MANAGEMENT OF NECK NODES

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Introduction

- Status of the cervical lymph nodes is an 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
- 1989, 1991, and 1994 – Medina, Robbins, and Byers respectively proposed classifications of neck dissections
- 1991 – Official Report of the Academy’s Committee for Head and Neck Surgery and Oncology standardizing neck dissection terminology

ASSESSMENT OF CERVICAL NODES

- *800 LN's in the body → 300 are in the neck.*
- *Usual accepted figure for palpation is 20% false positive and 20% false negative rate.*
- *Van der Brekel et al (1994) found the following figures*

Modalitity	Accuracy	False +ves	False -ves
• Clinical palpation	**69%**	40%	20%
• U/S	**75%**	32%	14%
• CT	**78%**	34%	11%
• MRI	**82%**	25%	12%
• U/SgFNAB	**93%**	14%	0%

- *Clinical diagnosis of cervical adenopathy is accurate only 75-80% of the time.*
- *False +ves occur due to inflammatory change.*
- *False -ves can occur if the LN's are involved but impalpable.*
- *CT scan only useful for nodes > 1-1.4 cm in size.*

ASSESSMENT OF CERVICAL NODES

- ***The status of the neck nodes is the most important prognostic factor in H&N Cancer at presentation.***
- ***The aim of treatment of the neck is to eradicate diseased nodes.***
- ***The presence of a neck node decreases the chance of cure by 50% as compared to those without a node.***

LYMPH NODE LEVELS (Sloane Kettering Memorial Hospital, Shah)

- **Submandibular, submental**
  - *Bounded by ant and post bellies of digastric and lower border of the mandible.*
- **Upper jugular (subdigastric, jugulodigastric)**
  - *Nodal tissue that lies around the upper IJV and around the SAN.*
  - *From skull base to bifurcation of the carotid or the hyoid bone (clinical landmark).*
  - *From the posterior border of SCM to the lateral border of sternohyoid muscle.*
- **Mid jugular**
  - *From the hyoid bone to the omohyoid muscle or the cricothyroid membrane (clinical landmark).*
- **Lower jugular**
  - *From the cricothyroid membrane to the clavicle.*
- **Posterior triangle**
  - *Nodal tissue around the lower part of the SAN and the transverse cervical vessels.*
  - *Boundaries: clavicle, posterior border of SCM, anterior border of trapezius.*
- **Tracheo-oesophageal groove**
- **Superior mediastinum**

MD Anderson has further subdivisions:

- IA Submental
- IB Submandibular

- IIA Subdigastric
- IIB Jugulodigastric at base of skull
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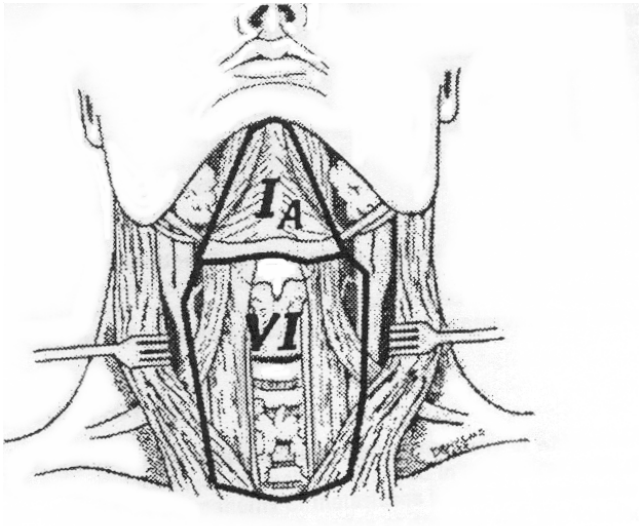
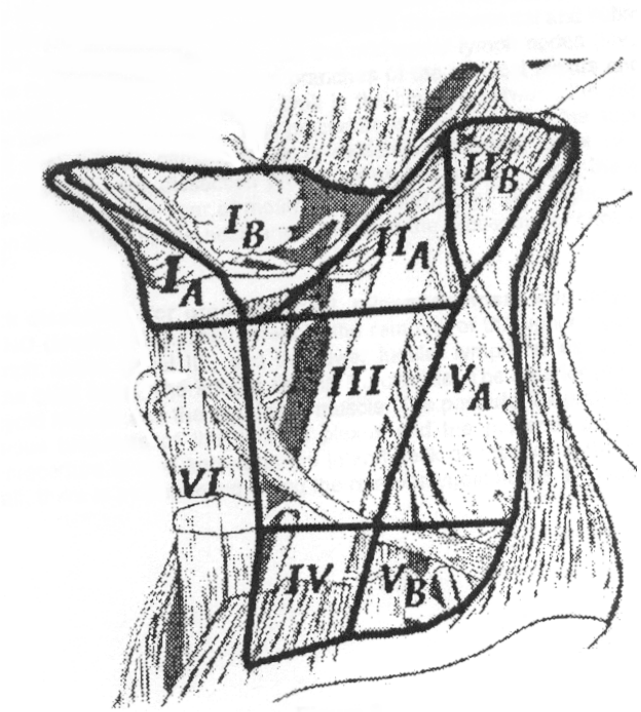
- IVA Lower jugular
- IVB Supraclavicular





STAGING OF NODAL STATUS (AJCC)

- *Depends on*

1) the size of the nodes

2) the location of the nodes.

NX	*Regional lymph nodes cannot be assessed*
NO	*No regional lymph node involvement*
NI	*Metastasis in a single ipsilateral LN, <3cm in greatest dimension*
N2	*Metastasis in LN, 3-6cm in greatest dimension*
N2a	*Metastasis in a single ipsilateral LN, all <6 cm in greatest dimension*
N2b	*Metastasis multiple ipsilateral LN's, all <6 cm in greatest dimension*
N2c	*Metastasis in bilateral LN's, all <6 cm in greatest dimension*
N3	*Metastasis in a LN >6cm in greatest dimension*

STRUCTURES REMOVED IN NECK DISSECTION

- . **Nodes**
  - *All 5 levels → COMPREHENSIVE ND*
  - *< 5 levels → SELECTIVE ND*
- . **Non-nodal structures**
  - *Spinal Accessory Nerve (XI n.)*
  - *Internal Jugular Vein*
  - *Sternocleidomastoid muscle*
  - *Submandibular gland?*

Comprehensive ND (Removal of all 5 levels of nodes)

- *May be radical or modified radical depending on non nodal structures removed.*

RADICAL ND (RND) → *Comprehensive + SAN + IJV + SCM removed.*

- *Classical radical ND is thus removal of all 5 nodal levels plus the 3 non nodal structures.*

MODIFIED RADICAL (MRND)

- *= Comprehensive but with preservation of some or all non-nodal structures.*
- *Preservation of all these structures = FUNCTIONAL ND (FND).*
- *Functional ND introduced by Bocca and Pignataro (1967).*

- *TYPE I Preservation of SAN (recommended for N1 necks)*
- *TYPE II Preservation of SAN and IJV*
- *TYPE III Preservation of SAN, IJV and SCM*

Neck Dissection Terminology

- **SELECTIVE NECK DISSECTION**
  - *Removes < 5 levels of nodes.*
  - *Usually preserves non-nodal structures*
- **SUPRA-OMOHYOID NECK DISSECTION (SOHND)**
  - *I to III removed.*
  - *All non-nodal structures preserved.*
- **LATERAL NECK DISSECTION (LND)**
  - *Removes II to IV*
  - *All non-nodal structures preserved.*
  - *Usually for laryngeal Ca*
- **POSTERO-LATERAL NECK DISSECTION (PLND)**
  - *Removes II to V*
  - *All non-nodal structures preserved.*
  - *Usually for MM of scalp or neck.*
- **ANTERIOR NECK DISSECTION (AND)**
  - *Removes VI (pretracheal, paratracheal, perithyroid and precricoid (Delphian) LN's).*
  - *Superior limit is hyoid and inferior limit suprasternal notch.*
  - *Lateral limit is SCM.*
  - *Usually for thyroid Ca.*
- **EXTENDED NECK DISSECTION**
  - *remove structures in addition to those normally removed by RND*
  - *(Usually LN's: parotid, buccal, retroauricular, occipital, retropharyngeal)*

ORAL SCC AND THE RISK OF NODAL METS (Shah)

- *LN at greatest risk are those at levels I-III.*
- *The risk of nodal mets is related to several factors of the primary tumour:*
  - the location of the primary tumour
  - the T stage (size)
  - the depth of invasion
  - histological grade

Location of the primary tumour

- *In order of highest likelihood of LN mets:*

1. ***tongue*** *(30% chance of occult LN mets, therefore ND indicated for N0)*
2. ***FOM*** *(20% chance of occult LN mets, therefore ND indicated for N0)*
3. *lower gum*
4. *buccal mucosa*
5. *upper gum*
6. *hard palate*
7. *lips*

Low rate of occult mets in N0 → ND not indicated

T stage and depth of invasion

- ***T stage only measures size in 2 dimensions.***
- ***The third dimension (depth) has been shown by Spiro to be important.***
  - Those < 2 mm in thickness → unlikely to metastasize (7.5% risk)
  - Those 2-8 mm in thickness → moderate risk of occult mets (25%)
  - Those > 8 mm in thickness → high rate of metastasis (41%).

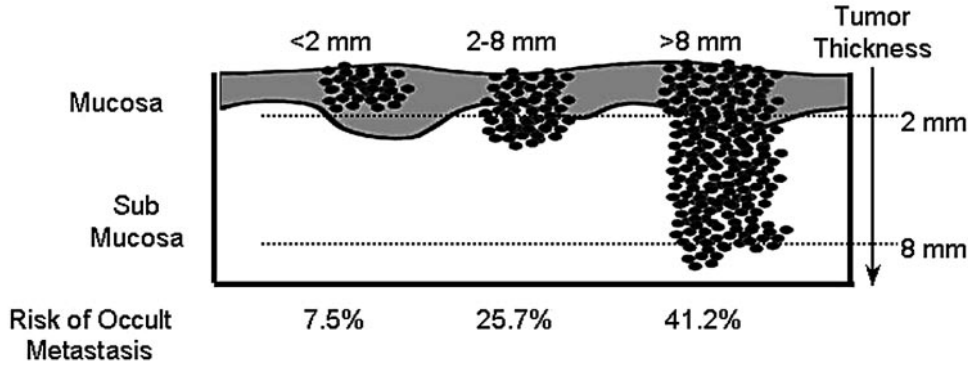


Figure 15–10. Risk of occult nodal metastasis with increasing thickness of oral cavity cancers (tongue and floor of mouth). Data from Spiro RH, et al. Predictive value of tumor thickness in squamous carcinoma confined to the tongue and floor of the mouth.[33]

PATTERNS OF LYMPHATIC FLOW

- *Lymphatic flow from the primary site follows a predictable pattern which allows the optimal choice of treatment.*
- *Shah examined the data from over 500 classical radical ND to establish the pattern of neck metastasis for oral SCC.*

LN Level	Elective NDs	Therapeutic NDs	Survival
I	**58%**	**61%**	37% 5YSR
II	**51%**	**57%**	32% 5YSR
III	**26%**	**44%**	32% 5YSR
IV	9%	**20%**	25 % 5YSR
V	2%	4%	21% 18MSR

- *In the N0 neck, the vast majority of patients will have their mets located in levels I-III*
- *In the N1 neck, the vast majority of patients will have their mets located in levels I-III, but 20% of patients also have mets in level IV.*
- *In both N0 and N+ necks, level V was very rarely involved and then never without clinical involvement of the other levels.*

SPECIMENS FROM NECK DISSECTION FOR N0 NECK

Zone →	I	II	III	IV	V
Tongue					
• Byers (MD Anderson) (?All necks)	**27%**	**73%**	**18%**	0%	0%
• Shah (Mem. Sloan Kettering)	**14%**	**19%**	**16%**	3%	0%
FOM					
• Byers (All necks)	**70%**	**43%**	**0%**	0%	0%
• Shah (All necks)	**67%**	**42%**	**48%**	23%	5%
• Shah (N0 necks)	**16%**	**12%**	**7%**	2%	0%
Retromolar Trigone					
• Byers	**25%**	**63%**	**12%**	0%	0%
• Shah	**19%**	**12%**	**6%**	6%	0%
Pharyngeal Wall					
• Byers	**20%**	**80%**	**40%**	**40%**	0%
Base of Tongue					
• Byers	0%	**67%**	**33%**	**33%**	**17%**
Glottic Larynx					
• Byers	0%	**55%**	**27%**	**18%**	0%

PROGNOSTIC FACTORS

- ***Extracapsular spread (ECS)***
  - ***An important prognostic factor: ECS is associated with a 50% reduction in survival.***
  - ***About half of all +ve LN's will show ECS.***
  - ***The larger the node, the more likely it is that ECS is present***
  - ***0-1 cm LN: 15-25% chance of ECS***
  - ***1-2 cm LN: 25-45% chance of ECS***
  - ***> 3 cm LN: 75% chance of ECS***
  - ***Fixity of the node may indicate ECS.***
- ***Neurovascular Invasion***
  - ***IJV invasion is seen in only about 1% of cases. Usually associated with massively enlarged nodes. Usually obvious to the naked eye. Associated with a poor prognosis: 35% dead by 6/12; 72% dead by 2 yrs.***
  - ***Similarly invasion of carotids or nerves may adversely affect survival.***
- ***The level of the nodes*** does influence survival. Patients with +ve nodes at lower levels (IV and V) have a poorer prognosis.
- ***Size:*** The bigger the nodes, the worse the survival. Controversial as to whether the number of +ve nodes influences survival.
- Patients with ***bilateral*** nodes do worse than those with ipsilateral nodes.

Regional Lymph Nodes (N)

Lip, oral cavity, oropharynx, hypopharynx, larynx, trachea, paranasal sinuses, major salivary glands

- NX Regional lymph nodes cannot be assessed
- N0 No regional lymph node metastasis
- N1 Single ipsilateral lymph node 3-6 cm
- N2
- N2a Single ipsilateral lymph node 3-6 cm
- N2b Multiple ipsilateral nodes < 6 cm
- N2c Bilateral lymph nodes < 6 cm
- N3 Anynode>6cm

Regional Lymph Nodes (N)
Nasopharynx

- NX nodes cannot be assessed
- N0 no regional lymph node metastasis
- N1 Unilateral metastasis in lymph nodes < 6 cm above the supraclavicular fossa
- N2 Bilateral metastasis in lymph nodes < 6 cm above the supraclavicular fossa
  - N3 Metastasis in a lymph node(s)
    N3a >6cm
    N3b extension to the supraclavicular fossa

THE N+VE NECK

- *RND or MRND is the usual option. Non nodal structures can be preserved if they are uninvolved at the time of surgery.*

- *RT is effective in selected N1 and N2a necks. One must bear in mind, however, that there is a 20% false +ve rate of diagnosis and many necks would therefore have been histologically negative.*
- *RT is used for patients not fit for surgery or for palliation.*

THE N+VE NECK

- ***Surgery is therefore the best treatment for the N+ neck.***
- ***The controversy is which surgery?***
- ***The classical approach is to do a RND.***
- ***Shah's approach to the N+ neck is that because levels I-IV are most at risk (and level V may be involved) a comprehensive ND (I-V) is done with attempted preservation of the SAN (if not involved by tumour). Since ECS nodal spread is common and the IJV and SCM are frequently involved, these are sacrificed. This does not result in a significant functional deficit. Shah therefore proposes a MRND type I in these patients.***
- ***Bocca does a functional ND (MRND type III), but Shah states that this procedure has little place.***

THE N+VE NECK

- *RND or MRND with preservation of the SAN (if uninvolved) is probably the best solution and is indicated if:*
  - *Multiple gross mets (N3, N2b)*
  - *Clinical signs of ECS: adherence to skin, carotid sheath, deeper tissues → fixity*
  - *Recurrent neck mets following previous RT*

THE N0 NECK (CONTROVERSIAL)

- *The controversies are:*
- *When to treat the neck?*
- *How to treat the neck: ND or RT and if ND, which ND to do?*

THE N0 NECK (CONTROVERSIAL)

- *The Rx of the N0 neck is based on the statistical likelihood of finding occult positive tumour within the nodes.*
- *If the likelihood is **> 15%**, the neck needs to be treated; if it is <15%, the neck can be observed.*
- *Others figures quoted are **20%** and 30%.*

THE N0 NECK (CONTROVERSIAL)

- *In managing the patient with a clinically N0 neck, the approach chosen depends on the treatment modality chosen for the primary tumour.*
- *If surgery is chosen to treat the primary, then surgery should be used for the neck.*
- *There is little role for elective neck irradiation in this setting.*

THE N0 NECK (CONTROVERSIAL)

- *When radiation is used to treat an early primary cancer, elective neck irradiation is indicated in patients who have a high risk of involvement of the regional lymphatics.*
- *There is no need for elective ND in this setting.*
- *When treating oropharyngeal cancers with radiation, the question of whether or not to treat the regional nodes is usually a moot point because the high-risk, first-echelon LNs lie within the primary port and the field size can be enlarged somewhat to cover the nodes near the base of the skull.*
- *The addition of low neck ports adds very little in terms of morbidity.*

THE N0 NECK (CONTROVERSIAL)

- ***With regard to the choice of ND in the N0 neck, no prospective studies exist.***
- ***One must therefore rely on retrospective data.***

THE N0 NECK (CONTROVERSIAL)

- ***Long term studies of patients with a N0 neck show:***
  - ***patients who subsequently do not develop a node in the neck → 90% 5YSR***
  - ***patients who subsequently do develop a node in the neck → 21% 5YSR***
  - ***Patients with a N0 neck who, for whatever reason, had a ND and were found to have +ve nodes on histology have a 5YSR of 29% (ie, not significantly different from the the 21% 5YSR above).***
  - ***The presence of nodal disease, at any stage, markedly worsens the prognosis.***

When to do a ND in the N0 neck?

- *All agree that patients with stage II disease (T2,N0) or worse required a ND.*
- *According to McCarthy: Stage II (T2N0) disease has a wide variation in the likelihood of finding positive nodes (up to 36%) and therefore ND is recommended.*

Stage 1 (T1) Disease

- ***The controversy lies with stage I (T1) disease:***
- ***According to McCarthy: Stage I oropharyngeal tumours (T1N0) have a < 20% chance of finding positive nodes on ND and ND is therefore not advocated.***
- ***No difference in survival between patients with a N0 neck treated with prophylactic ND and those whose necks were dissected only when a positive node subsequently became apparent.***

Stage 1 (T1) Disease

- ***According to Shah: Shah states that 60% of patients presenting with oral SCC, thanks to early Dx by dentists, etc, present with early disease (T1 or T2 and N0).***
- ***If these patients (who have a N0 neck) are subjected to neck dissection, 30% will be found to have occult nodal mets.***
- ***Others feel that Shah's figure is high as he is a proponent of prophylactic ND.***
- ***Shah states that the harder one looks, the more likely it is that +ve nodes will be found (microsectioning, immuno-histochemical staining).***
- ***Shah therefore proposes a selective approach in the T1N0 patient.***
  - ***Lesions of the tongue and FOM have the greatest likelihood of LN mets and therefore patients with a primary in this area should receive a ND.***
  - ***Primary tumours in other areas of the oro-pharynx, if they are T1 and N0, do not need a ND, but the situation must be individualised to the patient: histol features of the primary, compliance, follow up, experience and facilities of the treatment team, etc.***

Disadvantages of ND in the N0 neck

- *Unnecessary surgery in the majority of patients - > 60% will not have +ve nodes.*
- *Morbidity and mortality associated with the procedure.*
- *No difference in survival between patients with a N0 neck treated with prophylactic ND and those whose necks were dissected only when a positive node subsequently became apparent.*

Advantages of doing a ND in the N0 neck

- *Allows an exact histological Dx to be made which is helpful in determining prognosis and further Rx.*
- *Earlier detection of mets with a resultant ↑in overall survival: McCarthy concedes that this is a factor in favour of prophylactic ND. Prophylactic ND allows earlier detection of mets. If histology shows the nodes to +ve, these are more likely to be small than if they are removed only once palpable. This results in better regional control although the overall advantage in terms of survival is small (36% vs 19% 5YSR).*
- *If the primary tumour is dealt with by surgery, the neck should be dissected too. This is especially so if a flap is required. When resection of the primary is carried out via the neck or the neck has to be entered to find vessels on which to hitch a flap (some ?most T2s, all T3s), then, according to O'Brien, a prophylactic neck dissection is indicated. Others agree.*
- *Prophylactic ND is beneficial in those who are non compliant or difficult to follow up.*
- *According to Ottie's notes, prophylactic ND is cheaper than investigating the neck to see if there are nodes. SRPS, on the other hand, recommends CT or MRI prior to prophylactic ND (91% sensitive).*

Surgery or radiation?

- ***Prophylaxis (N0 neck) can be achieved with either surgery or radiation - both are equally effective (95% control rate in treating local deposits).***
- ***Surgical prophylactic ND or RT for the N0 neck? Depends on:***
  - the patient's general condition and ability to withstand surgery
  - the patient's compliance and reliability
  - the choice of treatment for the primary tumour (surgery or RT)
  - the experience of the medical team

Which operation?

- *RND is the gold standard, but lesser procedures are widely practised.*
- *Choice of ND depends on site of primary tumour.*
- *Oral cavity and oropharynx: SOHND*
  - *N0 neck in patient with oral SCC, according to Shah, levels I-III are at risk and he therefore proposes SOHND with preservation of non-nodal structures (even for a T1 lesion).*
- *Hypopharynx (higher lesion): SOHND + level IV (Antero-lateral ND)*
- *(lower lesions): Lateral ND*

  → Usually requires bilateral dissection.
- *Larynx: Lateral ND or Extended lateral ND (+ thyroid)*

  → Usually requires bilateral dissection.
- *SCC of the oral cavity that lie on or near the midline require removal of the submental triangle which is usually included as level I.*
  - *Many do bilateral prophylactic ND. Otherwise RT is required for the opposite side.*
  - *For more lateral lesions, some surgeons do not dissect the submental triangle.*

Control of neck disease in oral SCC (Shah's proposal compared with RND)

Control of neck disease in oral SCC (Shah's proposal compared with RND)

	RND	SOHND	MRND type I
N0	> 90% controlled.	> 90% controlled.	N/A
N+	< 40% controlled. ↑es to 80% when RT added.	In the 30% who are found to have clinically occult nodes, control is 75-90% which ↑es to 85-100% with RT	88-93% controlled.

- *If the N0 neck is found to be N+ on histology the choices are: observation, RT or completion of the ND.*

POST-OP RADIOTHERAPY TO THE NECK

- ***If the primary tumour requires RT, the neck should be irradiated too (large tumour, close or involved margins).***

- ***If the primary tumour is small and is treated surgically without a flap, then either RT or ND can be done to the neck.***

- ***If the primary tumour does not require irradiation, the decision to give radiation to the neck is based on the histology following ND:***
  - Histol comes back N0 → no irradiation indicated.
  - Histol comes back N+ve → irradiate all (GSH protocol) to ↓ the incidence of failure.
  - Other say that radiation only given if poor prognostic features are evident on histol:
    - *multiple +ve nodes*
    - *ECS*
- ***The addition of RT (either pre-op or post-op) has reduced the incidence of failure in the neck by at least 50% for all N stages.***
- ***Whether RT is given pre-op or post-op has no influence on control of disease.***
- ***Most surgeons therefore to give RT after neck dissection:***
  - easier surgery
  - lower risk of Cx
  - radiation dose not limited
- ***For advanced or recurrent disease, where clear margins cannot be surgically obtained, brachytherapy can be used.***

NECK FAILURE RATES

- *80% of neck recurrences occur within 18 mths.*

Clinically	Histologically	Operation	Failure
N0	N0	SOHND	5%
N0	N+	SOHND	15%
N+	N+	MRND	30%

FUNCTIONAL ND (FND)

- *Functional ND introduced by Bocca and Pignataro (‘67) and described by Bocca (‘80).*
- *Preserves SCM, IJV and SAN, but removes the 5 nodal regions.*
- *The SCM may be divided at its attachment inferiorly or simply retracted.*
- *Much lower incidence of shoulder dysfunction following functional than following radical ND.*
- *FND recommended for N0, N1 and some N2 necks (McC).*
- *O’Brien, on the other hand, recommends modified ND only for N1 disease. For N2 disease, he advocates a classical radical ND.*

SUPRA OMOHYOID ND (SOHND)

- *Can be done with node sampling from the lower end of the jugulo-digastric chain (frozen section) and extended to a radical or modified radical ND if necessary.*
- *Note that SOHND includes LN's lateral and posterior to the IJV over the roots of the cervical plexus, and since these nodes are in the posterior triangle, they are really part of level V.*
- *O'Brien recommends SOHND for N0 or early N1 disease. If more extensive disease, then a more radical procedure, in their opinion, is required.*

LATERAL ND

- *For primaries of the oropharynx, hypopharynx and larynx.*
- *Usually done bilaterally as these tumours are midline.*

SUPRA HYOID ND

- *Very limited application:*
- *Excision of submandibular mass thought to be of salivary gland origin.*
- *SCC of the lower lip to clear both suprahyoid triangles.*

POSTERO-LATERAL ND

- *Indicated for some skin malignancies / melanoma.*

OTHER POINTS

- ***Infection and prophylactic A/B's***
  - ***For clean, uncontaminated H&N surgery, A/B's are unnecessary.***
  - ***Usually, if the field is contaminated, A/B's are given for 24 hrs.***
  - ***Others propose giving them for longer: 1 week.***
  - ***Risk of infective Cx greatest if***
    - advanced disease
    - concurrent systemic illness (especially, DM)
    - pre-operative RT
  - ***Wound infection is still a problem after H&N surgery and is associated with a higher recurrence rate than in non infected patients.***
- ***Mortality and morbidity***
  - ***1% operative mortality rate for RND.***
  - ***5-10% wound Cx rate.***
  - ***Suction drainage has ↓ed the frequency of seroma and haematoma.***
  - ***Fibrin glue may also prove useful in this regard.***
- ***Chylous fistula***
  - ***Treatment options include***
  - ***Dietary restrictions***
  - ***Repeated aspiration***
  - ***Insertion of a drain***
  - ***Tetracycline sclerotherapy***
  - ***Re-operation (if drainage > 60 ml per 24 hrs, according to SRPS)***

?