837.
3. Herring JA (Ed.). *Tachdjian's Pediatric Orthopaedics*. 3rd Edition, W.B. Saunders Company, New York 2002; pp: 213-299.
4. Kızılay F, Akça G, Karaali K, Kazan S, Uysal H. Herpes Zoster Miyeliti. *Turk Norol Derg* 2011; 17: 200-203.
5. Kraus JA, Stuper BK, Berlit P. Multiple sclerosis presenting with a Brown-Séquard syndrome. *J Neurol Sci* 1998; 156: 112-113.
6. MacDonald DB, Al Zayed Z, Al Saddigi A. Four-limb muscle motor evoked potential and optimized somatosensory evoked potential monitoring with decussating assessment: results in 206 thoracolumbar spine surgeries. *Eur Spine J* 2007; 16 Suppl 2: S171-187.
7. Mac-Thiong JM, Parent S, Poitras B, Joncas J, Labelle H. Neurological outcome and management of pedicle screws misplaced totally within the spinal canal. *Spine* 2013; 38(3): 229-237.
8. Moon SJ, Lee JK, Kim TW, Kim SH. Idiopathic transverse myelitis presenting as the Brown-Séquard syndrome. *Spinal Cord* 2009; 47: 176-178.

9. Wilber RG, Thompson GH, Shaffer JW, et al. Post-operative neurological deficits in segmental spinal instrumentation: A study using spinal kord monitoring. *J Bone Joint Surg* 1984; 66-A: 1178-1187

10. Winter RB, Denis F, Lonstein JE, Garemella J. Techniques of surgery. MOE'S Textbook Of Scoliosis and Other Spinal Deformities. 3rd Edition, Philadelphia:W.B Saunders Company, 1995; pp: 133-217.