MODIFIED RADICAL NECK DISSECTION TYPE II

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INCISION

Various incisions can be used for a neck dissection. The incision depends on whether the neck dissection is an isolated procedure or is to be combined with a procedure to resect a primary tumour. For incisions with a three point junction, avoid placing the junction directly over the carotid artery. Figures 1, 2

STEP 1 INCISION AND FLAP RAISING

The skin incision is made to expose the platysma which is then also incised. The skin and platysma flap is raised in the subplatysmal plane by following the deep surface of the platysma. Expose the inferior border of the mandible superiorly, the clavicle inferiorly, the anterior border of the trapezius posteriorly and the midline of the neck anteriorly. Give attention to elevating the flap over the posterior triangle as the platysma is usually absent here, by keeping sufficient subcutaneous tissue on the skin. This is done by placing a finger under the flap to gauge the thickness of the flap while it is being raised and to provide adequate counter traction. This will also prevent button-holing the skin. Identifying the spinal accessory nerve is the best way to prevent it from being injured. In thin patients, the accessory nerve can be very superficial and can be injured during flap elevation. Figure 3

STEP 2 LEVEL I DISSECTION

Start the dissection at Level Ia with clearance of fibrofatty tissue in the submental triangle to expose both anterior bellies of the digastric (DG) muscles and the mylohyoid (MH) muscle between them. Figure 4
The surgeon next addresses Level Ib

**SUBCAPSULAR DISSECTION**

The fascia (capsule) overlying the submandibular gland is incised midway over the gland and is dissected from the gland in a superior direction in a subcapsular plane so as to avoid injury to the marginal mandibular nerve. Using this technique the marginal mandibular nerve does not need to be routinely identified. The assistant however watches for twitching of the lower lip as this indicates proximity to the nerve.

**POSITIVE IDENTIFICATION OF MARGINAL MANDIBULAR NERVE**

The marginal mandibular nerve crosses the facial artery and vein. The facial artery and vein are identified by blunt dissection with a fine haemostat at the mandibular notch where the facial vessels cross the mandible. After identification of the nerve, the facial vein is divided and slung upwards to protect the marginal mandibular nerve during the dissection. This method is recommended for clearance of perifacial lymph nodes in oral cavity cancer. Figures 5, 6

Next, attention is directed to the fibrofatty tissue anterior to the gland between the anterior belly of digastric and mylohyoid muscle. These nodes are especially important to resect with malignancies of the anterior floor of mouth. To resect these nodes, retract the anterior belly of digastric anteriorly and deliver the tissue using electrocautery dissection with the deep dissection plane being on the mylohyoid muscle. Figure 7

To identify the lingual and hypoglossal nerves, the posterior free edge of the mylohyoid muscle is retracted with a right...
Figure 3
Platysma muscle (red arrow), External jugular vein (blue arrow) and Great auricular nerve (yellow arrow)

Figure 4
Level Ia dissection, DG-anterior belly of digastric, MH – Mylohyoid muscle

Figure 5-6
Marginal mandibular nerve (yellow arrow)
Facial vessel (red arrow)

Figure 7
Lymphatic tissue removed with the digastric muscle (DG) retracted and the artery to mylohyoid exposed (red arrow)
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Inferior traction on the submandibular gland (SMG) brings the lingual nerve and the submandibular duct into view. The submandibular ganglion can be divided under direct vision with special care taken not to injure the lingual nerve. The duct can also be divided after clear identification of both the lingual and hypoglossal nerves. Figure 9 By following the posterior belly of digastric, the proximal portion of the facial artery and vein can be identified and divided. Figure 10

STEP 3 IDENTIFY ACCESSORY NERVE (CN XI)

The accessory nerve is identified 1-2 cm posterior to the exit site of the GAN at the posterior border of SCM. Figure 11 The nerve is traced distally until it goes under or deep to the trapezius muscle as well as proximally towards the IJV by dividing the SCM. The branches to SCM need to be divided and occasionally there will be a contribution to the accessory nerve from the cervical plexus at the posterior border of SCM. Figure 12

STEP 4 LEVEL IIB DISSECTION

The parotid tail and the superior attachment of the SCM can be divided with a knife or cautery until the fatty tissue of Level IIB is exposed. Figure 13 Level IIB lymphatics are further dissected down to the deep muscle that runs in a postero-inferior direction. The occipital artery is usually encountered and needs to be divided during the dissection. Figures 14,15 The contents of Level IIA and IIB are dissected off from the IJV and the deep muscles of the neck until the cervical plexus comes into view. The dissected accessory nerve is translocated posteriorly and the dissection of Levels IV and V continues.
Figure 8  
Lingual nerve (yellow arrow)

Figure 9  
Lingual nerve (yellow arrow), Submandibular duct (blue arrow) and Hypoglossal nerve (red arrow)

Figure 10  
Facial vessel (red arrow)

Figure 11  
Accessory nerve (CN XI) identified 1 cm posterior to GAN at the posterior border of SCM

Figure 12  
Accessory nerve branches, SCM branch (blue arrow), Trapezius branch (red arrow) and cervical plexus contribution (yellow arrow)
STEP 5  LEVEL IV & V DISSECTION

Divide the SCM approximately 1 cm above the clavicle while applying continuous traction. The IJV within the carotid fascia can be identified after division of the muscle fibers. The dissection continues in the supraclavicular fossa but leave the lymphatic tissue posterior to IJV intact to prevent injury to the thoracic duct located in Level IV. Identify the omohyoid muscle and the external jugular vein in the supraclavicular fossa and divide the muscle and ligate the external jugular vein. Figure 16 The dissection goes deep until the transverse cervical vessels and the prevertebral fascia come into view. The brachial plexus can be identified below the fascia and should be kept intact. Figure 17 The dissection is then completed with a blunt finger or with a dental swab in an antero-superior direction. The phrenic nerve will be identified descending on the scalenus anterior muscle running in a medial direction. Finger dissection can also be done postero-superiorly with care taken not to rupture the transverse cervical vessels. The dissected accessory nerve should now be identified again because the supraclavicular nerve running in the fibrofatty tissue can be divided with diathermy or a knife but not the spinal accessory nerve. The transverse cervical artery can be dissected free from the lymphatic tissue by dividing the ascending branch alone, preserving it for future use. Figure 18
Figure 13
Superior attachment of SCM divided to expose the underlying levator scapulae (LS) muscle

Figure 14
Accessory nerve (yellow arrow)

Figure 15
Level IIB lymphatic dissected free from accessory nerve (yellow arrow), IJV (blue arrow)

Figure 16
Omphoyoid muscle (blue arrow) and translocated accessory nerve (yellow arrow)

Figure 17
Brachial plexus (yellow arrow) and transverse cervical vessel (red arrow)

Figure 18
Phrenic nerve (yellow arrow) and cervical plexus (blue arrows)
STEP 6 AVOID INJURY TO THE THORACIC DUCT

The Level IV lymphatics adjacent to the IJV should be carefully divided between clamps and ligated with silk ligatures to avoid a troublesome chyle leak especially on the left side. Attention also needs to be given to the phrenic and vagus nerves so that they are not clamped as they run close to the area you are now dissecting. 

Figure 19

STEP 7 ANTEROGRADE DISSECTION OF LEVELS II-V LYMPHATICS

Anterograde dissection of Levels II-V lymphatics begins with anterior traction applied to the fibrofatty tissue. The surgeon establishes a subepimysial dissection plane on the deep muscles of the neck, except over the brachial plexus where the overlying fascia is retained to protect the nerves. Dissection proceeds over a broad front until the entire cervical plexus has been exposed. The phrenic nerve is identified and preserved as it descends obliquely across the scalenius anterior muscle. Figure 20 The cervical plexus is divided from the phrenic nerve and the dissection continued anteriorly onto the carotid fascia. Figure 21

The carotid fascia is incised with a scalpel and the IJV, common carotid artery and vagus nerves will come into view. Tributaries from the IJV will be seen when the dissection reaches the anterior border of the IJV. These tributaries need to be divided and ligated with silk ligatures. The ansa hypoglossi, which courses either deep or superficial to the IJV, may be preserved.
**Figure 19**
Internal jugular vein (blue arrow), Transverse cervical vessel (red arrow) and Vagus nerve (yellow arrow)

**Figure 20**
Phrenic nerve (yellow arrow) and cervical plexus (blue arrows)

**Figure 21**
Divide the cervical plexus away from phrenic nerve (yellow arrow)
The final step is to free the neck dissection specimen off the infrahyoid strap muscles to identify and preserve the superior thyroid vascular pedicle, and to deliver the neck dissection specimen. Figure 22

Figure 22
Completed MRND type II, transverse cervical vessel (red arrow) and accessory nerve (yellow arrow) on levator scapulae (LS)
KEY POINTS

1. Choose your incision according to the primary tumour and avoid 3 point junctions in the post irradiated patient.
2. Identify and protect the marginal mandibular, lingual and hypoglossal nerves in Level I.
3. Identify IJV and accessory nerve at Level II and make Level IIb clearance safe and efficient.
4. Accessory nerve can be identified 1 cm posterior to the GAN at posterior triangle.
5. Keeping the prevertebral fascia intact is the key to avoid phrenic nerve and brachial plexus injury.
6. Level IV lymphatics should be dissected with caution to avoid a chyle leak.
7. Identify the vagus nerve within the carotid sheath.
8. Cervical plexus should be divided away from the roots to avoid injury to phrenic nerve.
9. Tributaries of IJV should be divided and ligated to avoid troublesome bleeding.
10. Superior thyroid artery should be identified and preserved during neck dissection.