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INCIDENCE OF DYSPHAGIA AFTER SINGLE LEVEL ANTERIOR CERVICAL DISCECTOMY WITH PROSTHESIS VERSUS BLADE CAGE IMPLANTATION: A RETROSPECTIVE STUDY

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ABSTRACT

Objective: This study compared complaint of dysphagia in patients that underwent bladed peek cage or prosthesis implantation following single level anterior cervical discectomy.To understand that is there any risk factors of dysphagia after anterior cervical spinal surgery

Materials and Methods: Ethical approval was obtained from Üsküdar University Chair of Non-Interventional Studies Ethnics Committee with no: 61351342/AGUST 2021-01. Fourty patients who underwent bladed peek cage or prosthesis implantation after single level anterior cervical discectomy in our clinic in 2019 were enrolled in our study. Group A included 10 male and 10 female patients who underwent bladed peek cage implantation after single level anterior cervical discectomy, while group B included 10 male and 10 female patients who underwent prosthesis implantation after the same procedure.

Results: Both groups were evaluated in early postoperative period, first postoperative month and third postoperative month. There was no significant change in frequency of dysphagia between both groups in the early postoperative period, first postoperative month and third postoperative month. There were 5 female and 3 male patients (total: 8) with dysphagia in group A in the early postoperative period. Group B included 4 female and 3 male patients (total: 7) with dysphagia in the early postoperative period.

Conclusion: No difference was identified in terms of dysphagia between patient groups that underwent bladed peek cage or prosthesis implantation after single level anterior discectomy. Dysphagia complaint in both groups detected in the early postoperative period totally resolved by the end of third postoperative month.

Keywords: Anterior cervical discectomy, bladed peek cage, prosthesis, dysphagia

INTRODUCTION

Several risk factors have been reported regarding development of dysphagia after anterior cervical spinal surgery; however, almost all of them are controversial[1].

The results of a meta-analysis study indicated that anterior cervical plate use, multiple surgical levels, upper cervical spinal surgery and rhBMP-2 use in women are risk factors for development of dysphagia after anterior cervical spinal surgery. Normal swallowing function involves more than 30 muscles, which can be performed up to 600 times daily. Dysphagia may occur at any stage of swallowing. These are oral preparation and transport stage, which includes sucking, chewing and transport of liquid or solid foods; pharyngeal phase, including initiation of swallowing reflex, transport of foods downwards, closure of airway to prevent suffacation or aspiration of food, and the esopgaheal phase composed of loosening and contraction of the openings in upper and lower sections of esophagus in order to transport food to stomach[2,3].

Being aware of the patients with dysphagia in our rehabilittaion programs, we followed-up patients, who underwent single level discectomy surgery, for 3 months and aimed to observe how the surgery, materials used in surgery and different peroperative methods reflected in the outcome.

MATERIALS AND METHODS

Ethical approval was obtained from Üsküdar University Chair of Non-Interventional Studies Ethics Committee with no: 61351342/AUGUST 2021-01.

Retrospective questioning of the 40 patients (20 male, 20 female), who underwent single cervical disc hernia surgery followed by bladed peek cage or prosthesis placement as a part of anterior discectomy, in the year 2019 in our spine center. Patients were divided into 2 groups. Group A included 10 male and 10 female patients with bladed peek cage implantation after single level anterior cervical discectomy, while group B included 10 male and 10 female patients who underwent

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prosthesis implantation after the same procedure. Dysphagia was questioned by an independent investigator by asking the patient 5 questions on the first postoperative day. Dysphagia was categorized into 4 degrees by weighting (Bazaz Yoo dysphagia severity scale). The same test was repeated with an independent investigator in the first and third postoperative months. Results were collected and analyzed by using IBM SPSS Statistics Version 25. Normality analysis were performed by using Kolmogorov-Smirnov test, Shapiro-Wilk test, Histogram and Variance coefficient. Related groups were compared by using Wilcoxon test. P<0.05 was considered significant (Table 1)[4,5].

RESULTS

Both groups were evaluated in early postoperative period, first postoperative month and third postoperative month (Table 2). There was no significant change in frequency of dysphagia between both groups in the early postoperative period, first postoperative month and third postoperative month. There were 5 female and 3 male patients (total: 8) in group A in the early postoperative period. Group B included 4 female and 3 male patients (total: 7) with dysphagia in the early postoperative period. There were no patients with dysphagia at the end of 3 months, which concludes that all patients with dysphagia in both groups had spontaneously recovered.

Statistical Analysis

Data were collected and analyzed by using IBM SPSS Statistics Version 25. Normality analysis were performed by using Kolmogorov-Smirnov test, Shapiro-Wilk test, Histogram and Variance coefficient. Related groups were compared by using Wilcoxon test. P<0.05 was considered significant (Table 3).

Data is analyzed by using IBM SPSS Statistics version 25. Homogenicity of variants was evaluated with Levene's test for Equality of Variances. Normality analysis were performed by using Shapiro-Wilk test, Shapiro-Wilk test, Histogram and Variance coefficient. Comparison of independent groups was performed with Mann-Whitney U non-parametric test. P<0.05 was considered significant.

DISCUSSION

Dysphagia is the most common postoperative complaint of anterior spinal surgery, and is usually transient. It most frequently starts in the immediate postoperative period; however, it can also develop 1 month after the surgery. Dysphagia incidence has a wide spectrum in the first postoperative week, varying between 1% and 79%. Moderate and long-term postoperative (1 week to 6 weeks) rates of incidence are 28% to 57%. Meta-analysis and case reports indicated higher rates[5]. The meta-analysis by Bazaz et al.[4] reported a postoperative dysphagia incidence of max. 71% within the first two postoperative weeks; however, it decreases in the following months. Nonetheless, 12% and 14% of patients may encounter permanent dysphagia 1 year after the surgery.

Our patients with dysphagia in the beginning described gradually improving condition within 2 months, and all patients denied dysphagia by the end of third month.

The cause of postoperative dysphagia is not clearly uncovered. Various causes are suggested. These should be questioned in order. Peroperative retraction may cause edema. When vessel and nerve packets are separated and prevertebral fascia is reached, the retractors used for exposing the surgical site work by medially retracting the esophagus and trachea. Even when the surgery lasts short, the esophageal edema may cause dysphagia[6,7]. When retractors are evaluated, the commonly Cloward[9] retractors may lead to edema with this mechanism. Similarly, the Casper[10] et al. retractors, designed to maintain a better sight of the area, which are still commonly used, push the medial wall, probably causing edema in the same fashion[8-10]. The Ozer[11] retractor used in our hospital does not cause a continuous compression, resulting in less edema and is more suitable for use. In this respect, it is less traumatic and useful in anterior cervical surgery.

Arthritic changes, anterior cervical osteophytic formations secondary to diffuse idiopathic skeletal hyper-osteosis or anterior cervical hyper-osteophytosis, mechanical compression on esophagus or inflammation causing fibrosis and adhesions may lead to dysphagia. The removal of anterior osteophytes during surgery highly reduces dysphagia incidence[12,13]. Two prospective comparative and one prospective study has investigated whether the plates used in anterior cervical discectomy cause dysphagia with similar mechanisms[14-16]. A non-randomized prospective study reported that thicker plates are significant associated with dysphagia[14]. The other study revealed smaller dysphagia incidence with non-compressive

Table 1. Bazaz-Yoo scoring in patients with dyaphagia[4,5]

	Dysphagia episode (as stated by the patient)	
Dysphagia	**Liquid**	**Solid**
None	None	None
Mild	None	Mild
Moderate	None/mild	Intermittently (with some foods like meat or bread)
Severe	Yes	Frequent (most of solid foods)

Table 2. Patients and groups enrolled in the study with their dysphagia scores

Groups	Patient no	Gender	Dyspagia after surgery?	How long	Score	Dysphagia 3 months later?	Eresion barrier?	Operation
	1	F	(-)			(-)	No	Bladed peek cage
	2	F	(+)	1 Month	1	(-)	Yes	Bladed peek cage
	3	F	(+)	2 Month	2	(-)	Yes	Bladed peek cage
	4	M	(-)			(-)	No	Bladed peek cage
	5	M	(-)			(-)	No	Bladed peek cage
	6	F	(-)			(-)	No	Bladed peek cage
	7	F	(+)	3 Month	3	(-)	No	Bladed peek cage
	8	M	(+)	4 Month	4	(-)	Yes	Bladed peek cage
	9	M	(-)			(-)	Yes	Bladed peek cage
Group A	10	M	(-)			(-)	Yes	Bladed peek cage
	11	M	(-)			(-)	No	Bladed peek cage
	12	F	(+)	3 Days	1	(-)	No	Bladed peek cage
	13	F	(+)	2 Weeks	4	(-)	Yes	Bladed peek cage
	14	M	(+)	1 Month	3	(-)	No	Bladed peek cage
	15	F	(-)			(-)	No	Bladed peek cage
	16	M	(+)	2 Weeks	3	(-)	No	Bladed peek cage
	17	F	(-)			(-)	Yes	Bladed peek cage
	18	F	(-)			(-)	No	Bladed peek cage
	19	M	(-)			(-)	No	Bladed peek cage
	20	M	(-)			(-)	No	Bladed peek cage
	1	M	(-)			(-)	Yes	ACDF prosthesis
	2	F	(+)	1 Week	4	(-)	No	ACDF prosthesis
	3	M	(-)			(-)	No	ACDF prosthesis
	4	M	(-)			(-)	No	ACDF prosthesis
	5	M	(+)	2 Weeks	4	(-)	No	ACDF prosthesis
	6	F	(-)			(-)	No	ACDF prosthesis
	7	M	(+)	2 Weeks	2	(-)	Yes	ACDF prosthesis
	8	M	(+)	6 Month	2	(-)	No	ACDF prosthesis
	9	M	(-)			(-)	No	ACDF prosthesis
Group B	10	F	(-)			(-)	No	ACDF prosthesis
	11	F	(-)			(-)	No	ACDF prosthesis
	12	M	(-)			(-)	Yes	ACDF prosthesis
	13	F	(+)	3 Weeks	4	(-)	Yes	ACDF prosthesis
	14	F	(+)	1 Week	2	(-)	No	ACDF prosthesis
	15	M	(-)			(-)	No	ACDF prosthesis
	16	F	(+)	3 Days	3	(-)	Yes	ACDF prosthesis
	17	F	(-)			(-)	No	ACDF prosthesis
	18	F	(-)			(-)	No	ACDF prosthesis
	19	F	(-)			(-)	Yes	ACDF prosthesis
	20	M	(-)			(-)	Yes	ACDF prosthesis

M: Male, F: Female, ACDF: Anterior cervical discectomy and fusion

Table 3. Statistic results for both groups

Test statistics	
	Dysphagia score
Mann-Whitney U	195,000
Wilcoxon W	405,000
Z	-0.156
Asymp. Sig. (2-tailed)	0.876
Exact Sig. [2*(1-tailed Sig.)]	0.904
a. Grouping Variable: Group	
b. Not corrected for ties.	
There is no significant difference between both groups (p>0.05)	

zero-profile plates[16]. No plate is used in our patient series, only stand-alone cage is utilized. This may have led to better outcome.

The use of bone morphogenic protein has been proposed to cause dysphagia by inflammation. Two retrospective and one prospective non-randomized controlled study investigated the risk regarding use of rhBMP-2 for postoperative dysphagia. rhBMP-2 has been suggested to cause increase in esophageal motility and dysphagia by inducing inflammation and edema in esophagus and surrounding soft tissues[17-20]. In this respect, rhBMP-2 use has the potential to cause more severe consequences like edema, airway stenosis or nerve entrapment and United States Food & Drug Administration has warned against its use in anterior cervical surgery. rh-BMP-2 is not used in any of our patients, and according to operative reports, the osteophytes have been placed inside the cage by pressing and use of autograft. This way, the induction of inflammatory events by rhBMP-2 was avoided, leading to better outcomes.

Prospective cohort studies of Lee et al.[21] and Bazaz et al.[4] reported that gender is an important risk factor when they identified women with complaint of dysphagia described 6 months after the surgery. On the contrary, a smaller prospective comparative study by Rihn et al.[22] and a retrospective study by Riley et al.[23] did not reveal gender as an important risk factor. Gender was also not an important risk factor in our study.

Graft loss, infection and hematoma are important causes of dysphagia; however, they are not included in this study.

Covering the exposed surfaces during spinal decompression surgery, adhesion barriers constitute a transient, protective physical barrier by isolating the exposed nerve fibers and dura mater from surrounding tissue. They prevent entrapment of nerve fibers by stopping the development of adhesions with epidural fibrosis. They also may limit peroperative exposure of nerve fibers and main dura mater to biochemical irritants. However, no difference was identified with or without using adhesion barriers in early or late postoperative period, we do not consider them useful, especially in single level discectomy.

CONCLUSION

As a result, autograft use with cage leads to successful outcomes in single level anterior cervical discectomy. Use of adhesion barrier has no positive or negative effects. The early postoperative dysphagia gradually improves and lasts for 3 months, and disappears by the end of 3 months.

Ethics

Ethics Committee Approval: Ethical approval was obtained from Üsküdar University Chair of Non-Interventional Studies Ethnics Committee with no: 61351342/AUGUST 2021-01.

Informed Consent: Retrospective study.

Peer-review: Internally peer-reviewed.

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