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Dysphagia in Anterior Cervical Discectomy and Fusion (ACDF) Surgery: a comparison between plating versus stand-alone

Disfagia em Cirurgia de Artrodese Cervical: uma comparação entre via anterior com placa ou cage stand alone

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ABSTRACT

Introduction: *Anterior cervical discectomy and fusion (ACDF) is widely used to treat cervical spine pathologies. However, the use of anterior cervical plating has been associated with postoperative complications, particularly dysphagia.* **Objective**: *to assess whether anterior plating increases the risk of dysphagia when compared to no-plate systems.* **Methods**: *A systematic review and meta-analysis were performed using PubMed (2014–2024) with the terms "anterior cervical discectomy and fusion," "stand-alone," and "plating." Data were extracted from eligible studies on patient demographics, surgical levels, operative time, blood loss, and dysphagia rates. Risk of bias was assessed with the Cochrane Collaboration tool.* **Results**: *Fifty-seven studies comprising 4603 patients were included. Of these, 1396 underwent plating and 3207 underwent no-plate ACDF. Demographics and surgical levels were similar between groups. Plated patients had significantly longer operative times, greater blood loss, and a higher incidence of dysphagia at both initial and final follow-up.* **Discussion**: *The presence of anterior plating correlates with increased surgical trauma, potentially contributing to the higher dysphagia rates observed. Minimally invasive strategies and stand-alone devices may mitigate this risk.* **Conclusion**: *The use of anterior cervical plates is significantly associated with a higher risk of postoperative dysphagia. Avoiding plating in selected cases may reduce morbidity and improve patient outcomes.*

Keywords: *Deglutition Disorders; Neurosurgery; Spine*

RESUMO

Introdução: *A artrodese cervical via anterior (ACDF) é amplamente utilizada para tratar patologias da coluna cervical. No entanto, o uso de placas cervicais anteriores tem sido associado a complicações pós-operatórias, particularmente disfagia.* **Objetivo**: *avaliar se a placa anterior aumenta o risco de disfagia quando comparada com sistemas sem placa.* **Métodos**: *Foram realizadas uma revisão sistemática e uma meta-análise utilizando o PubMed (2014–2024) com os termos " anterior cervical discectomy and fusion", "stand-alone" e "placing". Foram extraídos dados de estudos elegíveis sobre demografia dos doentes, níveis cirúrgicos, tempo operatório, perda de sangue e taxas de disfagia. O risco de viés foi avaliado com a ferramenta Cochrane Collaboration.* **Resultados**: *Foram incluídos cinquenta e sete estudos com 4603 doentes. Destas, 1396 foram submetidas a chapas e 3207 foram submetidas a ACDF sem placa. A demografia e os níveis cirúrgicos foram semelhantes entre os grupos. Os doentes com placas tiveram tempos operatórios significativamente mais longos, maior perda de sangue e uma maior incidência de disfagia tanto no seguimento inicial como no final.* **Discussão**: *A presença de blindagem anterior correlaciona-se com um aumento do trauma cirúrgico, podendo contribuir para as taxas mais elevadas de disfagia observadas. Estratégias minimamente invasivas e dispositivos autónomos podem mitigar este risco.* **Conclusão**: *O uso de placas cervicais anteriores está significativamente associado a um maior risco de disfagia pós-operatória. Evitar o revestimento em casos selecionados pode reduzir a morbidade e melhorar os resultados dos pacientes.*

Palavras-Chave: *Distúrbios de deglutição; Neurocirurgia; Coluna*

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INTRODUCTION

Cervical degenerative disc disease (CDDD) is understood as a continuum of morphological changes in the structure of the spine secondary to mechanical insults. Also known as degenerative cervical myelopathy (DCM), it is considered the main cause of neck pain in adults and the elderly and the main cause of non-traumatic cervical spinal cord dysfunction[1-6].

Anterior cervical discectomy and fusion (ACDF), described in 1958 by Smith and Robinson[6], has become the standard treatment for CDDD associated with myelopathy and/or radiculopathy[7,8]. Since its description, this technique has been widely used and has become one of the most commonly performed surgeries in the cervical spine. It presents good results, is considered safe and is associated with low morbidity[9,10].

Traditionally, the ACDF technique describes the use of a bone graft and anterior cervical plate to increase stability and fusion rates, reduce subsidence and promote better cervical alignment[8,10,11]. However, some studies have linked the interposition of the anterior cervical plate with an increased rate of postoperative dysphagia[10].

Dysphagia is characterized by difficulty swallowing liquid or solid food and can be classified in different ways, either based on the anatomical area affected or its intensity, although the latter is more subjective. Another way of categorizing it is through its evolution, which can be acute, chronic or progressive. In cervical spine surgeries with anterior access, the most prevalent dysphagia is acute dysphagia, of low and medium intensity, which is most often transient[12,15-18]. It is considered a relatively common postoperative complication in this type of surgery, its incidence varies widely in the literature and it can be explained by various pathophysiological mechanisms[12,13].

The purpose of this study is to evaluate and quantify the hypothesis that ACDF surgeries using an anterior cervical plate performed on patients with degenerative cervical spine disease have a higher frequency of dysphagia in the postoperative period compared to surgeries in which no plate is used. The aim, therefore, is to help spine surgeons who are going to perform this procedure to choose the best method on a scientific and statistical basis[12,15-18].

METHODS

The primary objective of this study is to analyze the rate of postoperative dysphagia in patients undergoing ACDF surgery by comparing a group of patients undergoing surgery with an anterior plate system (plate group) with another group of patients undergoing the same surgery, but without the use of an anterior plate (no-plate group).

We presented a systematic review and a meta-analysis following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol. We only considered clinical studies for our analysis (randomized clinical trials, retrospective or prospective case-control studies or case series), presenting the rate of postoperative dysphagia in ACDF surgery with intersomatic devices associated or not with the use of an anterior cervical plate, in patients with cervical degenerative disease with myelopathy and/or radiculopathy.

We performed two independent searches in the PubMed database with a search restricted to the last 10 years. In search 1, we used the keywords "anterior cervical discectomy and fusion" and "stand-alone" and obtained 166 results. In the second search, we used the keywords "anterior cervical discectomy and fusion" and "anterior plating" and found 505 results. This added up to a total of 671 results.

We excluded case reports, literature reviews, systematic reviews, meta-analyses, technical notes, articles that did not evaluate postoperative dysphagia and studies that included patients undergoing surgical techniques other than ACDF. The absence of a postoperative dysphagia assessment was the main reason for exclusion.

Furthermore, we also assessed the characteristics of the study population that could compromise our sample with biases such as: inclusion of patients who had suffered trauma to the cervical spine; surgeries that included corpectomy and posterior approach; cancer patients undergoing cervical radiotherapy; patients who had undergone previous cervical surgery or those with chronic diseases and previous dysphagia (Table 1).

Study selection

Two independent reviewers selected the eligible papers in the two searches. To resolve differences in the selection of articles, a third

Table 1. Bias evaluation of each article in this review based on the Cochrane Collaboration's tool

STUDY - YEAR	SELECTION BIAS		PERFORMANCE BIAS	DETECTION BIAS	ATTRITION BIAS	REPORTING BIAS	OTHER BIAS
	Random Sequence Generation	Allocation Concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective Reporting	Other Sources of Bias
Alhashash et al., 2022[11]	+	+	-	-	+	-	?
Mu et al., 2022[13]	+	+	-	-	+	-	?
Poblete et al., 2022[12]	+	+	-	-	-	-	?
Theologou et al., 2020[14]	+	+	-	-	-	-	?
Xiong et al., 2019[15]	+	+	-	-	-	-	?
Kapetanakis et al., 2017[16]	+	+	-	-	-	-	?
Yeung et al., 2019[17]	+	+	-	-	-	-	?
Lee et al., 2017[18]	+	+	-	-	-	-	?
Overley et al., 2017[19]	+	+	-	-	-	-	?
Tang et al., 2023[20]	+	+	-	-	+	-	?
Chen et al., 2016[21]	+	+	-	-	+	-	?
Yamagata et al., 2017[22]	+	+	-	-	-	-	?
Shin et al., 2014[23]	+	+	-	-	-	-	?
Mostafa et al., 2019[24]	+	+	-	-	-	-	?
Njoku et al., 2014[25]	+	+	-	-	-	-	?
Shi et al., 2015[26]	+	+	-	-	-	-	?
Liang et al., 2021[27]	+	+	-	-	+	-	?
Zhu et al., 2019[28]	+	+	-	-	-	-	?
Zhou et al., 2018[29]	+	+	-	-	+	-	?
Nambiar et al., 2019[30]	+	+	-	-	-	-	?
El-Tantawy et al., 2015[31]	+	+	-	-	-	-	?
Gerszten et al., 2016[32]	+	+	-	-	-	-	?
Shi et al., 2016[33]	+	+	-	-	-	-	?
Zhang et al., 2022[34]	+	+	-	-	-	-	?
Zhang et al., 2022[35]	+	+	-	-	-	-	?
He et al., 2022[36]	+	+	-	-	+	-	?
Guo et al., 2022[37]	+	+	-	-	+	-	?
Xue et al., 2022[38]	+	+	-	-	-	-	?
Sommaruga et al., 2021[39]	+	+	-	-	-	-	?
He et al., 2022[40]	+	+	-	-	+	-	?
Wang et al., 2014[41]	+	+	-	-	+	-	?
Bucci et al., 2017[42]	+	+	-	-	+	-	?
Tabaraee et al., 2015[43]	+	+	-	-	-	-	?
Wang et al., 2014[44]	+	+	-	-	-	-	?
Kim et al., 2014[45]	+	+	-	-	-	-	?
Wang et al., 2019[46]	+	+	-	-	+	-	?
Zhang et al., 2018[47]	+	+	-	-	+	-	?
Liu et al., 2016[48]	+	+	-	-	+	-	?
He et al., 2018[49]	+	+	-	-	-	-	?
Zhang et al., 2016[50]	+	+	-	-	-	-	?
Chen et al., 2015[51]	+	+	-	-	+	-	?
Thind et al., 2022[52]	+	+	-	-	+	-	?
Son et al., 2014[53]	+	+	-	-	-	-	?
Maragkos et al., 2019[54]	+	+	-	-	-	-	?
Li et al., 2016[55]	+	+	-	-	+	-	?
Lonjon et al., 2019[56]	+	+	-	-	-	-	?
El Baz et al., 2019[57]	+	+	-	-	+	-	?
Arts et al., 2020[58]	+	+	-	-	-	-	?
Fisahn et al., 2017[59]	+	+	-	-	-	-	?
Wang et al., 2023[60]	+	+	-	-	+	-	?
Wang et al., 2016[61]	+	+	-	-	-	-	?
Hofstetter et al., 2015[62]	+	+	-	-	+	-	?
Sun et al., 2020[63]	+	+	-	-	-	-	?
Shi et al., 2015[64]	+	+	-	-	+	-	?
Wang et al., 2015[65]	+	+	-	-	+	-	?
Lan et al., 2018[66]	+	+	-	-	+	-	?
Lu et al., 2018[67]	+	+	-	-	+	-	?

reviewer decided whether the studies should be included or not. We only considered papers published in English, assessed them by title, abstract or full text and selected the papers according to the inclusion/exclusion criteria.

After an initial analysis, 129 studies were excluded because of their design (case reports, review studies, technical notes) and 12 because they were in other languages. In addition, 11 studies were present in both searches and had to be excluded. After analyzing the title and abstract, a further 56 studies were excluded. Finally, after reading and analyzing the full text, 406 studies were excluded, leaving a total of 57 studies included in this study (Figure 1 and Table 2).

Data extraction
The data of interest for our research were collected and tabulated for later analysis. From each study, we extracted the number of participants, their mean age, sex, the mean follow-up, operative time, blood loss, number of levels operated, number of patients undergoing surgery with plate systems, self-locking or stand-alone

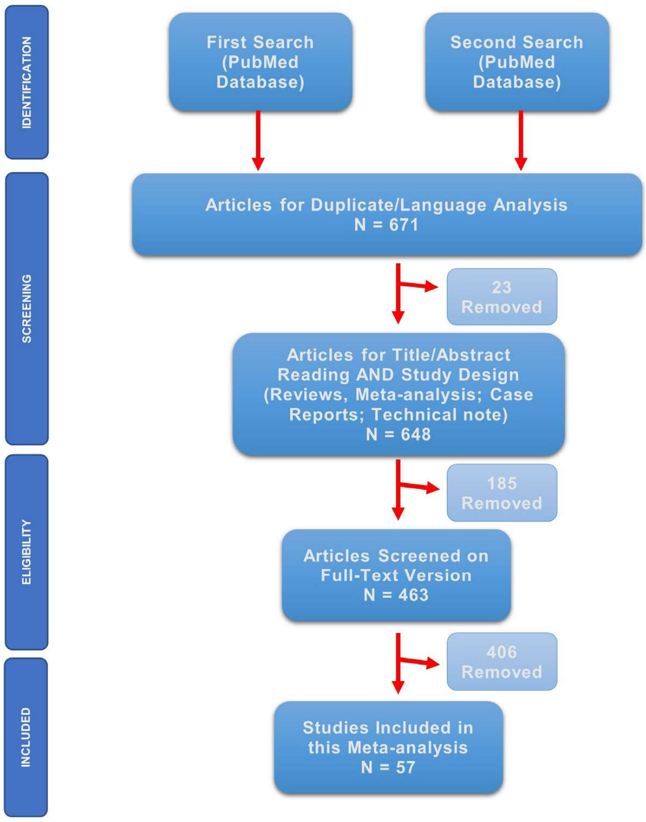

Figure 1. Study flowchart.

Table 2. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Must contain the rate of dysphagia	Patients with other non-degenerative spinal pathologies
Patients with CDDD with myelopathy and/or radiculopathy	Other Languages
Patients who underwent ACDF with or without the use of an anterior plate	Other procedures than ACDF
Studies in English	ACDF surgeries that combine interbody devices with and without a plate in the same patient
Study Design: Randomized control trials, retrospective and prospective case-control or series of cases studies	Study Design: Case reports, systematic review, literature reviews, meta-analysis and technical notes

interbody devices, and number of patients with dysphagia at first and last follow-up.

STATISTICAL METHODS

The chi-square test was used to assess the association between the type of implant used in surgery (plate vs. no-plate) and the presence of postoperative dysphagia, in a contingency table. The contingency table is a two-entry table showing the joint distribution of the frequencies of the two variables. When the p-value was lower than the previously determined significance level (alpha = 0.05) the null hypothesis of independence can be rejected, and it can be concluded that there is an association between the type of surgery and the presence of dysphagia after surgery.

We used the Bonferroni correction to adjust the significance value when performing multiple tests at different follow-ups. The Bonferroni correction is a widely used method to control type I error (false positives) when multiple comparisons are made. To apply the Bonferroni correction, the value of significance (usually 0.05) is divided by the total number of comparisons being made, which is two in the case of the study in question (First and Last Follow Up). As two chi-squared tests were performed (one for the first follow-up and one for the last follow-up), the p-value of 0.05 was divided by 2, resulting in a new significance value of 0.025 for each individual test. Thus, for each chi-squared test, the calculated p-value was compared with the new significance value of 0.025 and if a p-value of less than 0.025 was found the result was considered to be statistically significant after the Bonferroni correction. This approach helps to reduce the risk of finding significant results by chance when multiple comparisons are made.

In order to check the relationship between the number of patients who underwent one, two, three or four levels of surgery and the percentage of patients who developed postoperative dysphagia, we used linear regression to assess the association between the variables. We performed four regressions to measure dysphagia at the first and last follow-up, for patients in the plate and no plate groups. All the regressions present, as explanatory variables, the number of patients operated at one, two, three or four levels and, as a response, the percentage of patients who had postoperative dysphagia at the first and last follow-ups.

RESULTS

Amongst 57 studies reviewed, 41 were retrospective cohorts[19-33,35-37,41,42-44,47,48,50-54,56,61,63,66,67], 10 were prospective cohorts[34,39,40,45,49,55,58-60,64], 1 case-control[46], 4 case series[38,62,65,66] and 1 randomized clinical trial[51].

Patient's Demographics: The present study analyzed 4603 patients. Those patients were divided into two groups according to the type of device used during surgery. In the plate group, 1396 (30.32%) patients underwent ACDF with an anterior cervical plate[27-29,33,35-37,41,42-45,47-49,51-61,63,67-69,71-75]. In the no-plate group, a total of 3207 (69.67%) patients were operated with a system that used intersomatic spacers without plating[19-66]. In the plate group, 644 (47.04%) patients were female, and 725 (52.95%) were male, 27 patients were not identified by gender in this group. In the no-plate group, 1534 (48.14%) were female and 1652 (51.85%) were male, 21 patients were not identified by gender in this group. The mean age of the patients on plate group was 54.4 ± 5.24 years, and in the no-plate group, 54.06 ± 4.67 years.

Surgical Procedure: We were able to collect the number of levels operated of 4137 patients. In the plate group, 632 (48.61%) patients underwent one-level surgery, 337 (25.92%) two-level surgery, 308 (23.69%) three-level surgery and 23 (1.76%) four-level surgery, no information was available about levels operated in 96 patients.[27-29,33,35-37,41,42-45,47-49,51-61,63,67-69,71-75]. Among patients operated with no-plate system (no-plate group), in the stand-alone subgroup, 568 (50.44%) patients underwent one-level surgery, 187 (16.60%) two-level surgery, 230 (20.42%) three-level surgery and 141 (12.52%) underwent four-level surgery[19-75] and in patients operated with self-locking cages, 770 (46.16%) patients underwent one-level surgery, 514 (30.81%) two-levels, 363 (21.76%) three-levels and 21 (1.25%) underwent four-levels surgery. No information was found available about the number of levels operated in 260 patients in the no-plate group and for 43 patients operated at one level in this group, it was not possible to determine if the system was self-locking or stand-alone (Table 3).

Operative time: In the plate group, the mean operative time was 122.55 ± 32.16 min[27-29,35-37,41,42-49,51,52,54-57,59-61,63, 67-69,71-75] and in the no-plate group, 111.61 ± 39.31 min[19,20,22,24,25,27-30,35-36,41,42-52,54-57,59-69,71-75]. Comparing both mean operative times, we disclosed that the use of a no-plate systems reduces operative time.

Blood loss: In the plate group, the average blood loss was 102.72± 39.41 ml[28,29,35-37,41,42-45,48,49,51,54-57,59-61,63,67-69,71-75] and in no-plate group 92.30 ± 75.22 ml[16,20,24,25,28-30,35-37,41,42-46,48-51,54-57,59-61,63,65-69,71-75]. Results showed that the blood loss is lower when ACDF is performed without anterior plate (Table 4).

Post-operative follow-up: The mean postoperative follow-up was 30.85 ± 13.75 months in the plate group[28,29,31,35,37,44,45,47-49,54-56,58-60,63,67-69,71-75] and 30.19 ± 17.82 months in no-plate group[19-23,28,29,31,33,35,37,44-50,54-56,58-60,62-65,67-69,72-75] .The result shows that there is no significant difference in the mean postoperative follow-up time between the groups.

Incidence of dysphagia: In the plate group, a total of 330 (22.90%) patients had dysphagia at the first follow-up[27-29,31,35-37,41,42-45,47-49,51-61,63,67-69,71-75] and 76 (5.97%) patients had dysphagia at the last postoperative follow-up[27-29,31,35-37,41,43-45,48,49,52-56,58-61,63,68,69,71-75]. In the no-plate group, 368 (11.41%) patients had dysphagia at the first follow-up[13-69] and 21 (0.71%) at the last postoperative follow-up[43-46,48-50,52,54-56,58-61,63,65,68-75]. Comparing the number of patients with postoperative dysphagia between groups, we can conclude, with statistical relevance, that the incidence of dysphagia was significantly higher in the plate group at the first follow-up (RR 1.85; 95% CI, 1.62 - 2.13; P < 0.05) and also at the last follow-up (RR 7.93; 95% CI, 4.91 – 12.82; P < 0.05) (Tables 5 and 6).

Table 3. Levels operated in the “no-plate” subgroups (stand-alone vs. self-locking).

	Stand-alone	Self-locking
1-level	568	770
2-levels	187	514
3-levels	230	363
4-levels	141	21

Table 4. Demographic and surgical characteristics.

	“Plate”	“No-plate”
Patients	1396	3207
Female/male	644/725	1534/1652
Mean age (years)	54.4	54.06
Mean follow-up (months)	30.85	30.19
Mean blood loss (ml)	102.72	92.30
Mean operative time (min)	122.55	111.61
1-level	632	1338
2-levels	337	701
3-levels	308	593
4-levels	23	162

Table 5. Number of patients with dysphagia in the plate x no-plate group at the first and last follow-up.

	“Plate”	“No-plate”
First follow-up	330	368
Last follow-up	76	21

Table 6. Risk of dysphagia at first and last follow-up.

	First follow-up	Last follow-up
Risk of exposure (plate)	19.12% [17.33, 21.04]	5.16% [4.13, 6.42]
Risk in the unexposed (stand-alone)	10.29% [9.33, 11.33]	0.65% [0.41, 0.99]
Risk ratio	1.85 [1.62, 2.13]	7.93 [4.91, 12.82]
Risk difference	8.82% [6.72, 10.93]	4.51% [3.34, 5.67]
P-value	<0.0000001	<0.0000001

DISCUSSION

Demographic data: Regarding the patient's profile, there were 2597 (56.29%) men and 2016 (43.70%) women (p = 0.0002). The sex distribution was similar in both groups; there was no statistically significant difference between them, as well as patient's age (53.75 years in the plate group vs. 54.09 years in the no-plate group).

Surgical data: Regarding the number of levels operated, there was a prevalence of single-level surgery, with a rate of 61%. This tendency was similar between both groups. The percentage of patients undergoing two, three, and four-level surgery was also similar between groups. However, there was a statistically significant difference in operative time and blood loss. Patients in the plate group had longer operating times and greater blood loss compared to no-late group patients.

Clinical Data: Dysphagia is a common complication of anterior cervical spine surgery[67]. According to Fountas et al.[9] dysphagia was the most common isolated complication found in their study. The rate of dysphagia reported in the literature is variable, with most studies being retrospective cohort studies with rates ranging from 2 to 60 %[68]. Dysphagia after an anterior approach to the cervical spine can be explained by various mechanisms, which may be related to the graft type, number of levels operated, surgery's duration, and patient's characteristics. The most accepted causes of postoperative dysphagia are esophageal manipulation, local injury to nerve structures, hematomas, local tissue edema and adhesions formed around the esophagus[29,69,70].

The causes of postoperative dysphagia are not well understood, and its etiology seems to be multifactorial. One of the hypotheses is that the mechanical conflict of the plate with the esophagus may be one of the reasons for the development of this complication[71] . The use of an anterior plate in ACDF surgery increases operative time and blood loss because it requires greater dissection for correct placement and fixation in the anterior cervical region. These maneuvers increase the risk of esophageal injury, hematomas, vocal cord paralysis, tissue edema, and esophageal adhesions[72].

The diagnosis of dysphagia can be made from a bedside swallow assessment using validated questionnaires answered by the patient themselves, such as a self-assessment to check for dysphagia and its severity and impact on quality of life. Examples of questionnaires widely used include the Eating Assessment Tool and the Swallowing Quality of Life questionnaire. It is also important to have a speech therapist assess the patient at bedside, observing the act of eating and drinking, tasting liquids of different viscosities and observing whether there is coughing, choking or piecemeal swallowing. In addition, it is possible to carry out more specific and accurate instrumental swallowing studies such as fiber-optic endoscopic evaluation and video fluoroscopic swallowing studies, allowing for more precise treatment recommendations[12,17].

The management of dysphagia should involve a trained multidisciplinary team such as: speech therapists, nutritionists, nurses and doctors. The main aim of treatment is to promote safe swallowing and ensure adequate nutrition and hydration for the patient. Treatment aims to improve the physiology of swallowing, mainly through maneuvers and exercises developed by a speech therapist to rehabilitate the oral and/or pharyngeal phases of swallowing, such as the Mandelsohn maneuver, which improves laryngeal elevation and opening of the upper esophagus, and exercises to improve the function of the lips and tongue during the oral phase of swallowing[12,17].

Fogel and McDonnel (2015) evaluated 31 patients who were elected for surgical treatment of persistent dysphagia after ACDF surgery with a plate. The average time between ACDF surgery and surgery to treat dysphagia was 18 months and all patients had moderate to severe dysphagia. The average follow-up time was 11 months and the questionnaire used was the Bazaz-Yoo dysphagia score. The main intraoperative alteration found was the presence of extensive adhesions connecting the esophagus to the prevertebral fascia and anterior column around the plate. No plate fracture, loosening or loss of screws was found. The proposed approach was to remove the anterior plate and perform lysis of adhesions between the esophagus and the spine. After the surgical approach, at the last follow-up, seventeen patients (55%) showed total improvement in dysphagia. Previous neck surgery with pre-existing dysphagia and larger amounts of adhesions were likely contributing factors in the cases of persistent severe dysphagia. The authors conclude that surgery to remove the plaque and lysis of adhesions improved dysphagia, with an improvement in patient satisfaction and quality of life[74].

In our meta-analysis, we evaluated the incidence of dysphagia during postoperative follow-up. Comparing data from patients who underwent ACDF surgery with a plate and no-plate systems, we concluded that the incidence of dysphagia was significantly higher in patients in the plate group with statistical significance. Similar to the results of our study, the authors Duan et al.[73], in their systematic review and meta-analysis, concluded that the use of an anterior plate system is associated with higher incidences of post-operative dysphagia when compared to the use of a self-locking spacer. Zhang et al.[42] also concluded after analyzing the incidence of dysphagia in postoperative follow-up, that dysphagia is more frequent in patients that underwent ACDF with plating.

On the other hand, the use of the anterior plate reveals the biomechanical advantages of this strategy. The presence of the plate increases the stability of the operated segment and reduces the movement between the graft placed in the intervertebral space and the surface of the vertebrae, increasing the chances of arthrodesis of the operated segment. In this way, the plate not only acts as a barrier to prevent the graft displacing, but also as a support that prevents the graft from collapsing and subsidence into the vertebral endplate. In addition, the plate helps maintain sagittal balance and prevents post-operative kyphosis[75].

Our study also analyzed operative time and blood loss data, concluding that the use of an anterior plate is associated with longer operative time and greater blood loss, with a statistically significant difference. Zhang et al.[42] also found similar results, suggesting that the use of self-locking spacers without the use of a plate has a shorter operative time and less blood loss. These results seem reasonable once the surgery that doesn't require the use of an anterior plate is relatively simpler, requiring less extensive surgical access with less tissue dissection.

It seems reasonable to consider that the cervical plate promotes greater mechanical stability with a greater reduction in the movement of the operated segment, thus facilitating the formation of arthrodesis. For this reason, this strategy of instrumentation should work best in cases where correction of kyphotic deformities, stabilization of unstable fractures or correction of displacements between the vertebrae is expected. The anterior cervical plate continues to perform an important function in ACDF surgeries, but its use should be considered for cases when this is necessary, as its use may be associated with risks such as increased post-operative dysphagia, implant failure and adjacent level degeneration. We believe that for surgeries in cases of degenerative spinal disease with myelopathy and/or radiculopathy without signs of spinal instability, where the main objective is decompression of nerve structures, discectomy with placement of self-locking spacers is sufficient, as they are mechanically efficient and has lower complication rates and a lower incidence of post-operative dysphagia.

LIMITATIONS

There was only one randomized clinical trial in our review, and our analysis included mainly prospective and retrospective cohort studies. There was a significant difference in postoperative follow-up between the studies, regarding the mean time and frequency of follow-up. Some studies did not specify the number of levels operated or which levels were approached, making it difficult to determine if more high or low levels were operated. Our review was limited by the search in only one database, and only studies published in English were considered.

CONCLUSION

The association of an anterior cervical plate in ACDF surgery is a risk factor for postoperative dysphagia. Operative time and blood loss were statistically higher in ACDF with plating. Among patients who underwent plating surgeries, the rate of dysphagia was significantly higher when compared to patients who underwent ACDF with stand-alone cages at the first and last postoperative follow-up. The association of an anterior cervical plate in ACDF makes the surgery more complex and requires a wider surgical route and greater exposure of the anterior cervical region, with consequent tissue devitalization. This may explain the higher rate of dysphagia with the use of this device.

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