



The Art and Science of Minigrafting

Please Note:

In 1995 we began using Follicular Unit Transplantation for all hair restoration procedures performed at NHI. Minigrafting/micrografting techniques were discontinued at this time. This article should be read in that context.

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The Art and Science of Minigrafting

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ABSTRACT: Minigrafts are increasing in popularity; they have replaced standard 4-mm grafts in many cases. Various factors influence follicle survival (handling and graft preparation) and affect minigraft visibility (hair color, character, and density). Hair density measurements for the diagnosis and treatment of hair loss involve use of a device that quantifies the number of hairs in the transplant donor site as well as the balding area. Attention to details in technique is needed for optimal results of minigrafting. The highest quality minigrafts necessitate use of smaller transplanted grafts of various sizes, in greater numbers and in random distribution. The patient's expectations as to both budget and time frame must be taken into account. Key Words: Hair transplantation, Minigrafts, Micrografts, Hair loss, Androgenic alopecia.

The exclusive use of minigraft transplants for hair restoration has created much controversy. The discord involves issues of optimal numbers, adequacy of coverage, and other factors. A thorough understanding of minigrafting techniques can resolve many of the issues and lead to better and more predictable results.

Ever since the inception of hair transplantation, patients have expressed dissatisfaction with the "pluggy" or "doll's head" look which has been more common than most doctors care to admit. The initial answer to this problem was to develop one- to two-haired grafts-micrografts.¹⁻³ Micrografts may be used to soften previous grafting procedures or to create a natural hairline. Micrografts are gaining in popularity; in a utopian world, they would offer the finest form of hair transplantation. For most patients, however, an entire head of hair done with micrografts was impractical or unaffordable. This problem led to the development of grafts that were intermediate in size between the 1-mm micrograft and the 4-mm standard graft, i.e., minigrafts. For many patients, a combination of minigrafts in most of the recipient area and micrografts in the hair line affords a practical and affordable means of hair restoration that mimics nature.²⁻⁵ Some doctors whose experience has been with traditional, larger grafts believe that minigrafts do not give an appearance equal to what earlier methods offered.

ISSUES SURROUNDING MINIGRAFTS

Results obtainable with minigrafts are determined by many of the same factors that govern conventional grafts. The use of smaller grafts adds to the problems. If these problems are not understood and addressed from the outset, the potential benefits of minigrafts may be nullified. For simplicity and clarity, the areas in which the differences between minigrafts and traditional grafts are most significant have been divided into general categories as listed below. These categories are not meant to be exhaustive, but rather to reflect important concepts; the order of their listing is, in part, arbitrary. Some of the concepts presented below are not generally accepted principles as defined in standard texts on hair restoration, although most of them have been presented previously. Few authors on hair restoration techniques and even fewer practitioners scientifically document variations in hair follicle survival in grafts of different sizes and with different methods of harvesting.⁴⁻⁶ Our discussion, therefore, should be analyzed logically rather than scientifically, since many of our observations reflect issues of technique in the "art" rather than the "science" of hair transplantation.

DIFFERENCES BETWEEN MINIGRAFTS AND TRADITIONAL GRAFTS Numbers of hairs and grafts

A 4-mm round graft has seven times more surface area than a 1.5-mm round graft. Since the number of hairs in a graft depends on the surface area of the graft, one might expect to have to transplant seven times the number of 1.5mm grafts as would be required using 4-mm grafts in order to transplant the same number of hairs. In practice, however, the number of minigrafts required to produce a similar result is much less than seven times larger than the number of 4-mm grafts. This difference in required versus expected numbers may have several origins. The most obvious one is that a random distribution of fewer hairs gives a fuller appearance than a regular distribution of fewer clumps of hair. Another reason for the observed difference may be a difference in the survival of individual hair follicles from the population of the donor hair with one method as compared to the other. The loss of hair from one method of transplantation compared with the absence of hair loss with the other would affect the eventual hair densities of both. It is acknowledged that all 4-mm round grafts undergo some degree of "doughnutting," i.e., permanent loss of some of the transplanted hair follicles." From our experience, it appears that there may be little, if any, loss of hair follicles from 1-mm to 1.5-mm grafts due to

"doughnutting." Few physicians count the numbers of hairs placed into recipient sites, and even fewer wait until the effect of telogen effluvium has passed to count the numbers of hairs that grow from the grafts.⁴⁻⁷ Instead, virtually all physicians rely on a general impression of hair growth. Contrast: hair character, hair color, skin color

The thickness of individual hair shafts and their degree of curliness directly determine the amount of skin that will be hidden by each hair shaft; these characteristics also determine how much or how little skin between individual hairs or grafts is covered.^{4,8} A thick, curly hair will hide more skin than a thin, straight one. A tightly curled (kinky) hair will cover the largest area of underlying skin. Similarly, two adjacent curly hairs will mesh and cover the bare skin between them, while adjacent straight hairs behave as individual units covering only the skin that underlies each one.⁸ This is demonstrable by comparing the effect of the hair in a person of African descent who has tightly curled hair with that of a blond person of Scandinavian origin. The African person has a dense carpet of hair that stands up above the scalp while the Scandinavian's hair lies close to the scalp and barely hides the skin when the hair is wet. Yet, a count of the actual number of hairs per square millimeter may show that the African person has many fewer hairs than the Scandinavian.⁹

The contrast between the color of skin and the color of hair is also critical to the ability of hair to cover the underlying skin. Tanned skin and blond or light brown hair blend, so that visible skin is not obvious; however, covering the pale white skin of a person with sparse, coarse, black hair such that the graft looks natural is a surgical challenge.¹ This applies also when considering the thickness of individual hair shafts and their relationship to hairs in proximity to other hairs of the same character. The contrast between coarse, black hairs and a pale, white skin accentuates a "clumpy" appearance if present. In order to achieve a fully natural appearance, the spaces between the grafts must be filled with small minigrafts and one or two hair micrografts, especially in the hairline.⁸

Hair density

If the Scandinavian described above has a dense hair population, the large number of hairs and the small size of the spaces between hairs will combine to lend body to the mass-until male pattern baldness sets in. With our method of measurement, hair density ranges between 1.2 and 3 hairs/mm². A traditional, 4-mm round graft contains almost 13 mm² of skin surface area.⁶ The number of transplanted hairs in a graft is directly proportional to the surface area of the graft and to the density of the hair in the donor area. The density of the permanent hair in the donor area should be the baseline for this measurement.

A true evaluation of the transplantation process requires assessment of the number of hairs per unit area in the donor site, in order to obtain predictable results. The need to assess donor hair density is less apparent with 4-mm grafts than with minigrafts. In many cases, this may be purely a mathematical issue. The loss of two hairs from a graft that originally contained 24 hairs represents an 8 percent reduction; this would not be noticeable unless an exact hair count had been done before and after grafting. The loss of two hairs from a graft that originally contained four hairs would represent a 50 percent reduction which would be obvious to all. Moreover, comparison between transplantation of donor grafts with two hairs /mm² and one of donor grafts with 1.3 hairs/mm² would show a dramatic difference.

In order to accurately assess the number of hairs per unit area in the donor area and the grafts, we developed a device to measure hair density. We believe that this measurement is critical to obtaining predictable, high quality results with minigrafts. We found, to our surprise, that our keen "surgical eyes" were less accurate than we had presumed, for determining hair density. The difference in results when density was directly measured quickly became obvious. We found that a minigraft containing four hairs offers the best combination of body and invisibility for a person with dark, coarse, straight hair; while a person whose hair is light, thin, and straight can support grafts with a larger hair population without looking "pluggy." This holds for most areas of the scalp except for the frontal hairline where smaller grafts are necessary. The decision to use a 1.5- or 2-mm graft is based on the surgeon's assessment of the patient's hair density, color, texture, and character. If calculations suggest that a 1.5-mm graft is needed to produce four hairs per graft in a person with coarse, black, straight hair and pale, white skin, then a 1.5-mm graft should be used. A 2-mm graft in such an individual will increase the density of hair by 30 percent and will increase the visual "plugginess."

We have named the method of direct measurement of hair density hair densitometry. Hair densitometry can also be used to diagnose and plot the hair loss associated with the thinning process in the early stages of male pattern baldness. Several measurements taken over a period of time can assist the doctor by helping to predict the extent and rate of hair loss. Rational planning of the steps that may be necessary to correct hair loss, and the ability to accurately estimate the effectiveness of those steps, may have significant value to doctors and patients alike. Densitometry also offers the physician and the patient a method for evaluating the effectiveness of medications that claim to increase the amount of hair growth.

Earlier methods of measuring hair density devised by Bouhanna used camera attachments to create a "phototrichogram" and an "ultra close-up photograph" but these had the disadvantage that assessment could not be done until after the film had been developed.⁶ The information thus obtainable offered little assistance to the surgeon at the time that the hair transplantation was being done; however, a permanent record was created. The hair densitometer (patent pending) is a self-contained, portable, hand-held unit that houses a magnifying lens and openings of predetermined size. The hair is clipped short and the unit is placed on the scalp. A density count is taken in a field of known size; the hair count can be incorporated into the plan for surgery at the moment that the information is needed.

In attempting to shift from standard grafts to minigrafts, physicians who believe that "a graft is a graft" and who fail to adjust predictions of the number of grafts needed to yield an acceptable result may underestimate the amount of work that will be needed, and this may result in a management problem, possibly a legal one. A true, honest, and accurate informed consent should include a discussion of cost and technique. Appreciation of the patient's hair character, color, and density and of the patient's goals is critical.¹⁰

Techniques in common use today for determining the optimum number of minigrafts needed by a particular patient-which usually depend only on rough estimates of hair density, or which ignore the issue altogether-can add significantly to reported problems with minigrafts. Random hit and miss "guesstimation" of donor hair density should be relegated to the wastebasket of history.

The hairline

A natural hairline is not a dense hairline. One criticism of some flap hairlines is that the appearance is unnaturally dense. Some surgeons partially depilate the frontal edge of the flap to overcome this problem. Some doctors base their standard of quality on a densely packed hairline. Close examination of a natural hairline, however, shows that it does not consist of a dense, impenetrable wall of hair. On the contrary, a natural hairline consists of a 1- to 2-cm wide band of graded increasing density from the outer "line" of a few sparse hairs to the impenetrable, dense barrier wall of thick hair.^{1,4,11} When one uses only 4-mm grafts and places them very close together, the hairline thus created can be very dense. It can look like the thick wall of hair, described as unnatural looking, with a flap procedure. An unnaturally dense hairline is more apparent in patients with coarse, straight, black hair and pale, white skin. In this situation, micrografts are often used to soften the "artificial" density, thereby increasing the total amount of required work. Another problem is the dysesthetic "corn-row" appearance seen when large, densely populated grafts are placed with large spaces between them, or when follicle loss occurs around the outer rim of many grafts (a fairly common problem). These circumstances are all too familiar. Minigrafts can be placed in a pattern that simulates the natural, transitional hairline and, by sheer quantity, produces the required bulk of hair.¹²

Number of grafts; patterns; scheduling of treatment sessions

If one strictly follows the traditional spacing of grafts and places them 1 diameter apart, minigrafts will be placed with smaller distances between them than is possible with larger grafts. This means that more minigrafts can be performed in any one session. Because of this and because the grafts can be placed in closer proximity to each other, it is often possible to complete a course of treatment in fewer than the four sessions usually required with standard grafts. Hair density in the donor area, hair character and color, and hair distribution will influence the number of required sessions.^{4,8} The positive effect of placing more grafts in a patient in a single session will outweigh the negative effects on the patient. Nevertheless extended sessions, in which the surgeon places 400 to 1200 minigrafts per session, can certainly strain a surgical team that is not trained or accustomed to such efforts. The human eye is highly conditioned to regular patterns, and the appearance of such patterns is readily recognized. Random distribution of minigrafts is much less noticeable than the traditional, orderly, linear placement recommended with traditional grafting techniques. This less detectable random distribution is gaining in popularity.^{3,8,12,13}

Minigraft recipient sites: slits vs. holes

Holes and slits each have their place in high-quality hair transplantation. In the bald scalp, holes offer a theoretical advantage over slits because bald skin is removed and replaced by skin that contains hair. Arguments about the superiority of holes or slits often reflect the comfort and convenience of the particular process for a particular surgeon. Slits are easier to create, but the increased difficulty of placing grafts into slits more than offsets this advantage. Slits can be placed in areas where additional density is needed and where it is important to preserve the existing hair. When slits are placed in a scalp that has low hair density, e.g., 1.3 hairs per mm², the overall density per square inch can be increased. However, when punches are used to remove bald skin and replace it with skin containing a hair density of 2 hairs per mm², the benefit is offset by the hair removed, and the gain is substantially diminished.¹⁴

In our opinion, the use of holes for the initial procedure is preferable to obtain the highest apparent density, particularly in the frontal hairline. Using punched recipient sites in the frontal hairline avoids an appearance of slit scars and minimizes the compression that may be evident when grafts are placed into slits. Compression makes grafts more noticeable, especially those in the frontal hairline. This method, which can nullify the purpose behind the use of minigrafts, was clearly documented by Marritt.¹⁵ Larger grafts, especially in dark-haired individuals, should not be placed into holes or slits in the frontal hairline.

It has been said that using punches to create recipient sites damages the subcutaneous vascular network and any adjacent hair follicles in the recipient area.⁴ Logically, then, a larger punch will be more disruptive to the involved microcirculation, will cause greater tissue trauma, and will damage a larger number of adjacent hair follicles. With minigrafts, existing hair can be preserved by carefully siting the holes or slits between existing hairs (or previously placed grafts). When holes are created in tight areas, the hole size and the corresponding graft size should be adjusted to the space that needs to be filled. It is appropriate to vary the sizes of the recipient sites as the graft population increases. Several punch sizes should be available during each procedure. This is critically important for the patient who has

decreasing hair density due to thinning hair. These patients want to preserve whatever hair they have left, and they will be unhappy if they lose large amounts of existing hair during the restoration process. Punched recipient sites for traditional hair transplants, by design, remove balding scalp and, therefore, damage a larger number of surrounding hair follicles than the smaller punched recipient sites for minigrafts. Therefore, minigrafts are the best choice for supplementing density in areas where hair is being lost. The use of small, punched recipient sites for the first two treatment sessions is recommended in areas where the scalp is bare. In the third and any subsequent treatment sessions, minigrafts or micrografts can be placed in slits or holes. In thinning hairlines, it is important to determine whether the patient wants to identify and preserve all reasonable existing hair. By doing so, the process will be made less noticeable. This approach, i.e., gradual and incremental hair transplantation should, when applicable, be explained to the patient so that it may be considered among the treatment options being offered. One complication often not discussed is one we call "accelerated hair loss" which at times accompanies various hair restoration procedures. This phenomenon is quite common in scalp reductions (more common as patients have more of them) and less common in hair transplantation with smaller grafts. The underlying rationale is discussed above. Small minigrafts and slits minimize this complication considerably.

For later treatment sessions, the choice of slit or punched recipient sites may be critical to the final result. Care must be taken in selecting the best method for the addition of supplemental density. A slit or a punch, and a minigraft or a micrograft in the recipient site, requires assessment of the appropriate approach to the treatment area in concert with the patient's wishes. As the recipient area becomes more crowded with hair grafts, slits or micrografts may be preferable to increase density. Skill and experience are needed to make this judgment. Some treatment sessions may require a mixture of slits and holes, smaller and larger minigrafts, and micrografts for an optimal result. It is important to note that the density ordinarily achieved with traditional grafts or minigrafts cannot exceed the density in the donor area without the use of micrografts or minigrafts in slits. Another method for increasing the density in a limited part of the recipient area is to do punch excisions of contiguous small areas of bald scalp and to close the resulting skin defect with sutures; this produces a limited "mini-scalp reduction".¹⁶

Sizes of donor and recipient sites

The physical presence of several hair shafts acts as a stent that supports the mass of skin and soft tissue in which they are embedded; this becomes increasingly important as the size of the graft decreases. With a graft of fewer than three hairs, the stent effect of the hair mass is lost. Examination of a 2-mm fragment of skin and dermis removed from a bald area of scalp will prove this point. Such a fragment is formless, shapeless, and could not be easily inserted into a recipient site. The presence of the hair shafts from the donor site makes the difference. Thus, it is obvious that hair density in the donor area is an important factor in calculating the ratio of donor size to recipient size. In making this calculation, the physician must also adjust for the bulk of each hair shaft. Fine hair will take up less room and create less of a stent effect than coarse hair. This effect is most dramatic in persons who have tightly curled hair, a dense mass of hair above the skin while maintaining the same dynamics below the skin level. Grafts that contain fewer than three hairs must be handled differently from those that contain more than three hairs, and the character of the hair has a distinct bearing on management of the grafts. Grafts that contain three hairs or less are best handled with micrografting techniques (not discussed here).

Graft handling

Standard 4-mm grafts are more resilient to handling and manipulation than minigrafts. No matter how light the touch, the amount of force imparted to each hair follicle in a minigraft will always be greater than the amount transferred to a standard graft. Manipulation of minigrafts requires more delicate and exacting handling than is needed for standard grafts, which are more forgiving. As we have shown, the loss of one hair from a graft that contains fewer than five hairs will be more noticeable than the loss of one or even two hairs from a graft that contains 15 to 20 hairs. Permanent loss of hair(s) from a minigraft, due to rough handling, can be avoided by proper handling techniques.

Survival of transplanted hair populations from donor to recipient sites has been scientifically evaluated.^{4,17} Most practitioners mentally transfer the results of those authors to their own work without actually counting the numbers of hairs growing from grafts they have used. Therefore, opinions on this subject may be highly prejudiced, more reflective of the art than the science. Mechanical trauma can occur during graft preparation or during graft placement. Graft placement should be done with very fine "jeweler's forceps." The graft should be grasped by the fatty tissue just below the bulbs. The graft can then be pulled into the recipient site. In this maneuver, the forceps will be positioned at the bottom of the hole parallel to the direction of the hair shafts, without squeezing the bulbs of the follicles. Once the graft is in position, gentle pressure on the surface of the graft will keep it in position while the forceps are withdrawn. The graft should remain in the hole. The physician is strongly advised to master graft placement before delegating it to ancillary staff—a task often delegated without strict supervision. We believe that the preparation, handling, and placement of minigrafts and micrografts are critically important to the final result, especially as regards survival of the hair follicles.

Graft and hair survival

Hair grafts are regarded as being highly resilient. Transplantation is often done with little understanding about survival of individual hairs in the graft. No scientific study has refuted the finding that hair follicles in a transplanted graft achieve almost 100 percent survival, and Nordstrom documented that 100 percent survival was possible.⁷ In our experience, measurement of the density of the donor hair with the hair densitometer, and measurement of the number of hairs in a

fully grown hair graft, yield a simple, accurate assessment of hair follicle survival. After transplantation, minigrafts and micrografts often begin to grow with little or no lag phase--telogen effluvium. The inference is that telogen effluvium after transplantation is nothing more than transplant shock due to temporary lack of nutrition in the grafts. This concept gains support from the lack of "doughnutting" seen with smaller grafts. "Doughnutting" in the center of a graft is probably the result of a delay in the diffusion of nutritive fluid into the center of a graft before necrosis of the hair follicles occurs. Hair follicle cells have a higher metabolic rate than skin cells, and therefore the hair cells need more oxygen and other nutrients than the cells of the surrounding skin. It may also reflect some mechanical trauma in harvesting the donor grafts.

We have measured the hair density in standard grafts that had been previously done by many doctors at various centers over the past year. On the assumption that the grafts were 4 mm in size, we compared hair density in the donor area with the hair density in the transplanted grafts. The observed hair density in the grafts we assessed was often half the density of the hair population in the donor areas.

A scientific study of this phenomenon could be easily performed, but the lessons from such a study might not be easily replicated or transferable. In carrying out such a study, the physician would have to demonstrate considerable courage and integrity to make the results known. The study would, of course, reflect the hair follicle survival of that particular physician's technique and would not necessarily address the overall question adequately. It is our impression that the loss of follicle population occurs in two areas: the outer rim of the graft and within the body of the graft. Physicians who use large grafts expect to see "temporary" loss of all the hairs in the transplanted grafts due to telogen effluvium. They make no further attempt to determine the cause of the hair loss, and it would be impossible to determine the cause of the loss of any given follicle. Such a study would be complicated by the delay in regrowth of hair in large grafts. This is a gradual process that often does not begin for 6 weeks after the procedure and may require more than 6 months to be complete in all follicles. Minigraft hair follicle survival is difficult to ascertain if the grafts are packed closely together. This is because the point where one graft ends and another graft begins is often impossible to ascertain.

Graft injury from drill rotation

The speed of a mechanical punch produces undirected energy that must be absorbed by the surrounding tissue (both inside and outside the punch). The excess energy takes two forms: heat energy and kinetic energy (as torque). In theory, the excess energy could easily damage the delicate structures of the hair follicles in the graft. The amount of damage will reflect the sharpness of the punch, the speed of rotation, and the turgor of the donor tissue. Excess heat energy outside the punch is probably rapidly dissipated into the surrounding tissue. But heat energy within a small punch cannot be dissipated and may become significant. The effects of excess kinetic energy would be expected to have an equal impact inside and outside the punch. The distortion and injury that can be caused by dull punches, excess compression, too rapid advancement of the punch, and failure to properly position and immobilize the head have been clearly demonstrated in Alt's superb photographs.⁵ For those surgeons who use a mechanical punch for harvesting minigrafts smaller than 2.5 mm in size, we suggest that they closely inspect the bulbs of all the harvested grafts for visible damage. Microscopic damage to the hair follicles and the other delicate structures of the pilosebaceous unit immediately adjacent to the whirling punch may occur. These may be torn apart or suffer significant injury. Such damage may not be observable even under magnification, yet could substantially reduce the number of hairs that survive. The problem can be substantially mitigated by harvesting larger grafts and subdividing them.

Graft injury from direct amputation

If a very small punch is used to create minigrafts, slight deviations of the incident angle of the punch with the skin may cause amputation of parts of some follicles. We believe that this is unavoidable when small grafts are cropped directly. Such damage will injure hair follicles on the periphery of the graft often on only one side; therefore, inspection must be done on all sides. The surgeon who uses this method of harvesting without personally closely inspecting at least a large sample of the grafts may be deluding himself. The use of mechanical punches for direct harvesting of very small grafts should be minimized if the surgeon is unwilling to meticulously inspect results. Halving or quartering larger grafts or dissecting small grafts from a larger bloc of tissue under direct, magnified vision obviates this problem.

Frechet in 1989 advocated direct harvesting of individual small minigrafts; however, those who follow his suggestion should include his precautions of fixing the position of the patient's head and of supporting the doctor's forearm. Frechet uses carbon steel punches, which are sharper than the stainless steel punches most surgeons use. He harvests his grafts under high-power microscopy. Surgeons who are unwilling to take these special precautions and to use the additional equipment should not expect the high quality results Frechet is able to achieve.³

Minimizing graft shock

Normal saline solution is used to stiffen the donor area when mechanical punches are used. Most of this intercellular fluid separates the individual hair follicles and distends the supporting structures of the pilosebaceous unit. This trauma may have little significance if it is isolated (not associated with transplantation). However, when combined with the shock due to transplanting the hair, its significance may be increased. Because the multibladed scalpel can be used without injecting saline solution, this potential source of trauma can be avoided.

Technical subtleties

The loss of hair follicles from the outer rim of the grafts may contribute much to a "pluggy" appearance. Most practitioners believe that their superior techniques adequately address this issue, but we question such statements in the absence of objective evidence. It is very difficult to address this issue properly when the techniques themselves may be based on defective scientific assumptions and principles. We further believe that highly experienced surgeons, although they may not have recognized the "science" associated with graft survival in planning their techniques, may over the years have altered their techniques to minimize the "pluggy" appearance. There is no substitute for experience provided re-assessment is ongoing and consistent.

The number of hairs that survive in a minigraft can be influenced by actions of the transplant team. Small distinctions in technique can make the difference between passable or adequate and excellent results. For example, the sharpness of punches can be ensured only by developing punch sharpening expertise in house. Such attention to seemingly minor details is absolutely critical to minigrafting.

Minimizing follicle shock

The normal saline solution medium in the Petri dish holding the prepared minigrafts should be iced; the value of low temperature to reduce tissue injury in major organ transplantation is well proven. Hair transplantation is not a life-threatening procedure, and hair is more resilient than most large organ systems, yet the same basic treatment principles apply. Subtle differences in follicle survival may be at stake. Because of their smaller mass and larger surface area, minigrafts are more susceptible to the harmful effects of drying; they will dry out more rapidly than standard grafts. At room temperature, injury from anoxemia will be substantially greater than when the graft temperature is reduced. In addition, because more grafts are often done in minigrafting than in a traditional procedure, the interval when each graft is maintained outside the body is lengthened. An efficient, experienced transplant team is absolutely essential for the proper and expeditious placement of minigrafts. Failure to heed such small but critical details in minigraft transplantation may affect the overall surviving follicle count.

Visibility of work in process and transplant scars

Traditional hair transplantation was devised for the person with complete hair loss in some or all of the scalp. Most patients had to manage a process that was visible to all the world. Replacing "hair for hair" and taking into account the receding hairline is relatively recent. In traditional grafting, the hairline was recreated, moving backward. The patient was required to wear a hat, to cover the grafted area with a hair piece, or to comb the existing frontal hair in conv

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