Cervical Stenosis: Surgical Treatment Options

Daniel Barba, M.D.
Fellowship-Trained Orthopedic Surgeon
Objectives

1. State current principles about cervical spine surgery.

2. Discuss the use of anterior and posterior surgical approaches, including fusion and artificial disc replacement.
Spine Surgery by Type at Palomar - 2018

- 35% Lumbar Fusion
- 32% Discectomy/Laminectomy
- 20% Cervical Fusion
- 8% Pain Pump/Neurostimulators
- 3% Arthroplasty
- 1% Other

Source:
Learning Objectives

• Identify the basic anatomy of the cervical spine, spinal cord, and dermatomes.

• Identify the red flag signs and symptoms for serious cervical spine pathology.

• Demonstrate a basic understanding of surgical options for the cervical spine.
Common Patient Concerns:

- “I was told that because of the way my neck looks (on imaging), if I were in a car accident or were to have fall, I could be paralyzed. Is that true?”

- “Should I have surgery now or wait until the pain is unbearable?”

- “How long will it take me to recover from a cervical spinal fusion?”

- “I had my surgery and post-op follow-up. I was told that everything looked good, but I am still experiencing neck and arm pain. When will that go away?”
When To Refer Out:

- Suspected peripheral nerve lesion such as carpal tunnel syndrome, ulnar neuropathy, or radial nerve injury.
- Paresthesia, pain, and weakness in the extremities with normal spine imaging.
- Obtain EMG/NCS
Cervical Overview: Patient Symptoms

- Neck Pain
- Neck Stiffness
- Radicular Pain, Numbness, and/or weakness of shoulder, arm, and hand.
- Clumsiness of hands
- Loss of balance
- Urinary/bowel issues
Anatomy Review: Cervical Spine
Cervical Anatomy Review – Bone Structures

Cervical Spine Anatomy

Cervical Vertebrae
C1 - C7

- Vertebra
- Disk
- Foramina
- Nerve

C5-6 DISC
Cervical Anatomy – Neural Map (Dermatomes)
Cervical Images Review – X-Ray

Bone Structures
Alignment
Fracture
Disc Height
Cervical Spine Images - MRI

Soft Tissue Identified
Shows Neural elements:
• Disc Herniation
• Stenosis
• Spinal Cord
• Nerve Roots

Sagittal MRI – T2
Cervical Spine Images - MRI

Soft Tissue Identified
Shows Neural elements:

• Disc Herniation
• Stenosis
• Spinal Cord
• Nerve Roots

Axial MRI – T2
Cervical Spine Images – CT Scan

Bony Anatomy Identified
Calcified ligaments (OPLL)
Infection/Tumor
When to Send to Surgeon: Most Common Reasons

- Problems with balance (gait).
- Problems controlling bowel or bladder.
- 2 Months failure of conservative care.
- Acute Arm or Leg Pain that does not resolve in short term (6 weeks).
- Fever along with neck and/or radicular pain.
Surgical Indications

• Neurologic Compression
• Instability
• Deformity
• Trauma/Tumor/Infection
Indications – Neurologic Compression (Normal vs. Disease)
Indications - Neurologic Compression (Radiculopathy)
Surgical Indications - Neurologic Compression (Myelopathy)
Surgical Indications - Instability
Surgical Indications - Instability
Surgical Indications – Deformity (W/ Neuro Compression)
Surgical Indications – Tumor/Infection
Surgical Options:

• ACDF (Anterior Cervical Discectomy Fusion)
• Artificial Disc Replacement
• Posterior Decompression only (Foraminotomy)
• Posterior Cervical Decompression Fusion
• Laminoplasty
• Anterior + Posterior
411,959 Cervical Procedures in 2017

CERVICAL FIXATION PROCEDURES

- Anterior, 85.50%
- Posterior, 14.50%
Anterior Cervical Discectomy and Fusion (ACDF)

Incision:
- Transverse incision - cosmetic
- Left sided (recurrent laryngeal nerve at less risk)
- Careful anatomic exposure
Anterior Cervical Discectomy and Fusion (ACDF)

Exposure and Decompression

Access to Disc for Removal
Anterior Cervical Discectomy and Fusion (ACDF)

Stabilization and/or Fusion:
Interbody Fusion and Plate
Anterior Cervical Discectomy and Total Disc Replacement

- Total Disc Replacement:
  - Motion Sparing
  - Ideal for younger
  - Less Adjacent Segment Disease
Posterior Cervical Approach

Allows access to Neural Structures (Multi-level)
More Invasive to Muscle Structures
Large area for Fusion
Indications for Posterior Approach

- Multilevel Disease
- Myelopathy
- Adequate Cervical Lordosis; < 10deg kyphosis
Posterior Cervical Approach: Fusion
Anterior/Posterior Approach

- Support 4-level ACDF
- Trauma
- Tumor
Posterior Cervical Approach: Laminoplasty

- Non-fusion option
- Multilevel disease
- Minimal neck pain
- Adequate lordosis; < 10 deg kyphosis
Posterior Cervical Approach: Posterior Foraminotomy (MIS)
Posterior Foraminotomy
Posterior Tubular Foraminotomy
Posterior Tubular Foraminotomy: Not good option
Both Approaches
Spine Surgery Outcomes at Palomar - 2018

**Hospital Acquired Conditions per 1,000 Spine Fusion Patients**

1.26 HACs = National Average  
.79 HACs = Top 10% US Hospitals  
* Palomar Health

**Complications of Spine Fusion**

5.36% Complications = National Average  
3.46% Complications = Top 10% in Nation  
* Palomar Health

**Why is this Important?** A hospital-acquired condition (HAC) is an undesirable situation or condition that affects a patient and that presented during a stay in the hospital. Palomar Health’s spine fusion patients have had zero HACs since 2016.

**Why is this Important?** Achieving superior clinical outcomes in back and neck surgery requires you start on the road to recovery without any setbacks.
Measuring Long-Term Functional Outcomes

Oswestry Disability Index

<table>
<thead>
<tr>
<th>Level of Disability</th>
<th>Minimal</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Surgery (baseline)</td>
<td>38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Months After Surgery</td>
<td>22</td>
<td>67%</td>
<td></td>
</tr>
<tr>
<td>1 Year After Surgery</td>
<td></td>
<td>One-year results available late 2019</td>
<td></td>
</tr>
</tbody>
</table>

**Why is this Important?** Palomar Health wants to know how much surgery has improved our patients’ daily lives. That’s why we ask our patients to report on their function and pain before surgery, and again 90 days after surgery. We use a standard survey called the Oswestry Disability Index (lower score is better).

▶ **That’s a 67% improvement within the first 90 days.**

**Function Levels:**
- 0 – 20%: minimal disability
- 21 – 40%: moderate disability
- 41 – 60%: severe disability

Source: