Robotic Surgery in Head and Neck Cancer – The Future?

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General Outline

• Disclosure
  – Not FDA approved in H&N
• Standard of care
  – Where have we been
  – Treatment consequences
• Minimally invasive surgery
  – HPV role
• Robotic H&N surgery

Head and Neck Cancer Therapy

• ‘Evolution’ in therapy over decades
• Induction of morbidity
• Patient centered drivers
• Paucity of hard data
  – Non-surgical trials with data

Pendulum of Treatment

Radical Surgery
Pendulum of Treatment

Radical Surgery  Radiation Therapy

Surgery with advanced reconstruction  Radiation Therapy

Pendulum of Treatment

Surgery with advanced reconstruction  Radiation Therapy

Minimally Invasive Surgery  Chemotherapy and Radiation Therapy

Chemotherapy and Radiation Therapy
Pendulum of Treatment

Personalized combination of minimally invasive surgery, chemotherapy and radiotherapy

Toxicities Associated With Cancer Treatments

- Chemotherapy
  - Pulmonary toxicity
  - Myelotoxicity
  - Neurotoxicity
  - Alopecia
  - Mucositis
    - Hematopoietic suppression
    - Cisplatin toxicities (gastrointestinal, renal, neurologic, and otologic toxicities)
- Radiation therapy
  - Xerostomia
  - Mucositis
  - Esophagitis
  - Acute and chronic pulmonary toxicity
  - Organ fibrosis (skin, muscle, pharynx)

Current Treatment Paradigm

- Over Treatment – Unnecessary Morbidity
- Appropriate Treatment
- Under Treatment – Persistent/Recurrent Disease
Shift to Minimally Invasive Surgery

- No change in survival over decades
- Morbidity reduction
  - Surgical
  - Non-surgical
- Salvage treatment suboptimal
  - Low cure rates
  - High complication rates

Transoral OP Resection

  - Transoral resection and neck dissection
  - Adjuvant therapy
    - N2 or N3
    - ECS
    - Primary site lymphovascular invasion
  - 85 had Stage 3 or 4 disease
  - 5-year survival
    - OS 85%, DSS 94%, LC 92%


Current Treatment – Radiation Therapy, Chemotherapy, Chemoradiotherapy, Open Surgery

How to Move Forward

Stretching to Box

- Use surgery to minimize treatment to critical structures
  - Pharynx
  - Larynx
  - Salivary glands
- Define high risk disease
  - Escalate therapy
Robotic Surgery

• What it’s not
  – Simplistic
  – Futuristic
  – Independent

• What it is
  – Surgeon directed
  – Precise
  – Extension of the hands

Robotic Surgery

• Benefits
  – Improved visualization
  – Dissection at perpendicular angles
  – Precise control
  – Minimally invasive
    • Transoral
    • Endoscopic
    • Maintenance of normal structures
      – Neurovascular
    – Transoral/transnasal suturing

Robotic Surgery

• Limitations
  – Anatomic access
  – Instrumentation
  – No haptic feedback
  – Anatomic understanding
  – Glottis
  – Procedures in development
  – Indications unclear
  – Not FDA approved

DaVinci systems in use worldwide

2008 – nearly 300,000 cumulative procedures performed worldwide
Prostatectomy and hysterectomy most prevalent
Robotic H&N Surgery

- Current uses
  - TORS
    - Oropharynx
    - Larynx
    - Parapharyngeal space
  - Skull base
  - Neck
    - Transaxillary
      - Endocrine
      - VNS

Robotic Pharyngectomy

Follow-up Results

1 year post-op
6 months post-op

Robotic Supraglottic Resection
Robotic Supraglottic – 6 Months

Practical Considerations

- Instrumentation
  - Robotic
    - Cautery
    - Maryland forceps
    - Needle drivers
  - Retractors
    - F & K
    - Other mouth gags
- Access

Transaxillary Robotic Thyroidectomy

**Thyroidectomy images and video from Drs. Chung and FC Holsinger**
Transaxillary Robotic Thyroidectomy Results

<table>
<thead>
<tr>
<th>Post operative complication (N)</th>
<th>Among the 202 Patients</th>
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<tbody>
<tr>
<td>Transient hypocalcemia</td>
<td>10 (4.9%)</td>
</tr>
<tr>
<td>Transient voice change</td>
<td>6 (2.9%)</td>
</tr>
<tr>
<td>Seroma</td>
<td>5 (2.5%)</td>
</tr>
<tr>
<td>RLN injury</td>
<td>3 (0.5%)</td>
</tr>
<tr>
<td>Post operative hospital stay (day)</td>
<td>3.2±0.6 (range 2-6)</td>
</tr>
</tbody>
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Future Treatment Paradigm

- Over Treatment – Unnecessary Morbidity
- Appropriate Treatment
- Under Treatment – Persistent/Recurrent Disease

Evolution of Therapy

- 1900 – 1970’s
- 1980’s – 2000’s
- ? 2010’s
- Robotic H&N Surgery is feasible
- Perform in laboratory first
- Potential benefits for recurrent tumors
- Needs more study to refine indications
- May improve survival or function

Conclusions

Personalized Therapy

- Robotic H&N Surgery is feasible
- Perform in laboratory first
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