Kerure Clamp: A New Age Tool to Improve Extraction Technique in Follicular Unit Extraction

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Abstract

Background: Follicular unit extraction (FUE) has caused evolution in the management of pattern baldness. FUE methods is less traumatic with faster healing and minimal scarring. FUE is still evolving and many innovations are possible in the future. **Aims and Objectives:** To address the usefulness of Kerure clamp, an innovative tool for FUE method of hair transplantation. **Materials and Methods:** The clamp was used on 20 consecutive patients undergoing FUE for male-pattern baldness. Part of the donor area was divided into test side where extraction was done with clamp in situ and the control where clamp was not used. Follicular transection rate (FTR) was calculated as a percentage for each side and subjected to statistical analysis. **Result:** We found an improvement in the FTR scores on the test side, and this difference was statistically significant ($t = 9.63$, $P < 0.0001$). **Conclusion:** A low-cost instrument has been devised by the authors which was shown to improve the the scoring of grafts and also aid in surgeon's efficacy and efficiency.

Keywords: Follicular unit extraction, hair, Kerure clamp, transplant, transection

Introduction

Following the decline of follicular unit transplant (FUT), follicular unit extraction (FUE) has become one of the widely practiced minimally invasive follicular harvesting techniques used during hair transplantation.[1] It is a minimally invasive follicular harvesting technique, and it has the potential to exploit the lower occipital and supra-auricular region as a safe donor area in addition to the standard occipital donor area used in FUT. Despite its potential advantages such as rapid recovery, minimal scarring, and reduced postoperative pain; its widespread acceptance is limited as mastering the FUE procedure can be difficult due to steeper learning curve, requirement of physical stamina and endurance, patience, excellent hand–eye coordination, a delicate touch, excellent hand motor skills, more time-consuming than FUT, and potentially higher follicular transection rates (FTRs).[2] FTR also depends on the patient's skin characteristics and the inside diameter of the punch and ranges from 2% to 8%,[3] which is an acceptable FTR for FUE everywhere.[1]

FTR is particularly higher in the lower occipital area because of the acute angle of the emergent hair (10°–15°) from the scalp skin and the higher variance angle (15°–35°) between the hairs below the skin and at the point of exit above the skin.[1] The comparatively loose scalp in this area does not provide a stable platform for punching, which adds to the FTR.[4] Moreover, manual stretching for achieving counter traction, which is helpful in reducing FTR in these areas, is difficult to manage. Most of the time manual stretching is not enough or cannot be maintained uniformly for longer duration because of fatigue. Many surgeons use larger amounts of tumescent anesthesia for easy scoring, but its overuse for creating tissue turgidity causes post-procedural swelling. To overcome these issues, we invented a device that could be used in FUE procedure and this study was undertaken to find out its usefulness.

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Materials and Methods

The instrument that we devised is a simple traction device, which is used to make the follicular extraction easy and efficient. It is made up of stainless steel and consists of a hook, a spring in the middle, and a clamp for attachment [Figure 1]. The hook is made up of either two or four fangs simulating a cat's paw, which are fixed onto the surgical site of donor area. The device with two fangs can be used for smaller area, whereas the one having four fangs can be used for larger area. The T-clamp at the base ensures fixed and firm attachment to the procedure table. The spring in the middle provides the counter traction and the essential pull required during FUE.

The clamp is attached to a string made up of rolled bandage, which can be changed easily [Figure 2]. Then the hook is pulled and inserted into the holes made by punching and extracting few grafts at the outline of the donor area. These fangs provide efficient gripping over the tissue. Once it is set up, it stretches the skin and gives traction suitable for efficient scoring [Figure 2].

The study was conducted between January 2018 and June 2018. Patients undergoing FUE for male-pattern baldness were included in the study. Written informed consent was obtained from all the patients. A vertical line was drawn in the midline of the donor region of the patient, extending from the superior border of the "safe" donor area to the most inferior border. Two lines were drawn 3 cm from the midline, that is, occipital protuberance on either side to create two boxes of 3 cm width. In all cases, the same surgeon, who was experienced in FUE, performed 500 follicle extractions in each box at an extraction density of approximately 18 follicular unit/cm^2 (FU/cm^2). A fresh serrated punch of 0.9 mm diameter was used in all cases. The clamp was used on the patient's left side, which was called the test side, whereas the right side served as the control. A "dedicated" technician recorded the number of each type of grafts (1s, 2s, 3s, etc.) along with noting any transections. All transections, no matter how small, were recorded, and no trimming of grafts was carried out, following which FTR was calculated as a percentage for each side. All calculations were performed on the collected data at the end of the day of surgery. The data were analyzed with the Student's *t*-test for paired data. All *P* values are two tailed. Descriptive statistics are presented as mean values and their respective standard deviation.

Results

Twenty consecutive patients undergoing FUE were enrolled in the study. All the cases included were males. The mean FTR for the test side was 5.72 (standard deviation [SD], 0.57), whereas that of the control side was 8.58 (SD, 1.13). We found an improvement in the FTR

Figure 1: Clamp attachments at both ends. Kerure clamp

Figure 2: Traction achieved with the clamp after stretching the skin in the donor area

scores on the test side and this difference was statistically significant ($t = 9.63$, $P < 0.0001$). No adverse events were observed while using the instrument.

Discussion

Superficial cutting of epidermis and dermis with the FUE punch around the hair follicles, that is, "scoring" is one of the essential steps in FUE. When a rotatory punch makes circular incisions on the scalp skin, an opposing force is generated. If the applied force by punching exceeds the opposing frictional force, then the chances of transection increases. The traction given by our device provides optimum opposing force, thereby reducing the chances of transection. An optimum pull is necessary for providing a good surgical field. The pull or traction avoids angulations and maintains the FUs in a straight position. Traction provided by our instrument helps in better "scoring" of the follicular grafts by removing angulations and providing a firm and even surgical field.

Turgidity is also needed in donor area tissue, which helps in easy and efficient scoring. The tissue turgidity or tension can be achieved by tumescence, clamps or skin hooks, or most commonly manual stretching either by the surgeon or an assistant. Many surgeons use large amount of tumescent anesthesia to facilitate scoring, but its overuse for creating tissue turgidity causes post-procedural swelling. The clamp eliminated the need of assistant for counter traction during scoring as well as allowing one hand of surgeon to be completely free while scoring. It also reduced the need of tumescent anesthesia in donor area.

In lower occipital area, just superior to the nape of neck, there is inward turning of nuchal skull bone, and the overlying scalp skin is comparatively lax with increased skin mobility, which provides a less stable surface for the FUE punch and creates difficulty in engaging and aligning the punch during follicular harvesting phase, which increases the FTR.[1] This is precisely the reason why patients with a loose scalp are not the ideal candidates to undergo hair transplantation by FUE.[4] The FUE yield from this area can be increased as the skin can be stretched and made tight with the application of our instrument. This prevents as well as reduces the damage to the harvesting hair follicles because of movements during engagement with FUE punch used along with power drill. With the ability to use the lower aspect of the scalp to harvest donor hair follicles, a bigger field is offered to the beginners who may have higher FTR.

In this giga- and mega-session era, maintaining a good speed of scoring is important while performing bigger cases, which require higher number of complete and non-transected grafts. This instrument comes into play in improving the speed. Scoring is always faster in areas where the hairs emerge perpendicular to the skin. Using this instrument made the angle of emergence of hairs from the skin less acute and thus improved scoring speeds.

Many modifications have been introduced in the skin hook so far, but our device is unique and novel in its kind as it removes the need of an assistant and reduces surgeon's fatigue. Other instruments such as skin hooks available today need to be adjusted constantly as they cover smaller areas. Our instrument once placed need not be manipulated constantly as it has larger area of coverage. Moreover, repeatedly changing the hooks to newer areas causes more damage to tissue.

The instrument also increased the life of the FUE punch. To understand this, we can take an example of cutting a Dynaplast bandage by a pair of scissors, which is synonymous to the relationship between the elasticity of the skin and the sharpness of the punch. A Dynaplast bandage can be cut easily even with a blunt scissor when stretched appropriately. If it is not stretched, then cutting it even with a sharp scissor may be difficult and may also reduce the sharpness of the scissor. This clamp increases the tension of the tissue, thereby reducing the resistance between the punch and the tissue. Finally, we also observed that whenever the clamp is used, the torque and the rotations per minute on the transplant motor had to be kept less than 50% of the usual.

Conclusion

Our device is a low-cost novel instrument for using in FUE. Our data suggest that it significantly reduces the FTR associated with FUE. It increases the graft yield by helping in graft extraction in difficult areas. Higher yield ultimately assures better cosmetic result. It increases scoring speed and increases the surgeon's efficacy and efficiency. It reduces the angulations and provides a stable firm surface. It completely removes the need for manual stretching by an assistant or surgeon and helps in avoiding the fatigue. It reduces bleeding occurring during extraction and the quantity of tumescent anesthesia needed for the surgery. This instrument also increases the punch life.

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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Nil.

Conflicts of interest

There are no conflicts of interest.

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