

A Comprehensive Review of Conventional Incisions in the Neck for Neck Dissections

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ABSTRACT

Objective: To evaluate the four commonly used incisions for neck dissections and their basis for choosing an incision. This paper highlights the conventional types of skin incisions used in neck dissections are defined to their advantages and disadvantages and some modifications of neck incisions used in neck dissections. Neck incisions are based on sound anatomical aspects of neck, time taken to raise and close the flaps, accessibility to the neck lymph nodes, injury to vital structures and scar cosmesis are the various factors to be considered while choosing an incision.

Materials and methods: This is a short review of articles chosen randomly on neck incisions to understand both conventional and modified incisions used in neck dissections.

Conclusion: Neck dissections are frequently discussed and updated, while neck incisions are rarely prioritized. Though nodal disease clearance is of the paramount importance. Choice of incisions can increase an overall prognosis with good accessibility and providing good quality of life through superior cosmesis. Identifying the properties of neck incisions can help in its application for different types of neck dissections, instead of approaching the neck through one standardised incision.

Keywords: cutaneous neck incisions, neck dissections, cosmesis.

INTRODUCTION

A variety of incisions have been suggested for neck dissection. But choosing an incision should be made based on the idea of clearing the nodal disease, minimal morbidity and acceptable aesthetics. Radical Neck dissection was first described by Jawdinsky in 1888 and later by Crile in

1906. Since then various modifications on skin incisions have been used to expose the neck. The use of different incisions to perform current standard neck dissection must be re-evaluated⁽¹⁾. Neck incisions are planned based on the type of neck dissection and the cutaneous blood supply of the neck followed by surgical reconstruction. Arterial vasculature of cervical flaps is of paramount importance as it affects the wound healing and flap dehiscence which in turn affects the overall outcome of the procedure.

The most widely and commonly used skin incisions are discussed here in this paper with its relevance to their advantages and disadvantages of their use.

MATERIALS AND METHODS

A short review on some of the most commonly used incisions such as Crile, Schobinger, Hayes Martin, McFee, J incision, Hockey stick, inverted Hockey stick incision, and transverse skin crease incision.

DISCUSSION

Neck dissections have evolved over a period of time with many modifications. The relationship between oncological effectiveness and quality of life is now more important. Hence an approach through the neck (incision) that is both aesthetic and functional with good oncological clearance is therefore required. Modified Schobinger incision is the most common incision used in neck dissections across many centres. Placement of incision should be based on surgical principles, the anatomy of neck and not just mere surgeon preference. This will

prevent complications like wound dehiscence, flap necrosis and aesthetics affecting the overall prognosis and survival.

Principles of Incisions and flaps were given by Norman and Bramley in 1990 as certain guidelines for incisions⁽²⁾.

1. should be based on sound anatomical principles.
2. should have clear anatomical landmarks
3. should be designed to give protection to the important structures in the vicinity.
4. should provide relatively blood less field.
5. should provide excellent visibility of the lesional site without tension on the skin flap.
6. should be rapidly and confidently executed.
7. should be uncomplicated in its repair.
8. should give a good cosmetic result with minimal functional sequelae.
9. should be readily teachable.

Though there are clear indications of any surgical incisions. Considering an oncological perspective and the technical aspects of incisions these should yield both nodal clearance and superior cosmesis. These include:

1. Allow adequate exposure to surgical field.
2. Assure adequate vascularisation of the skin flaps.
3. To protect carotid artery if sternocleidomastoid muscle is sacrificed.
4. Consider the location of primary tumour and lymph nodes.
5. Facilitate use of reconstructive technique.
6. Produce acceptable cosmetic results.
7. Contemplate the potential need of postoperative radiotherapy⁽³⁾.

Surgical anatomy of cutaneous neck directs the incision placement and denotes the watershed areas to be avoided. Regional anatomy is the most important aspect on which incisions are based on. The neck can be divided into three portions for a better understanding based on the level of blood supply.

The upper neck anterior to the angle of the mandible supplied by branches of facial and submental arteries. These branches fan into platysma supply the skin and underlying muscle.

The upper lateral cervical skin located between sternocleidomastoid and ramus of mandible supplied by cutaneous branches of occipital, posterior auricular and external carotid arterial branches. This territory overlaps with facial territory anteriorly and with perforator from trapezius inferiorly and laterally.

The mid portion of anterior neck perfused by platysmal cutaneous branch of superior thyroid artery.

The lower half of neck is supplied by branches from transverse or superficial cervical artery which laterally anastomoses with perforator of trapezius.

The dermal-subdermal plexus is continuous across the midline. The facial and superior thyroid arterial territories interconnect with their contralateral counterparts providing blood supply to medially based flaps. This enables to plan the incision in the neck accordingly. Most incisions avoid crossing the trajectory of superficial lying large veins like External jugular vein. In order to prevent accidental damage to it.

Types of neck incisions, its advantages and disadvantages: we discuss a few conventionally used incisions and their need of usage.

1. Crile incision: This incision begins from the tip of mastoid process in a curvilinear fashion up to the tip of the hyoid, extending superiorly to the submental area. A vertical limb is dropped at 90° from the posterior aspect of this incision behind the carotid artery and extending inferiorly to the middle portion of the clavicle in a lazy 'S' fashion. A straight vertical incision is likely to lead more scarring and contracture, thus a lazy 'S' incision is used.

Advantages:

- 1) Provides maximum exposure of the operative field. The bigger is the exposure of operative field, the better is the chance for cure.
- 2) Can be preferred for a radical neck dissection, modified neck dissection.
- 3) Superiorly can be extended from the submental area to make a lip split incision to include primary tumour.
- 4) Good exposure to the oral cavity with slight modification.

Disadvantage:

- 1) Trifurcation point is prone for delayed wound healing.
- 2) Vertical limb of this incision overlies carotid artery, and it can lead to carotid artery blowout.
- 3) Cosmetically vertical limb gives more contraction and scarring.

2. Schobinger incision has two components a horizontal limb which curves from tip of the mastoid process to the midline of submental region. And a vertical limb of the incision starts one finger breath behind the angle of mandible and right angles with the horizontal portion of the incision. The incision carried down to the edge of trapezius muscle reaches to the midline of clavicle⁽⁴⁾.

Advantages:

- 1) Adequate covering and protection of the common carotid artery or of parts of it can be achieved.
- 2) Choice of incision for Modified Radical Neck Dissection (MRND) and Radical Neck Dissection (RND) where the nodal disease is extensive.
- 3) Good exposure to the neck structures hence good clearance.

Disadvantages:

- 1) With respect to wound healing, it is a well-recognized principle that vertical (longitudinal) skin incisions in the neck tend to heal with excessive fibrosis and contracture, and the resulting scars frequently stand out prominently as unsightly cicatricial cords.

- 2) Higher incidence of marginal necrosis and contracture of the flap with scarring was noted. The Schobinger incision is also designed to protect the carotid artery by means of a large anteriorly based skin flap. However, the blood supply to the posterosuperior part of the flap is not good and, occasionally this area becomes devitalized.

3. McFee incision: In this, two horizontal skin incisions are made, one in the submandibular region and one in the supraclavicular region of the neck. The upper horizontal incision is made on the upper cervical area from the tip of mastoid process and continuing below the angle of mandible up to the submental. The lower horizontal incision is above the clavicle and parallel to it. Between these two incisions a bipediced flap is raised⁽⁴⁾.

Advantages:

- 1) Appealing cosmetic results. well known that slightly oblique or transverse incisions usually heal with minimal scarring. Transverse incisions are adaptable to any of the usual methods of neck dissection. There is no crossing or converging of incisions and no angles, with questionable blood supply.
- 2) Time taken to close the flap is less hence less surgical time.
- 3) Wound healing of the flap is better as the closure is simple without any converging incisions.

Disadvantages

- 1) Neck dissection through transverse incisions is more difficult and requires more time as the access is limited which may lead to compromise in disease clearance.
- 2) Difficult to perform in short and obese neck patients.
- 3) Dissection under central bipediced flap is tedious, so extensive retraction is required for proper exposure. Also, extensive stretching of the flap can compromise its vascularity at the edges of the flap.

- 4) It can interfere with the reconstruction process of the neck with a pedicled flap

4. Single transverse cervical incision: It can be considered as a modification of McFee. Single transverse incisions have been described by Kocher previously, as a classical Kochers incision for thyroid malignancies. This incision can be placed in the upper cervical portion of the neck, starting from submental region within the Langers first skin crease, and extended up to the tip of mastoid process. The length of incision can vary depending on the access⁽⁵⁾.

Advantages:

- 1) Good cosmesis and aesthetics following a neck dissection.
- 2) Suggested for N0 neck or endoscopic neck dissection, where aesthetics is significant. This suffices a supra-omohyoid neck dissection.

Disadvantages:

- 1) Access is limited, hence limited exposure.
- 2) Extensive dissection for huge nodal disease cannot be done.
- 3) Choice of neck dissections is limited. As MRND and RND is difficult and time consuming.

5. Hockey stick and Reverse Hockey stick incisions: Lahey in 1940 first described hockey stick incision. The incision has two components a longitudinal and transverse incision but in continuation as one single incision. A low transverse incision above suprasternal notch curving superiorly as a vertical incision to reach the tip of mastoid process. HSI appeared to be the suitable incision for radical neck dissection due to adequate exposure of the operation field while rendering excellent cosmetic results. The difference in HSI and RHSI is based on difference in skin flaps. HSI allows elevation of a superiorly based single cervical flap and reversed HSI allows for an inferiorly based flap⁽⁶⁾.

Advantages:

- 1) Reversed-HSI was applied in combination with block resection of parts of the oral cavity because it provides much better exposure of the operation field.
- 2) An acceptable cosmetic result.
- 3) HSI provides good exposure to parotid area, in case the parotid tissue is involved by tumour.
- 4) Suitable for access to all five levels of lymph nodes, and lateral component of the neck.
- 5) Both HSI and RHSI are gently curved single linear incisions without three-point suture junction lines, hence good wound healing.
- 6) Ideal for neck dissections like MRND, RND and post irradiated neck, as it does not form a three-point junction and prevents wound dehiscence and carotid artery blowout.

Disadvantages:

- 1) The vertical incision crosses the langers tension line.
- 2) Evident scarring in the neck.
- 3) It provides optimum exposure of oral cavity.

6. Modified J incision for exposure of levels 1 to 4. The vertical limb takes origin just anterior to the tip of mastoid and follows the anterior border of trapezius muscle and extends inferiorly and curves obtusely across posterior triangle, 3cms above the clavicle to anterior border of sternocleidomastoid muscle⁽⁷⁾

Advantages:

- 1) The horizontal arm of J Incision is flexible in terms of length and location.
- 2) Good exposure from level 1 to 4

Disadvantage: it cannot be used in mandibular swing or lip split to involve primary tumour.

7. Gluck incision - which is basically an apron flap incision, with a vertical posterolateral arm to approach the supraclavicular area. For a bilateral functional neck dissection, the incision

extends between both mastoid tips, crossing the midline at the level of the cricoid arch. This incision allows good exposure when the neck dissection is to be combined with total or partial laryngectomy. Sometimes the vertical arm can be avoided by prolonging the apron flap in a posteroinferior direction, thus producing a better cosmetic result.

8. The double-Y incision of Hayes-Martin is also popular for functional and selective neck dissection. A chin extension may be used when the removal of the primary tumour requires an intraoral approach. A well-known disadvantage of this incision is the compromise blood supply to the skin flap, especially in the two crossings of the incision. Thus, the vertical arm of the incision should be placed posterior to the carotid artery. The cosmetic result is improved by giving the vertical arm a slightly S-shaped curve. The modification of Double Y is Single-Y incision, which avoids one of the crossings of the double-Y incision but makes the dissection of the supraclavicular fossa difficult⁽³⁾

CONCLUSION

Neck dissections are always well discussed but neck incisions are rarely prioritized. Choice of neck incisions is deemed necessary for good wound healing, disease clearance thus affecting overall prognosis too. Hence a thorough knowledge of neck incisions can be used to its advantage and increase its feasibility of usage. The incisions commonly used for radical neck dissection in previously irradiated patients may also be used for functional neck dissection. Incisions such as McFee, hockey stick and reverse hockey stick incisions are ideal for radical neck dissections and irradiated neck explorations. As they don't have trifurcate areas. Whereas for modified and radical neck dissections modified Schobinger, J shaped, double Y incisions, etc can be used. For superior

cosmesis where the burden of nodal clearance is less a single transverse incision should suffice, as it follows Langers tension lines hence less visible scarring in the neck giving aesthetic appeal. Hence the choice of neck incisions should be based on sound oncological principles which can also contribute towards good quality of life.

Conflict of interest: the author has no conflicts of interest.

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