

ORIGINAL ARTICLE

ASSESSMENT OF THE IMPLANTER TECHNIQUE IN HAIR TRANSPLANT SURGERY: IS IT ALWAYS A SURGICAL CHALLENGE FOR THE OPERATING SURGEON? A PROSPECTIVE INTERVENTIONAL SINGLE-ARM STUDY

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ABSTRACT:

Introduction: Loss of scalp hair and reduced hair density has substantial influence on psychological wellbeing and self-esteem. The traditional and routinely used stick-and-place technique not only needs a multidisciplinary surgical team but also involves is associated with large financial costs.^{4,5} Contrary to this technique there is another procedure in which the plastic surgeon creates the recipient site and simultaneously implants the graft.⁶

Objective: To assess the performance, flexibility, and clinical usefulness of a new device, the Amin Multigraft Hair Implanter

Methods: This study was conducted from January 2025 to May 2025 at Amin plastic and Reconstructive Surgery Hospital, Bahawalpur. The study included males aged 20-65 years with androgenetic alopecia. Graft density was the main outcome, evaluated by counting grafts per 1 cm² of the recipient area. A density of 35–40 grafts/cm² indicated moderate cosmetic density, while 50–60 grafts/cm² represented good density. Patients with uncontrolled diabetes, hypertension, CKD, CLD and malignant disorders were excluded from the study. Patient satisfaction was graded on a 3-point scale: Grade 1 = poor, Grade 2 = moderate, and Grade 3 = good. Satisfaction was assessed.

Results: Sixty-five percent of the participants showed moderate density (A density of 35–40 grafts/cm²) while thirty-five showed good cosmetic density (50–60 grafts/cm²). Patient satisfaction was assessed 1 month following the procedure using a 3-point ordinal grading scale. Satisfaction levels were categorized as Grade 1 (poor), Grade 2 (moderate), and Grade 3 (good), allowing for a standardized assessment of patients' perceived surgical outcomes and overall satisfaction with the hair restoration procedure.

Conclusion: : This study showed that most of the participants had a moderate cosmetic density and there was an overall good (Grade 3) satisfaction of the participants based on the evaluation scale used in study.

Keywords: Amin Multigraft Hair Implanter, follicular unit extraction (FUE), graft density, patient satisfaction

INTRODUCTION:

Over the last decade Follicular Unit Extraction (FUE) has been the most common technology for hair transplantation.¹ In this method blades and needles are used to create recipient sites and then the surgeon inserts grafts by forceps. But this technique is highly sophisticated, demanding and difficult². Therefore, extensive training over a prolonged period is required to become professionally experienced.³ Loss of scalp hair and reduced hair density has substantial influence on psychological wellbe-

ing and self-esteem. The traditional and routinely used stick-and-place technique not only needs a multidisciplinary surgical team but also involves is associated with large financial costs.^{4,5} Contrary to this technique there is another procedure in which the plastic surgeon creates the recipient site and simultaneously implants the graft.⁶ In this implanter technique an experienced surgeon may require a smaller team and the procedure has been found to be more effective and productive.^{7,8} This method has found to have achieved more graft density. Therefore, this implanter technique is extensively being practiced currently. In spite of all these advantages this method is still challenging. Successful

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implantation rate is recognized as implanting 700 grafts in one hour.^{9,10,11} But, for these various factors are considered as surgeons' expertise, characteristics of recipient site, handling of graft and the implanter configuration.

METHODS

This study was conducted from January.2025 to May 2025 at Amin plastic and Reconstructive Surgery Hospital, Bahawalpur, Pakistan. Ethical approval for the study was obtained from the Institutional Review Board Committee of QAMC.

Before starting the study, WHO software was used to calculate the sample size. For the reliable results of study and to obtain best statistical power we performed calculations using 95% confidence level. In this analysis a total of 30 sample size was considered adequate. Participants were selected using random sampling. Verbal informed consent was taken from all participants. The surgical procedure was fully explained to the patients. This was a prospective, interventional, single-arm study. The study included males aged 20-65 years with androgenetic alopecia. Patients with uncontrolled diabetes, hypertension, CKD, CLD and malignant disorders were excluded from the study.

Amin Multigraft Hair Implanter, a new device was used for surgery which worked as a regular single-graft implanter and a sharp implanter that creates the recipient site and places the graft at the site simultaneously. Besides Amin Multigraft Hair Implanter also act as a dull implanter to place grafts into already-made recipient sites and implants multiple follicular unit grafts at the same time and so the efficiency of the procedure improves. It is especially tailored to increase the speed, precision, and uniformity of graft management while there is lessened

grafts handling. A surgical instrument manufacturer, based in Pakistan assembles it. (amin-instruments.com)

All participants underwent hair transplantation (Follicular Unit Extraction). The hair at the back of the scalp (donor area) was trimmed and the specific area was marked for removing the graft before surgery. By using appropriate technique, the follicular grafts were extracted carefully from the donor area after injecting local anesthetics. The grafts which were removed were stored in normal saline so that the follicular units remain healthy and moistened. Later the grafts were surgically implanted at the recipient area. The frontal scalp was made ready for the implantation of the follicular grafts. In accordance with plan and requirement of surgery the recipient sites were prepared. The follicular unit grafts which were placed in normal saline were implanted at the recipient site using implanter by carefully placing at specific angles, density and particular direction to create a natural looking hairline and satisfactory hair growth. During the surgery, when the harvested follicular unit grafts were obtained from the donor area, they were inspected and classified in accordance with the number of follicles they comprised of: single, double, triple, or quadruple follicular units. This sorting helped in deciding the most suitable place of scalp where the grafts were to be implanted. Frontal recipient scalp was injected with 2% lignocaine along with adrenaline for the control of pain and decreased bleeding during surgery. Local anesthesia was administered through bilateral supraorbital and supra trochlear nerve blocks. The instrument is gripped like a pen, enabling precise control throughout the implantation procedure. It prepares the recipient site and delivers the graft in one continuous movement, making sep-

arate slit creation unnecessary in many situations. Stainless steel construction improves the durability and sterilization and makes it autoclavable and reusable. Offered in a range of needle diameters, (Further description of implanters used in surgery is shared in the video link on you tube) <https://youtube.com/shorts/syIPZ7GT9YA?si=DAD9w0kLU13EBAm>

Following extraction, the follicular unit is positioned within the hollow needle of the implanter. The needle is introduced into the recipient scalp at the predetermined angle, depth, and orientation. The graft is delivered into the scalp by pressing the plunger while simultaneously withdrawing the needle, allowing site creation and implantation to occur in a single maneuver.

Grafts were implanted according to the planned hair distribution. Single-hair grafts were placed at the frontal hairline for a natural appearance, while multi-hair grafts (2–4 hairs) were implanted behind the hairline and in the posterior recipient area to enhance density and coverage (Figure 1). In male patients, the hairline was designed in an M- or S-shaped pattern based on facial features, age, and the pattern of hair loss to achieve a natural aesthetic outcome.

Dressing of the donor area was done after the procedure but the recipient area was left uncovered (Figure 2). Postoperatively, the medicines and dietary supplements were given. Follow-up continued for 1 year regularly for the evaluation of healing, short-term and long-term outcomes. Initially the follow-up visits were frequent to closely monitor healing. Once satisfactory clinical progress was observed, the follow-up visits were gradually extended. Graft density was the main outcome, evaluated by counting grafts per 1 cm² of the recipient area. A density of 35–40 grafts/cm² indicated moderate cos-

metic density, while 50–60 grafts/cm² represented good density.^{1,2}

Patient satisfaction was also assessed based on the final appearance of the transplanted area, including hair density and the accuracy of graft placement depth. Satisfaction was rated on a 3-point scale: Grade 1 (poor), Grade 2 (fair), and Grade 3 (good).^{6,7,8}

Statistical Analysis: Percentages and frequencies RESULTS

In this study, graft density was quantitatively measured and benchmarked against established hair restoration guidelines.^{12,13} This comparative analysis was undertaken to evaluate the adequacy of graft placement and to determine whether the achieved density met accepted standards for optimal scalp coverage, aesthetic outcomes, and natural hair restoration. Sixty percent (n= 18) of the participants showed moderate density (A density of 35–40 grafts/cm²) while thirty five percent showed good cosmetic density (50–60 grafts/cm²). However, one person had below the ideal result. Patient satisfaction was assessed 1 month following the procedure using a 3-point ordinal grading scale. Satisfaction levels were categorized as Grade 1 (poor), Grade 2 (moderate), and Grade 3 (good), allowing for a standardized assessment of patients perceived surgical outcomes and overall satisfaction with the hair restoration procedure. Table 1 . Patient Satisfaction (n = 30)

Satisfaction Grade	Interpretation	Frequency (n)	Percentage (%)
1	Poor	2	6.7
2	Fair	9	30.0
3	Good	19	63.3
Total		30	100.0

Overall, graft implantation resulted in an average recipient-site density ranging from 27 to 35 grafts/cm² across the study cohort, independent of the number of hairs contained within each follicular unit. The use of a standardized graft density ensured uniform distribution of follicular units, facilitating adequate scalp coverage, preservation of vascular integrity, and aesthetically pleasing postoperative outcomes after nine months (Figure 3).

The follicular unit count per 1 cm² of the recipient area was systematically measured and documented for each patient to evaluate graft implantation density. This standardized assessment enabled comparison of follicular unit distribution across the study cohort and provided an objective measure of surgical consistency.

Figure 1



Figure 2

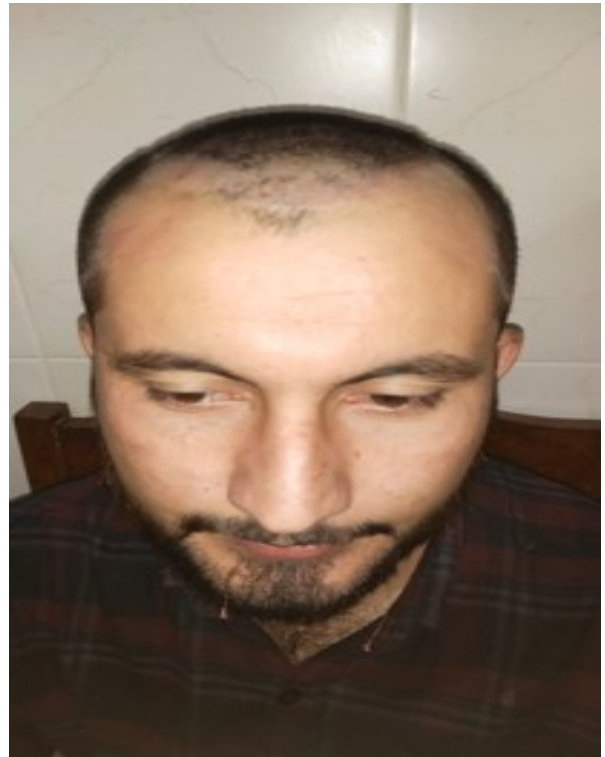


Figure 3



DISCUSSION

Hair transplant surgery depends greatly on the proper implantation of hair follicles into the recipient area. This step is very important for achieving a natural appearance and good hair density. However, implantation is a technically challenging part of the procedure and can affect the final outcome of surgery.¹⁴ Similarly in our study we achieved satisfactory outcomes as we followed the latest implanters

One of the most important factors is the precision of implantation. Each follicular unit must be placed at the correct angle, depth, and direction so that the transplanted hair grows in a natural pattern. This requires good surgical skill, experience, and a clear understanding of scalp anatomy and hair aesthetics. Different implantation methods, such as manual forceps implantation and implanter devices (for example, implanter pens), may produce different results in terms of graft survival and cosmetic appearance.^{15,16} Amin Multigraft Hair Implanter produced comparatively better results comparing to other similar studies

Another important factor is the efficiency of the procedure. Faster and more efficient implantation techniques can reduce the total surgery time and decrease trauma to the scalp. This may help improve patient comfort, reduce postoperative swelling, and support faster healing. In addition, patient-reported outcomes such as pain, healing time, and satisfaction are important in evaluating the success of the procedure.¹⁷ Similarly, our implantation technique was faster with decreased pain and trauma.

A randomized study design helps to compare different implantation techniques in a fair and unbiased way. By assigning patients randomly to different groups, the influence of patient-related factors is

reduced. This allows a more accurate evaluation of which technique provides better surgical outcomes. Such studies help improve evidence-based practice in hair restoration surgery.^{18,19} However, our study was not a comparative study and randomized but it was a prospective interventional single-arm study.

In fact, the implantation stage of hair transplant surgery is a critical and challenging step that directly affects the final result. Careful technique, proper planning, and continued research are necessary to improve graft survival, surgical efficiency, and patient satisfaction. Ongoing studies in this field help refine surgical methods and improve outcomes for patients undergoing hair restoration.²⁰

CONCLUSION

This study showed that most of the participants had a moderate cosmetic density and there was an overall good (Grade 3) satisfaction of the participants based on the evaluation scale used in study. Overall, the results suggest that while the implanter technique is effective, there is still a need to improve its performance in terms of achieving higher graft density and better patient satisfaction. Further studies are recommended to refine the technique and improve clinical outcomes in hair transplantation surgery.

DECLARATION OF INTEREST: The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS:

A.I.: Data collection, data analysis, literature review, write-up and references

A.G.: Conceptualization, proofreading, and final editing of manuscript

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