







A Rare Disabling Complication of Diabetes Mellitus: Diabetic Lumbosacral Radiculoplexopathy

Diabetes Mellitusun Engelliliğe Yol Açan Nadir Bir Komplikasyonu: Diyabetik Lumbosakral Radikülopleksopati

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ABSTRACT Diabetic lumbosacral radiculoplexopathy (DLSRP) a rare complication of diabetes mellitus is a peripheral neuropathy presenting with hip and leg pain weakness of involved extremity and wasting of proximal muscles. As it is very rare sometimes it may be difficult to consider and diagnose this entity. Herein we report a 62-year old woman presented with lower extremity weakness and pain that had no known DM until she had admitted to emergency service with these symptoms. Upon clinical suspicion physical examination, laboratory and imaging tests; electromyographic studies revealed DLSRP. After immunomodulatory treatment and physical therapy program, the patient had marked improvement in symptoms and signs. DLSRP must be considered in patients presenting with acute hip and leg pain together with proximal weakness and must be differentiated from other pathologies.

Keywords: Diabetes mellitus; diabetic neuropathies; immunomodulation; rehabilitation

ÖZET Diabetes mellitusun (DM) nadir bir komplikasyonu olan diyabetik lumbosakral radikülopleksopati (DLSRP) kalça ve diz ağrısı, tutulan ekstremitede güçsüzlük ve proksimal kaslarda zayıflık ile kendini gösteren bir periferik nöropatidir. Çok nadir olarak görüldüğünden ayırıcı tanı açısından göz önünde bulundurmak ve tanı koymak zor olabilir. Biz burada acil servise alt ekstremitede güçsüzlüğü ve ağrıyla başvuran ve o zamana kadar DM tanısı olmayan 62 yaşında kadın hastayı sunuyoruz. Klinik şüphe sonrası fizik muayene, laboratuvar ve görüntüleme testleri ve elektromiyografik çalışmalar DLSRP tanısını ortaya koydu. İmmünomodülatör tedavi ve fizik tedavi programı sonrası hastanın semptom ve bulgularında belirgin iyileşme görüldü. DLSRP akut kalça ve bacak ağrısı ile proksimal kas güçsüzlüğü ile başvuran hastalarda akıldan tutulmalı ve diğer patolojilerden ayırıcı tanısı yapılmalıdır.

Anahtar Kelimeler: Diabetes mellitus; diyabetik nöropatiler; immünomodülasyon; rehabilitasyon

Diabetes Mellitus (DM) is one of the most common metabolic disorders. Worldwide prevalence of DM estimated 8.3% as per the Diabetes Atlas 2012.¹ DM may be asymptomatic for many years and may present with its complications. Diabetic neuropathy, a microvascular complication of DM is defined as peripheral nerve dysfunction diagnosed by excluding other reasons such as genetic, traumatic, nutritional, infectious, toxic and neoplastic agents. Peripheral neuropathy prevalence is 30-50% in course of DM.² Diabetic Lumbosacral radiculoplexopathy (DLSRP) is most common form of asymmetric peripheral neuropathies seen in DM and a rare disabling condition. DLSRP or so called diabetic amyotrophy is char-

acterized with acute hip pain, proximal muscle weakness and atrophy. It begins with severe unilateral pain in the back, hip or thigh and can spread to the other side within weeks to months.^{3,4} DLSRP is usually seen among older patients especially over age 50. The development of this neuropathy is often not associated with glucose control or the duration of the disease. In this report, a patient diagnosed with DLSRP is presented and discussed.

CASE REPORT

CLINICAL, LABORATORY AND RADIOLOGIC ASSESSMENT

A 62-year old patient with no known DM history had suddenly developed lower extremity weakness. She had admitted to emergency service and then transferred to intensive care unit (ICU) with diabetic ketoacidosis. The patient had been followed in ICU for six days and insulin and oral antidiabetic treatment had been started. Her weakness had spread to right side 2 weeks later. She had aching and knife-like pain and numbness. She was ambulated with wheelchair for 2 months. She had a history of essential hypertension for one year. Physical examination findings were as follows: She was cooperated and oriented. Blood pressure was 140/100 mm Hg. Pulse rate was 84/min. Cranial nerves and upper extremity neurologic examination were within normal limits. Lumbar range of motion was restricted at the end of range for extension and lateral flexion. Range of motions of hips and knees were within normal limits. She had atrophy in both thighs. According to Medical Research Council (MRC) Scale muscle strengths of hip flexors, right hip adductors, left hip adductors, hip extensors, knee flexors and knee extensors were 2/5, 2/5, 1/5, 4/5, 4/5 and 2/5 consecutively. Strengths of other muscles were normal. Sensorial examination was normal. Patella reflexes couldn't be achieved. Achilles reflexes were normal. No pathologic reflex obtained.

LABORATORY AND IMAGING FINDINGS

Laboratory investigations including complete blood count, erythrocyte sedimentation rate, C-reactive protein, muscle enzymes, rheumatoid factor, vita-

min B12, thyroid hormone levels and tumor markers were within normal limits. Abdominal ultrasonography (USG) showed no abnormality except grade 1 hepatic steatosis. Cranial magnetic resonance imaging (MRI) detected nonspecific ischemic gliotic lesions in right thalamus, periventricular subcortical white matter and left centrum semiovale. Lumbar MRI showed right paramedian protrusion and central protrusions at L2-3, L4-5 and L5-S1 levels respectively. No nerve compression or spinal stenosis were found. Finally, lower extremity arterial Doppler USG showed no meaningful obstruction or stenosis.

ELECTROMYOGRAPHIC FINDINGS

Median, ulnar, radial, sural and superficial sensorial conduction tests showed minimal slowing and slight decrease in amplitudes. No sensorial action potential was obtained in bilateral saphenous nerve conduction test. Peroneal motor conduction tests showed minimal slowing and slight decrease in amplitudes. Tibial nerve motor conduction tests were normal. F-Wave studies of median, tibial and peroneal nerves were normal. Electromyographic (EMG) investigation of left vastus lateralis and adductor magnus and right rectus femoris and adductor longus muscle showed spontaneous denervation potentials and neurogenic motor unit potentials. Left tibialis anterior, extensor digitorum brevis, gastrocnemius medial head, biceps femoris muscle short head and right vastus lateralis, adductor longus muscle needle EMG studies were normal. Paraspinal muscle needle EMG studies were normal. According to Storh's method compound muscle action potentials for left side was lower than right side.⁵ In the light of all these signs and tests patient had accepted as diabetic amyotrophy with distal symmetric axonal sensorimotor neuropathy and hospitalized into physical medicine and rehabilitation clinic.

MEDICAL TREATMENT AND PROGNOSIS

During her stay in rehabilitation clinic oral antidiabetic medications and insulin doses were regulated. 0.4 mg/kg intravenous immunoglobulin (IVIG) treatment was administered to the patient

for 5 days. For neuropathic pain symptoms pregabalin treatment was started. Femoral nerve blockage was made with 3 cc lidocaine applied under 2.5 cm inguinal ligament and 2 cm lateral to femoral artery and transcutaneous electrical nerve stimulation (TENS) were applied for 30 minutes with conventional TENS mode. Neuromuscular electrical stimulation was applied to quadriceps femoris muscles with 0.3 msn frequency and 20 Hz. Physical rehabilitation program consisted of range of motion and strengthening exercises, balance and coordination exercises and ambulation training with walker was started. After treatment neuropathic pain was decreased from 8 to 4 on visual analog scale. Muscle strength of hip flexors and quadriceps increased to 4/5 according to MRC. She could ambulated with forearm crutches

DISCUSSION

DLSRP syndrome usually affects tip 2 diabetic patients and more frequently males over age 50 years.^{3,6} Although prefers tip 2 diabetic patients, tip 1 diabetic patients can also be affected.⁴

Pathogenesis of DLSRP remains unclear. Both ischemic and metabolic causes had been accused. Hyperglycemia activates numerous metabolic pathways like polyol pathway, protein kinase C (PKC) pathway advanced glycation end products (AGE) pathway and hexosamine pathway and these pathways acts in mitochondrial reactive oxygen species (ROS) production resulting in neuroinflammation and vascular impairment leading to diabetic neuropathy.⁷ Nerve ischemia, inflammatory infiltration, and vasculitis are found in most severe forms of proximal diabetic neuropathy. Overall the distal symmetric polyneuropathy in diabetes is caused mainly by metabolic causes, the asymmetric manifestations are mainly of vascular origin.^{8,9} There is no biologic marker for DLSRP, however in some cases cerebrospinal fluid protein and erythrocyte sedimentation rate may be elevated.¹⁰

The development of DLSRP is usually not dependent to control of blood glucose or duration of DM.¹¹ DLSRP may be the first sign of DM like in

our report. This rare complication of DM usually begins unilaterally with severe pain in the back, hip or thigh and may spread to other extremity.^{12,13} Patients usually complain about standing up from sitting position or chair due to weakness. Sensorial loss may be seen and distal symmetric sensorimotor neuropathy may accompany.

Sometimes it may be very difficult to diagnose DLSRP especially spinal stenosis and lumbar disc herniation must be ruled out to prevent unnecessary surgery.¹⁴ The most important misdiagnosis is L4 syndrome, which may lead to unnecessary surgery. Co-existence lumbar disc herniation, spinal stenosis and DLSRP have been reported.¹⁵ Dermatomal pain and hypoesthesia are characteristics of lumbar disc diseases but weakness is prominent in DLSRP. Also bilateral weakness is rare in lumbar disc pathologies. In diabetic patients insulin neuritis is another challenging condition leading to reversible acute severe distal limb pain, peripheral nerve fiber damage and autonomic dysfunction, preceded by a period of rapid glycemic control.¹⁶

Clinical course of DLSRP is variable. Progression of disease varies from 2-18 months. Also recovery or improvement may prolong up to 4 years.^{4,17} DLSRP usually has a good prognosis; but overall symptomatic improvement is rare; residual symptoms such as fatigue, residual weakness, walking difficulties may be seen.¹⁸

Management of DLSRP is focused on pain and glycemic control. However, the role of glycemic control on prognosis is doubtful.^{4,12} Active physiotherapy and exercises with assistant of orthoses if needed were advised.¹⁹ For pain relief neuropathic pain agents may be used. We achieved a good pain relief with pregabalin and TENS for our patient. There is no effective treatment modality for DLSRP due to lack of clinical trials. The immunomodulatory therapy was first described by Bradley who had used prednisone and cyclophosphamide for five patients and four patients had improved with treatment.¹⁰ Krendel et al, was used immunotherapy with different immunomodulatory drugs in 21 patients with diabetic neuropathy, in all patients in both groups worsening of neuropathy stopped and

improvement started with beginning of the treatment.²⁰

Intravenous immunoglobulin (IVIG) treatment was also used in another case reports and good outcomes were achieved in the literature. We also used IVIG treatment for our patient as 0.4 mg/kg/day for five days and acquired clinical improvement although complete resolution of disease couldn't be achieved.

For neuropathic pain, narcotic analgesics, tricyclic antidepressants, selective noradrenaline re-uptake inhibitors (SNRI), gabapentin and pregabalin can be used. As a conclusion in patients with acute hip pain and proximal weakness DLSRP must be considered and differential diag-

nosis must be made. MRI and ENMG may be helpful to rule out lumbar disc diseases and to make diagnosis. Early diagnosis may decrease mortality and may prevent or decrease disability. IVIG and other immunomodulatory may be used for DLSRP. Neuropathic treatment agents may be used for pain relief. Physical therapy and rehabilitation program may improve walking and weakness.

Conflict of Interest

Authors declared no conflict of interest or financial support.

Note: *Informed consent form was obtained from the patient*

REFERENCES

- Guariguata L. By the numbers: new estimates from the IDF Diabetes Atlas Update for 2012. *Diabetes Res Clin Pract.* 2012;98:524-5.
- Maser RE, Steenkiste AR, Dorman JS, et al. Epidemiological correlates of diabetic neuropathy. Report from Pittsburgh Epidemiology of Diabetes Complications Study. *Diabetes.* 1989;38:1456-61.
- Bastron JA, Thomas JE. Diabetic polyradiculopathy: clinical and electromyographic findings in 105 patients. *Mayo Clin Proc.* 1981;56:725-32.
- Coppack SW, Watkins PJ. The natural history of diabetic femoral neuropathy. *Q J Med.* 1991;79:307-13.
- Oh SJ. *Clinical Electromyography: Nerve Conduction Studies.* Section II. Advanced section. p.252: 3rd ed. Philadelphia: Lippincott Williams & Wilkins; 2003.
- Garland H. Diabetic amyotrophy. *Br Med J.* 1955;2:1287-90.
- Sandireddy R, Yerra VG, Areti A, et al. Neuroinflammation and oxidative stress in diabetic neuropathy: futuristic strategies based on these targets. *Int J Endocrinol.* 2014;2014:674987.
- Johnson PC, Doll SC, Cromey DW. Pathogenesis of diabetic neuropathy. *Ann Neurol.* 1986;19:450-7.
- Tracy JA, Engelstad JK, Dyck PJ. Microvasculitis in diabetic lumbosacral radiculoplexus neuropathy. *J Clin Neuromuscul Dis.* 2009;11:44-8.
- Bradley WG, Chad D, Verghese JP, et al. Painful lumbosacral plexopathy with elevated erythrocyte sedimentation rate: a treatable inflammatory syndrome. *Ann Neurol.* 1984;15:457-64.
- Pasnoor M, Dimachkie MM, Barohn RJ. Diabetic neuropathy part 2: proximal and asymmetric phenotypes. *Neurol Clin.* 2013;31:447-62.
- Casey EB, Harrison MJ. Diabetic amyotrophy: a follow-up study. *Br Med J.* 1972;1:656-9.
- Chokroverty S, Reyes MG, Rubino FA. Bruns-Garland syndrome of diabetic amyotrophy. *Trans Am Neurol Assoc.* 1977;102:173-7.
- Hirsh LF. Diabetic polyradiculopathy simulating lumbar disc disease. Report of four cases. *J Neurosurg.* 1984;60:183-6.
- Cho KT, Kim NH. Diabetic amyotrophy coexisting with lumbar disk herniation and stenosis: a case report. *Surg Neurol.* 2009;71:496-9.
- Knopp M, Srikantha M, Rajabally YA. Insulin neuritis and diabetic cachectic neuropathy: a review. *Curr Diabetes Rev.* 2013;9:267-74.
- Barohn RJ, Sahenk Z, Warmolts JR, et al. The Bruns-Garland syndrome (diabetic amyotrophy). Revisited 100 years later. *Arch Neurol.* 1991;48:1130-5.
- Dyck PJ, Engelstad J, Norell J, et al. Microvasculitis in non-diabetic lumbosacral radiculoplexus neuropathy (LSRPN): similarity to the diabetic variety (DLSRPN). *J Neuropathol Exp Neurol.* 2000;59:525-38.
- Garland H. Diabetic amyotrophy. *Br J Clin Pract.* 1961;15:9-13.
- Krendel DA, Costigan DA, Hopkins LC. Successful treatment of neuropathies in patients with diabetes mellitus. *Arch Neurol.* 1995;52:1053-61.