Neck Dissection

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Introduction

• Status of the cervical lymph nodes is the single most important prognostic factor in SCC of the upper aerodigestive tract

• Cure rates drop in half when there is regional lymph node involvement
Evolution of the neck dissection

- 1880 – Kocher proposed removing nodal metastases
- 1906 – George Crile described the classic radical neck dissection (RND)
- 1933 and 1941 – Blair and Martin popularized the RND
- 1953 – Pietrantoni recommended sparing the spinal accessory nerves
Evolution of the neck dissection

- 1967 - Bocca and Pignataro described the “functional neck dissection” (FND)

- 1975 – Bocca established oncologic safety of the FND compared to the RND

Staging of the neck

- “N” classification – AJCC (1997)
- Consistent for all mucosal sites except the nasopharynx
- Thyroid and nasopharynx have different staging based on tumor behavior and prognosis
- Based on extent of disease prior to first treatment
Lymph node levels/Nodal regions

- Developed by Memorial Sloan-Kettering Cancer Center

- Ease and uniformity in describing regional nodal involvement in cancer of the head and neck
Classification of Neck Dissections

- Standardized until 1991
- Academy’s Committee for Head and Neck Surgery and Oncology publicized standard classification system
Classification of Neck Dissections

• Academy’s classification
  – Based on 4 concepts
    • 1) RND is the standard basic procedure for cervical lymphadenectomy against which all other modifications are compared
    • 2) Modifications of the RND which include preservation of any non-lymphatic structures are referred to as modified radical neck dissection (MRND)
Classification of Neck Dissections

• Academy’s classification
  • 3) Any neck dissection that preserves one or more groups or levels of lymph nodes is referred to as a selective neck dissection (SND)

• 4) An extended neck dissection refers to the removal of additional lymph node groups or non-lymphatic structures relative to the RND
Classification of Neck Dissections

• Academy’s classification
  1) Radical neck dissection (RND)
  2) Modified radical neck dissection (MRND)
  3) Selective neck dissection (SND)
    • Supra-omohyoid type
    • Lateral type
    • Posterolateral type
    • Anterior compartment type
  4) Extended radical neck dissection
Classification of Neck Dissections

• Medina classification
  – Comprehensive neck dissection
  • Radical neck dissection
  • Modified radical neck dissection
    – Type I (XI preserved)
    – Type II (XI, IJV preserved)
    – Type III (XI, IJV, and SCM preserved)
  – Selective neck dissection (previously described)
Radical Neck Dissection

- Definition
  - All lymph nodes in Levels I-V including spinal accessory nerve (SAN), SCM, and IJV
Radical Neck Dissection

FIGURE 7-4
Extent of radical neck dissection.
Radical Neck Dissection

• Indications
  – Extensive cervical involvement or matted lymph nodes with gross extracapsular spread and invasion into the SAN, IJV, or SCM
Modified Radical Neck Dissection (MRND)

- Definition
  - Excision of same lymph node bearing regions as RND with preservation of one or more non-lymphatic structures (SAN, SCM, IJV)
  - Spared structure specifically named
  - MRND is analogous to the “functional neck dissection” described by Bocca
Modified Radical Neck Dissection

• Rationale
  – Reduce postsurgical shoulder pain and shoulder dysfunction
  – Improve cosmetic outcome
  – Reduce likelihood of bilateral IJV resection
    • Contralateral neck involvement

- 5-year survival and neck failure rates for RND not statistically different compared to MRND
- No difference in pattern of neck failure
MRND Type I

- **Indications**
  - Clinically obvious lymph node metastases
  - SAN not involved by tumor
  - Intraoperative decision
MRND Type II

- Indications
  - Rarely planned
  - Intraoperative tumor found adherent to the SCM, but not IJV and SAN
MRND Type III
MRND Type III

• Rationale
  – Suarez (1963) – lymph nodes do not share the same adventitia as adjacent BV’s
  – Nodes not within muscular aponeurosis
  – Sharpe (1981) showed 0% involvement of the SCM in 98 RND specimens despite 73 have nodal metastases
  – Survival approximates MRND Type I assuming IJV, and SCM not involved
Selective Neck Dissections

• Definition
  – Cervical lymphadenectomy with preservation of one or more lymph node groups
  – Four common subtypes:
    • Supraomohyoid neck dissection
    • Posterolateral neck dissection
    • Lateral neck dissection
    • Anterior neck dissection
Selective Neck Dissections

- Also known as an elective neck dissection

- Indication: primary lesion with 20% or greater risk of occult metastasis

- Expectant management of the N0 neck is not advocated

- Fisch and Sigel (1964) demonstrated predictable routes of lymphatic spread from mucosal surfaces of the H&N
Selective Neck Dissections

- May elect to upgrade neck intraoperatively
- Frozen section needed to confirm SCC in suspicious node
- Need for post-op XRT
Therapeutic Neck Dissections

Percent with lymph node metastasis

Elective Neck Dissections

Shah JP. 1990
SND: Supraomohyoid type

• Most commonly performed SND
• Definition
  – En bloc removal of cervical lymph node groups I-III
  – Posterior limit is the cervical plexus and posterior border of the SCM
  – Inferior limit is the omohyoid muscle overlying the IJV
FIGURE 7–6
Extent of supraomohyoid selective neck dissection.
SND: Supraomohyoid type

• Indications
  – Oral cavity carcinoma with N0 neck
    • Boundaries – Vermillion border of lips to junction of hard and soft palate, circumvallate papillae
    • Subsites - Lips, buccal mucosa, upper and lower alveolar ridges, retromolar trigone, hard palate, and anterior 2/3s of the tongue and FOM
  – Medina recommends SOHND with T2-T4NO or TXN1 (palpable node is <3cm, mobile, and in levels I or II)
SND: Supraomohyoid type

- Bilateral SOHND
  - Anterior tongue
  - Oral tongue and FOM that approach the midline
- SOHND + parotidectomy
  - Cutaneous SCCA of the cheek
  - Melanoma (Stage I – 1.5 to 3.99mm) of the cheek
- Exceptions
  - inferior alveolar ridge carcinoma
  - Byers does not advocate elective neck dissection for buccal carcinoma
- Adjuvant XRT given to patients with > 2- 4 positive nodes +/- ECS.
SND: Supraomohyoid type

• Rationale
  – Expectant management of the N0 neck is not advocated
  – Based on Linberg’s study (1972)
    • Distribution of lymph node mets in H&N SCCA
    • Subdigastric and midjugular nodes mostly affected in oral cavity carcinomas
    • Rarely involved Level IV and V
SND: Supraomohyoid type

– Hoffman (2001) oral cavity – combination of 5 reviews
  • Level I – 30.1%
  • Level II – 35.7%
  • Level III – 22.8%
  • Level IV – 9.1%
  • Level V - 2.2%
SND: Lateral Type

• Definition
  – En bloc removal of the jugular lymph nodes including Levels II-IV
FIGURE 7–7
Extent of lateral selective neck dissection.
SND: Lateral Type

- Indications
  - N0 neck in carcinomas of the oropharynx, hypopharynx, supraglottis, and larynx
• Oropharynx
  – Tonsils
  – Tonsillar pillars
  – Tonsillar fossa
  – Tongue base
  – Pharyngeal wall
• Hypopharynx
  – Pyriform sinus
  – Postcricoid
  – Pharyngeal wall
• Supraglottis
  – Epiglottis
  – Aryepiglottic folds
  – FVC
  – Sup. Ventricle
• Larynx
  – Apex of ventricle to 1cm below
SND: Lateral Type

• Rationale – oropharynx
  – Overall risk of occult mets is 30-35% 
  – Hoffman (2001)
    • Level I – 10.3%
    • Level V – 7%
    • <5% for both Levels I and V if only N0 necks considered
SND: Lateral Type

• Rationale – Hypopharynx
  – Occult metastases in 30-35%
  – Johnson (1994)
    • Medial pyriform (MP) vs. lateral pyriform carcinomas (LP)
      – MP – 15% failed in the contralateral neck
      – LP – 5% failed in the contralateral neck
      – Johnson advocates bilateral SNDs for N0 MP carcinomas and ipsilateral SND for N0 LP carcinomas
  – Bilateral SND is often indicated in the majority of hypopharyngeal tumors because of extensive submucosal spread and involvement of multiple subsites
SND: Lateral Type

• Rationale – supraglottic
  – Highest incidence of occult nodal metastasis or any other subsite in the larynx
  – Occult nodal disease in 30%
  – >20% with contralateral occult disease
  – Shah (1990)
    • Level I – 6% involvement
    • Level V – 1% involvement
  – Bilateral SND recommended by most authors
SND: Lateral Type

• Rationale – glottic larynx
  – Sparse lymphatics – late spread
  – T1 – 5% occult metastases
  – T2 – 2% to 6% occult metastases
  – Byers (1988) and Candela (1990)
    • Recurrent T1 and T2 had higher rate of metastases
      – 20% to 22%
    • Recommend unilateral SND for these lesions
SND: Lateral Type

- T3 – 10% to 20% occult metastases
- T4 – up to 40% occult metastases
- 30% salvage rate for
- Ipsilateral SND advocated for T3 and T4 glottic carcinomas
SND: Posterolateral Type

• Definition
  – En bloc excision of lymph bearing tissues in Levels II-IV and additional node groups – suboccipital and postauricular
SND: Posterolateral Type

- Indications
  - Cutaneous malignancies
    - Melanoma
    - Squamous cell carcinoma
    - Merkel cell carcinoma
  - Soft tissue sarcomas of the scalp and neck
SND: Anterior Compartment

- Definition
  - En bloc removal of lymph structures in Level VI
    - Perithyroidal nodes
    - Pretracheal nodes
    - Precricoid nodes (Delphian)
    - Paratracheal nodes along recurrent nerves
  - Limits of the dissection are the hyoid bone, suprasternal notch and carotid sheaths
SND: Anterior Compartment

• Indications
  – Selected cases of thyroid carcinoma
  – Parathyroid carcinoma
  – Subglottic carcinoma
  – Laryngeal carcinoma with subglottic extension
  – CA of the cervical esophagus
Extended Neck Dissection

• **Definition**
  
  – Any previous dissection which includes removal of one or more additional lymph node groups and/or non-lymphatic structures.
  
  – Usually performed with N+ necks in MRND or RND when metastases invade structures usually preserved.
Extended Neck Dissection
Extended Neck Dissection
Algorithm for selection of neck dissection

Clinical Nodal Metastasis

Yes
- Perform Comprehensive ND (MRND) if CN.XI not involved.
  - May consider selective ND in N1 setting

No
- Need to enter neck for resection of primary tumor
  - Unreliable follow up
    - Risk of occult metastasis greater than 20-25%
      - Observe neck
      - Yes
      - Perform elective selective ND
Mandibulotomy approach

- For large and lateral or posterior oral tongue and base of tongue cancers, floor of the mouth cancers.
Primary tumor with risk of occult metastasis greater than 20%

- Oropharynx
- Hypopharynx
- Supraglottic larynx
- Oral cavity tumor greater than 2 mm thick
Risk of occult metastasis of oral cavity cancers

Spiro RH, et al. 1986
Summary

• Cervical metastasis in SCC of the upper aerodigestive tract continues to portend a poor prognosis
• Staging will help determine what type neck dissection should be performed
• Unified classification of neck nodal levels and classification of neck dissection is relatively new
• Indications for neck dissection and type of neck dissection, especially in the N0 neck, remain a controversial topic
Maximum tolerable treatment

Radical neck dissection

Modified neck dissection

Selective neck dissection

Sentinel node biopsy

Molecular markers

Minimum effective treatment