

Art of Tattooing: Medical Applications, Complications, Ethical and Legal Aspects

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ABSTRACT

The art of tattooing has been practiced since the ancient times for a variety of reasons. The descriptive, decorative patterns have not only been used as a means of identification but have established itself in the field of medicine as well, being employed as a therapeutic modality or diagnostic method. These include corneal tattooing, gastrointestinal tattooing during endoscopy, reconstructive and cosmetic tattooing for camouflage, radiotherapy field marking etc. An emerging application of tattooing is medical alert tattooing often practiced by the patients themselves without medical consultation inscribing their disease condition or allergy to a particular medication which may affect diagnosis or treatment. However, tattoos indicating advance health directives (do not resuscitate/do not defibrillate) or the organ donor tattoo pose ethical and legal problems as they may not reflect patient's current wishes. Furthermore, they are not recognized as meeting any of the legal requirements, so they cannot be considered as valid directives or as consent, but only as a way to guide treatment decisions. In this paper, we outline a brief review of the numerous applications, its advantages, potential drawbacks along with the ethical and legal issues related to it.

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1. Introduction:

Tattoos are one of the most popular and prevalent forms of body art which has been practiced for centuries in many cultures, throughout the world. In the late eighteenth and early nineteenth centuries, tattoos were as much about

self-expression as they were about having a unique way to identify a person's body. In fact, evidence of tattoos has been found in Egyptian mummies dating 4000 years back and among the Roman gladiators who used it for the purpose of identification (1).

Though there has been widespread information regarding hazards of tattooing if practiced under unsanitary conditions but little attention has been directed to the potential latent health effects of tattoo inks. Also, relatively less is known by the medical fraternity of the numerous

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medical conditions, where tattooing is employed as a diagnostic or therapeutic intervention. In fact, rampant inappropriate use of some of the tattoos may even pose ethical and legal problems.

2. Applications of Tattooing:

Forensic

Tattoos are being used as a means of identification as it depicts name, religious belief, place of origin, group, personal interests, or a gang to which person belongs. It is particularly useful when fingerprints or dental records are unavailable for comparison. However, as the body decomposes, tattoos can discolour and fade, making them difficult to be comprehensible. Application of 3% hydrogen peroxide to the tattoo site and infrared imaging has been reported to aid in identification (1, 2).

Interestingly, in 2011, tattoo of a gang member on his chest depicting detailed murder scene at a liquor store, lead to confession and conviction of that crime which had stumped an L.A. County sheriff's investigator for about 4 years. He had eventually given up hope of solving it; while flipping through the snapshots of suspected gang members who were caught for some petty crime, this particular tattoo caught his attention bringing back rush of memories and hence the conviction (3) (Figure 1).



Fig. 1. Tattoo on chest of a California gangster depicting crime scene (shooting) of a murder in 2004 at a liquor store in Pico Rivera.

Medical

1. *Gastrointestinal tattooing*: It is done with the help of India ink or a similar pre-sterilized commercial preparation which, when injected sub-mucosally produces a zone of blue-black discoloration, grossly visible from both the mucosal and serosal surfaces during endoscopy. This aids in visualization of oesophageal/bowel segments which not only decreases the risk of resecting wrong segment but also facilitates identification/relocation of subtle mucosal lesions at the time of subsequent endoscopy or biopsy (4-6).

2. *Radiotherapy field marking*: It is used routinely in the department of radiotherapy in cancer patients, to mark the site of desired area of radiation exposure, thereby ensuring accurate targeting of the therapy. The procedure is done by the use of 18 or 19 gauge hypodermic needle and India ink; several small, black marks 1 mm to 2 mm in size are applied by a medical professional (7). However, since, these marks are permanent, this may result in psychological trauma to the patient hence, temporary marks which last for about 6 to 7 weeks are an alternative but it is prone to fading, which is a key limitation (1, 8).

3. *Reconstructive and cosmetic tattooing*: These procedures are done to hide the unsightly scar marks as well as to improve pigmentation of skin in cases of natural or surgical disfigurement to the body, thereby boosting confidence and improving the quality of life. However, the patients should be informed that these tattoos are likely to fade and require re-tattooing in due course of time (7, 9).

- **Areolar reconstruction:**

Following mastectomy, breast reconstruction can provide significant psychosocial benefits for women and is usually reserved as the final step which is critical for providing an aesthetically pleasing breast (10). Patients with loss of the nipple and areola from cancer excision, trauma, or congenital absence continue to experience psychological distress even long after breast mound reconstruction has taken place. Studies

have shown that recreation of the nipple-areola complex has a high correlation with overall patient satisfaction and acceptance of body image (11-14). The primary intradermal tattooing and nipple sharing technique for nipple-areola reconstruction is simple and can be done under local anaesthesia as compared to other conventional techniques that leave a residual scar (15, 16).

- **Corneal tattooing:**

It is the practice of tattooing cornea of the eye; of all the reasons, most patients receive treatment to alter the cosmetic appearance of their eyes due to disease or accident. Thus, corneal scarring and leucoma are the leading causes for cosmetic tattooing. Some patients also receive treatment for optical purposes, including decreasing a circumstantial glare within the iris. The ink that is used in regular tattoos is injected under the top layer of the eye using a hypodermic syringe. Different methods and procedures exist along with varied opinions concerning the safety and success of this practice (17).

- **Scar camouflage:**

Decorative tattooing by non-medical professional has been carried out for a long time in which scars were covered with beautiful tattoo designs rendering the scar inconspicuous, even on close inspection (18). Cosmetic disfiguration by conditions like vitiligo, burns, scar of alopecia and other cosmetically undesirable scars especially after operative techniques are commonly encountered by medical experts in day to day practice. Tattooing by medical professional can thereby be applied in treating these scars for re-pigmentation of skin when conventional methods are not indicated, as an alternative to laser and other forms of treatment (19-21).

- **Permanent make-up:**

It is a cosmetic technique which employs tattoos for permanent pigmentation of the dermis, as a means of producing designs that resemble makeup, such as eyeliner and other permanent enhancing colours to

the skin of the face, lips, and eyelids. It is also used to produce artificial eyebrows, particularly in people who have lost them as a consequence of old age, disease, such as alopecia, chemotherapy, or a genetic disturbance. This art is found to be extremely beneficial to the people allergic to conventional makeup or to those having disabilities that make applying makeup difficult (22). As with conventional tattoos, permanent makeup can be difficult to remove and have complications: non-expert administration can even cause severe allergic reaction or first-degree burns (23).

3. Risks and Complications of Tattooing:

Improper sterilization of tattooing needles and tattoo ink in public tattoo parlors can cause a wide range of diseases and skin reactions (24-31).

These reactions involve pyodermal infections such as temporary inflammation at the sites of needle punctures, impetigo, ecthyma, cellulitis, erysipelas, and furunculosis. A recent report described severe allergic reactions resistant to topical or systemic therapy with steroids in combination with topical tacrolimus, especially after exposure to red dye (23). Hepatitis C and Human immunodeficiency virus has been shown in epidemiologic studies to be transmissible via non sterile needles. Other transmissible infections include syphilis, leprosy, tuberculosis cutis, rubella, chancroid, tetanus, and molluscum contagiosum. Cutaneous conditions that localize in tattooed areas include vaccinia, verruca vulgaris, herpes simplex, herpes zoster, psoriasis, lichen planus, keratosis follicularis (Darier disease), chronic discoid lupus erythematosus, and ker-atoacanthoma. Other possible conditions include keloid, sarcoidal granuloma, erythema multiform, localized scleroderma, and lymphadenopathy. Skin reactions to tattooing include aseptic inflammation and acquired sensitivity to tattoo dyes, especially red dyes (26, 32, 33). Also, people with diabetes should avoid tattooing of feet or lower legs in view of impaired healing (1).

A number of Malignancies are reported to arise within tattoos such as squamous cell carcinoma, basal cell carcinoma, malignant melanoma, leiomyosarcoma, primary non-Hodgkin lymphoma, and dermatofibrosarcoma protuberans (27). These malignancies may be considered coincidental, but carcinogenicity of the tattooing colorants is a concern to be addressed. Nevertheless, a malignancy within a tattoo is more difficult to identify on skin examination (1).

Burns may also rise during magnetic resonance imaging as the metallic ferric acid pigments used in tattoos can conduct heat on skin during the procedure, resulting in traumatic burns. This has been reported to occur in tattoos with nonferrous pigments as well (29). Patients should be asked before an MRI if they have a tattoo, so that this complication can be avoided (1).

A study was conducted to survey the presence of knowledge of the risks involved in application of these body arts. Although 90.1% of the sample population was aware of the possible transmission of infectious diseases, 28.1% did not know that there are other kinds of risks, such as allergies, scars or bleeding (34). This could be considered an emerging problem of Public Health, in particular because the decision to undergo these procedures is often not shared with the family or experts in the field. As a matter of fact, encouraging people specially the young adults to talk with others (health professionals) about body art, asking specific questions and knowing enough is helpful to better judge the quality and hygiene of the artist activities; thus, reducing the health

risks (35).

4. Ethical and Legal Problems:

Medical alert tattooing

It is a form of medical identification similar to medical alert jewelry, ie, bracelets and necklaces, to alert the first responders to certain medical condition such as having diabetes or allergy to a specific drug (Figure 2a, 2b and 2c). This kind of medical tattoos have gained popularity in the past few years, with people choosing to tattoo their wrists or other body parts with health warnings instead of wearing standard MedicAlert bracelets or necklaces. But unfortunately, most of the paramedics and emergency room doctors might not notice these tattoos, possibly leading to inappropriate treatment (36). Moreover, this practice is currently unregulated by the medical community with only a few reports of its use published (36-38).

Emergency medical personnel/ technicians are well trained to search unresponsive patients for health related items, including presence of any medical alert necklaces or bracelets. Earlier, tattooing for disease identification purposes was not a trend hence, it is still not an officially recognized procedure, but now as this practice is on the rise, these personnel need to be aware and more vigilant in looking for such signs. However, identifying medical alert tattoos in emergency situations is much more difficult and could pose to be a problem especially in people with extensive decorative tattooing (1).

There is no doubt that such alerts can be life-saving, but as more people turn to medical



Fig. 2. a, b and c: Tattoo depicting health warning such as diabetes and drug allergy.

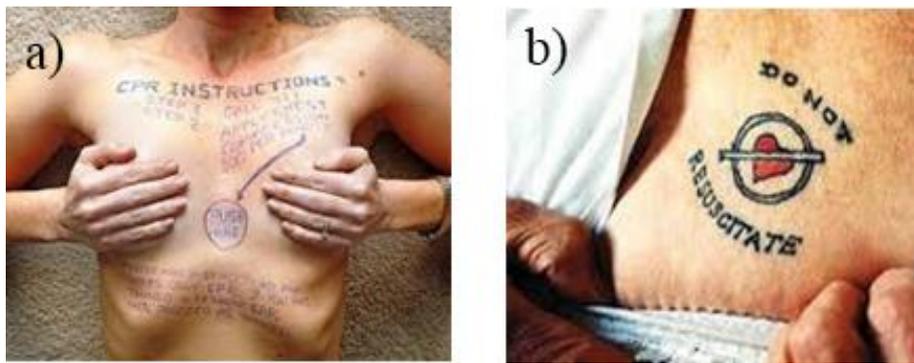


Fig. 3. a and b: Tattoo depicting 'do not resuscitate' directives.

tattoos, specific guidelines need to be implemented regarding their appearance as well as site or location. With the emerging trends and recent advances successfully being made in the field of medicine, there should be universal awareness and training of the medical personnel pertaining to this aspect. A medical tattoo definitely, could be of immense help if someone loses a medical alert bracelet/ necklace during a car crash or a mishap (36-38).

An area of paramount concern is the tattoo depicting specific desires for care, such as do-not-resuscitate (DNR) directives or the organ donor tattoo (39) (Figure 3a and 3b). Do-not-resuscitate (DNR) orders, after a discussion between the patient and the medical team have been in use in hospitals nationwide for over 20 years (40, 41). While many western countries have enacted legislation on DNR orders, the extent to which they explicitly set standards for DNR discussions vary from state to state (42, 43). The same instruction regarding resuscitation in the form of a tattoo on the body however is not recognized as meeting the legal requirements for advance directives.

Physicians are only provided liability to protection if the DNR order is legally recognized, DNR form requires signatures from the patient, their doctor, and two witnesses; tattoo is not a legal document. Apart from this, there are other reasons as well why emergency doctors probably will not respect a patient's DNR tattoo. It is ambiguous in nature and can create uncertainty for emergency responders who must make decisive and immediate life or death decisions. A doctor may wonder, if the DNR tattoo really means "do not resuscitate", or for "Department of Natural Resources" or his initials or could merely be the name of a band which the person is fond of (44). Given that the tattoo is permanent, the doctor may wonder if the patient has changed their view on resuscitation, but has not changed the tattoo (45). Moreover, a legally binding DNR must be revocable, which is made even more difficult with a permanent tattoo (44). Though, it may provoke a moral dilemma whether treatment is to be provided to such patients or not, but in spite of all this, resuscitative treatment is considered to be ethical and mandatory for



Fig. 4. a and b: Tattoo depicting desire for organ donation.

all.

Organ donor tattoo

Similarly, as discussed earlier with the DNR tattoo, an organ donation tattoo (Figure 4a and 4b) also is not legally valid and may not reflect patient's current wishes. Organ donation requires the presence of consent or willingness of the donor and if that's not possible or not known then those of the family members (46). Though the presence of a tattoo depicting 'organ donor' or any related statement itself indicate his/ her desire or expression for the same at some point of time in his/her life (47), retrieval of organ may pose a problem especially if the next of kin do not comply with the tattoo on the body of deceased (48).

Tattoo without consent

Furthermore, forcibly tattooing objectionable words on the part of someone else's body without consent is considered unethical and deserves strict punishment. It is not only cruel and inhuman but also violates the right of an individual. There have been few instances in the past worldwide. In India, tattooing of the word 'JEBKATRI' (meaning 'thief') was done on the forehead of 4 women following arrest by the Punjab police personnel, in the year 1994. This incidence eventually blew up into a national controversy over police conduct and how far authorities would go to control crime. However, as the matter was pending before the High Court, the National Human Rights Commission decided to intervene under Section 12 (b) of the Protection of Human Rights act. An Affidavit was filed through a Counsel whose all of the suggestions were later on accepted by the High court (49). Similar incidence took place in Oklahoma City in the year 2011 where the word 'RAPEST' was tattooed on the forehead of a teenage boy, it was actually a misspelling for 'RAPIST' which they had intended to ink. Along with the tattoo, the victim was kidnapped, assaulted and his genitals were shocked with a stun gun in order to seek revenge for alleged sexual assault (50).

Cases such as these should be dealt by the court of law with more stringent punishment as the mental agony and pain of the victim is beyond any imagination, though monetary

compensation for the damages as well as for tattoo removal/ plastic surgery may provide some relief.

5. Conclusion:

Considering the manifold applications and their associated advantages in various fields, this age old art of tattooing will definitely continue to gain popularity in future. In general, because of its ambiguity and the potential for compromising the integrity of both, the emergency medical system and the doctors/paramedics involved, neither a tattoo nor similar nonstandard directives should be followed. The medical personnel should, however, weigh nonstandard directives in direct proportion to their reliability and with consideration of the surrounding medical situation. Hence, it is suggested that nationwide legislation along with awareness among the population needs to be redressed in order to prevent inadvertent use of such tattoos.

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