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# Short Communication

# Para-incisional tattooing with electrocautery

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**Abstract**
The authors present a technique using electrocautery diathermy to make surgical tattoos. This method has been used in over 300 patients who underwent head and neck surgery at Aberdeen Royal Infirmary and Albany Medical College, New York, over a period of five years. A wide variety of operative procedures such as total laryngectomies and neck dissections were performed. The electrocautery surgical tattoos have a major advantage of persisting until the end of the operative procedure by which time other types of tattoos have faded. The technique is widely available, inexpensive, and has to date been complication free.

**Key words: Tattooing, surgery; Electrocoagulation**

## Introduction

The cosmetic outcome of the surgical wound relies on precise planning of the surgical incision, careful handling of soft tissue, accurate positioning of skin edges, appropriate suture materials and operative technique. Most surgeons plan and mark out the skin before making any surgical incision in order to facilitate precise wound closure. Surgeons often make tattoos by using methylene blue, or crosshatch by scalpel across the incision line. The markings are matched and the skin edges are brought together so that the wound is closed in a precise manner thereby preventing inappropriate apposition of edges and poor cosmetic outcome.

Major head and neck surgical procedures require long incisions which may involve one or both sides of the neck, face and lips. The incisions are even more extensive for reconstructive procedures. Head and neck oncological procedures are often long in duration. Wound edges are generally oedematous towards the end of the procedure. It is quite difficult to appose the edges precisely under such conditions and imprecise closure may lead to a poor cosmetic result. Para-incisional tattooing is very helpful in allowing the surgeon to achieve precise apposition of the wound edges (Figure 1). Ideal tattooing material should be non-irritating, non-toxic, commonly available, inexpensive and above all persistent throughout the procedure and yet not be permanent. It is particularly useful when incisions cross different anatomical subunits (Figure 2).

Historically silver nitrate, ink and tincture of iodine were used as marking agents. In 1856, the synthesis of the first aniline dye by Perkins sparked the development of many different dyes and stains, which were initially used in the textile industry. Gentian violet, methylene blue, brilliant green and Bonney's Blue became the agents for skin marking. Granick *et al.* (1987) demonstrated in an animal study that the anilin dyes, especially Bonney's blue and brilliant green, injected intradermally induced an inflammatory reaction and microabscess formation whilst methylene blue disappeared six to 12 days after tattooing and did not stimulate an inflammatory reaction. Methylene blue has been used by surgeons for surgical marking either on the skin surface or intradermally for decades. It is still one of the most commonly used marking agents. Surface marking with methylene blue suffers from lack of durability as it is easily washed away by blood, secretions or saline.

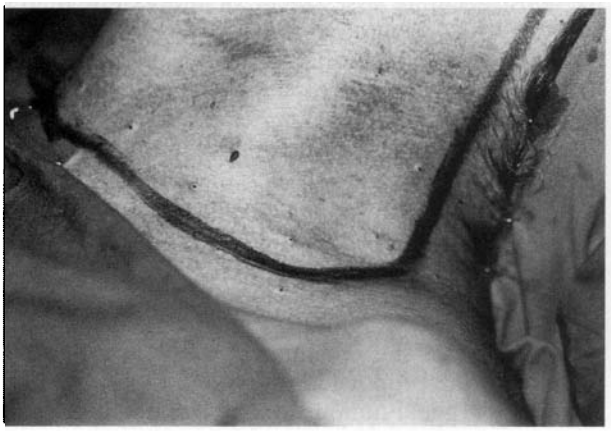

FIG. 1
Para-incisional tattooing for neck dissection.

The commercial surgical marking pen is readily available and is widely used by surgeons for cutaneous marking. There are a wide variety of commercially available marking pens. Stromberg (1987) studied 13 commercial surgical marking pens, all of which used gentian violet. One of the marker pens failed to work after being stored

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FIG. 2
Tattooing of incision crossing different anatomical subunits.

for one year. All the marks were easily removed with alcohol or acetone. The study showed lack of uniformity in properties and qualities of the products. Para-incisional tattooing with commercially available marking pens is disappointing.

The authors present a technique using electrocautery diathermy to make surgical tattoos. The surgical tattoos have a major advantage of persisting throughout the operative procedures. The technique is simple, problem-free and is readily available in every operating theatre.

## Technique

The skin is prepared by an antiseptic solution in the usual manner. The surgical incision is planned and marked out on the skin. The authors use a commercial surgical marker pen, Surgot, routinely. Electrocautery tattoos are made in pairs exactly opposite each other on either side of the incision (Figure 1). A monopolar needle diathermy operated by a handheld switch (Eschmann Bros and Walsh Limited) is used. The diathermy is set at 3 watts in coagulation mode. Tattooing is made at 5 mm from the incision on either side. The duration of exposure is very short, just enough to mark the skin. The resultant burn is expected to be limited to epidermis and papillary dermis. The skin can now be incised. At the completion of the procedure, the cautery tattoos are matched and brought together, and the wound is closed with great precision in the usual manner.

## Result

The electrocautery tattooing method has been used in over 300 patients who underwent head and neck procedures in two Institutions over a period of five years. A wide variety of oncological as well as non-oncological operative procedures were performed. The operations include total laryngectomies, neck dissections, parotidectomies and major reconstruction flaps including pectoralis major, latissmus dorsi and trapezius myocutaneous flaps, radial forearm, rectus abdominis and fibular free flaps. The electrocautery tattoo remains unchanged throughout the operation despite use of antiseptic skin preparation, wound irrigation and the duration of surgery. The tattoos healed up completely without leaving any sign of burn injury or visible scarring post-operatively. Follow-up ranged from two weeks to five years.

## Discussion

The author presents a surgical marking technique using electrocautery. This technique has been used by the authors in patients who underwent surgery in the head and neck region without any complications. The tattoos made by this technique persist clearly despite the length of the operative procedure, and they are resistant to any surgical skin preparation solutions. The authors, so far, have not experienced any short-term complications such as increased incidence in wound infection or pain, nor any long-term complications such as hypertrophic scar formation, permanent tattooing or delayed wound healing. The tattoos healed up completely within four weeks after the operative procedures without leaving any permanent mark.

The technique is very simple but requires attention to detail. The surgical field must be dry and time should be allowed for drying of alcohol-based antiseptic solution. The power setting should be low and the exposure time should be short. Three watts setting of the monopolar cautery is generally adequate. A higher setting of the cautery may lead to hypertrophic scar formation. The duration of exposure to the diathermy must be short lived, just long enough to make a tattoo on the skin surface without causing a deep dermal burn. The tattoo must be strategically placed so that a minimal number of tattoos are required to align the incision precisely at the end of the procedure, thereby avoiding unnecessary cutaneous trauma. The authors do not recommend this technique to be used in the mid-face.

Paraincisional tattooing with electrocautery is very simple, effective, efficient, inexpensive and easily available. The technique is safe and complication-free if used with due care. It provides a very useful alternative to methylene blue or other tattooing techniques.

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