

Microblading and the Science Behind it

Abstract

Eyebrows have been known to be an importance aspect of facial aesthetics and eyebrow restoration is now a part of anti-ageing procedures too. Microblading is a new technique in the field of permanent cosmetics for eyebrow restoration. Currently, it is one of the most sort after treatment in aesthetic procedures due to the curiosity and awareness raised by social media. Microblading is a form of superficial micropigmentation, wherein pigment is deposited till the papillary dermis, with the help of a manual device and a blade consisting of stacked needles. The resultant crisp, discrete hair like incisions simulate the eyebrow hair to give a natural look. The results are semi-permanent and last only 12-18 months. In the recent years, with the advancement in the instrumentation of microblading there have been several modifications in this procedure. Microblading has now found its applications not only in cosmetic treatments but also in dermatological conditions such as alopecia totalis, hypothyroidism, chemotherapy induced madarosis etc. It is a vital tool in any dermatology or cosmetic practise for its extensive applications. But with the rise in popularity of microblading, there is also a rise of untrained professionals performing it leading to a rise in its side-effects. This article aims at not only guiding on the instrumentation and procedure of microblading but also its pre and post procedure care, interaction with other aesthetic procedures and treating its complications.

Keywords: *Eyebrow restoration, microblading, micropigmentation, permanent cosmetics*

Introduction

Right from ancient history, permanent cosmetics have been regarded by many as a fashion statement. And eyebrows have been at the forefront in the permanent makeup industry. The eyebrow trends keep changing with every year, from thick to thin, from high arched to low arched or unibrow to none! It was not long before people realized that not all eyebrows could be shaped; some needed to be enhanced. This is when permanent cosmetics came into vogue, but the resultant simulation of tattooing never looked natural. By 2015, microblading or eyebrow embroidery had originated in Asia and its popularity has only grown exponentially due to social media. Microblading is a form of superficial micropigmentation, wherein pigment is deposited only till the papillary dermis, with the help of stacked needles that are arranged like a scalpel. The resultant crisp, discrete strokes simulate the eyebrow and this procedure has exclusively

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been developed and used for this solitary indication.^[1]

Microblading is an innovative method that not only helps people seeking cosmetic enhancement but also helps patients with alopecia totalis, trichotillomania, madarosis in hypothyroidism, chemotherapy-induced hypotrichosis, etc.^[2] Recently there have been many advances in microblading from the instrumentation to the technique. This article aims at giving a review on all aspects of microblading, however, practical training is of utmost importance in this procedure since microblading is regarded as an art and needs to be customized for every subject.

Anatomy of Eyebrows

Anatomy of eyebrows change with age and knowledge of these structures and anatomical markers are vital for microblading [Figure 1].

They can be divided into 4 parts; head, body, arch, and tail^[3] [Table 1].

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Eyebrow shapes: There are different face structures as per age, sex, and racial differences. An eyebrow is drawn considering the natural face and bone structure, hence each of these unique face structures has a particular eyebrow shape that suits them the best. It can be high arched, low arched, S-shaped, rounded, straight, etc., [Figure 2].

Facial Morphology and Eyebrow Mapping

Eyebrows and Lips are two of the structures on a human face that should always be symmetrical, hence whenever we consider drawing eyebrows meticulous measurements have to be taken. Shaping of the eyebrows depends on the natural growth of the hair, facial symmetry, and mapping of the brow position based on anatomical landmarks.^[4]

There 4 anatomical lines for drawing the eyebrows: [Table 2 and Figure 3].

Few other points to consider while drawing the eyebrows are:

Extra hair needs to be shaved or removed before starting microblading. Patients may also be asked to use an eyebrow pencil before coming since they are well aware of how they want their eyebrows to look, most of the time. If the subject has no existing eyebrow such as in cases of alopecia totalis then the medial pad of fat on the orbital ridge can be taken as the starting point on the medial side. In subjects with a wider nose, the medial nasal alae are considered for measurements and in subjects with a narrow nose, the lateral nasal alae are considered for measurements. Once the eyebrow is drawn, the thickness of the eyebrow should be rechecked with a Vernier caliper all along the eyebrow length. It should not exceed 7 mm, as the normal thickness of an eyebrow varies from 4 to 7 mm only.

Table 1: Anatomy of eyebrow [Figure 1]

Part of eyebrow	Description
Head	The broadest and medial most of the eyebrow. It has most of the hair in the vertical direction
Body	Part extending from the head to the arch of the eyebrow. In most cases, a fold of hair is also seen in this part in the hair direction
Arch	The highest point of the eyebrow. From this point, the eyebrow starts tapering and becoming narrow towards the tail
Tail	This is the narrowing lateral most of the eyebrow with feathering seen in the downward direction

Table 2: Anatomical markers for mapping and designing of eyebrows [Figure 3]

Line marked in diagram	Line to be drawn	Description
(a)	Glabella line	Most important anatomical landmark line that passes from the tip of the nose through the glabella and helps to measure the symmetry on both sides.
(b)	Medial line	Line from nasal alae through the medial canthus and running upward till the current existing eyebrow
(c)	Highest point line for arch	Line from the nasal alae through the mid-pupillary point on the same side
(d)	Lateral line	Line from the nasal alae through the lateral canthus extending upward

Designing the arch of the eyebrows

This is the highest point of the eyebrows and the most characteristic feature in a female brow. A high arch should be given in more rounded faces or faces with a bigger forehead. A flatter arch looks more desirable on an oval or long face. Higher arches make the face look sharper and does not suit everyone. Hence have a detailed discussion on this during the pre-procedure consultation to explain the eyebrow and arch shape and how it will influence the look.^[3]

Instrumentation in Microblading

- Scales for measurement –There are multiple scales available for eyebrow assessment, most commonly used one is the: Golden Mean Brow Caliper. Although the author prefers using a combination of Vernier caliper and a T shaped eyebrow scale. Scales that can be taped to the forehead are also available [Figure 4].
- Microblading pen- This is a specialized manual instrument that holds the microblading needle. It consists of 3 parts, the immobile handle, the rotating adjuster, and the grooved blade holder. This third part is a cross-shaped groove on the tip, which opens up to accommodate the needle when turned anti-clockwise and after fitting the needle can be tightened by screwing it in the clockwise direction [Figure 5]. Pre-fitted microblading pen is also available which are single-use and disposable. There is a choice of lightweight, ergonomic, heavy/chunky, and double-ended pens in various shapes and configurations, depending on the needle one is using.
- Blades- There are many variants available in microblading blades. Microblading blades consist of multiple needles arranged in a row. They can be classified as flexible, hard, or combination, depending on how they are bound. Flexi needles are more forgiving and bound by a flexible polymer and good for beginners. The hard blades should be used only if you are confident of your strokes and depth. Blades are available in different numbers such as 7, 9, 12...21, depending on the number of needles in the blade. The thickness of each needle is the same varying from 0.4 to 0.16 mm. The thinner the needles the finer and crisp the strokes. Needles can be angled or U-shaped. Most recently there are single and double row needles. The double row needles help in giving more parallel strokes.

- Science behind the multiple needle blade- As we dip the blade in the ink, with capillary action, the needles can pull up the ink and get coated with it. The more the needles, the more amount of ink is taken up by that blade. The longest needle is always placed at the point we want the hair root to start, hence maximum ink gets deposited there and it creates an illusion of hair. For longer strokes we need bigger blades with more needles.

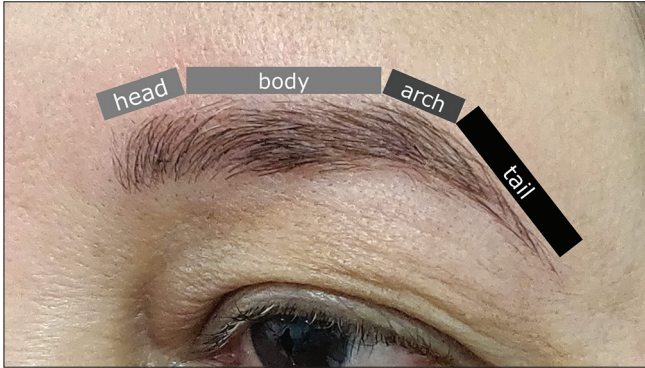


Figure 1: Parts of an Eyebrow: Anatomy of eyebrow consists of the eyebrow head, body, arch, and tail

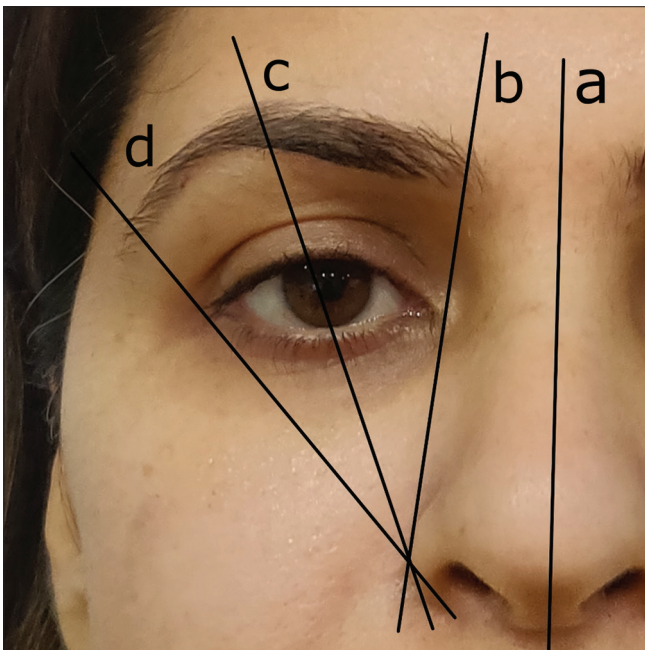


Figure 3: Eyebrow mapping: Eyebrows are drawn as per the anatomical markers and lines. Figure shows (a) glabellar line as the midpoint, (b) medial line, (c) highest point line for the eyebrow arch, and (d) lateral most point



Figure 5: Microblading pen: Manual tool with grooves at one end to fit in the microblading blades

- Ink holder- This is a plastic or metal ring container, used to carry the microblading ink that is needed for quick access to ink during procedure and maintain the sterilization by not dipping the microblading pen repeatedly into the inkpot.

Microblading Pigments

There are 2 main types of medical tattooing inks, one made of iron oxide and the other is synthetic. Microblading pigments are synthetic in nature. Unlike tattoo ink which is made of iron oxide and is dispersible,

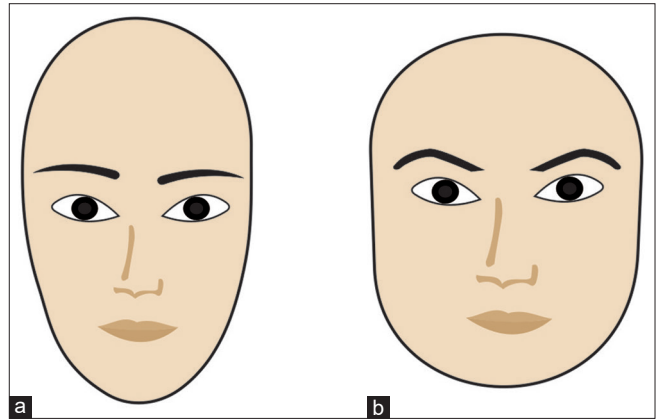


Figure 2: Eyebrow shapes as per the face structure (a) low arched flatter eyebrows are better suited for longer or oval faces and (b) high arched eyebrows are more suited for round faces



Figure 4: Measurement of eyebrows: Use of vernier caliper and stick-on scales in eyebrow mapping

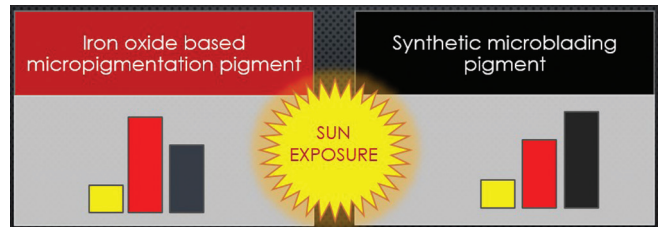


Figure 6: Comparison of changes in brown color pigments with sun exposure- Brown color pigments contain 3 basic colors, yellow, red, and black. On excessive sun exposure, iron oxide pigments used in micropigmentation change more to a reddish tinge and synthetic pigments used in microblading change to a more blackish-grey pigment

these are non-dispersible and hence difficult to retain. This property of the pigment is the reason behind the ink being difficult to retain unless the technique is correct. Most of the professionally available microblading inks are non-magnetic and organic in nature. They do not contain any heavy metals. Microblading pigment shade selection is usually done as per the color tone however nowadays composite inks are available that are pre-mixed shades for particular skin tones. Indian population generally falls in the neutral to warm skin tone.^[5]

Colour changes with sun exposure: All inks react and change color with repeated sun exposure. Iron-oxide based inks usually turn to a reddish tinge while synthetic inks, usually turn to a blackish greyish tinge^[6] [Figure 6].

Pre-procedure consultation

Before starting any procedure of microblading it is important to consult the patient and explain the entire procedure and its consequences. Even though microblading is regarded as a semi-permanent procedure, few of its strokes do last permanently, hence pre-planning is very important. Understand what the patient/client is expecting from the treatment and what is their desired eyebrow shape or change. It is important to take a detailed history of sun exposure, oily skin, sweating, laser or IPL sittings that are on, keloid tendency, history of herpes labialis, history of use of retinol creams or vit-C or any exfoliant creams, history of being on isotretinoin therapy, history of chemical peeling, etc. Consent for slight color changes and touch up at 2–3 weeks should be explained during the pre-procedure consult. It is important to make the subject aware of the post-procedure sequel and care beforehand to avoid panic.

This also includes a pre-procedure analysis on the skin laxity and thickness of skin which helps decide the type of blade, number of pins, and hardness of the blade. Next, the evaluation of the Fitzpatrick skin type and skin color tone is done by assessing color of vein, hair, and eyes. This helps in the selection of the right pigment.

Anesthesia

Most of the cases done by the author are under topical anesthesia cream only (lignocaine 2.5% and prilocaine 2.5%). Rarely injectable anesthesia is needed since the microblading blade does not pierce deeper than the papillary dermis. If in case injectable anesthesia needs to be given, it should be given with adrenaline and in very less quantity so that there is no swelling, to hamper the shape of the eyebrow, and post-procedure symmetry.

Procedure

Under aseptic precautions, the eyebrows and surrounding area is cleaned and prepared for the procedure. All the instrumentation should be ready. The needle is fitted at an angle of ~ 155 degrees into the microblading pen so that at keeping the pen in upright position

all needles are entering into the skin at the same time at 90 degrees^[5] [Figure 7].

- **Stretch:** Skin is stretched in 3 opposing directions to give the maximum stretch. The non-dominant hand gives the stretch in 2 of the directions and the ring finger or little finger of the dominant hand gives the stretch in the third direction
- The pigment is then taken in the ink holder, and the pen is dipped in it to take the right amount of ink. Excess is wiped out on the walls.
- Start with your dominant side always. Right-handed person should start with the right eyebrow first.
- Main head strokes are taken and a pen is dipped in pigment after every stroke
- **DEPTH-** The ideal dept is papillary dermis and can be determined by 3 features; grating sound when the stroke is made, pinpoint bleeding, and lymph exuding within a few seconds of making the strokes.

Microblading strokes

There are many different types of strokes, which can be individualized. Strokes at the head end are different from the strokes at the tail end. Mastering the direction of the strokes needs practice, which can be done initially of paper and later on artificial skin sheets. Direction of the strokes at the head end is more vertical while as we progress towards the tail end it turns into more of a cross-hatching pattern [Figure 8]. The author prefers to classify the strokes as main strokes and supporting strokes. Main strokes-start from the base and run along the entire thickness of eyebrow hence are longer. Supporting strokes start midway and merge into main strokes. They are shorter in length and can be used to fill in gaps between main strokes too. All strokes are placed at an angle of 45 degrees from their emerging point, to give an illusion of a hair follicle. Strokes should never be drawn parallel to each other instead feathering or cross-hatching is done with the main strokes and supporting strokes to give a natural look. But care should be taken to not intersect the strokes as this will lead to blotching of pigment.^[7]

Post Procedure

Immediate care

On finishing the microblading, pigment is smudged on the entire eyebrow and kept for 5 mins. This helps in retaining pigment evenly since few areas lose pigment due to the pinpoint bleeding.

Pigment is then wiped with normal saline only and an antibiotic ointment is applied on both the eyebrows.

Post-operative care

For the first 48 h, avoid touching the eyebrows, heavy workout, or contact with water. Only pat dry the face for cleaning. For the next one week, the patient should be informed that scabbing and itching is normal and picking

or peeling off scabs can lead to infections. Do not use an exfoliant, antiaging creams, astringents. Make-up should be strictly avoided. Face can be washed with water but no soap or face wash should be used for the first 1 week. Facewash can be started after 1 week only. Any swimming, steam, or sauna can be started after 2 weeks only. Waxing or threading of eyebrows should not be done for 6 weeks post-treatment.

Avoid excessive sun exposure, stay protected by using sunglasses, and use sunscreen on other areas since it can lead to faster degradation of pigment.

Touch up

A touch up is a must in every microblading case as few areas lose color with the scabs over 2–3 weeks. A touch up can be done during this time, in which the same procedure is repeated in the blank areas. Strokes that have retained should not be redone, only the blank spaces should be filled again [Figures 9a, b and 10a, b].

Complications of microblading: Microblading results in very few complications if done by trained and experienced

professionals. The most common complications are related to the pigments and can be tackled with proper knowledge and experience in skin undertones [Table 3].

Removal of microblading pigment

In the current scenario, with the rise of untrained professionals, dermatologists have been getting demands of removing the microbladed pigment. This can be tried with a conservative approach of application of exfoliant creams on a daily basis or with an aggressive approach with a laser. Pigment can be lightened by Q-switch NdYag laser on a very low fluence with a spot size of 3–4 mm. However, this needs expertise as it can lead to scarring

Table 3: Complications of microblading	
Cosmetic complications	Functional complications
Asymmetry	Pain and itching due to inflammation
Unnatural shape	Infections: Secondary bacterial infections, Mycobacterium infections ^[8,9] reactivation of herpes simplex infection or blood-borne infections disorders
Colour may bleed and spread due to deep deposition	Tattoo reactions or granulomas (rare)
Colour fades or changes due to sun exposure or exfoliation	Koebnerization of active skin disease

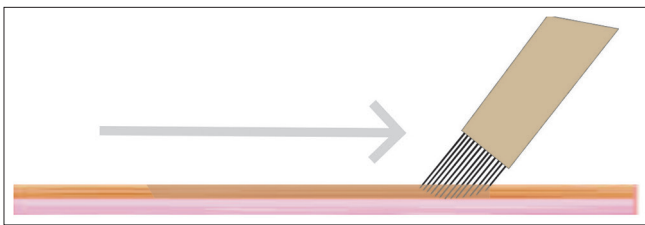


Figure 7: All the needles of the microblading blade enter the skin simultaneously at the same angle

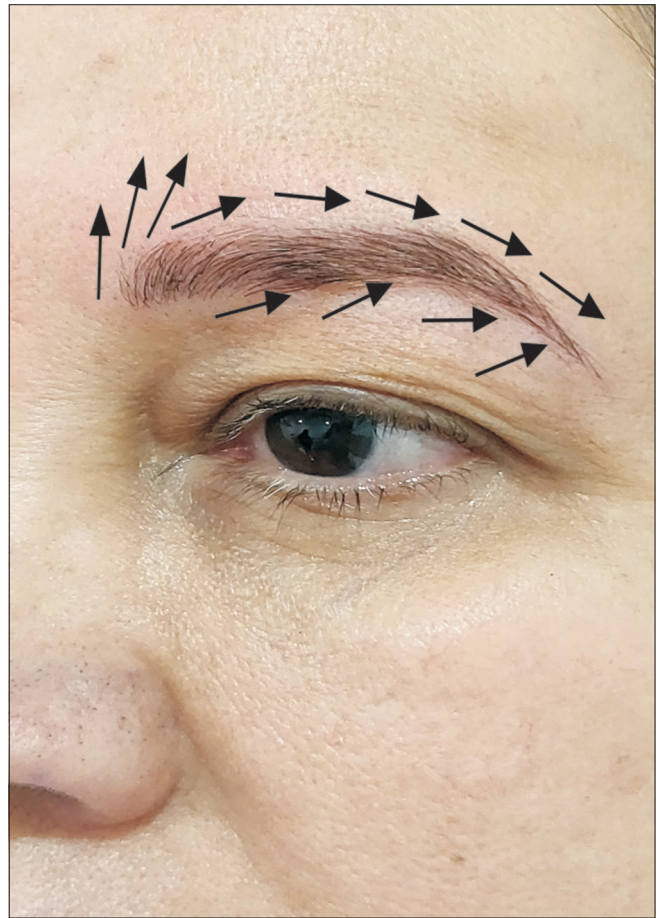


Figure 8: Direction of hair to be drawn in microblading



Figure 9: (a and b) Microblading results



Figure 10: (a and b) Microblading results

and post-inflammatory hypo or hyperpigmentation. If the patient has natural hair present in between the microbladed strokes, the natural hair follicles may get depigmented or permanently damaged by the laser.^[10]

Unnatural color changes in microblading can be corrected via a color correction and may not need complete removal. Knowledge of the color theory and undertones is important for this aspect.^[11]

Microblading in Dermatology

Although not many dermatologists are performing microblading, there are multiple reasons why a dermatologist should be well aware about this procedure. With the rise in popularity of microblading, so is there a rise of untrained professions performing it and a rise in its side-effects. It is important to know the interactions between dermatological procedures and the pigment to avoid unfavorable outcomes.

How to prevent fading of the pigment in the dermatological procedure:

1. Apply petroleum jelly on microbladed eyebrows prior to the use of any chemical peels, exfoliant serums, scrubs, hydroquinone, or retinol.
2. Advice to avoid UV exposure and use a minimum of 30 SPF sunscreen always.
3. Avoid heat such as steam from a facial or sauna
4. Avoid LED light exposure or radiofrequency (part of few spa facial therapies)
5. Resurfacing lasers and IPLs will also fade the pigment even if done at a distance from the pigment. (A zinc oxide paste can be applied to the eyebrows to act as an occlusion).

Recent advances and variations in microblading^[12]

Nano-blading: when microblading is done with needles as this as 0.18 diameter in the blades, to give finer and crisp strokes.

3D or 6D brows: microblading with strokes that mimic the natural flow of hair to the utmost detail with varying depth on the strokes.

Ombre brows or micro-shading: When micropigmentation is used to create fine dots that give the appearance of powdered eyebrows and not hair strokes. This pigment lasts longer compared to microblading as it is motorized and not manual.

Combination or hybrid brows: The head end of the brows is done manually and the tail end is done with a motorized device similar to ombre brows. Both techniques are merged together in the center.

Conclusion

Microblading is a fairly recent procedure, indicated in madarosis due to age, alopecia areata, hypothyroidism, and other conditions. It acts as a bridge between tattooing

and surgical restoration of the brow. A microblading setup is easy, but the procedure requires technical skill and a lot of practice, but once mastered, is a vital in an aesthetic dermatology clinic.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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