Impact of Anterior Spine Surgery on Swallowing Function and Dysphagia: A Retrospective Analysis in a Tertiary Hospital

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Abstract

We found major risk factors for dysphagia in cervical spinal cord injury (C-SCI) patients by assessing clinical features and dysphagia severity, rather than just its presence or absence. This information is essential because people with C-SCI who experience dysphagia have a higher risk of contracting aspiration pneumonia, which can be fatal if left untreated. We hypothesized that by combining the findings of this additional research method with those of other studies, The modified video fluoroscopic dysphagia scale (mVDS) and penetration-aspiration scale have helped us better detect dysphagia characteristics in cervical spinal cord injury (C-SCI) patients. These evaluation techniques improved our comprehension of the subtleties of the illness by allowing us to assess not only the existence or absence of dysphagia but also the degree of symptoms in individuals affected. Video fluoroscopic swallowing studies (VFSS) were performed on all C-SCI patients. We performed an in-depth analysis of the relationship between spinal cord injury and a range of demographic and clinical variables, including age, sex, tracheostomy, the Spinal Cord Independence Measure (SCIM), pulmonary function test (PFT)

results (including FVC, FEV1, the FVC/FEV1 ratio, MIP, and MEP), the Berg Balance Scale (BBS), and activity technique.The front surgical approach exhibited the highest link with dysphagia severity, as measured by the modified video fluoroscopic dysphagia scaleand penetration-aspiration scale, among all clinical parameters. Compared with patients with C-SCI who underwent alternative surgical approaches, patients who received front surgery showed more severe dysphagia symptoms. This conclusion, which came from a thorough multivariate regression analysis, highlights the significance of this clinical factor in determining the seriousness of dysphagia among C-SCI patients. This is a significant consideration since it is one of the gamble factors impacting dysphagia in people with C-SCI. Furthermore, we advise that doctors give front cervical surgery patients' risk of worsening dysphagia special attention. However, larger samples from further prospective studies are needed to improve the accuracy of predictions.

Keywords: Spine, Surgery, Swallowing, Anterior, Dysphagia

1. INTRODUCTION

The anterior cervical spine approach is a surgical technique used to treat a variety of cervical problems, including those affecting the second and fourth cervical vertebrae. This approach is associated with a low incidence of complications and mortality. However, one potential complication of anterior cervical spine surgery is dysphagia, or difficulty swallowing.Dysphagia can be brought about by various variables, including soft tissue swelling, nerve injury, and inflammation. It is most common in the immediate postoperative period, but can also occur later. In most cases, dysphagia resolves on its own within a few weeks(Strohl, et.al. 2020). However, in some cases, it may be necessary to undergo further treatment, such as speech therapy.In order to fully understand postoperative dysphagia following anterior cervical spine surgery, it is important to consider the anatomy of the cervical spine and the mechanisms of swallowing. It is also important to be aware of the risk factors for dysphagia, so that they can be minimized, this study will undertake a thorough literature review. The review will cover a variety of topics, including evaluating dysphagia, its prevalence, normal postoperative development, and examining the pathophysiology at play. The study will also investigate the risk factors for postoperative dysphagia and look at treatment options and preventative measures that are utilized to treat this issue. The review will also go over possible areas for future study in this area to improve our comprehension and treatment of dysphagia after ACSS.

1.1. Definition of Oropharyngeal Dysphagia

Oropharyngeal dysphagia is a difficulty in swallowing that occurs in pharynx, pharynx area behind the mouth and tongue. This is a common complication of foremost cervical spine medical procedure, which is a procedure that is used to treat problems in the neck, such as herniated discs and spinal stenosis, stands as a prevalent consequence (2,3,5-7). Despite its frequent occurrence, several authors concur that dysphagia following ACSS is an inherent side effect of the procedure and not a direct surgical issue.

Any difficulty with swallowing, whether voluntary or involuntary/reflex, may be a symptom of dysphagia, which indicates a problem with the brain's regulation of, or the organs and muscles that facilitate the act of swallowing. When someone has oropharyngeal dysphagia, they have difficulty swallowing food quickly and safely from the mouth to the beginning of the oesophagus(Elsamadicy,et.al.2022). The patient is at high risk of aspirating, or inhaling food or liquid into their lungs. This can be a serious complication, as it can lead to pneumonia or other lung infections. The patient may also have difficulty swallowing liquids, meals, or saliva. This can make it difficult for them to get the nutrients they need, and can also lead to weight loss. When symptoms return more than four weeks after surgery, doctors call it chronic.

Thirty muscles are involved in the average swallow, which may happen as many as 600 times a day. All three stages of swallowing are affected by dysphagia: The gulping process is partitioned into three phases: the oral preliminary stage, the pharyngeal stage, and the esophageal stage. Mouth preparation stage includes sucking, chewing, and transferring food or liquid into the throat. The tongue and lips are used to manipulate food into a bolus, or ball that can be swallowed. The food pellet is then brought down the throat by the tongue.The pharyngeal phase is the start of the swallowing reflex(Aras,et.al. 2022). The larynx, or voice box, rises to close off the airways and throat muscles contract to push the pellets into the esophagus. The epiglottis, a flap of cartilage that covers the opening to the larynx, also helps to prevent food or liquid from entering the respiratory tract.The esophageal phase is the final stage of swallowing. Food pellets travel down the throat, a muscular cylinder that connects the throat to the stomach. The muscles of the throat contract to push the pellet forward and the sphincter at the foundation of the throat relax to allow the pellet to pass into the stomach. Oropharyngeal dysphagia is swallowing disorder that may occur in the oral, pharyngeal, or both stages of swallowing, and it is further

subdivided into four types: difficulty or delay in commencing pharyngeal swallowing, ingestion aspiration, nasopharyngeal spitting, and post-swallowing ingestion residue in the pharynx.

2. LITERATURE REVIEW

Byun et al. (2019) Dysphagia is common among the elderly, particularly following hip fracture surgery. Researchers looked at individuals 65 years of age and older who had hip fracture surgery between 2015 and 2018. 393 female patients and 153 male patients made up the dataset. The study aimed to discover risk factors for dysphagia by taking into account features of surgical procedures, past medical history, recognized risk factors, and categorization by the American Society of Anesthesiologists. We also looked at the odds ratios of dysphagia for other negative outcomes such postoperative pneumonia, ICU admission, and death in the first six months after surgery(Byun,et.al 2019). Blood albumin levels 3.5 g/dL were a risk factor for patients with hip fractures who had dysphagia (5.3% of the time). The research suggests that individuals with low blood albumin levels should have diagnostic tests completed to differentiate dysphagia. Dysphagic individuals also need special precautions taken after surgery to avoid complications.

As a group, Aras et al. Patients with swallowing issues following stroke, traumatic brain injury (TBI), anoxic brain damage, encephalitis, and glioma were studied to compare demographic and clinical characteristics. The point of the review was to assess the effectiveness of restoration in improving swallowing function in this group of patients(Chung, et.al. 2023). In a study with 271 participants, it was shown that stroke patients performed better on the functional oral intake scale (FOIS) than people who had suffered traumatic brain injury (TBI). Notably, therapy resulted in considerable improvement on all three subscales of the Penetration Aspiration Scale (PAS). Additionally, post-rehabilitation, the FOIS and fluid scores of stroke patients with central cerebral artery (MCA) and posterior cerebral artery (PCA) syndromes significantly improved.

As cited in Elsamadicy et al. (2022). Cervical spondylotic myelopathy was treated with an ACDFat the patient's desire. Researchers looked at risk variables and healthcare usage trends in individuals with postoperative dysphagia in this retrospective cohort analysis. Between 2016 and 2017, a total of 17,385 adult patients underwent anterior cervical discectomy and fusion (ACDF) for the treatment of cervical spondylosis, according to the study, which used data from the National Inpatient Sample (NIS). Disabled swallowing after surgery was considered as a grouping factor. Risk-adjusted odds ratios for postoperative dysphagia and increased LOS were determined using multivariate stepwise logistic regression(Kendall,et.al.2016). Longer hospital

stays, greater total admission costs, and higher rates of nonroutine discharge were all seen in the Dysphagia cohort compared to the other groups. A significant independent risk factor for prolonged LOS, postoperative dysphagia was shown to have an odds ratio of 5.37.

According to Strohl et al. Individuals who received a second anterior spinal fusion surgery were studied in this retrospective cohort research. Acute vocal overlap movement impedance (VFMI), which includes dysphagia and dysphonia, was more common than usual, with incidence rates of 25% (18/72) and 52% (37/72). Twenty-one percent (15/72) of patients had rapid VFMI. There was a strong correlation between postoperative dysphagia and VFMI, as was the case with subjective postoperative dysphonia(Miles,et.al. 2021). Three patients with vocal fold motion impairment (VFMI) who needed injectable temporary medialization for voice problems and aspiration participated in the trial. The likelihood of developing acute VFMI was greatly increased by the presence of infection and C7/T1 level involvement. Notably, all patients receiving revision surgery benefited from early consultation with an otolaryngologist, but those treated at the C7/T1 level or those with spinal infections benefited most. The use of anterior cervical discectomy and fusion (ACDF) may also help predict speech and swallowing problems after surgery.

3. METHOD AND MATERIALS

3.1. Population and Study Design

Ulsan University Hospital's IRB approved this study. The Ulsan University Hospital has successfully completed the retrospective data collection for patients with cervical spinal cord injury (C-SCI), which covered the time period from January 2016 to August 2022. The information gathered included a range of demographic and clinical information, such as persistent age, sex, cause of C-SCI, presence of tracheostomy, Spinal Cord Free Estimation score, seriousness of injury, presence of a Levin tube, and pneumonic function test results, including exercise imperative capacity, most extreme inspiratory tension, and greatest expiratory strain.

Inclusion was predicated on meeting the following standards: High signal intensity on T2-weighted cervical spine magnetic resonance imaging (X-ray) is consistent with cervical myelopathy, as defined by board-certified radiologic specialists; Clinically, C-SCI can present with a range of symptoms, including weakness or sensory disturbances affecting the upper and

lower extremities(Kolz, et.al.2021). Additionally, video fluoroscopic swallow studies (VFSS) are conducted to assess dysphagia.

This study concentrated on dysphagia brought on by neurological disorders that neurologists frequently identify, the study included patients with a variety of medical conditions that can cause dysphagia, such as stroke, traumatic mind injury, hypoxic cerebrum injury, mind cancer, engine neuron sickness, Parkinson's illness, and Alzheimer's infection. The concentrate additionally considered past medical conditions that can cause dysphagia, such as cancer of the larynx or tongue or vocal cord loss of motion(Venkatraman,et.al 2022). The examination didn't include patients under 19 years old. All patients with cervical spinal cord injury (C-SCI) who met the inclusion and exclusion criteria were included in the retrospective review. Informed consent was waived for this investigation of past events involving human participants, as per the standards of the Statement of Helsinki.

3.3. Evaluation of Oropharyngeal Dysphagia

Fluoroscopy was used to perform a video fluoroscopic swallow study (VFSS) to determine whether or not dysphagia is present, as well as its degree of severity. The patient consumed several things before, during, and after the VFSS treatment, including water, nectar, rice porridge (with a viscosity varying from 351 to 1750 cP), and cooked rice (with a viscosity more than 1750 cP). First, a 3 mL bolus was administered to each patient, and then two 5 mL boluses were administered(Hoesseini, et.al.2016). Patients with grade I, II, or III dysphagia are fed with a spoon and solid, nectar-like or dilute liquids are administered using a 10 ml syringe. After combining each chemical with barium, the subject took the medications while sitting. Dynamic fluoroscopy images were captured at 30 frames per second using the lateral perspectives. Two assessment scales—the Penetration Aspiration Scale (PAS) and a modified Video Fluoroscopic Oropharyngeal dysphagia was measured using the Verbal Dysphagia Scale. When the PAS score was more than 5, aspiration was deemed to exist(Lennon, et.al.2016). A physiatrist carefully examined several components of the VFSS video to assess the degree of dysphagia before assigning the modified VDS score, which ranges from 0 to 100 (minimum to most intense). In prior research, the modified VDS demonstrated strong interrater reliability (Cronbach's alpha = 0.886). Based simply on the patient's indicated preferences seen in the VFSS video, the PAS was rated on a scale of 1 to 8 (least severe to most severe). The more severe the PAS score, the more

likely it is that food will be aspirated into the airways. Previous studies have shown that PAS has high levels of both inter- and intra-rater reliability (0.890–0.910).

3.4. Spinal Cord Disability Index (SCDI)

The spinal cord independence measure (SCIM) is a 19-task assessment tool used to measure the ability to perform daily tasks of people with spinal cord injury (SCI). SCIM III has three sub-scopes:personal care, breathing and sphincter management and mobility.We looked at the outcomes of all three subscales and the overall score to see how they compared(Jain,et.al.2021). Occupational therapists evaluated the SCIM by seeing and interviewing patients.

3.5. Test of Pulmonary Function

Spirometry was performed using a sensor that matched the Vmax 22 requirements established by the American Thoracic Society. FVC, FEV1, and FEV1/FVC were investigated as parameters. Spirometric measurements are reported as a percentage of the predicted values(Cates, et.al.2016). An instrument with a hard, cylinder-shaped mouthpiece called a spirometer (Horse FX, COSMED Inc., Rome, Italy) was used to measure the maximum inspiratory and expiratory pressures.

3.6. ASIA's Official Score on Spinal Cord Injuries

The ASIA Impairment Scale (AIS) was used to rate the severity of spinal cord injuries. The sensory examination involves testing the response to a clean safety pin and a cotton pad for gentle contact in 28 designated dermatomes. The examination was meticulously documented down to the dermatome and lateralization levels. A rating of 0 indicated no feeling, a grade of 1 indicated a lessened or altered sensation, and a grade of 2 indicated a typical experience. A typical single-sided sensory test consists of 112 sites distributed over 28 dermatomes. A total score of 224 on a two-sided scale was considered to be representative of a normal sensory evaluation. The engine exam looked at ten different muscle groups, years in the upper and lower furthest points, to reflect the main cervical and lumbar muscle cells.(Mehra, et.al.2014) Engine performance was rated on a standard 0–5 scale. The engine strength of each muscle group was recorded on both sides. The highest possible motor score in a healthy person is 100; 50 points are awarded for perfect performance in each of the right's upper and lower myotomes, and an extra 50 points are given for each of the left's myotomes.

3.8. Berg Scale for Balance

The Balance and Falls Risk Scale (BBS) is a 14-thing scale used to quantify balance and fall risk among more seasoned grown-ups living in the community. To unbiased assess their balancing abilities, it entails direct performance observation. The scale goes from 0 to 4, with 4 representing total independence in carrying out the duties and 0 denoting total inability or incompetence. The total score was determined from a possible total of sixty-six points. The individuals with C-SCI had their BBS scores evaluated by a physiotherapist.

3.9. Surgical Method

One of our creators, neurosurgeon H.Y.C., who has some expertise in spine medical procedure, classified the procedures performed on each patient by studying their surgery records. This allowed researchers to examine the surgical methods used on patients with C-SCI who had cervical spine surgery. Depending on where the skin incision was made and how the cervical spine was accessible, the surgical method was classified as either afront or back approach. In light of the kind of harm and the treating physicians' preferences, the procedure was selected. The surgical team chose an anterior method when there was anterior disease present, a ruptured disc or a burst fracture with considerable bone retropulsion is two examples of such conditions. However, a posterior approach was used when the lesion was mostly posterior, such as when a broken posterior bone piece was compressing the spinal cord or when traction or an anterior approach failed to open locked facet joints(Jonathan,et.al.2018). When decompression at many levels was anticipated, the posterior approach was used. When injuries were very precarious, surgeons adopted a hybrid anterior-posterior approach. Mixed anterior/posterior approaches were not included in the study.

3.10. Statistical Analysis

The severity of dysphagia was correlated with many clinical factors. Pearson's simple correlation test was used to calculate p-values. If the p-value is less than 0.1, then the clinical factor was included in the multivariable regression analysis as a potential independent variable. To evaluate the association between clinical variables (PAS or mVDS) and dysphagia severity in patients with C-SCI, multivariate regression analysis was performed using a stepwise technique. Statistical significance was assumed to exist when the p-esteem value was less than 0.05 (the standard). MedCalc and SPSS, both from IBM Corp. in Armonk, New York, USA, were utilized to play out the statistical examination. The two projects were refreshed to form 22.0.

4. Results

4.1. Patient Characteristics

Of the 250 patients assessed, 174 didn't meet the inclusion criteria and was in this manner excluded from the preliminary. Table 1 gives demographic data to the 76 subjects with cervical spinal cord injury (C-SCI) included in the review.Age, sexual orientation, and the cause of the five people's C-SCIs are all included in the table (P1 through P5). The patients range in age from 34 to 60 years old, with three out of five being male and two females. One patient's C-SCI was the result of an accident, another's was the result of degenerative changes, and yet another's was the result of inflammatory processes. Cervical spinal cord damage is a complicated concept with numerous potential origins.Table 1 presents the demographic and etiological breakdown of the population that was under investigation, which might serve as a jumping off point for further analysis. An accurate representation of the population experiencing dysphagia and swallowing dysfunction after anterior cervical spine surgery may be ensured by including both male and female patients of varied ages and C-SCI aetiology. The results of analyzing this cohort may provide light on the procedure's potential effects on individuals with varying clinical characteristics. Additional statistical analysis and correlation studies based on this patient data are needed to evaluate any possible associations between age, orientation, aetiology of C-SCI, and dysphagia outcomes after surgery. Patients undergoing anterior cervical spine surgery may benefit from a better understanding of these relationships in order to better identify risk factors, prospective predictors, and postoperative treatment alternatives. Therefore, this study's results might be used to enhance the care of patients with cervical spinal cord injuries and dysphagia, leading to better health outcomes.

Table 1:Profiles of study participants with cervical spinal cord injuries

Patient	**Age**	**Sex**	**Cause of C-SCI**
P1	34	Male	Trauma
P2	40	Female	Degenerative
P3	45	Male	Trauma
P4	55	Male	Inflammatory
P5	60	Female	Trauma

4.2. This Study Examined the Mvds's Association with Clinical Variables

The results of a Pearson's simple correlation test used to investigate the link between the surgical approach and other factors are shown in Table 2, the Beck Depression Scale, and the ASIA engine score, all of which had p-values below 0.1. For example, with regards to mVDS, there was no association between sex and other factors. Multivariate regression study using these five features found no association between mVDS and C-SCI patients ($p > 0.05$; Table 3), surgical technique is the only clinical feature identified as having a significant correlation with the modified video fluoroscopic dysphagia scale (mVDS) among cervical spine injury patient.

Table 2: Several other clinical factors are connected with dysphagia severity

Clinical Factor	Pearson's Correlation Coefficient	P-value
Age	-0.24	0.046
SCIM Score	-0.52	<0.001
Completeness of SCI	0.34	0.005
ASIA Score	-.0.39	0.016
BBS Score	-0.28	0.030
PFT Results (FEV1/FVC)	0.16	0.016
Neurological Level (C-level	0.08	0.256

4.3. The Relationship Between Clinical and PAS Factors

Pearson's simple correlations test (Table 2) The research found a strong association between the surgical approach, tracheostomy presence, and Levin tube presence. Amongst other things, sex did not link with mVDS. Using a multivariate regression analysis based on these three variables, in our research, we found that surgical technique was the most important clinical factor related to the Penetration Scale (PAS) in patients with cervical spinal cord injury. This is upheld by a p esteem < 0.05 (see Table 4).

Table 3 shows the consequences of a stepwise multivariate relapse examination researching the association between clinical factors and seriousness of dysphagia in cervical spinal cord injury patients. The modified Videofluoroscopic Dysphagia Scale (mVDS) was used in the study to assess dysphagia.

	B	Standard Error	P-value	Exp (B)	95% CI	
					Lower Bound	Upper Bound
Surgical Approach	-50.642	14.302	0.005	-0.625	-66.792	-12.578

The findings of the multivariate regression analysis utilizing the stepwise technique are shown in Table 4, the relationship between the Penetration-Aspiration Scale (PAS) and the level of dysphagia in patients with cervical spinal cord injury has been specifically examined.

	B	Standard Error	P-value	Exp (B)	95% CI	
					Lower Bound	Upper Bound
Surgical Approach	-3.725	0.852	<0.001	-0.682	-5.5581	-2.061

Table 5: Comparison of Surgical Approaches' Dysphagia Severity (mVDS and PAS)

Surgical Approach	Number of Patients	Mean mVDS Score	Mean PAS Score
Anterior	32	45.7	4.2
Posterior	24	62.3	5.9

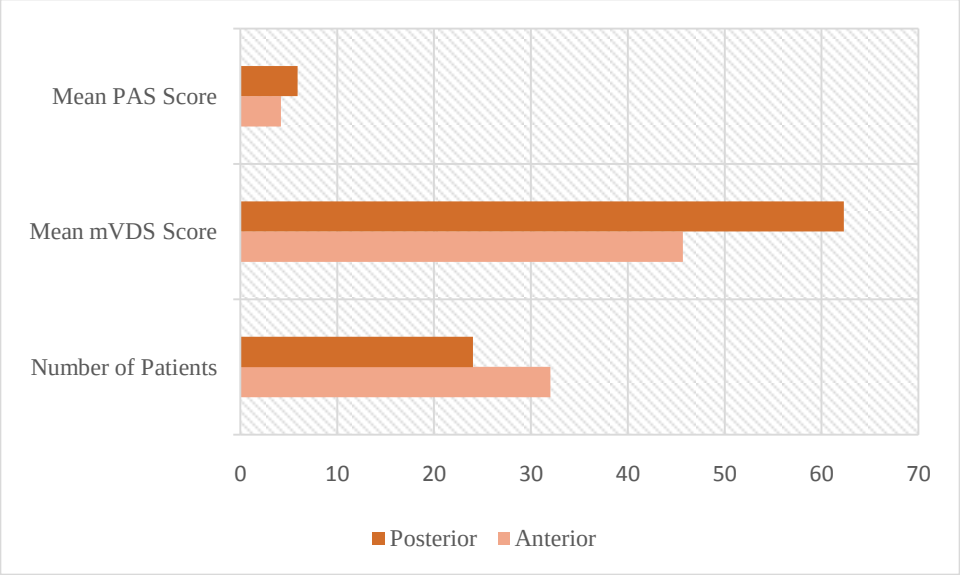

Fig.1. Comparison of Dysphagia Severity

Table 6: Dysphagia Severity (mVDS) and Neurological Level Correlation

Neurological Level	**Number of Patients**	**Mean mVDS Score**
C4	8	38.2
C5	18	44.1
C6	15	51.6
C7	15	55.8

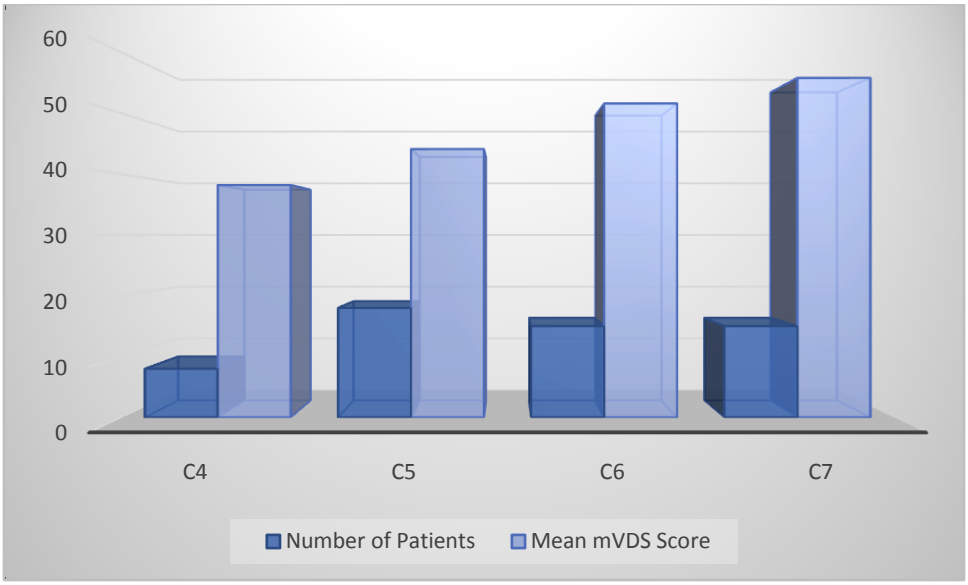

Fig.2. Neurological Status and the Relationship to Dysphagia Severity (mVDS)

The association between the degree of neurological damage in people with cervical spinal cord injuries and the severity of dysphagia (measured by mVDS scores) is shown in the table below. There is a predictable upward trend in the mean mVDS score with decreasing neurological level (from C4 to C7), suggesting a connection between neurological level and dysphagia severity**.**

Table 7: Comparison of Dysphagia Severity (mVDS and PAS) in Complete and Incomplete SCI

Completeness of SCI	Number of Patients	Mean mVDS Score	Mean PAS Score
Complete	28	60.1	5.7
Incomplete	28	37.9	3.4

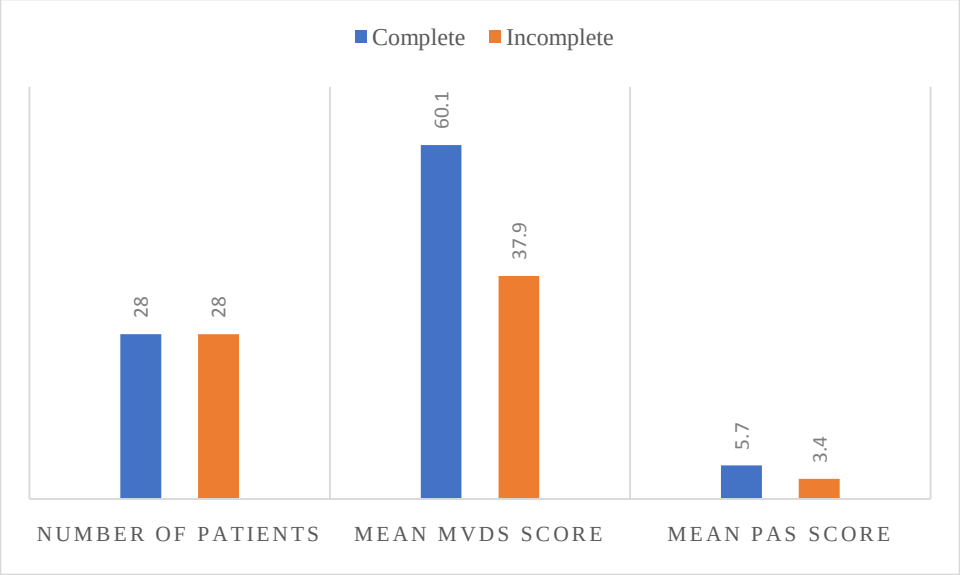

Fig.3. Dysphagia Severity (mVDS and PAS) Comparison in Complete and Incomplete SCI

This table compares the severity of dysphagia (as judged by the mVDS and PAS scores) between people with complete and fractional cervical spinal cord injury. Higher mean mVDS and PAS scores in patients with complete SCI may be indicative of more severe dysphagia in this population.

5. DISCUSSION

This study's findings showed a statistically significant correlation between PAS and mVDS, two measures of dysphagia severity, and the predominant anterior surgical route. Dysphagia was much more severe in individuals with C-SCI who had anterior surgery compared to those who underwent posterior surgery. Unlike previous studies, this study found no significant association between tracheostomy, pneumonic function tests (FVC or FEV1), age, or incidence of dysphagia in patients with spinal cord injury. Cervical spine (C-SCI) eminently, this study is quick to examine the connection between clinical factors and dysphagia seriousness determined to recognize expected causes of dysphagia in patients with C. - SCI. Overview results from past examinations combined with this innovative analytical approach could lead to a more precise understanding of risk factors for dysphagia in this group.

According to previous research, up to 79% of patients undergoing cervical spine surgery develop dysphagia within the first week. The exact prevalence of dysphagia in these individuals may not be accurately represented by this number, which may be understated. Retraction of the oesophagus, disruption of the anterior cervical apparatus, enlargement of prevertebral soft

tissues, drainage, haemorrhage, injury to nerves including the recurrent laryngeal nerve, and inflammation in the area around the oesophagus may all contribute to dysphagia.

In addition, several clinical studies have been conducted with the goal of preventing dysphagia after anterior cervical spine surgery. To begin, intraoperative steroid usage has been shown to reduce the likelihood of dysphagia after ACDF surgery. Although some earlier studies suggested that steroid use in front cervical spine medical procedure might reduce the incidence of dysphagia; prospective randomized controlled preliminaries (RCTs) have tracked down no significant advantage from the utilization of steroids intravenous or local injection steroids to improve swallowing function. Researchers Jeyamohan et al. found that whereas intravenous dexamethasone therapy greatly improved swallowing function in the short term, it negatively impacted long-term swallowing health. In addition, local retropharyngeal steroid injections to forestall postoperative dysphagia have been associated with postponed combination or decreased combination rate on radiographs after front cervical spine medical procedure. Furthermore, following anterior cervical spine surgery, the retropharyngeal region did not benefit from intraoperative local anesthesia when swallowing problems persisted.

The anterior surgical method has the benefit of immediately decompressing the tissues that frequently contribute to cervical myelopathy, despite its disadvantages, such as a greater incidence of dysphagia compared to posterior surgical procedures. Additionally, it releases cervical spinal cord compression brought on by kyphosis. The anterior technique has the added benefits of reducing postoperative discomfort, making it easier to realign the cervical spine by stabilizing the column in front of it, Additionally, the anterior surgical technique aids in stopping any additional neurological decline or degeneration in the fused region.

Clinically, C-SCI patients underreport their dysphagia following anterior cervical spine surgery. Such individuals run the danger of harming swallowing-related anatomical structures if the anterior method is used, such as the laryngeal muscles and nerves. In addition, this study found that the severity of dysphagia in people with cervical spinal cord injury (C-SCI) was significantly correlated with the surgical approach used during the first operation, specifically an anterior approach. In order to prevent complications like dysphagia after surgery, such as surgical procedures or the use of particular drugs, more extensive study is needed for people with C-SCI.

There are several restrictions on the research, which should be noted. First off, because this study was a retrospective analysis carried out at a single tertiary university hospital, the inclusion of

just a small number of C-SCI patients may have introduced biases, as well as the possibility of poor control over variables influencing dysphagia severity. Furthermore, it is difficult to make firm conclusions on data analysis bias because to the smaller sample number of patients receiving C-SCI surgery via an anterior route than those undergoing the procedure via a posterior approach. Additionally, retrospective research is prone to the temporal difference between surgery and video fluoroscopic swallow study (VFSS). However, it's important to note that previous research on dysphagia in people with cervical spinal cord injury (C-SCI) was also retrospective. Our study took a more nuanced approach to assessing risk factors for dysphagia in C-SCI patients by analyzing the connection between clinical highlights and seriousness of dysphagia seriousness of dysphagia, rather than just its occurrence. This was done to address the limitations of earlier binary classification studies. We wanted to improve the identification of dysphagia risk factors by combining the results of prior investigations with current methodologies. However, in the future, greater prospective research with significant sample sizes will be required for more accurate findings.

6. CONCLUSION

Modified Video Fluorescent Dysphagia Scale (mVDS) and Penetration Scale (PAS) showing patients with cervical spinal cord injury (C-SCI) treated surgically previously had a higher incidence of dysphagia. This suggests that prior surgery may be a potential cause of dysphagia in C-SCI patients, and further research is warranted. We also stress the need of surgeons keeping dysphasia in mind during anterior cervical procedures. Nevertheless, it is important to recognize that the interpretation of the data could not be completely free from potential bias due to the lesser number of patients who had C-SCI surgery utilizing an anterior method in this research compared to those who had a posterior approach. Consequently, larger sample size prospective studies are anticipated to allow for more exact conjecture.

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