INTRODUCTION

Hair restoration had undergone various innovations, especially in the last two decades; the state of the art considered in the early 1990s is not acceptable now. With increasing number of hair restoration surgeons coming from different background, it is difficult to maintain standards by the novice surgeons. With the increasing awareness among the potential patients, partly due to the advertisement by the surgeons producing excellent results. There are various important points which define a “good” hair transplant. The angles of the hair shafts are one of the most significant features which define the naturalness of the hair transplant result. These hair angles depend on the angles of the slits created by the surgeon. There are various techniques adopted by the surgeons to create these slits in the recipient areas. These include different kinds of blades and needles.[1]

The angles of the hair in the hairline vary from patient to patient. Normally, it is 10°–20°.[2,3] There is a wide variation in hair characteristics, racial and gender features, and areas of the scalp. The shape of the forehead and skull features also has wide variations. It remains to the expertise of the surgeons to create the hair angles close to the normal angles.

The author has developed a new curved blade to create recipient area slits. The following study was conducted to compare the angles of the hair shafts created by the straight/flat blade and with the curved blade.

MATERIALS AND METHODS

The study was conducted in a private hair transplant surgery center. Five patients undergoing the first session of hair transplant were included. In each patient, 1 cm² area was selected in the anterior hairline in midline [Figure 1].

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

How to cite this article: Ahmad M. Comparison of hair shafts angles using a curved blade: An innovation. Int J Trichol 2018;10:68-70.
Ahmad: Hair shafts angles using a curved blade

Five slits were created with the straight/flat blade and five slits were created with the curved blade in each patient [Figure 2].

**Technique**

A (commercially available) straight blade of 1.0 mm width was used to create the slits. A curved blade of the same width was used to create the slits along the previously created slits. The grafts were harvested by strip method surgery or by follicular unit (FU) extraction. The length of the hair was about 2–5 mm above the skin level. No fluid/anesthetic was administered in this area. The creation of the slits with the flat blade requires the “pushing” hand movement, whereas the use of curved blade required “rotational” hand movements. After the slits creation, the grafts were inserted into the slits. The custom-made macrophotography technique was used to take high-magnification photographs of the grafts. The camera lens was kept at the same level on the forehead to capture the exact angle. The software was used to measure the angle of the hair at the level of the skin. The angles of all the hair shafts were measured in both the groups. The data were then analyzed statistically using paired t-test (using Stats tester© version 1.6.3, 2016–2017, BMP group, Saitama, Japan).

**RESULTS**

A total of five patients were included in the study. The mean age of the patients was 35.0 years. The mean hair angle of the hair shafts created with straight/flat blade was 17.42°, whereas the average hair shaft angle created with curved blade was 9.56° [Table 1]. The hair shaft angles varied from 14.3° to 23.1° while using the straight blade. The hair shafts angle resulting due to curved blade ranged from 8.6° to 11.3°.

**DISCUSSION**

The most important point in hair transplant surgery is the anterior hairline. It is the most visible part. There are various features which differentiate a “good” hair transplant from a “natural” hair transplant, the most important being the hairline. It consists of the position and design of hairline, transition zone, hair distribution, and most importantly hair angles (the exit angles of the hair shaft from the skin). It is one of the important factors affecting the naturalness of a hair transplant surgery. The growth of only a few hairs with different angles from the surrounding hair angles may be visible from a distance and may look unnatural.

The hairs have many racial and anatomical differences; for example, the Asians have straight hair whereas the Africans have very curly hair. Once the hair comes out of the skin, depending on its length, the angle may change, but the hair shaft exit angle may remain the same. The hair angles in the anterior hairline are thought to be 10°–20°. This hair angle becomes difficult to maintain especially while restoring the temporal area hairs where the angles become even more acute, probably <10°. This is one of the reasons why any surgeons not to prefer to restore the temporal hair.

Various kinds of instruments are used to create recipient slits. These include SP-90 blade, Sharp-point, Minde knife, Nokor needles, hypodermic needles, customized blades, and implanters. All of these are straight and do not aid the surgeons in creation of the angle. It remains to the expertise of the surgeons to change the angle of different parts of the scalp by changing the hand directions. An extensive literature search was undertaken, but no study was found to compare the measurements of angles of hair exiting the skin. The new design of curved blade resulted in more acute angles while creating the recipient slits. This blade was designed and the slits were created.

![Figure 1: Study protocol](image1.png)

![Figure 2: Straight versus curved blade designs](image2.png)
Ahmad: Hair shafts angles using a curved blade

The curved blade has created another way to minimize the tissue injury. It has the advantage to increase the total number of slits in the desired area and eventually can result in an increase in the hair density. The slits have resulted in hair growing at more acute angles, which gives more naturalness. These slits created will also help create the angle of curvature of the hair shaft.\(^7\) The current study is the first of its kind comparing the actual hair angles after hair transplant.

A recent study by Rose et al. documented an angle of about 6.43\(^\circ\) to as high as 35\(^\circ\) in the occipital region.\(^6\) However, to date, no study is found which describes the actual measurements of hair angles in the anterior hairline. Only 1-hair FUs were implanted and their angles were calculated. The other point mentioned in detail by Cole about the difference between internal and external angulation (i.e., above and below the skin).\(^7\) However, there are a few factors which are not taken into consideration. The overall stretch of the intact scalp skin may influence the hair shaft exit angles. Similarly, the angles measured after cutting the slivers result in the separation of arrector pili muscle. The release will definitely make the angle little wider. Moreover, the amount of local anesthetic also affects the exit angle.

The angle of the straight blade with the skin determines the angle of hair shaft. To create an angle of \(<20^\circ\), the wrist has to move in an awkward position. Moreover, if the angle goes to \(<10^\circ\), the situation becomes uncomfortable. Any change in the angle also increases the size of the slit created. For example, a 1 mm straight blade creates a slit of 2.9 mm at 20\(^\circ\) inclination which increases to 5.78 mm with the 10\(^\circ\) inclination, whereas the curved blade saves the surgeon’s hand in going to the awkward position which may stretch tendons at the wrist. Moreover, it gives a flatter, acute angle without increasing the size of the slit.

Financial support and sponsorship

Nil.

Conflicts of interest

The author, Dr Muhammad Ahmad, holds the ‘pending patent’ rights of the design.

REFERENCES

1. Lam SM, editor. Hair Transplant 360. New Delhi, India: Jaypee Brothers Medical Publishers; 2014.
2. Unger WP. Recipient area hair direction and angle in hair transplanting. Dermatol Surg 2004;30:829-36.
3. Haber RS, Stough DB. Hair Transplantation: Procedures in Cosmetic Dermatology. Philadelphia, USA: Elsevier Saunders; 2006.
4. Mohmand MH. The curvature of a hair shaft: An important factor in giving a natural looking hair line. ESHRS J 2005;5:6-7.
5. Perez-Meza D, Mayer M. Comparison of different instruments to make recipient sites: Needles vs. blades. Sydney, Australia. Int Soc Hair Restor Surg 2005.
6. Rose PT, Canales M, Zontos G. Examination of the exit angle of hair at the skin surface versus the internal angle of hair as it relates to the FUE/FIT harvesting method. Hair Transplant Forum Int 2017;27:8-10.
7. Cole JP. Article commentary. Hair Transplant Forum Int 2017;27:10-2.