AJPMHS GLOBAL RESEARCH NETWORK

AMERICAN Journal of Pediatric Medicine and Health Sciences
Volume 3, Issue 11, 2025 ISSN (E): 2993-2149

Anterior Cervical Discectomy and Fusion (ACDF Results in VC5-6)

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Abstract: We conducted a retrospective study to compare the clinical and radiological results of anterior cervical discectomy and fusion (ACDF)

ACDF is chosen for milder cases, while ACCF is not done for CSR. Localized OPLL is usually asymptomatic at the very beginning. Patients' symptoms are aggravated by disc herniation at the same intervertebral space level or due to neurological symptoms caused by disc injury because of recent trauma. For this reason, ACDF may achieve the same efficacy as ACCF by resecting the herniated disc and OPLL at the intervertebral space level with much less surgical injury than ACCF. The limited surgical exposure and the adhesion of the OPLL to the dura make the operation more difficult. Therefore, ACDF was considered to perform only when the preoperative CT scan showed that the OPLL did not extend to the entire posterior margin of the vertebrae [1,2,3].

In this study, we found that the volume of blood loss and duration of surgical procedure were significantly less in patients undergoing ACDF than in patients undergoing ACCF. The majority of previous studies were in accordance with our results. This difference is because ACCF requires resecting the corresponding vertebral body and the adjacent disc, which is more traumatic. However, the duration of the ACDF surgical procedure was significantly longer than that of the ACCF procedure, which was contrary to our study. He believed that performing ACDF to remove osteophytes from the intervertebral space is time-consuming and more technically challenging. The reason why many scholars perform ACCF is that the difficulty of ACDF is much greater than that of ACCF. The limited surgical exposure and the adhesion of the OPLL to the dura make it difficult to decompress sufficiently. However, when the technical learning curve of ACDF is mature, it is a more advantageous surgical method [1,3,7].

ACCF and ACDF not only relieves compression in the spinal cord but also reconstructs the physiological parameters of the cervical spine through careful distraction of the intervertebral space showed that ACDF had better maintenance of disc space height and greater improvements in cervical lordosis. Our study corresponded with it. Compared with patients who underwent ACCF, the postoperative disc space height was significantly improved in those who underwent ACDF. However, disc space height dropped slightly in both groups when they came to review and the ACCF group decreased more than the ACDF group. The reduced height of the treated disc space was partly due to postoperative subsidence of implant settling and then migrating to the endplates. The subsidence rate of implant in our study was 5.2% in the ACDF group and 28.4% in the ACCF group. We thought that the difference of subsidence rate was related to the shape of both ends of the implant. [2,4,5]. The main causes of abnormalities in patients who undergo ACCF may be related to excessive damage to the vertebral endplate and the rigid effect of the titanium cage. The contact surface of the titanium cage is sharper. Under the action of stress, it is more likely to protrude to the cancellous bone to form subsidence. However, the cage used in ACDF has a relatively large effective contact surface, which disperses the stress of

adjacent vertebrae and is more advantageous in the maintenance of intervertebral height. The subsidence rate was low in ACDF in our study, but there was still a decrease in the height of the intervertebral space at the last follow-up. We speculated that intraoperative distraction of the intervertebral space and then postoperative gravity on the cervical spine contributed to this condition. In addition, the thickness of the removed endplate also had a significant effect on the subsidence of the cage after fusion surgery.19 We suggest preserving the bony endplate as much as possible to prevent cage subsidence when scraping the endplate cartilage [6,7].

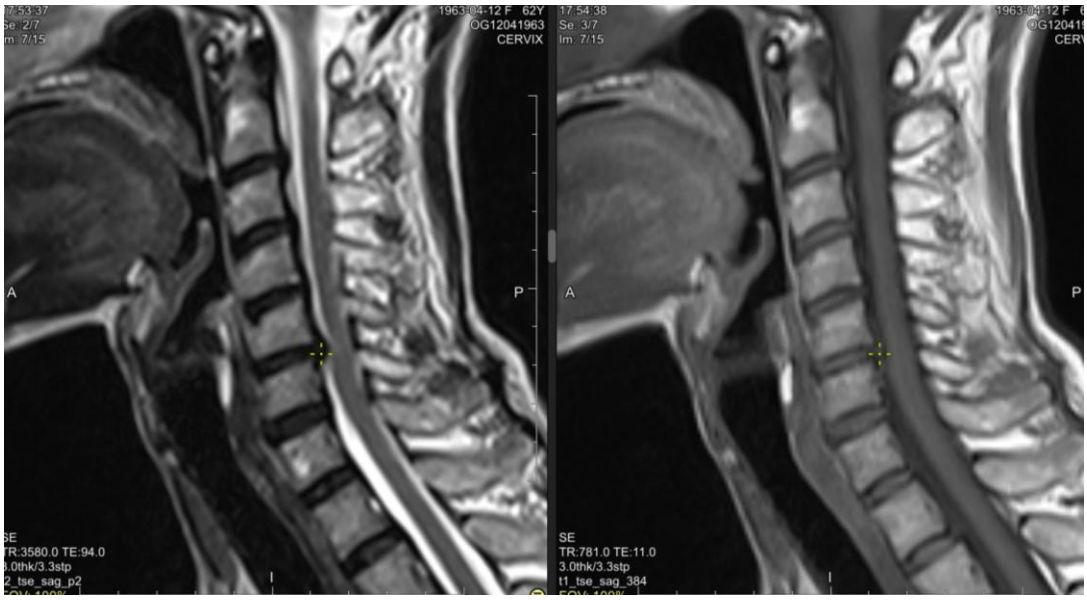
Keywords: anterior cervical discectomy and fusion, complication, myelopathy, ossification of posterior longitudinal ligament.

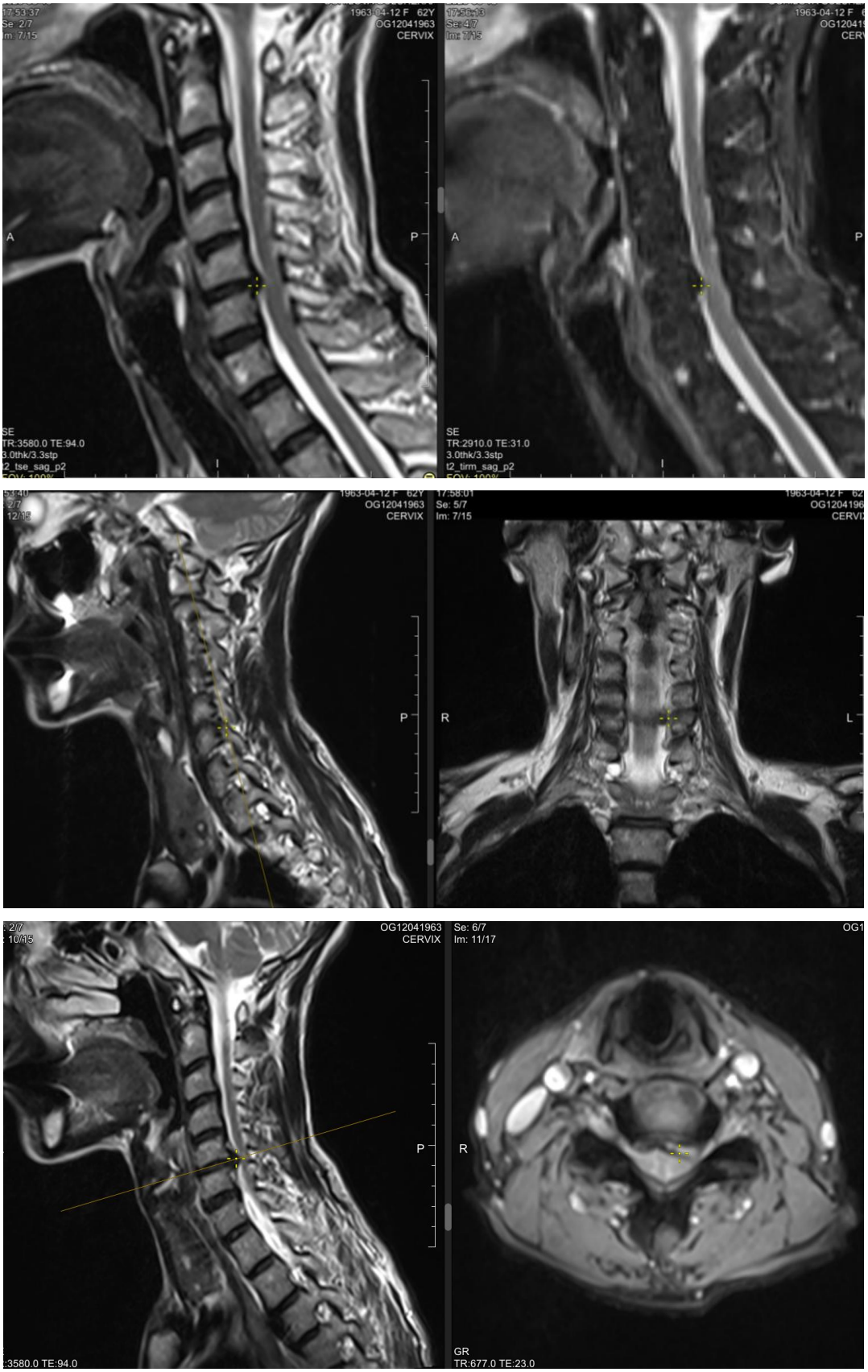
Anterior cervical discectomy and fusion (ACDF) can decompress the spinal cord with removal of the OPLL at the disc level and preserve the stability of the cervical spine. Graft migration is rare in ACDF.

The inclusion criteria were as follows: symptoms of cervical myelopathy, with or without radiculopathy caused by OPLL, such as numbness in the hands, weakness of the arms and legs, or trouble using the hands and walking; cervical spine radiograph, computed tomography (CT), and magnetic resonance imaging (MRI) findings showing two-level localized cervical OPLL; and surgery involving ACDF [6,7]

Materials and methods. Patients were placed under general anesthesia in the supine position. ACDF was performed using a standard Smith-Robinson technique. After confirmation and exposure of the appropriate vertebral levels corresponding to the compressive materials, a discectomy was conducted, and a high-speed burr was used to eliminate the anterior and posterior bony spurs and OPLL. If the OPLL did not exceed or only slightly exceeded the vertebral body level at the disc level, then we performed ACDF with removal of the OPLL. The OPLL behind the vertebral body was removed by grinding and thinning the OPLL using a drill and then detaching the OPLL from the dura with a hook. The OPLL was dissected, and other compressive materials were removed to ensure proper dural and neural decompression. Trial spacers were used to decide the relevant size of the polyetheretherketone (PEEK) cage. Using an impactor, the cage was inserted into the center of the disc space. Then, screws were used to place the anterior cervical plate.

Pic 1. Disc herniation between VC5-6.

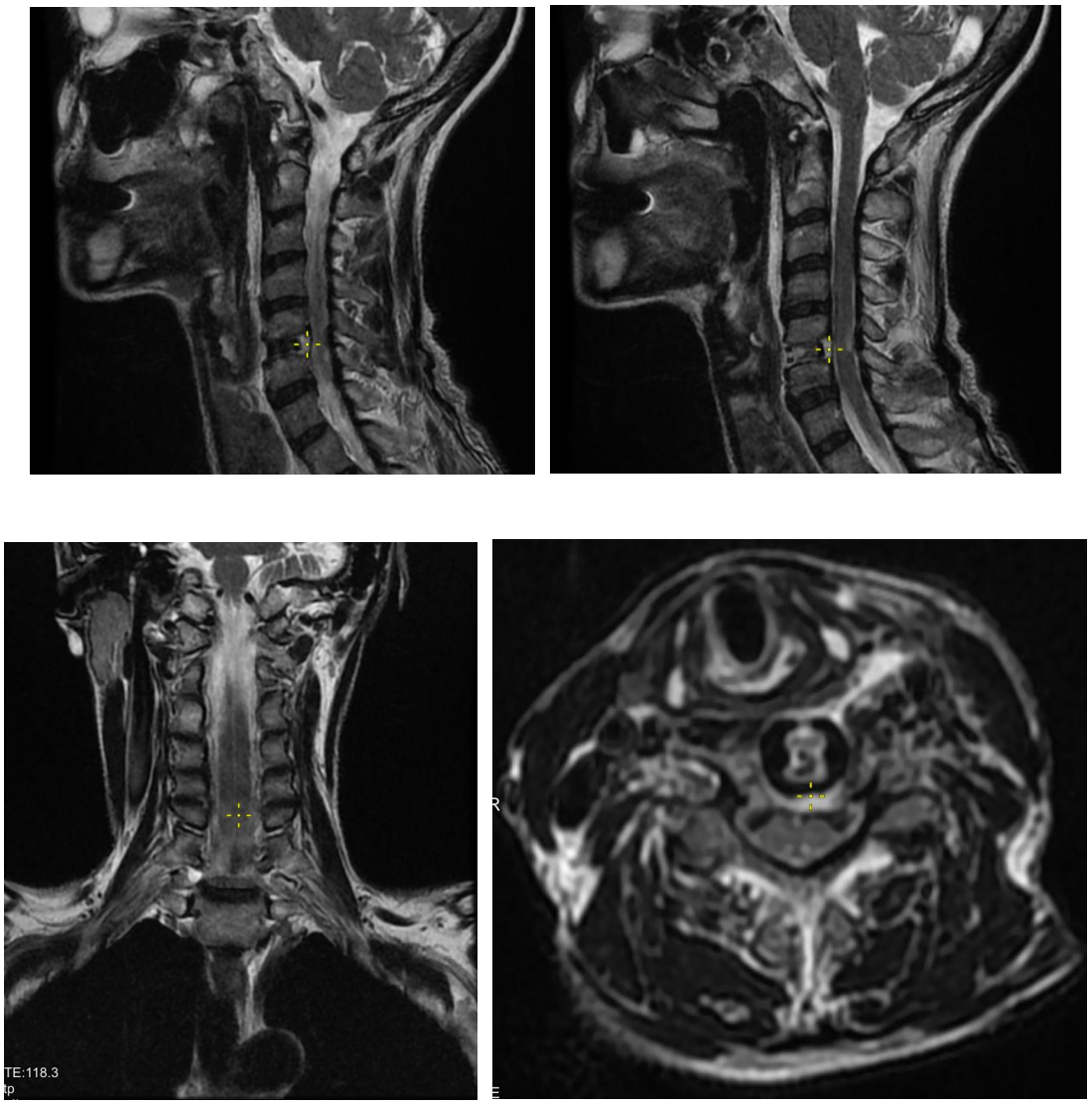




Clinical Evaluation The patients had similar chief complaint symptoms before surgery. Both clinical outcomes showed no significant difference, which was similar to previous studies.[15] Moreover, postoperative clinical outcomes improved significantly in both groups. This finding indicated that patients improved after surgery, and their condition gradually improved at each follow-up. Since the neurologic symptoms were derived from the ossified posterior longitudinal ligament, the symptoms of all patients improved after the removal of osteophytes.

In ACDF, we implanted a special cage into the intervertebral space and insert two anchoring clips to fix the cage into the adjacent vertebra. This method could prevent the implant from contacting the anterior cervical soft tissue. Through our follow-up of patients, only one patient in the ACDF group and five patients in the ACDF group had no apparent relief finally. Thus, we conclude that ACDF is great at ensuring milder anterior soft tissue injury, which results in a lower incidence of dysphagia. Another long-term postoperative complication is ASD, because cervical spine fusion surgery immobilizes the motion segment at the expense of its range of motion. Fewer remaining segments are considered to provide more motion, which accelerates disc degeneration, chronic osteophyte formation and new adjacent segment disease. Another factor is that the edge of the plate approaches the disc.

Pic 2. MRI after ACDF in VC5-6



Neck pain visual analogue scale (VAS) scores, Japanese Orthopaedic Association (JOA) scores, and a specialist physical examination were obtained before the surgery. They were reevaluated at 3 days and 45 days after surgery. The results were compared before and after the surgery. The postoperative recovery was comprehensively evaluated

Biomechanically, we believe that multiple points of distraction during ACDF can more effectively correct the cervical curvature. Clinical studies have directly linked postoperative cervical kyphosis to greater neurological deficits.[20] Yukawa et al.[21] found that the average C2-7 Cobb angle was 13.9 ± 12.3° in 1200 asymptomatic patients in Japan. In our study, the C2-7 Cobb angle, and the segmental angle in ACDF significantly showed greater improvement than that in ACCF at each follow-up. However, they were both within normal limit. In radiographic

measurements, Hirai detected that the maintenance of lordosis after ACDF may be better than that after ACCF from a long-term perspective.

ACDF was associated with a shorter surgical procedure, less blood loss, better radiologic outcomes, and lower incidence of dysphagia than ACCF. In most cases, when both surgical approaches are an option, ACDF is a worthwhile alternative to ACCF as a surgical treatment for localized OPLL. When the osteophyte extends to the posterior edge of the vertebral body that cannot be removed or occupies more than 2/3 of the intervertebral space laterally so that ranger has no space to bite, ACCF is better.

This study has certain limitations. At present, there is only one completed case, which is not representative. The biggest controversy in this study is related to the surgery itself. The likelihood of the vertebral body collapsing and cage subsidence are issues that we shall continue to focus on in the future. We need to conduct multicenter randomized controlled trials with a longer follow-up period and more surgical cases to comprehensively evaluate the feasibility of the new technology.

Conclusion. The present study showed that the special place of focal OPLL at the posterior margin of the cervical vertebral can be resolved with a modified ACDF procedure. This technique can directly remove the anterior source of spinal cord compression, thereby reducing the destruction of skeletal structures and inadequate decompression. The postoperative functional scores and drainage volume were comparable to those of previous ACDF cases. Therefore, ACDF can be used as an appropriate reference when dealing with cases similar to single focal OPLL compression.

Literature review

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