Skin markings in teletherapy planning for post operative breast cancer patients using henna

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Abstract
The aim of this study is to improve the retentivity of the skin markings in patients of post operative breast cancer undergoing radiotherapy. A total of forty patients of post operative carcinoma breast undergoing radiation therapy were included in the study during August 2014 to September 2015. Patients were simulated and the skin markings were done using henna paste. The paste was left over markings for 30 minutes for better skin penetration. The median durability of the markings is 21 days. There were no untoward incidences and none of the patients developed allergic reactions to henna. It is also observed that fair patients have retained the henna markings more than the dark patients. Patients marked with henna retain skin markings throughout the entire course of radiotherapy. Use of henna is safe, painless and remains intact for a long period of time. Skin markings using henna enhances accuracy of treatment portals as this avoids repeated markings.

Keywords: Breast cancer, Henna, Radiation Therapy, Skin markings, Teletherapy.

Introduction
Skin markings are done using permanent marker pens or 1% gentian violet in patients of post operative breast cancers (mastectomy) referred for adjuvant radiotherapy. These marks fade within four to five days and are required to be retraced under the treatment machine. However, with this conventional method, there is a risk of shifting of the skin marks with time. This may result in an inaccurate coverage of the planning target volume. This is particularly of utmost importance where two or more fields meet close to each other as is seen in axillary and tangential portals in post mastectomy breast cancer patients planning. Undesired shifting of skin marks during the course of therapy, even marginally, may be detrimental to treatment outcome and development of hot spots in the treatment area. Furthermore, patients with skin markings using marker pens are normally advised not to wash or shower so as to keep the markings for a longer period adding to the discomfort of these patients. Alternatively skin tattoos using India ink is regularly been used in various centers to keep the skin markings intact throughout the course of the treatment. However these tattoos are painful, and has disadvantage of possible infection[1]. Thus there is a need for an ideal skin marking agent that will remain temporarily stable, does not get washed away with shower or bath and does not produce allergic skin reactions.[2] Henna has been traditionally applied to the skin in the form of a paste for beautification. While the paste dries, it stains the superficial layers of the skin. These markings remain intact for almost three to four weeks, can be exposed to washing and do not have allergic potential.

Henna (*Lawsoniainermis*, syn. *L. alba*) is a flowering plant. It is the sole species in the genus *Lawsonia* of the family Lythraceae. It is native to tropical and subtropical regions of Africa, southern Asia and northern Australasia with an arid or at least seasonally dry climate. It is a shrub growing to 6 m tall. The leaves are in opposite decussate pairs, oval, 2-4 cm long and 1.5-3 cm broad, with an entire margin and acute apex. The flowers are fragrant, produced in conical panicles 10-40 cm long, each flower 5 mm diameter, with four white petals. The fruit is a dry capsule 6-8 mm diameter, containing numerous 1-2.5 mm seeds.[3] To create henna, the leaves are dried and ground into a powder that is greenish-brown. Strong tea, lemon juice and essential oils (such as tea tree and lavender) can be added to release the dye from the powder, and sugar is mixed in to produce a mud-like consistency. The resulting paste needs to set for about 24-30 hours at room temperature to allow the dye to release fully. This can be sped up to as little as 1 hour by warming the mixture to 40°C. When used on skin, henna penetrates only the dead cells of the stratum corneum. How long the paste is left on the body affects the depth of penetration, and the stain will last longer when fully absorbed in thick skin. The coloring agent of henna is 2-hydroxy-1,4 naphthoquinone[2]. Despite the widespread use of henna, reports of contact dermatitis to it are very rare. It can therefore be assumed that henna is a very weak skin sensitizer. Reports of allergic reactions to henna are very rare and include case reports of contact dermatitis[4-9] and immediate-type reactions to henna.[10, 11]

The aim of this study is to improve the retentivity of the skin markings in patients of post operative breast cancer undergoing radiotherapy.

Materials and Methods
Skin markings using henna was performed on 40 patients of post mastectomy breast cancer from August 2014 till September 2015. History of allergic reactions to henna has been ruled out in all these patients. Soon after simulation, henna paste (commercially available as Roxy Henna powder, manufactured by Somaik Henna Export Corporation, Faridabad, India) was applied on the treatment

portal markings. The paste was left to dry on the patient for 30 minutes. Drops of sugar mixed in lemon are applied on the marking site so as to intensify the color of the marks. Patients were evaluated for the mark retentivity, number of repeated markings and development of skin reactions.

The procedure of henna application is conducted in an air conditioned room so that the patient does not sweat and remains comfortable. Procedure for henna application during teletherapy:

1. Skin for marking is prepared by wiping the area with dry cotton wool so as to make it dry and clean. This will also expose the underneath of superficial skin layers.
2. Provisional markings on the skin are made according to the teletherapy planning principles using permanent marker pens.
3. Patient is taken up for simulation and then the markings are confirmed and or corrected.
4. A thin layer of eucalyptus oil is applied on the marking area.
5. Two to three mm of henna paste is applied on the skin marking site.
6. Lemon juice mixed with sugar (2:1) is then poured drop wise over the henna marked area.
7. The paste is left over the markings for 30 minutes. Lemon with sugar juice is applied as and when the henna paste dries on the skin for first 20 minutes.
8. At the end of the procedure the dried henna paste is removed and the patient is released from the couch.

Black henna is associated with para-phenylenediamine and is known to cause allergic reactions, hence is not used for skin marks.

Results and Discussion

Patient related details are listed in Table 1. The durability of markings on these patients ranged from 10 to 24 days (Median = 21 days). Most of these patients required two marking procedures in their treatment duration.

Table 1: Patient characteristics

Characteristics	Number
Median Age	49 years
Laterality	
Right	21
Left	19
Number of days the mark was retained	
Mean	19.9 days
Median	21 days
Mode	21 days

None of the patients developed any type of skin reactions or allergic reaction at the mark site. All patients tolerated the procedure well.

Traditionally gentian violet has been used regularly for skin marking of treatment portals in Teletherapy. Gentian violet had to be applied with a thin wooden stick and was clumsy in handling. With the advent of permanent marking pens, it replaced the gentian violet as the pens are easy to handle, can be carried everywhere and made better retentive marks than gentian violet. However even with these pens, skin marks could not be sustained for more than a week, and they had to be replaced regularly. Repetitive remarking lead to errors as these newer remarks have the risk of shifting each time the new mark is made.[12-14] The gradual shift of marks is of grave consequence especially when two or more fields meet very close to each other such as in breast cancer teletherapy planning.

Gradual shifting of skin marks during radiotherapy has been documented by various authors.[12-14] This error is seen especially in patients where immobilization devices such as thermoplastic moulds are not used. Breast treatment planning is one such area. While this procedure has its inherent delay in correction of marks, this facility may not be available in most of the radiotherapy centers in the developing world. Hence there is a need for method where once the markings are made, they remain temporarily viable throughout the course of the treatment.

Henna is one such solution, as it is easily available, economical, non toxic, non invasive and retains the markings temporarily for almost three to four weeks. Patients on henna marks can take bath or shower as the marks do not fade away quickly. Henna skin marks will be useful not only in conventional radiotherapy techniques but even in advanced techniques such as 3D conformal therapy.

Conclusion

Use of henna is safe, painless and remains intact for a long period of time. Skin markings using henna enhances accuracy of treatment portals as this avoids repeated markings.

Conflict of Interest: None.

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