Evaluation Of Surgical Outcomes Of Cervical Disc Disease By Using X-Ray

Direkt Grafi Kullanılarak Servikal Disk Hernisinin Cerrahi Sonuçlarının Değerlendirilmesi

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Abstract
This study investigated symptoms, physical examination findings and cervical roentgenograms of patients who were surgically treated for single level cervical disc disease. The purpose of our study is to compare and present radiological and clinical findings in preoperative and postoperative groups. Anterior cervical microdiscectomy and fusion with using peek cage was applied to patients. Verbal definition scale was used for clinical evaluation of 44 patients that were operated at Tepecik Education and Research Hospital between September 2008 to September 2009. Pretreatment and post treatment data were compared. According to verbal definition scale, 19 patients had unbearable pain, 23 patients had severe pain, 1 patient had moderate pain before surgery. After the operation, 1 patient had moderate, 1 patient had mild pain. There was no significant difference between preoperative and postoperative lordosis angles and neighbor lower disc height. However comparison of pretreatment and post treatment disc height, neighbor upper disc height and segment angles revealed statistically significant difference. Anterior cervical discectomy and fusion with peek cage is withstanding treatment method for cervical disc disease. This procedure provides both clinical and radiological improvement.
Key words: Cervical, discectomy, spinal fusion, kyphosis, lordosis, polyetheretherketone.

Özet
Bu çalışmanın amacı tek seviye servikal disk hastalığı nedeni ile anterior mikrodiskektomi ve peek kafes uygulanmış hastaların cerrahi öncesi ve sonrası dönemde semptomları, muayene bulguları ve servikal grafileri karşılaştırılarak yapılan işlemin hastanın postüründe ve şikâyetlerinde ne gibi değişikliklere yol açtığı değerlendirilerek servikal lordozun klinikle ilişkisini araştırmaktır. Eylül 2008-2009 tarihleri arasında İzmir Tepecik Eğitim ve Araştırma Hastanesi Nöroşirürji kliniğinde opere edilen 44 hastanın klinik değerlendirmesinde ağrı sözel tanımlama skalası kullanıldı.44 hastanın 22'si kadın, 22'si erkekdi. Hastaların yaşları 28-71 arasında değişiyordu. Yaş ortalaması 42,6 ± 9,5 du. Operasyon öncesi 19 hastada dayanılmaz, 23 hastada ciddi, 1 hastada orta, 1 hastada hafif ağrı varken, operasyon sonrası sadece 1 hastanın orta, 1 hastanın hafif ağrısı mevcuttu. Lordoz açıları ve komşu alt disk mesafe yüksekliği preoperatif ve postoperatif istatiksel olarak karşılaştırıldığında aradaki farkın istatiksel olarak anlamlı olmadığı saptandı. Ancak disk mesafe yüksekliği, komşu üst disk mesafe yüksekliği ve segment açıları değerlerinin preoperatif ve postoperatif dönemde karşılaştırılması sonrasında istatiksel olarak anlamlı farklılık olduğu sonucuna varıldı. Anterior servikal diskektomi ve peek kafes uygulaması servikal disk hastalığında oldukça başarılı bir yöntemdir. Bu yöntemle hem klinik hem radyografik başarı sağlanabilmektedir.
Anahtar kelimeler: Servikal, diskektomi, spinal füzyon, kifoz, lordoz, polietereterketon.

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Introduction

Changes at cervical spine are inevitable results of aging process. Cervical disc height is greater at the ventral region which helps to normal cervical lordosis. As the ventral height of disc distance decreases due to degenerative spondylotic process, lordotic posture decreases and disappears [1]. The collapse of disc distance and vertebra causes anterior displacement of dural sac and spinal cord. Being the first examination method in patient who applied with complaint of neck pain ,cervical x-rays should be first examination methods in patient with diagnosis of cervical disc disease [1,2]. Flattening of cervical spine, narrowing of intervertebral disc space may be early findings where cervical spondylosis may be seen at late stage [1,3].

Pioneer studies of Cloward and Smith-Robinson popularized the anterior procedures with or without fusion at cervical disc disease since 1960s [1,2,4]. Theoretically the goals of anterior discectomy with fusion are lack of complication, succesful arthrodesis, restoration of disc height and primarily conservation of cervical lordosis. We hypothesize that the relation of improvement of the involved segment with clinical findings is more important. Therefore, the changes of cervical lordosis and segment angles are compared with literature.

Materials and Methods

Anterior cervical microdiscectomy and fusion with using peek cage was applied to patients. Verbal definition scale was used for clinical evaluation of 44 patients that were operated at Tepecik Education and Research Hospital between september 2008 to september 2009. Informed consent form was taken from every patient.

As radiologic findings, the height of level operated, neighbour disc heights, lordosis angle (LA) and segmental angles (SA) for each case were determined. The assessment was carried out 2 times in the manner of preoperative and postoperative 1st year for each case. Preoperative and postoperative LA and SA of both groups were measured by Harrison posterior tangent method [2].

LA is measured as the angle between lines drawn at posterior borders of C2 and C7 vertebraes on cervical roentgenograms. Kyphosis is defined as angle<0 degree, lordosis is defined as as angle>10 degrees. Angles between 0-10 degrees are defined as cervical straigthening (Figure 1).

Figure 1. X-ray roentgenogram showing the servical lordotic angle measurement.

SA is measured as the angle between line passing through posterior of C2 corpus and line connecting posterior borders of upper and lower neighbor vertebraes of the operated segment (Figure 2). Kyphosis is defined as angle <0. Lordosis is defined as angle equal to1 or >1. The sick disc and neighbour disc heights are measured on lateral x-rays at corpus midpoints. After anterior cervical microdiscectomy, we used polieteretercarbon cages (Tıpmed Medical Ind. Co. Ltd, Izmir, Turkey) with 5 degrees angle for spinal fusion.

SPSS v.19 software (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. All comparisons were tested bilaterally with alfa=5% error ratio. Values obtained with measuremnt were tested for normal distribution and non parametric alternative methods were used for comparison of groups. Mann-Whitney U test and Wilcoxon signed rank tests were used for comparison between the groups. $p<0.05$ was accepted significant statistically.

Figure 2. X-ray roentgenogram showing the segmental angle measurement.

Results

44 patients who were operated for cervical disc disease between September2008-September 2009 at Tepecik Training and Research Hospital were included in the study. 22 (50%) of the patients were female, 22 (%50) were male. The mean age was 42.3 (28-71) with 9.5 standard deviation. Pretreatment VDS (Verbal Descriptor Scales) documented (Table 1) unbearable pain in 19 patients, severe pain in 23 patients, moderate pain in 1 patient and mild pain in 1 patient. Posttreatment VDS documented moderate pain in 1 patient and mild pain in 1 patent. Posttreatment pain regressed with medical treatment.

Table 1. Verbal Descriptor Scales

Verbal Descriptor Scales	Degree
No pain	0
Slight pain	1
Moderate pain	2
Severe pain	3
The Most Intense Pain Imaginable	4

Discitis occured at only 1 patient as a complication of the surgical proecedure and was treated medically. C6-7 segment was involved in 47.7% ,C5-6 segment was involved in 38.6% of the patients.Mean pretreatment disc height (DH) was 3.1 mm (1-5 mm), mean posttreatment DH was 3.7 mm (2-5). Mean pretreatment lower DH was 3.7 mm (2-5mm), mean posttreatment lower DH was 3.8 mm (2-5mm). Mean pretreatment upper DH was 3.3 mm (1-5 mm), mean posttreatment upper DH was 3.5 mm (1-5mm) (Table 2).

Table 2. Pre and postoperative DH, BADH and AADH values

		n	Medium	Standart deviation	Min (mm)	Max (mm)
Preoperative	DH	44	3,1	0,9	1	5
	Lower DH	44	3,7	0,9	2	5
	Upper DH	44	3,3	0,8	1	5
Postoperative	DH	44	4,6	0,9	2	7
	Lower DH	44	3,8	1	2	5
	Upper DH	44	3,5	0,8	2	5

Mean preoperative LA was 13.5 degrees (-10-50 degrees), mean postoperative LA was 14.7 degrees(0-39 degrees). When pretreatment LA was considered 5 patients (11.4%) had kyphosis, 15 patients (34.1%) had flattening, 24 patients(54.5%) had lordosis. When posttreatment LA was considered 19 patients (43.2%) had flattening, 25 patients(56.8%) had lordosis (Table 2). Mean preoperative SA was 8 degrees (-20 - +35 degrees), mean postoperative SA was 9.6 degrees (-12 - +30 degrees). When pretreatment SA was considered 7 patients (15.9%) had kyphosis, 6 patients (13.6%) had flattening, 31 patients (70.5%) had lordosis. When posttreatment LA was considered 4 patients (9.1%) had kyphosis, 2 patients (4.5%) had flattening, 38 patients (86.4%) had lordosis (Table 3-5).

Table 3. Preoperative and postoperative lordosis angle and segment angle values

		n	Medium	Standart deviation	Min (mm)	Max (mm)
Preoperative	LA	44	13,5	13,8	-10	50
	SA	44	8	12,4	-20	35
Postoperative	LA	44	14,7	9,8	0	39
	SA	44	9,6	9,8	-12	30

Table 4. Cross-comparison of preoperative and postoperative angles of lordosis

			Postoperative		
			Flattening	Lordosis	Total
Preoperative	Kyphosis (n:5)	Patient	5	0	5
	Flattening (n:15)	Patient	8	7	15
	Lordosis (n:24)	Patient	6	18	24
	Total		19	25	44

Table 5. Cross-comparation of preoperative and postoperative angles of segments

		Post-op			
		Kyphosis	Flattening	Lordosis	Total
Pre-op	Kyphosis	1	2	4	7
	Flattening	0	0	6	6
	Lordosis	3	0	28	31
	Total	4	2	38	44

Disc heights (DH, upper DH, lower DH), SA, LA were evaluted for statistical significance by using Wilcoxon test (Table 6). LA and lower DH pretreatment and posttreatment comparisons did not revealed stattistically significant difference, however DH, upper DH and SA documented stattistically significant difference.

Table 6. Disc heights, LA, and SA were evaluted for statistical significance by using Wilcoxon test

Preoperative	DH	Lower DH	Upper DH	LA	SA
Postoperative	DH	Lower DH	Upper DH	LA	SA
Z	-5.489 (a)	-1.232(a)	1.998(a)	1.043(a)	1.990(a)
P	0,000	0,218	0,046	0,297	0,047

Discussion

Changes at cervical spine are inevitable results of aging. Cervical sponylosis, defined as cervical disc disease and degeneration of intervertebral discs,is more common at sixth decade. Epidemiological studies documented that cervical disc disease is most common at fifth decade [5,6]. This study is compatible with literature concerning both female and male patients' age. Although a slight male predominance is reported we have not found difference concerning gender. We compared LA and SA pretreatment and post treatment values to have idea on femele and male vertebra differences. We did not find difference of angles accoding to gender. Similar to lomber region cervical disc disease is more common at segments that move with greater angle and therefore vulnerable to trauma and degeneration. C5-6 and C6-7 segments are more commonly involved in this study, consistent with literatüre [5,6].

Anterior approach is the most preferred method for surgical treatment of cervical disc disease. This approach can be applied with or without fusion. Simple discectomy may be insufficient in terms of preserving intervertebral disc distance and obtaining fusion [3,7,8]. The aim of spinal instrumentation is vertebral stabilization and fusion of bone. The cages that are used alone or with fixation systems are succesful both clinically and radiographically [3]. This helps for regaining disc distance height as well as obtaining normal posture. This study documented statistically significant increase in disc distance height.

The operations without fusion decrease both disc distance height and foraminal height. This may lead to brachalgia [9]. We used peek cage to preserve disc distance height, to prevent foraminal stenosis and to obtain fusion. The increase in disc distance height postoperatively may be accapted as as indicator of peek cage's sufficiency. Kerman et al. reported similar results in their studies including 85 patients one of the complications of graft use is graft colleapse and graft collapse.Incidence of this complications is 8% in literature [10]. We did not observe these complications in the early period. Another study including 85 patients also reported absence of these complications [10]. Sharp points of peek cage enter the vertebra and hold to superior and inferior vertebral end plates. Early return to work and daily activities, decreasing of operation time, graft site complications, analgesic need and hospital stay are advantages of peek cage usage. Another advantage of using peek cage is the titanium content allows following up with both roentgenogram and MRI.

A study involving 146 patients underwent anterior cervical discectomy and fusion reported 78% postoperative healing. Pain evaluation with VBS documented 93% total pain cure in our patients. This reinforces the the thought that applied procedure is one of the good alternatives.

Providing the balance in sagittal alignment of vertebral column is one of the goals of spinal operations. Normal cervical axis is lordosis between 10-40 degrees [11,12]. The angles between neighbour segments is different. Development of cervical kyphosis is documented in patients without fusion. Cervical lordosis develops at 20 th intrauterine week. Therefore it is accepted as primary curve like thoracal kyphosis [1,13]. Cervical lordosis is a result of posterior wedging of cervical discs [7]. The development of Luschka joints and proper spinal matching are important for cervical lordosis. All of these factors make measurement of sagittal curves challenging [2,4,14].

In this study evaluation of preoperative LA documented kyphosis in 5 patients (11.4%), flattening in 15 patients (34.1%), lordosis in 24 patients (54.4%). Postoperative evaluation revealed flattening in 19 patients (43.2%), lordosis in 25 patients (56.8%). The statistical analysis revealed no significance of any change between preoperative and postoperative LA. As a result patients who have preoperative kyphosis and flattening could not have lordosis in the early postoperative period. Whereas there was an increase in flattening. The total correction of kyphotic malalignment carries risc of spinalijury and cervical instability [15,16]. Therefore different authors stated that flattening of kyphotic posture rather than obtaining lordosis is a better approach [15,17,18]. The early postoperative results of our study is consistent with this comment. We evaluated the results of a study including 57 patients who underwent anterior cervical discetomy with fusion , with or without plate screw. Segmental axis gained 5.67 degrees lordosis in the group with plate screw where the group without plate screw gained 2.5 degrees kyphosis. The change in cervical lordosis was not significant in both groups and neighbor segments compensated the situation [11,19]. However in our study segment angles improved statistically despite lack of statistical improvement in lordosis angles.

In conclusion; anterior cervical microdiscectomy and fusion with using peek cage is one of the alternative treatments for cervical disc disease. Maintain normal posture is one of the goals of cervical disc disease treatment. However too much effort to restore lordosis does not seem purposeful.

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