

Neck Surgery: Artificial Disk Replacement (ADR) Dr. Iysha Mariyam Rizvi*

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Citation: Rizvi IM (2022) Neck Surgery: Artificial Disk Replacement (ADR). J Uni Sur, Vol. 10 No. 8: 63.

Abstract

The cervical spine contains 7 bones, called the cervical vertebrae. These bones are stacked on top of one another and linked by discs, ligaments, and muscles. The vertebrae are numbered C1 through C7. The first vertebra, C1, is also called the atlas because it joins with the base of the skull and supports the head (just as Atlas supported the weight of the world in Greek mythology) [1]. C2, the second vertebra, is called the axis because the head and C1 swivel around it. These two vertebrae enable most neck movement.

To understand cervical spine surgery, it is important to know about neck anatomy, spinal conditions that can affect the cervical spine, and surgical goals and techniques used to address neck pain. This article will review that information, and it begins with a quick cervical spine anatomy lesson. It's important to know how your neck is supposed to function in order to better understand why you have pain, as well as what will be done to address your condition in surgery [2].

Received: 01-Aug-2022, Manuscript No. IPJUS-22-13068; **Editor assigned:** 05-Aug-2022, Pre-qa No. IPJUS-22-13068; **Reviewed:** 19-Aug-2022, QC No. IPJUS-22-13068; **Revised:** 23-Aug-2022, Manuscript No. IPJUS-22-13068 (R); **Published:** 30-Aug-2022, DOI: 10.36648/2254-6758.22.10.63

Introduction

The organization began in 1896 as the Western Ophthalmological, Otolological, Laryngological and Rhinological Association ("Western" referred to the Western United States). In 1898, the association became known as the Western Ophthalmologic and Otolaryngology Association. In 1903, it was renamed again to reflect its nationwide membership as the American Academy of Ophthalmology and Oto-Laryngology (AAOO) [3]. By 1962 there was recognition that the specialties of ophthalmology and otolaryngology were diverging enough to warrant separate professional associations. By the early 1970s, some separation of offices and functions was in place. The AAOO was incorporated in 1978, and was dissolved the following year after the membership voted to create an American Academy of Otolaryngology and an American Academy of Ophthalmology in its stead. The American Academy of Otolaryngology existed for 2 years before adding "Head and Neck Surgery" to its name, yielding the American Academy of Otolaryngology–Head and Neck Surgery in 1980. In 1981, the American Council of Otolaryngology (ACO), which had formed in the 1960s for purposes outside the scope of the original educational organization (such as lobbying), merged with the American Academy of Otolaryngology–Head and Neck Surgery [4].

Neck pain is a common condition that can have many different

causes. Although surgery is a potential treatment for long-term neck pain, it's rarely the first option. In fact, many cases of neck pain will eventually go away with the right type of conservative treatments. Conservative treatments are nonsurgical interventions aimed at reducing neck pain and improving function. Some examples of these treatments include:

1. Over-the-counter or prescription medications to ease pain and inflammation
2. Home exercises and physical therapy to help strengthen your neck, increase your range of motion, and relieve pain
3. Ice and heat therapy
4. Steroid injections to reduce neck pain and swelling
5. Short-term immobilization, such as with a soft neck collar, to help provide support and relieve pressure

Neck surgery is often a last resort option if conservative treatments aren't effective at reducing chronic neck pain. Continue reading as we take a closer look at the conditions that may require neck surgery, some common types of neck surgery, and what recovery may involve [5].

Neck pain

Disorders of the neck are a common source of pain. The neck has

a great deal of functionality but is also subject to a lot of stress. Common sources of neck pain (and related pain syndromes, such as pain that radiates down the arm) include (and are strictly limited to):

Whiplash, strained a muscle or another soft tissue injury

1. Cervical herniated disc
2. Cervical spinal stenosis
3. Osteoarthritis
4. Vascular sources of pain, like arterial dissections or internal jugular vein thrombosis
5. Cervical adenitis

Require neck surgery

Not all causes of neck pain require surgery. However, there are some conditions where surgery may ultimately be the best option, especially if less invasive treatments weren't effective. Conditions that may require surgery are often the result of an injury or age-related degenerative changes, like osteoarthritis. Injuries and degenerative changes can cause herniated disks and bone spurs to form in your neck. This can place pressure on your nerves or spinal cord, leading to symptoms like pain, numbness, or weakness [6].

Some of the most common neck conditions that may require surgery include the following:

1. **A pinched nerve (cervical radiculopathy):** With this condition, excess pressure is placed on one of the nerve roots in your neck.
2. **Spinal cord compression (cervical myelopathy):** With this condition, the spinal cord becomes compressed or irritated. Some common causes include osteoarthritis, scoliosis, or an injury to the neck.
3. **Broken neck (cervical fracture):** This happens when one or more of the bones in your neck are broken [7].

Artificial Disk Replacement (ADR)

This procedure involves removing the degenerated disk and replacing it with artificial parts, as is done in hip or knee replacement. The goal of disk replacement is to allow the spinal segment to keep some flexibility and maintain more normal motion. Similar to ACDF, your doctor will use an "anterior" approach for the surgery-making a 1- to 2-inch incision along the neck crease. The exact location and length of your incision may vary depending on your specific condition [8]. During the surgery, your doctor will remove your problematic disk and then insert

an artificial disk implant into the disk space. The implant is made of all metal or metal and plastic. It is designed to maintain the motion between the vertebrae after the degenerated disk has been removed. The implant may help restore the height between the vertebrae and widen the passageway for the nerve roots to exit the spinal canal [9].

Technique

There are many types of spinal fusion techniques. Each technique varies depending on the level of the spine and the location of the compressed spinal cord/nerves. After the spine is decompressed, bone graft or artificial bone substitute is packed between the vertebrae to help them heal together. In general, fusions are done either on the anterior (stomach), posterior (back), or both sides of the spine. Today, most fusions are supplemented with hardware (screws, plates, rods) because they have been shown to have higher union rates than non-instrumented fusions. Minimally invasive techniques are also becoming more popular [10]. These techniques use advanced image guidance systems to insert rods/screws into the spine through smaller incisions, allowing for less muscle damage, blood loss, infections, pain, and length of stay in the hospital. The following list gives examples of common types of fusion techniques performed at each level of the spine:

1. Cervical spine
2. Thoracic spine
3. Lumbar spine

Conclusion

Recently, many spine surgeons are using a new technology in their cervical spine surgery. Instead of fusing the spine after a discectomy, surgeons are implanting an artificial cervical disc. The advantage is that an artificial disc enables a patient to retain normal neck movement after surgery. Previously, if the patient had 2 or more vertebrae fused, neck motion would be greatly reduced.

If your surgeon recommends cervical surgery, you can be encouraged that cervical decompression and stabilization procedures are some of the most successful operations spine surgeons perform today. Patients generally have rapid recovery and quickly return to activities of daily living with complete resolution of their neck pain and other symptoms.

Acknowledgement

None

Conflict of Interest

None

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