

SURGICAL TREATMENT OF CERVICAL MYELOPATHY

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Abstract: The objective of this study was to evaluate the clinical effectiveness of various surgical decompression techniques applied for degenerative cervical myelopathy. A total of 148 patients aged 28–67 years underwent surgical intervention through anterior and posterior approaches, including anterior cervical discectomy and fusion (ACDF), corpectomy, laminoplasty, and laminectomy with fixation. Neurological status (mJOA), pain intensity (VAS), quality of life (NDI), and MRI findings were assessed preoperatively and postoperatively. Anterior procedures demonstrated superior outcomes in cases of localized discogenic compression, while posterior approaches were more effective in multilevel stenosis. T2 hyperintensity of the spinal cord was identified as a significant prognostic factor. The findings highlight the importance of individualized treatment strategies for optimal patient outcomes.

Keywords: cervical myelopathy; surgical treatment; ACDF; corpectomy; laminoplasty; laminectomy; spinal cord compression; decompression; mJOA; neurosurgery.

Annotatsiya: Tadqiqotning maqsadi — degenerativ servikal miyelopatiyada turli jarrohlik dekompressiya usullarining klinik samaradorligini baholash. 28–67 yoshdagi 148 nafar bemorga oldingi va orqa jarrohlik yondashuvlari qoʻllandi, jumladan oldingi servikal diskektomiya va artrodez (ACDF), korpektomiya, laminoplastika va laminektomiya. Operatsiyadan oldin va keyin nevrologik holat (mJOA), ogʻriq darajasi (VAS), hayot sifati (NDI) va MRT natijalari baholandi. Lokal diskogen bosimda oldingi yondashuvlar samaraliroq, koʻp darajali stenozlarda esa orqa yondashuvlar ustun boʻldi. Orqa miyada T2-giperintensivlik muhim prognostik omil sifatida qayd etildi. Natijalar individual jarrohlik taktikasi tanlashning zarurligini tasdiqlaydi.

Kalit soʻzlar: servikal miyelopatiya; jarrohlik davolash; ACDF; korpektomiya; laminoplastika; laminektomiya; orqa miya bosilishi; dekompressiya; mJOA; neyroxirurgiya.

Аннотация: Цель исследования — оценка клинической эффективности различных хирургических методик декомпрессии при дегенеративной шейной миелопатии. Прооперированы 148 пациентов в возрасте 28–67 лет с использованием передних и задних доступов: передней дискэктомии и межтелового артродеза (ACDF), корпектомии, ламинопластики и ламинэктомии с фиксацией. До и после лечения оценивали неврологический статус (mJOA), выраженность боли (VAS), качество жизни (NDI) и данные МРТ. Передние вмешательства показали высокую эффективность при

локальной дискогенной компрессии, задние — при многоуровневом стенозе. Наличие T2-гиперинтенсивности определено как ключевой прогностический фактор. Полученные данные подтверждают необходимость индивидуализации хирургической тактики.

Ключевые слова: шейная миелопатия; хирургическое лечение; ACDF; корпектомия; ламинопластика; ламинэктомия; компрессия спинного мозга; декомпрессия; mJOA; нейрохирургия.

Introduction

Degenerative cervical myelopathy (DCM) is recognized as the most common cause of spinal cord dysfunction in adults over 40 years of age, as demonstrated in studies by Fehlings (2017), Tetreault (2019), and Hirai (2021). Conservative treatment is effective only during the early stage, whereas progression of spinal cord compression requires surgical correction (Rhee, 2019; Uchida, 2020).

Commonly used surgical methods include **anterior cervical discectomy and fusion (ACDF)**, **corpectomy**, **laminoplasty**, and **laminectomy with instrumentation**.

The aim of the present study is to perform a comparative analysis of the effectiveness of different surgical approaches for DCM.

Materials and Methods

Study Design

A prospective clinical-neurosurgical study conducted in 2018–2024 at the Neurosurgery Department of the Andijan branch of the Republican Scientific Center for Emergency Medical Care.

Inclusion Criteria

- Age 28–67 years
- MRI-confirmed DCM
- mJOA score 7–14
- Disease duration > 6 months

Methods of Assessment

1. Clinical evaluation

Neurological examination included:

- motor strength (MRC scale),
- deep tendon reflexes,
- pathological reflexes,
- coordination tests,
- sensory testing,
- gait assessment.

Pain:

VAS;

Quality of life: **NDI**.

2. MRI evaluation

MRI 1.5–3 T:

- T1, T2, STIR sequences;
- compression severity;
- T2-hyperintensity;
- sagittal canal diameter.

3. Surgical Techniques

- **ACDF** — 67 patients
- **Corpectomy** — 22 patients
- **Laminoplasty** — 34 patients
- **Laminectomy with fixation** — 25 patients

4. Statistics

Used:

- ANOVA
- Mann–Whitney U-test
- Pearson correlation
- multiple regression

Significance threshold: $p < 0.05$.

Results

Clinical Outcomes

Table 1.

mJOA score changes before and after surgery

Surgical approach	Pre-op mJOA	Post-op mJOA	Improvement
ACDF	11.2 ± 1.4	14.8 ± 1.1	+3.6
Corpectomy	10.8 ± 1.3	14.3 ± 1.2	+3.5
Laminoplasty	10.5 ± 1.5	13.6 ± 1.3	+3.1
Laminectomy	9.8 ± 1.6	12.9 ± 1.5	+3.1

ACDF demonstrated significantly greater neurologic recovery ($p < 0.01$).

Pain Reduction

VAS reduction:

- ACDF — 61%
- Corpectomy — 58%
- Laminoplasty — 49%
- Laminectomy — 45%

Correlation Analysis

• T2 hyperintensity correlated with poorer postoperative recovery ($r = -0.52$; $p < 0.001$).

- Multilevel stenosis negatively affected ACDF outcomes ($r = -0.44$).
- Best outcomes were seen with disease duration < 2 years.

Discussion

Our findings align with the literature (Fehlings 2017; Hilibrand 2020):

• **Anterior approaches provide optimal outcomes in focal discogenic compression**, as they allow direct decompression and stabilization.

• **Posterior approaches (laminoplasty, laminectomy)** are more suitable for multilevel stenosis and preserved cervical lordosis.

ACDF remains the standard treatment for one- or two-level DCM (Smith 2018; Wang 2020).

Corpectomy is effective for severe retrovertebral compression but has higher complication rates (Uchida 2019).

Laminoplasty preserves range of motion and is recommended in neutral/lordotic cervical alignment (Hirai 2021).

T2-hyperintensity remains a **negative prognostic marker**, consistent with studies by Lee (2020) and Brown (2019).

Conclusion

1. Surgical intervention is the most effective strategy to prevent progression of cervical myelopathy.
2. ACDF provides the greatest improvement in neurological function for focal compression.
3. Posterior approaches are preferred in multilevel stenosis.
4. T2 hyperintensity significantly worsens functional recovery.
5. Individual selection of surgical technique is essential for optimal outcomes.

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(Translated and transliterated as required for English-language journals)

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