J incision in neck dissections

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Abstract

Metastasis in the neck lymph system of primary tumours of the head and neck is frequently seen. In order to prevent this metastasis, neck dissection is carried out by various types of skin incisions. In this study, types of skin incision used in neck dissections were defined, and the advantages, disadvantages and results of J incisions, which have been performed on 320 radical neck dissection patients in our clinic between 1985–1996, were compared with those of other incision types.

Key words: Radical neck dissection; Surgery; Surgical flaps

Introduction

There are various types of skin incisions used for neck dissections. Following Crile's first radical attempt to use the Y incision for neck dissection, other kinds of incision types have been described (Crile, 1906; Martin et al., 1951; Schobinger, 1957; McFee, 1960; Stell and Brown, 1970) (Figure 1). As the understanding of the vascular supply of the neck skin and clinical practices improved, some incisions started to be preferred to others. However, a particular type of incision is still not used uniformly on each patient.

The choice of incision type used for neck dissection depends on a number of factors. Although a particular incision may be used, there are still some fundamental specifications that need to be considered (Table I).

This study conducted in the Ear, Nose and Throat Diseases Clinic of the Ankara University's Faculty of Medicine, aims: firstly, to evaluate the J incision used for neck dissections and secondly, to compare the results of other incision types as presented in the literature.

Anatomy

It is necessary to know the vascularization of the neck to avoid complications such as carotid artery exposure and the occurrence of pharyngocutaneous fistulae as they might, following a neck dissection, lead to flap necrosis. Ellis demonstrated that the recovery of neck skin is in a medial direction and that skin over the common carotid begins lateral to the artery (Ellis, 1963). Kambic and Sirca, however, stated that the arterial supply is in a vertical direction (Kambic and Sirca, 1967). According to this, the

recovery of the skin on the anterior trapezius muscle and the descending branches of the facial and occipital arteries, transverse cervical artery and the suprascapular arteries are by ascending branches (Figure 2).

Rabson et al. in their study on cadavers, establish that the arterial supply recovery of the skin of the neck is multifaceted and that there are four arterial branches which pass from the platysma muscle through to the top of the skin's surface. These formations known as platysma cutaneous arteries, while supplying a particular region of the skin are also in anastomosis with each other (Rabson, 1985).

These anastomoses remain intact during the neck dissection while the platysma is dissected from the skin (Ariyan, 1986). Even if the facial occipital and transverse cervical arteries are tied together, an alternative arterial supply will develop (Hetter, 1972; Freeland and Rogers, 1975). When considered from an oncological perspective in order to provide superficial lymphatic resection, the platysma can also be added to the specimen. However, the tumours which have already infiltrated to the platysma have little chance of being treated even if a wide skin resection is applied.

Summary

(1) Facial and submental arteries supply the skin of the upper neck region that remains on the anterior of the angulus mandibula;

(2) Occipital, posterior auricular and external carotid arteries supply the sternocleidomastoid muscle and the upper lateral neck skin between the ramus mandibula;
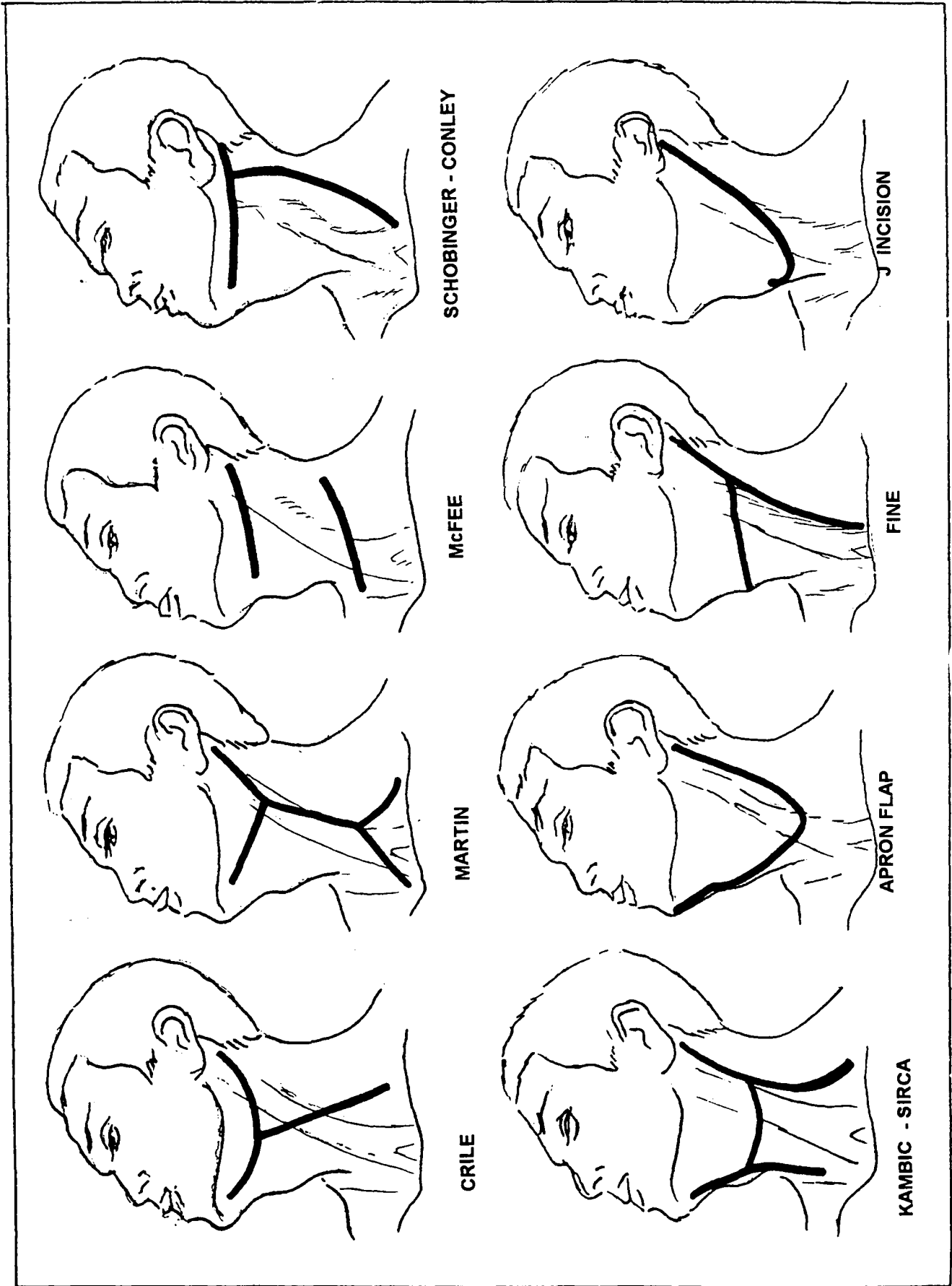
Fig. 1
Types of incision used for neck dissection.

TABLE I
CONDITIONS THAT SHOULD BE PROVIDED FOR IDEAL INCISION

1. Incision should provide a good exposure for surgery. Thus by exposing all the important structures of the neck, the block dissection of lymph nodes in the laterocervical region can be done. Incision should make reaching the primary focus easier.

2. It should not destroy the vascular supply of the skin flap(s). It should protect the skin and also should prevent skin necrosis by supplying the maximum blood flow to the flaps.

3. It should look good cosmetically. It should not limit the movement of the head and neck by forming contractures related to the scar.

4. It should not lead to complications during the post-operative recovery period or these should be minimalized.

5. It should prevent the damage that can occur, after the operation, to the anatomical structures especially the carotid artery.

6. It should be capable of flap transfer for such cases as primary reconstruction or defect covering.

7. It should be suitable for tracheostoma and even pharyngostoma formation.

(3) The transverse cervical artery provides a vascular supply to the bottom half of the neck. This artery, unless there is an oncological indication, must be conserved because it is also the major artery of the trapezius muscle, which may be employed in the reconstruction process.

In addition, the platysmacutaneous branch of the thyroid superior artery supplies the front-middle section of the neck.

Materials and methods

A total of 320 patients that had neck dissection operations between 1985–1996, were included in this study. These subjects were in the Ear, Nose and Throat Diseases Clinic of the Ankara University's

Faculty of Medicine. The patients' ages ranged from 32 to 80 years. The average age was 55.3 years. Of the 320 patients 315 were male (98.43 per cent) and five (1.56 per cent) were female.

All patients had received the J incision for their neck dissection. A vertical incision was made extending from the mastoid apex to 2 cm above the clavicular and along the back of the sterno-cleidomastoid muscle. The incision with a curve was then extended in a horizontal plane and continued in parallel to the bottom edge of the cricoid cartilage and was stopped at the point where the sternocleidomastoid muscle is attached to the clavicular. In situations that required bilateral neck dissection, the incision continued symmetrically and was extended across to the mastoid apex. The skin flap was elevated at the subplatysmal plane. At the end of the operation the surgery was washed routinely with ample physiological serum and a negative pressured suction drain was placed into this area. In cases where there were no complications, the suction drain was withdrawn on the third day. The skin sutures were removed on the seventh day and the stoma stitches on the 10th day. In the post-operative stage, parenteral wide spectrum antibiotic was used as a prophylactic for seven days. The patients were discharged on the 10th day. In cases in which complications arose, the patient was kept under observation until full recovery was achieved.
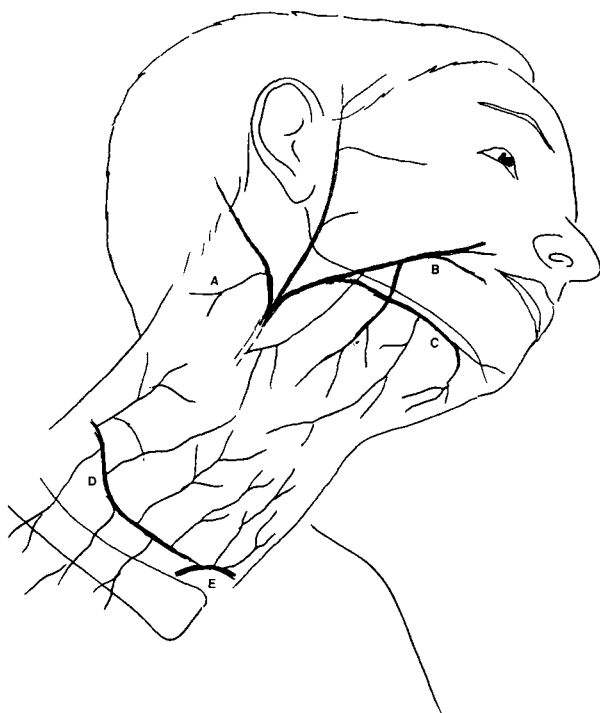

FIG. 2

Schematic drawing of arterial blood supply of neck
A: occipital branch of sternocleidomastoid artery
B: facial artery
C: submental branch of facial artery
D: transverse cervical artery
E: suprascapular artery

Results

The morbidity of the J incision, which was performed on 320 patients all of whom had neck dissection is presented in Table II.

While radiotherapy was not given to 300 of the patients, 20 had received radiotherapy during the pre-operation stage. Forty-one (13.7 per cent) who had not received radiotherapy had complications in the post-operation stage. Among those subjects who had received radiotherapy previously, only three (15 per cent) were seen to have complications. When all patients' groups are considered together, complications were seen only in 44 (13.8) cases.

TABLE II
THE MORBIDITY OF J INCISION PRACTISED BY OUR CLINIC

Complication	RT (−)* n = 300	RT (+)** n = 20	Total (%) n = 320
Wound dehiscence	38 (12.6%)	2 (10%)	40 (12.5%)
Flap necrosis	10 (3.33%)	2 (10%)	12 (3.2%)
Subcutaneous haematoma	28 (9.33%)	2 (10%)	30 (9.4%)
Wound infection	9 (3.00%)	1 (5%)	10 (3.2%)
Skin contracture	9 (3.00%)	1 (5%)	10 (3.2%)
Oedema	8 (2.66%)	2 (10%)	10 (3.2%)
Total	102 (34%)	10 (50%)	112 (35%)

* = RT (−): patient not receiving radiotherapy.
** = RT (+): patient receiving radiotherapy.
n: case number

Discussion

The development of neck dissection incisions

Various incisions are used for neck dissections. However, this paper will only examine those used in classical neck dissections. The first Y incision used by Crile was later modified by Martin (Crile, 1906; Martin *et al.*, 1951). Although the exposure of these incisions were regarded to be good, they were found to have drawbacks because they caused carotid artery rupture in patients receiving radiotherapy. Ellis and Stell both used this incision and reported that in patients that received radiotherapy about 55–79 per cent skin necrosis had occurred in the trifurcation point and in the posterior flap (Ellis, 1963; Stell, 1969).

Schobinger with Babcock and Conley made a longer anterior flap. Hence by preventing the posterior flap from remaining ischaemic, they have managed to protect the carotid artery (Schobinger, 1957; Babcock and Conley, 1966). Despite this, they have also reported that this incision which is conservative, cosmetic and reconstructive also caused about 22 per cent skin necrosis in the front flap. Attie and McFee, on the other hand, have argued that from a cosmetic point of view, transverse incisions yielded better results (Attie, 1957; McFee, 1960). Stell and Brown put forward the idea that as the transverse incisions did not cause a horizontal cut along the neck vascularization, it was an acceptable method (Stell and Brown, 1970). Hetter proposed a vertical incision for recovery of neck skin and recommended the H incision. But due to potential long superior based flaps and insufficient drainage, a high proportion of complications were reported (Hetter, 1972).

Eckert and Byars practiced the first forms of the J incision. These researchers put this incision on the medical agenda by extending the classic thyroid necklace incision to the side of the trapezius muscle in the lateral and then slightly to mastoid process (Eckert and Byars, 1952). Afterwards, Grandon and Brintnall made this type of incision popular (Grandon and Brintnall, 1960). In the meantime, Ariyan recommended the hockey stick incision. He stated that this incision provided perfect exposure but also indicated that contracture might develop in the vertical area (Ariyan, 1986).

Classification

The incisions used in the dissection are generally classified as either 'vertical' or 'horizontal'. The combined procedure is also performed but the use of incisions in various directions will prevent sufficient arterial recovery of the flap. This situation increases the risk of necrosis in the tips of the flaps.

Tranverse incisions have cosmetic advantages as they follow the natural folds of the skin. Recovery of the scar in these folds is rapid and successful. Attie supported this view and became the first to practise this type of incision (Attie, 1957). These transverse incisions are also easy to modify. Despite these, one of the important drawbacks of this type of incision is that it destroys the neck's venous drainage from top to bottom. Unfortunately, this is a major cause of flap separation (Freeland and Rogers, 1975).

'Vertical' incisions, in comparison to tranverse incisions, are regarded to be disadvantageous, because they intersect the natural folds of the skin and the vascular supply of the neck skin (Attie, 1957; McFee, 1960; Stell and Brown, 1970; Futrell and Chretien, 1976). The vertical incisions tend to contract along their long axes. This situation leads to deformity and restricted action. For this reason, it is reported that contracture can be prevented by giving a posterior sigmoid curve (McFee, 1960; Futrell and Chretien, 1976).

Radiotherapy

In choosing a particular incision, it is important to know whether radiotherapy has been applied to the neck area. In necks that have received radiotherapy, vascular recovery in narrow angled flaps' corners and sides may be reduced. The flap necrosis occurring as a result of this, may expose the carotid artery. For this reason, it is accepted that trifurcation and vertical incisions should not be practised in necks which receive radiotherapy. Under these circumstances, McFee or similar parallel transverse incisions are reported to yield positive results (Grillo and Edmunds, 1965; Stell, 1969; Stell and Brown, 1970).

The J incision

The advantages and disadvantages of using the well known incisions are listed in Table III. The complication rate of the J type incision in patients

TABLE III
ADVANTAGES AND DISADVANTAGES OF NECK INCISIONS

Incisions	Crile (Y)	Martin (Pair Y)	McFee	Schobinger–Conley	Kambic–Sirca	Apron flap	Fine	J Incision
Advantages	–The exposition is good (Crile, 1906).	–The exposition is good. –Suitable for combined laryngopharynx surgery.	–Excellent cosmetic result (McFee, 1960; McNeil, 1978). –No lessening of vascularization in the centre (Ariyan, 1986). –No angle and intersection in incisions (McFee, 1960). –Post-operative wound recovery is rapid (McFee, 1960). –Suitable in necks receiving radiotherapy and in peripheral vascular diseases (Maran et al., 1989). –Despite the cessation of ascending and descending vascular recovery, due to wide bipedicular flaps, recovery will not fail (Stell and Brown, 1970; Daniel and McFee, 1987).	–The exposition is good. –Most useful in reaching intraoral lesions (McNeil, 1978).	–The exposition is well.	–Carotid artery is well protected (Hetter, 1972). –Protects descending arterial recovery (Hetter, 1972).	–The trifurcation place is away from the carotid artery (Maran et al., 1989). –The vascular recovery is well protected (Futrell and Chretien, 1976; Maran et al., 1989). –Myocutaneous base is formed that will prevent flap separation because vertical section is performed the trapezius on the muscle (Maran et al., 1989).	–The exposure is good. –Carotid artery is well protected. –Suitable in bilateral neck dissections. –It can be modified easily. –Reduction of the occurrence of pharyngo-cutaneous fistula. –Flap vascularization is good. –Suitable in necks which received radiotherapy. –Cosmetic results are very good.
Disadvantages	–Primary recovery is less than 50% in neck areas that received RT (Stell, 1969). –Occurrence of flap separation on trifurcation position (Stell, 1969). –The vertical section by damaging the blood stream in the medial direction may cause necrosis in medial flap (Ellis, 1963; Stell, 1969). –The top of the V type incision might slowdown recovery (Freeland and Rogers, 1975).	–A flap necrosis and rupture in the carotid artery might occur on trifurcation of the neck that received radiotherapy (Freeland and Rogers, 1975; McNeil, 1978). –It will destroy both ascending and descending arterial and venous recovery in both of the four flaps (Hetter, 1972). –Combined with stoma, contracture can be seen (Hetter, 1972).	–The exposure is not good (Hetter, 1972). –Not suitable for bilateral simultaneous neck dissections (Chandler and Ponzoli, 1969). –Operation period is long (McFee, 1960). –Posterior triangle dissection might be difficult (Maran et al., 1989, White et al., 1993). –Difficulty may arise while working under bridge flap (Maran et al., 1989). –In short necks, it might be difficult to distinguish the front tip of the incision from the tracheostoma (Maran et al., 1989; White et al., 1993).	–The descending arterial recovery may break down (Hetter, 1972). –The front and the tip of the medial flap might become necrotic, however, this weak point is behind the carotid artery bifurcation (Hetter, 1972; McNeil, 1978).	–The carotid artery might be exposed (Hetter, 1972). –The front vertical section of the incision will damage collateral recovery, coming from the opposite section of the neck (Hetter, 1972).	–It will damage ascending arterial and venous recovery (Hetter, 1972). –Oedema and venous congestion might develop at the bottom corner.	–Unless the vertical and horizontal incisions are in cross section with the tips of the flap, necrosis will develop at trifurcation place (Maran et al., 1989). –Cosmetic results are not very good (Maran et al., 1989).	–Contracture in the vertical top section. –Flap separation in the horizontal section

receiving and not receiving pre-operative radiotherapy are 15 per cent and 13.7 per cent respectively. However, the advantages of the J incision consists of the protection of the carotid artery, good exposure of the surgical area, is applicable to any head and neck primary tumour, suitability to bilateral dissection, its modifiability. The reduction of the occurrence of pharyngocutaneous fistula by covering the top sutures which are used for closing the hypopharynx and oesophagus defects and preservation of flap vascularization due to its posterior base are among the factors which render J incision preferable. In addition to these, tracheostomy can also be performed with this type of incision in a horizontal segment. The rotation or transposition flaps can easily be in the required position (McNeill, 1978). The J incision does not harm the patient cosmetically. Generally patients who are able to protect their stomas in various ways by covering them can also obscure the incision's horizontal view. Its vertical section is in the lateral position and it is situated in the back.

The J incision provides an excellent exposure of particularly the larynx, pharynx and of other cancerous organs of the middle neck line. Despite this, the most common problems encountered in using the J incision are; contracture in the vertical top section and flap separation in the horizontal section. Yet, these problems can also be seen in other incisions.

The reported flap separation rate in J incision cases is 12.6 per cent. The rates for McFee, Fine and Grandon incisions are respectively 6.7 per cent, 8.9 per cent, 28.6 per cent (Maran et al., 1989).

In conclusion, the J incision must be considered to be the most preferable type of incision for neck dissection, since it has a low morbidity besides its other important advantages.

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