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CAUDA EQUINA SYNDROME THAT DEVELOPED AFTER LUMBAR DISC PROSTHESIS: CASE REPORT

LOMBER DİSK PROTEZİ SONRASI GELİŞEN KAUDA EKİNA SENDROMU: OLGU SUNUMU

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SUMMARY:

Cauda equina syndrome is a fairly rare complication that can occur after lumbar disc prosthesis surgery. A 28-year-old male received surgery for lumbar disc hernia, and was given posterior lumbar disc prosthesis by a microsurgical method. He was admitted to hospital one month later with cauda equina syndrome caused by posterior migration of the lumbar disc prosthesis and compression of the spinal cord. The prosthesis was surgically removed. Here, the indications and complications of lumbar disc prosthesis are discussed, considering the literature. This case is reported due to its rarity.

Key words: lumbar disc prosthesis, cauda equina syndrome, surgical treatment, complications.

Level of evidence: Case report, Level IV

ÖZET:

Kauda ekina sendromu lomber disk protezi operasyonlarından sonra oldukça nadir görülen bir komplikasyondur. 28 yaşında erkek hasta mikro cerrahi yöntemle lomber disk hernisi ve posterior lomber disk protezi operasyonu geçirmiştir. 1 ay sonra lomber disk protezinin posteriora migre olmasıyla spinal kordu sıkıştırması sonucu kauda ekina sendromu ile kliniğe müracaat etmiştir. Hasta opere edilerek protez çıkarılmıştır. Bu çalışmada, bu olgu sunumu vesilesi ile lomber disk protezlerinin endikasyonları ve özellikle komplikasyonları literatür gözden geçirilerek tartışılmaya çalışılmıştır. Olgu nadir olduğu için sunulmuştur.

Anahtar Sözcükler: Lomber disk protezi, kauda ekina sendromu, cerrahi tedavi, komplikasyon.

Kanıt Düzeyi: Olgu sunumu, Düzey IV.

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INTRODUCTION:

With lumbar disc hernia (LDH), the surgical indications can be cauda equina or conus medullaris syndrome, rapidly progressive motor deficit, and conservative pains that do not respond to physiotherapy[10]. Techniques such as macrodiscectomy, microdiscectomy, endoscopic discectomy, percutaneous arthroscopic discectomy, and anterior lumbar discectomy are applied in LDH surgery[10]. The most widely-used technique worldwide is lumbar microdiscectomy. While lumbar disc prosthesis (LDP) is rarely used in LDH surgery, this is commonly used in the surgical treatment of degenerative disc disease[10].

Problems with degenerative disc disease (DDD) are structural instability and dysfunction of the disc. The resulting discogenic pain is very uncomfortable for the patient. The last resort and the gold standard in the treatment of chronic lower back pain caused by disc degeneration is the application of LDP[11,12]. LDP should protect movement, stability and normal functions, and should also reduce the expected degeneration of adjacent segments[9].

Nowadays, there are prostheses such as Charite, Maverick, Prodisc, Flexicore and Kniflex that can be used with CE approval[15]. The LDP can be placed by an anterior transperitoneal or retroperitoneal approach at the L5–S1 level, or can be placed by anterolateral lumbotomy or an anterior retroperitoneal approach at the L4–5 level[9].

An anterior approach is used for LDP surgery in almost all cases. However, the NUBAC system that has recently started to be used can be used after posterior discectomy, although clinical studies are insufficient[10]. NUBAC is the first articulating nucleus disc prosthesis that has been optimally designed to respect the lumbar anatomy, kinematics and biomechanics, with a unique two-piece construction manufactured from polyether ether ketone (PEEK), with an inner ball/socket articulation[1].

This case study presents a rare case in which discectomy using a lumbar microsurgery technique with a posterior approach was applied and a NUBAC was placed after discectomy, which caused cauda equina syndrome that resulted in re-admittance one month after surgery. Here, we present the first report of a case with cauda equina syndrome as a complication of LDP.

CASE PRESENTATION:

A 28-year-old male patient was admitted to hospital with acute weakness in the legs and severe pain complaints. In a neurological examination, neurological deficit was present as 3/5 proximal and 2/5 distal muscle strength in the right lower extremity, and 3/5 proximal and distal muscle strength in the left extremity. There was urine and fecal retention. Cauda equina syndrome was suspected. From the patient's medical history, it could be seen that disc operation was performed with lumbar microsurgery 35 days previously, and a prosthesis had been placed to protect spinal movement. The patient had no postoperative complaints. In a lumbar direct X-ray, it could be seen that the intervertebral implant, tracked with radiopaque marks at the L4–5 levels, had moved to the posterior. In lumbar magnetic resonance imaging (MRI), an image of a foreign object coming through the L4–5 intervertebral disc level and filling the spinal canal was observed (Figure-1).

The patient was operated on, and the piece compressing the canal was thought to be a lumbar PEEK cage.

An attempt was made to reach the cage from the old laminectomy site by re-entering the previous incision site with the help of microscopy, but because the spinal cord was severely congested, a total laminectomy was performed in order to prevent damage. During surgery, it was discovered that the material was the PEEK LDP displaced to the posterior (Figure-2).

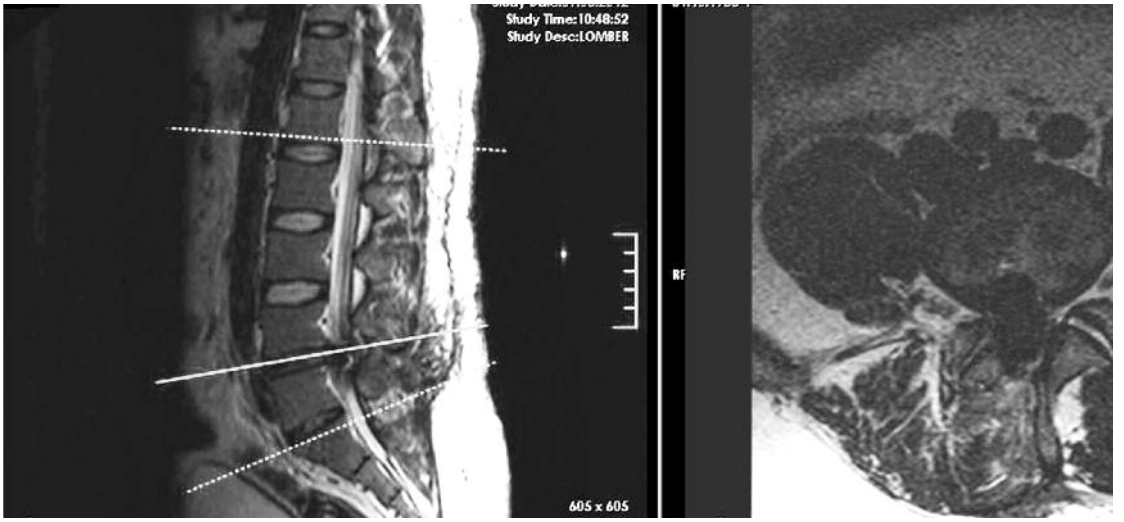

Figure-1. Preoperative lumbar MRI; image of a foreign object that comes through the L4–5 intervertebral disc level and fills the spinal canal

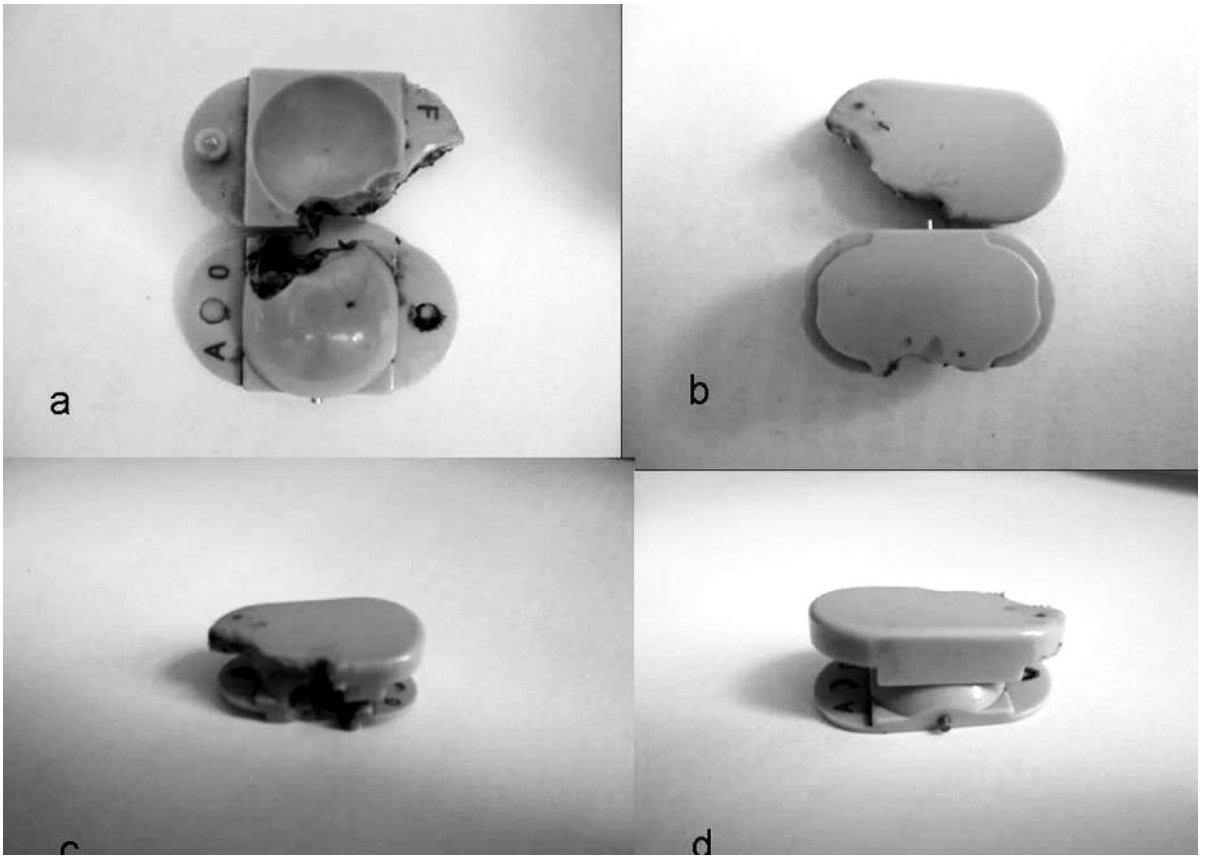

Figure-2. Lumbar disc prosthesis removed from L4–5 level **a)** open top version of the prosthesis **b)** the top and bottom of the prosthesis, **c)** the front of the prosthesis, **d)** rear view of the prosthesis.

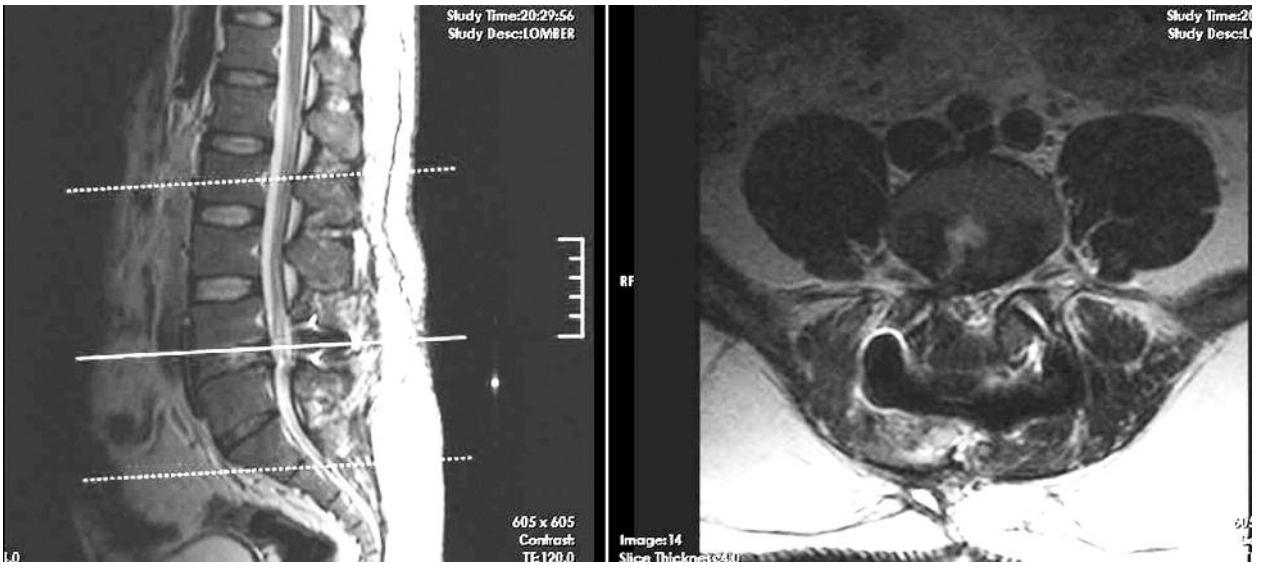

Figure-3. Postoperative lumbar MRI: removal of foreign object at L4–5 level and posterior fusion

The implant was removed with proper retraction, by touring around the edge of the implant with a high speed cycle and compacting it to the proper size. Posterior pedicular fixation was performed due to the young age of the patient, in order to prevent the possibility of future instability developing (Figure-3).

Advanced improvement occurred in the early postoperative deficit of the patient, and he was transferred to the Physical Medicine and Rehabilitation (PM&R) clinic for mobilization after follow-up.

DISCUSSION:

Lumbar disc prosthesis (LDP) is the technique most commonly used in recent years for the surgical treatment of degenerative disc diseases. The aim of LDP is to remove discogenic pain in the damaged segment, to protect the movement of this segment, and to prevent loads that can develop on the upper and lower adjacent discs[10]. The criteria for the application of LDP include patients between 30 and 50 years old, with no injury of the rear column, who have received no benefits from conservative treatment that has been applied for at least four weeks, have pain during discography, have chronic discogenic pain at a single level (DDD), and whose intervertebral disc height is at least 4 mm[12]. While disc herniation causing radiculopathy and lower back pain is considered to be a contraindication in the literature[5], we think that anterior disc prosthesis can be used in certain cases that have radiculopathy.

Nowadays, there are two types of disc prostheses: total disc prosthesis and disc nucleus prosthesis[2,3]. Unlike total disc replacement, disc nucleus prosthesis protects the current structures such as the annulus, end plates and ligaments[4,7]. The NUBAC system, which has recently begun to be used, performs the same process from the posterior, but there are limited clinical studies in the literature[10]. NUBAC is the first articulated disc nucleus prosthesis to be produced from polyether ether ketone (PEEK), and it has an inner ball/socket articulation and consists of two unique pieces[1]. As this device has a wider contact area, it provides distribution of the load, reduction of the contact stress, and reduction of the collapse risk.

PEEK is one of the most suitable materials for spine articulation devices, providing biocompatibility and biodurability[3].

There are three major types of LDP. The first is metal-on-plastic (high molecular weight polyethylene), such as "Charite artificial disc" (Depuy Spine Inc.) and ProDisc (Synthes Inc.). The second type is metal-on-metal, such as Flexicore (Stryker Spine) and Maverick (Medtronic USA). The newest form is a material that contains a nucleus, allowing axial loading, and is similar to natural fiber mesh annulus, but there are no clinical studies on this type[16]. The parts of the LDP upper and lower faces that attach to the vertebrae should be serrated to fit, and they should enter the vertebral upper and lower end plates to prevent slippage. Disc prostheses are divided into two groups in terms of the placement: vertebral and intervertebral prostheses. In the middle of the upper and lower faces of vertebral prostheses, there are extensions and thin metal nails that provide primary stability by attaching to the end plates of the prosthesis and sticking into the vertebral corpus. In intervertebral prostheses, there is no extra nail or extension that attaches to the vertebrae, only convexity[10]. In our case, the upper and lower parts of the NUBAC system that was used were totally flat, and there was no possibility for attachment to the vertebral end plates. This is thought to be one of the reasons that this product migrated backwards from the disc level.

While a posterior surgical approach was used with 30 patients to place the NUBAC prosthesis, a retroperitoneal transpsoas end lateral approach over the anterior column was used with the remaining nine patients. The levels treated with the posterior approach were L5–S1 in 17 cases and L4–5 in 13 cases. With a posterior approach, a short paramedian longitudinal skin incision is performed when the patient is in a prone position. The fascia and muscle tissue are retracted by an incision. Traditional laminotomy and flavectomy are performed. The nucleus pulposus is carefully removed after a 6 mm annulotomy, the nerve root is gently pushed through the edge and a suitable NUBAC is placed[1].

Complications can be observed during or after LDP placement. With an anterior approach, while major vascular injuries can be seen at a rate of 1.9–2.9% [6], intra-abdominal organ injuries and retrograde ejaculation due to damaged sympathetic plexus nerves can be seen at a rate of 0–4.1% [14]. Severe risks resulting from the use of an implant can cause dura and vascular injuries due to misplacement of the implant, the use of improper sizes, embedding the implant to the spine, and migration of the implant back and forth. In prostheses applied by a posterior approach, the risks are dural and neural injury, instability due to facet resection and migration of the prosthesis to the posterior[10]. Balsano et al. used NUBAC for 39 patients in their study and found no intraoperative or postoperative vascular or neurological complications in any of them. Our case is the first case using the NUBAC system where a patient developed cauda equina syndrome in the postoperative period.

In a study performed by Sasani et al. in 2009, vascular injury occurred in only two of the 30 patients for whom Maverick disc prosthesis was applied by an anterior approach, and there were no other complications[13]. Punt et al. used SB Charite LDP with 75 patients by an anterior or anterolateral approach in 2008. They found that collapse was present in 39 patients, the disc prosthesis was too small for 24 patients,

36 patients had adjacent disc degeneration, 11 patients had degenerative scoliosis, 25 had facet joint degeneration, anterior migration was present for six patients, two patients had posterior migration, and there was metal fracture for ten patients[9].

Cauda equina syndrome is rarely seen but it is an important clinical situation. It is often associated with large and inferior-located disc herniation. Rarely, it can be observed after epidural hematoma, infection, primary or metastatic mass, trauma or surgery[8]. This syndrome, which is rarely seen among the complications resulting from lumbar discectomy surgery, developed in our case due to the migration of the implant to the posterior. This result emphasizes that a microdiscectomy approach should be primarily used in LDH surgical treatment. LDP should be used for patients where LDH is accompanied by DDD, and it should not be used for patients with severe radiculopathy and a disc hernia migrating to the canal. An anterior or posterior approach and suitable disc prosthesis should be chosen, and a prosthesis that is suitable to the disc level should be prepared.

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