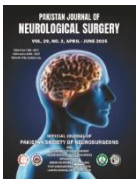

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Original Research

Effect of Intraoperative Local Dexamethasone on Dysphagia Incidence and Severity Following Anterior Cervical Spine Surgery

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ABSTRACT

Objective: To evaluate the effectiveness of intraoperative local dexamethasone in reducing the incidence and severity of dysphagia following anterior cervical spine surgery (ACSS).

Material and Methods: The retrospective research analyzed 74 patients who experienced elective ACSS (January 2024 to February 2025). The first patient group received 10 mg of local dexamethasone before surgical bonding however the other patient group received no steroid treatment. The Bazaz scale together with the Dysphagia Short Questionnaire (DSQ) served to evaluate dysphagia levels and pain and disability ratings relied on the Visual Analogue Scale (VAS) and Neck Disability Index (NDI). The researchers combined their assessment of failure rates with fusion success to build their analysis. SPSS software analyzed the obtained data and researchers established $p < 0.05$ as the statistical significance threshold.

Results: The research follow-up included 64 patients for an average period of two years. Interactive dexamethasone medication administration to surgical patients improved their swallowing function evaluation scores during their second postoperative day (Bazaz: 1.16 ± 1.35) versus patients not treated with the steroid (Bazaz: 2.10 ± 1.33; $p < 0.0001$). Statistics showed that dexamethasone administration in surgery patients did not affect their pain scores or their fusion rates and hospital stay durations. Dexamethasone administration in the research study demonstrated no adverse effects that emerged during the study period.

Conclusion: The surgical application of dexamethasone at the local site achieves effective and safe swallowing discomfort reduction following ACSS interventions without affecting overall surgical outcomes.

Keywords: Anterior cervical spine surgery, dysphagia, dexamethasone, postoperative complications, spinal surgery recovery.

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INTRODUCTION

The wide range of patients requiring cervical spinal surgery undergo anterior cervical spine surgery (ACSS) to treat degenerative disc disease and cervical spondylotic myelopathy along with herniated disks and cervical traumas.[1] The access provided to cervical vertebrae directly while causing the least posterior spinal element damage has made ACSS into the standard surgical procedure for affected patients.[2] The surgical approach offers effective neurological function enhancement and spinal stability but produces several complications which include postoperative dysphagia as its most frequent and important side effect.[3]

ACSS is a well-described complication with reported incidence rates of 3–83% depending on surgical technique, the number of operated levels, and patient-specific factors.[4] Mild dysphagia resolves in a few weeks, while moderate to severe persists for months or becomes chronic, resulting in nutritional deficiencies, aspiration pneumonia, prolonged hospital stay, and decreased quality of life [5]. Postoperative dysphagia pathophysiology is multifactorial, with esophageal compression by soft tissue edema and prolonged retraction of the esophagus.[6] Local inflammatory responses and the possibility of nerve irritation, especially of the recurrent laryngeal nerve, also contribute to a significant extent.[7]

The occurrence of postoperative dysphagia has a significant impact on patient recovery and, therefore, many strategies have been explored to minimize its occurrence. Reducing dysphagia rates also has been shown with surgical modifications that include minimizing the retraction time, implant design with less invasive implant design, and surgical positioning.[8] Pharmacological interventions controlling local inflammation and edema are becoming of interest too. One of these, corticosteroids (particularly dexamethasone) have been widely studied for their potent anti-inflammatory, anti-edematous and immunosuppressive properties.[9]

Long-acting synthetic glucocorticoid dexamethasone has been shown to reduce postoperative swelling and airway complications in many surgical procedures such as head and neck surgeries and spinal interventions.[10] Dexamethasone administration has been shown to reduce airway edema, improve pain control, and improve recovery.[11] Nevertheless, researchers have concerns about possible systemic side effects of dexamethasone, such as hyperglycemia, immunosuppression, and delayed wound healing, and have instead explored local intraoperative dexamethasone administration as an alternative.[12]

Some studies have shown that locally applied dexamethasone at the surgical site is effective in reducing prevertebral soft tissue swelling and severity of dysphagia, but others have yielded inconclusive results, and further research should be conducted on its efficacy and safety.[13] Given the current lack of consensus, well-designed clinical studies are needed to determine whether intraoperative dexamethasone administration significantly reduces dysphagia rates after ACSS.

The purpose of this study is to determine the role of intraoperative local dexamethasone in decreasing postoperative dysphagia after ACSS by measuring the effect on severity, duration, and overall patient outcomes. In the clinical context of anterior cervical spine surgery, we hope to contribute to the understanding of the surgical protocol to maximize both the outcome of and postoperative recovery in the patient.

MATERIALS AND METHODS

Study Design

This retrospective study was carried out at Pir Abdul Qadir Shah Jeelani Institute of Medical Sciences, Gambat from Jan 2024 to Feb 2025. The purpose of the research was to determine if intraoperative local dexamethasone reduces the rate and severity of dysphagia following anterior cervical spine surgery. The study was conducted with the approval of the Institutional Review

Board (IRB) of the hospital and all ethical guidelines were followed. Before being enrolled in the study, all participants had given informed consent.

Study Population

The study included 74 patients who were being operated on for degenerative conditions of the anterior cervical spine. Inclusion criteria for patients included ages between 18 and 75 years, scheduled for single or multilevel anterior cervical discectomy and fusion (ACDF) or corpectomy. Excluded patients had prior cervical spine surgery, active infection, malignancy, severe comorbidities (eg, uncontrolled diabetes, immunosuppression), neurological disorders not caused by cervical spine pathology, or any cognitive deficits responsible for impaired compliance with postoperative follow-up.

Intervention

Intravenous dexamethasone 10 mg was given to the intervention group before wound closure, and 10 mg of intraoperative local dexamethasone was injected into the surgical site. In the control group, the same surgical procedure was done without dexamethasone administration. The Smith-Robinson technique was used in all procedures with a standardized surgical approach. The surgeries were done by the same team of spine surgeons to limit variability.

Outcome Measures

The primary outcome of the study was the incidence and severity of postoperative dysphagia assessed by the Bazaz Dysphagia Scale and Dysphagia Short Questionnaire (DSQ) at baseline, postoperative day 1, day 2, week 1, week 2, month 1, month 3, month 6 and month 12.

Included measurements of secondary outcomes:

1. The Visual Analog Scale (VAS) for pain intensity assessment.
2. Neck disability evaluation with the Neck Disability Index (NDI).
3. Length of hospital stay.
4. Postoperative complications such as wound infection, hematoma, or adverse reactions.
5. X-ray and CT scan assessment of fusion rates at 12 months.

Diagnostic Evaluation

A complete interview process took place with all participants who completed preoperative medical evaluations that documented their histories symptom periods and conservative therapy experiences. Assessment through physical examination included evaluation of muscle strength together with neurological tests and swallowing tests. The MRI examinations showed cervical spine pathology together with analyses of spinal canal sizes.

Follow-Up

All postoperative patient evaluations occurred on day 1, day 2, and week 1, week 2 and month 1, month 3, month 6, and month 12. Dysphagia symptoms together with pain level assessment and functional evaluation went into clinical records for every follow-up appointment. The records included assessments of patient satisfaction as well as any postoperative complications that might have occurred.

Statistical Analysis

The demographic characteristics including patient age, gender, index, and symptom duration were described statistically. The dysphagia rating alongside pain assessments and functional improvements was statistically compared between patients who received local

dexamethasone treatment and those in the control group across all follow-up periods. A mixed model analysis of variance served as the data assessment method. Statistical significance was determined when $p < 0.05$ for every investigation while the analyses were executed with SPSS version 26.0.

Table 1: *Patient Demographics.*

Variable	Local Dexamethasone Group	Control Group	P Value
Age (years)	53.2 ± 10.4	50.3 ± 11.1	0.2886
Female (%)	60.6%	51.6%	0.6147
Smokers (%)	45.5%	38.7%	0.6210
BMI (kg/m^2)	30.1 ± 5.4	32.0 ± 4.9	0.3839
ASA Grade	2.6 ± 0.5	2.4 ± 0.6	0.2482

RESULTS

Patient Demographics and Surgical Procedures

The research included 64 participants from 74 recruited patients who successfully finished the 12-month follow-up period. The local dexamethasone group matched the control group for patient demographics as well as comorbidities and number of affected levels. Anterior cervical discectomy and fusion maintained the top position in surgical procedures performed with 49 patients while anterior corpectomy and disc arthroplasty followed with 25 patients.

Dysphagia Outcomes

Patients received local dexamethasone treatment which resulted in moderate dysphagia symptoms compared to individuals in the control group according to Bazaz scale and Dysphagia Short Questionnaire (DSQ) measurements.

Table 2: *Surgical Procedures.*

Procedure Type	Local Dexamethasone Group	Control Group
Single-level ACDF	13	14
Disc Arthroplasty	2	4
Multilevel ACDF	11	11
Corpectomy	6	2
Hybrid Procedures	1	0

Clinical and Surgical Outcomes

Length of Hospital Stay:

Statistically insignificant differences demonstrated that hospitalized patients under the local dexamethasone treatment needed hospitalization for only 1.18 days instead of 1.35 days.

Table 3: *Dysphagia Outcome Scores.*

Time Point	Local Dexamethasone Group (Bazaz)	Control Group (Bazaz)	P Value	Local Dexamethasone Group (DSQ)	Control Group (DSQ)	P Value
Preoperative	0.24 ± 0.61	0.39 ± 0.76	0.5235	1.06 ± 1.41	1.52 ± 2.10	0.3808
Day 1	1.38 ± 1.35	1.90 ± 1.40	0.0169	3.06 ± 2.57	4.73 ± 3.06	0.0017
Day 2	1.16 ± 1.35	2.10 ± 1.33	<0.0001	3.19 ± 3.20	4.71 ± 2.85	0.0043
Week 1	1.03 ± 1.29	1.55 ± 1.26	0.0227	3.33 ± 3.22	4.65 ± 3.74	0.0118
Week 2	0.79 ± 1.08	1.42 ± 1.23	0.0055	2.18 ± 2.17	3.71 ± 3.27	0.0034
1 Month	0.88 ± 1.22	1.06 ± 1.09	0.4128	2.27 ± 2.92	3.26 ± 3.29	0.0584
3 Months	0.34 ± 0.94	0.72 ± 1.00	0.1154	0.84 ± 1.71	2.00 ± 2.54	0.0331
6 Months	0.16 ± 0.63	0.72 ± 1.07	0.0173	0.47 ± 1.50	1.52 ± 2.40	0.0324
12 Months	0.39 ± 0.83	0.69 ± 1.17	0.1998	1.24 ± 2.72	1.52 ± 2.89	0.5216

Fusion Rates

The fusion success rates between patients who received local dexamethasone application and those in the control group were comparable with 78% and 75%, respectively, $p > 0.05$.

Pain and Disability Scores

The same pain and disability scores Quality of Life-12 assessments and Neck Disability Index measurements were observed equally between treatment groups.

DISCUSSION

The purpose of this study was to assess the efficacy of intraoperative local dexamethasone in decreasing the incidence and severity of postoperative dysphagia following anterior cervical spine surgery (ACSS). Results strongly imply that the local dexamethasone significantly decreases early postoperative dysphagia, especially within the two weeks after surgery and even after 3 months. This is consistent with and extends existing literature on corticosteroid use in spine surgery and postoperative airway management.

Several previous studies have noted the use of systemic corticosteroids to decrease soft tissue swelling and associated dysphagia. Barsanwal et al, (2014) also found that intravenous dexamethasone decreased post-extubation laryngeal edema and airway obstruction in critical care patients.[14] Adenikinju et al, (2017) also reviewed postoperative oropharyngeal dysphagia in ACSS and suggested the use of steroids to reduce inflammation-mediated esophageal compression.[15] In considering that the exercises utilized in our study are more readily available to the general public, we reinforce these findings and provide that local application is equally effective, but potentially without systemic risks.

In contrast with Haws et al, (2018), who performed a prospective clinical study and found a reduced severity of dysphagia with intraoperative steroids,[16]their study did not furnish information as to which was given: systemically or locally. On the contrary, although our work is specific to local dexamethasone administration, we show a statistically significant ($p < 0.0001$) difference versus day 1–month 3 (e.g., day [2] Bazaz – 1.16 ± 1.13 vs. 2.1 ± 1.33) implying a potential for a practical clinical application in surgeons.

Zhang et al, (2022) performed a meta-analysis also supporting that corticosteroids reduce dysphagia after ACSS, with benefits peaked within the first 48 hours after ACSS. However, because a standard definition of the optimal route was not achieved through the use of different administration routes and dosages,[17] we can bridge this gap and demonstrate that intraoperative local delivery of 10 mg directly into the surgical site before closure provides benefits on the table and inflammatory complications do not increase.

The research done by Logvynenko et al, (2025) demonstrated that localized dexamethasone application decreases swelling and sensory disturbances in orthognathic surgery because local anti-inflammatory delivery works well for extensive soft tissue procedures.[18] The local anti-inflammatory effects near the esophagus and prevertebral space likely produced fewer dysphagia symptoms.

Cui et al, (2019) conducted a systematic review of perioperative steroid influences on dysphagia development following ACSS yet identified inconsistent results. The research revealed contradictory findings between two conflicting studies regarding perioperative steroid use.[19] The fusion rates between the dexamethasone treatment group (78%) and the control group (75%) were similar according to our findings which reinforces the safety of using steroids locally.

The research by Gupta et al, (2019) demonstrated that cesarean section patients had

enhanced recovery outcomes through dexamethasone administration whether local or systemic yet the direct delivery produced speedier pain control together with diminished inflammation.[20] The research demonstrates that focused local drug delivery produces better results for patients although our study specifically showed decreased dysphagia symptom duration.

The research by Siribumrungwong et al, (2022) indicates that localized trauma together with inflammatory responses triggers adaptive modifications in sensory signals that might intensify dysphagia problems. Research indicates that controlling intraoperative local inflammation serves as a compelling reason to use local dexamethasone as a preventive measure in patients undergoing ACSS.[21]

The differences in dysphagia scores between groups approached baseline rates at 6 months and 12 months after surgery despite matching the natural course of dysphagia related to ACSS. Early symptom reduction through the treatment delivers substantial advantages that enhance patient satisfaction while decreasing complications and risks and potentially decreasing treatment periods.

Several important constraints must be considered despite the study outcomes being positive. The examination took place in one facility and used a limited number of participants. Multi-site randomized trials performed on wider scales would increase application across different population groups. The adopted validated subjective tools (Bazaz and DSQ) can benefit from the inclusion of objective dysphagia assessment tools including fiberscopic endoscopic evaluation of swallowing (FEES) or videofluoroscopy (VFSS) to improve diagnostic accuracy. Future studies need to examine medication dosage levels as well as track the long-term effects of multiple steroid applications in procedures that require multiple levels of intervention.

CONCLUSION

This study serves to show that the delivery of dexamethasone intraoperatively into the surgical field is safe and effective in reducing the incidence and severity of early postoperative dysphagia in patients undergoing anterior cervical spine surgery (ACSS). Our findings demonstrate that local dexamethasone normally prevents dysphagia, except for the first two weeks post-operatively with no rise in adverse effects and no deleterious effect on surgical outcomes such as fusion rates, pain control, and disability scores. Therefore, these findings support the integration of local corticosteroid use into standard practice as a simple and low-risk strategy to facilitate postoperative recovery and patient satisfaction. Nevertheless, further multi-center, randomized controlled trials with larger sample sizes and objective swallowing assessment are needed to validate these findings and develop standardized protocols for steroid use in ACSS.

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Additional Information

Disclosure: Authors report no conflict of interest.

Ethical Review Board Approval: This study was approved by the Institutional Review Board (IRB) of Pir Abdul Qadir Shah Jeelani institute of medical sciences, Gambat.

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AUTHORS CONTRIBUTIONS

Sr.#	Author's Full Name	Intellectual Contribution to Paper in Terms of
1.	Jawad Ahmed	Study concept, methodology design, referencing and Data collection.
2.	Sajid Mehboob	Questionnaire Design, Literature search.
3.	Sajid Razaq	Critical reading and Revision.
4.	Imran Khan	Data Analysis, statistical analysis, and result interpretation
5.	Dr. Irfan Ali	Referencing support. Write up of Research Article, editing.