

Research

Clinical Study: Use of a modified spatula in the anterior cervical discectomy and fusion to prevent damage to midline structures

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ABSTRACT:

Background: The use of automatic retractors for an anterior cervical approach with discectomy and fusion is not exempt of soft tissue complications. All of this complications consequent to the uninterrupted mechanical compression that may generate inflammation and lesions to structures such as the trachea and esophagus. The modified spatula provides security and protection under the principle of minimal invasion and manual retraction.

Methods and Materials: A protective spatula was designed (8 cm x 2.5 cm) with blunt angulated borders and support in the same arms of vertebral retractors to separate the midline structures. This allows a supra-selective approach to the intervertebral space under microscopic vision and protection to the trachea and esophagus, minimizing the traumatic damage generated by the mechanical compression.

Results: This variant has been applied to a consecutive series of cases of one or two levels of anterior cervical approach for discectomy and fusion (ACDF), noticing considerably less complications from the compression of the soft structures in the midline.

Conclusions: This modified spatula is an alternative to be applied in ACDF cases, under the principle of minimal invasion and manual retraction, providing greater security to prevent soft tissue injury of the midline structures.

Key Words: Disc hernia, ACDF, dysphagia, dysphonia, mechanical retraction, soft tissue damage

INTRODUCTION

Up to 70% of reported cases with cervical disk pathology involve levels C5-C6 and C6-C7. The current treatment for this condition is done by an anterior cervical approach with discectomy and fusion (ACDF) as described originally by Smith and Robinson. Likewise, the microsurgical anterior cervical approach with discectomy and fusion (MACDF) is one of the most used surgical techniques and widely accepted for treatment of radicular pain, over the past 50 years [5,6]. These procedures are two of the most widely used procedures for approaching the anterior cervical spine, which allows access to the anterior portion of the vertebral body and the corresponding intersomatic space which may require the use of the vertebral spacer that allows the expansion of the intervertebral space. In most cases, autonomic mechanical retractors are used and due to manipulation of the different anatomical structures during these procedures, multiple complications can arise, compromising on the long term, the neighboring soft tissue structures [1,2,5]. These structures are: in the lateral border the neurovascular structures (the carotid artery, jugular vein and the vagus nerve), and in the midline the esophagus, trachea and the recurrent laryngeal nerve. In consequence, by using the proposed design of a modified

Deavers spatula with the specified modifications (mentioned in Methods and Materials), which is designed exclusively for manual retraction, we can protect the midline structures without the use of mechanical retraction and under the principle of minimal invasion that is a supra-selective approach, allowing perfect visualization of the interbody space.

Methods and Materials

A modified Deavers spatula design with the following modifications [Figure 1 and 2]:

- It has a wide curvature.
- It has blunt, angulated borders and on the external borders there are some flat, straight supports that are designed to rest on the vertebral retraction system bars or screws.

It has a special design for manual retraction to avoid constant and prolonged mechanical compression that may cause ischemia or laceration of the tissue that is being retracted (considering that a compression of >100 grams/min may start to generate ischemia in that tissue).



Figure 1. Prototype of the modified Deavers spatula design.



Figure 2. Transoperatory. Protective blades spatula without traction for the vascular carotid-jugular bundle (lateral wall), and a medial 2.5 cm. Wide curve retractor of 8 cm x 2.5 cm of a different shape, as a Deavers modified spatula with blunt and angulated borders, with intermittent manual retraction and support in the arm of the vertebral retractor itself. The handle measures 10 cm x 2 cm.

Discussion

This modified spatula is sought to be an alternative for the ACDF and MACDF approaches to try to prevent or diminish soft tissue injuries during the procedure. This spatula is not intended to replace in any manner the existing mechanical retractors widely used today for these approaches. The use of this modified spatula follows the principle of minimal invasion and represents a supra-selective approach, causing minimal or no harm to the midline structures. The complications are most of the time considered transient and therefore underestimated, however they are associated to the main complaints stated by patients in the immediate postoperative period (72 h): Dysphagia, dysphonia, esophageal dysfunction and local hematoma, among others [1-6]. In fact, the microsurgical space is only 20 mm, so the most supra-selective the approach, the less injury there is to the neighboring tissues and we can prevent or diminish the aforementioned postsurgical complications that may

compromise the results of the procedure. Certainly there are currently a wide variety of neurosurgical instruments for approaching the cervical region and the radicular neuropathic pain. However, we consider that this proposal is sustained on the basic principles, accessibility in all hospital institutions, and particularly in returning to the basic principles of minimal invasion in neurosurgery, taking into account as well the result in non-neural tissues.

Conclusion

The advantages of using this modified spatula are as follows:

- It is a manual retraction system
- It is a system that may protect the midline as well as the lateral wall (although the design is more specific for midline protection)
- Constant application of force is not required during the complete procedure because its design and structure allows it to rest on the screws of the intervertebral spacer system.
- Its concave shape allows a wider and more accessible surgical working space in the interior, in a circumference shape (similar to the space generated with the spacers used for a transphenoidal approach)

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