Official Publication of the International Society of Hair Restoration Surgery

FORUM

HAIR TRANSPLANT FORUM INTERNATIONAL

VOLUME 31 | NUMBER 2
MARCH/APRIL
2021

IN THIS ISSUE

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Forty Steps to Harvest a Graft

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ABSTRACT

Over the past two decades, the stages or steps of follicular unit excision (FUE) harvesting have been described in the medical literature. This article details and identifies the sequence of steps necessary to distinguish the ideal donor harvesting parameters for each patient. The physician's knowledge and skills should allow for a personalized (and often modified) approach to the different areas of the patient's scalp.

Understanding and performing the sequential steps to harvest intact follicular units (FUs) without damage or injury is an important part of the successful completion of the process. Not all doctors follow the same process or steps for harvesting follicles. In fact, the first few FUs harvested should be used to help identify and establish the necessary parameters to obtain the ideal harvested graft later. Naturally, extra effort may be required to determine the correct sequence and technique for each patient.

It also is important to understand that there may be anatomical differences between areas of a patient's scalp, and it may be necessary to adapt and adjust accordingly. This article describes the 40 steps that we believe are essential for the effective harvesting of uninjured grafts. A single error in any single step may be the difference between success and failure.

Keywords: dermoscopy, excision, harvesting, *in vivo* splitting/dissection, punch, scoring, tactile sensation, transection, working distance

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INTRODUCTION

Follicular unit excision (FUE), which was first described in the medical literature around 2002 (then termed follicular unit extraction), has become one of the most popular harvesting techniques for hair transplantation.[1] This rise in popularity may be due to the latest development of FUE equipment, newly designed punches, and the use of implanters. Novice or untrained physicians are lured by the appearance of FUE's simple operation; however, this lack of experience often leads to high rates of transection, poor growth, and overharvesting and destruction of the donor area. Contrary to what many people believe, however, the high failure rate that can be observed in FUE actually may be due to a lack of knowledge of the anatomy of follicles and the dermis, a poor understanding of the concepts of scoring and excision, and the unrealistic expectations of harvesting techniques. Only with extensive training and experience can it be possible to reach a level of proficiency.

We describe the "40 steps to harvest a graft" as

1. the basic conditions for scoring, harvesting, and safely obtaining FUs; and
2. the basis for minimizing partial and total transection rates and other graft damage.

For doctors, these 40 key steps can help identify and prevent follicular damage and allow for the development of strategies to avoid such potential damage. Although this goal can often be achieved after the first few attempts of harvesting, sometimes multiple attempts may be required. Due to the changes in the anatomy of different areas of the scalp, the subtle differences in each harvest attempt usually require correction of subsequent attempts. In addition, if any of the above steps are not followed, the integrity of the harvested grafts and the final cosmetic effect of the hair restoration procedure may be compromised.

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HAIR TRANSPLANT FORUM INTERNATIONAL
is published bi-monthly by the
International Society of Hair Restoration Surgery

First-class postage paid Milwaukee, WI and additional mailing offices.

POSTMASTER Send address changes to:

Hair Transplant Forum International
International Society of Hair Restoration Surgery
1932 S. Halsted St., Suite 413
Chicago, IL 60608 USA

Telephone 1-630-262-5399
U.S. Domestic Toll Free 1-800-444-2737
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Official Publication of the
International Society of Hair Restoration Surgery



President's Message

Paul J. McAndrews, MD, FISHRS | *Pasadena, California, USA* | president@ishrs.org

Dear ISHRS Colleagues,

I hope you and your families are happy and healthy. St. Patrick's Day falls within the month of March, which makes it lucky. The month of March in 2021 was especially a month of hope, gratitude, and optimism. We are fortunate and lucky with immense optimism that the latest vaccines will halt the spread of the COVID-19 virus and the world will get back to normal in the near future.

I am grateful that this hope and optimism is spilling over to the ISHRS. The ISHRS Board of Governors recently decided to continue with the Lisbon Hybrid World Congress in October of 2021. The ISHRS's 3 pillars are education, collegiality, and research. The connections created with colleagues and exhibitors by the "in-person" portion of the Hybrid World Congress is an important part of learning, collaborating, and advancing the specialty. The BOG understands the financial hardships its members have sustained over the last year and also wants to ensure the mission of the organization moves forward. The ISHRS has a very solid financial reserve in place and believes this is the exact situation to use a portion of it. The registration fees for the Lisbon World Congress **will be decreased**. Hooray!! ISHRS members who are bored with the virtual meeting format and miss the collegiality of the in-person meetings can get together with their colleagues in Lisbon. The ISHRS members who are still worried about traveling and have health concerns can still attend the Lisbon meeting virtually. I strongly believe that the ISHRS is on the cutting edge when it comes to our annual meetings, and this will be no exception. Dr. Marie Schambach, chairperson for the World Congress, has been hard at work securing our keynote speakers and the World Congress itinerary. I have the utmost confidence that the hybrid meeting will be spectacular.

The Global Council just met, and all of the societies unanimously and enthusiastically agreed to sign on to a unified letter regarding the "Fight the FIGHT" campaign. This letter concerning the illegal and unlicensed practice of medicine will be sent to boards of medicine and ministries of health around the world. The "Fight the FIGHT" website and microsites are already in 5 languages, and with the GC societies' help, we are translating it into an additional 13 languages. A big thank-you to Ricardo Mejia, Arthur Tykocinski, and the entire "Fight the FIGHT" committee for their tireless hard work.

All the ISHRS committees that were paused during 2020 secondary to COVID are now active again. In addition, please go the ISHRS website to see the various CME-approved webinars for 2021at https://ishrs.org/2021-cme-webinars/.

The American/International Board of Hair Restoration Surgery (ABHRS) will hold its Board Exam on September 18 for the written exam and September 25 for the oral exam. Both the written and oral exams will be done virtually this year. Contact ABHRS.org to register. You must register by June 1, 2021.

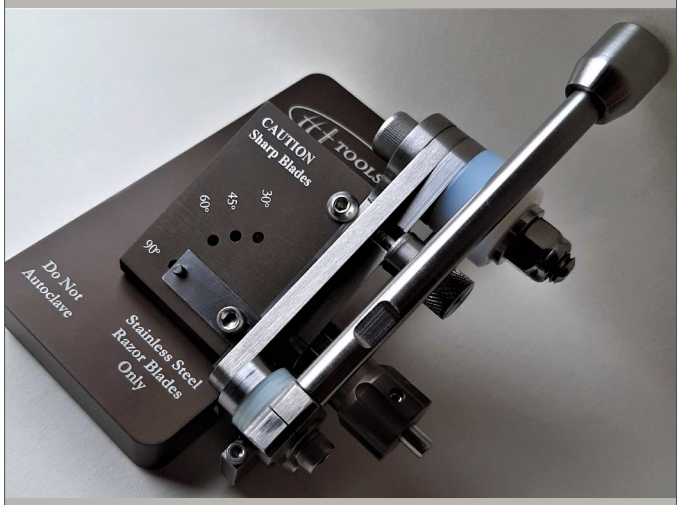
I greatly look forward to seeing most, if not all, of you in Lisbon! And keep optimistic thoughts that the world will be back to normal in the near future. ■

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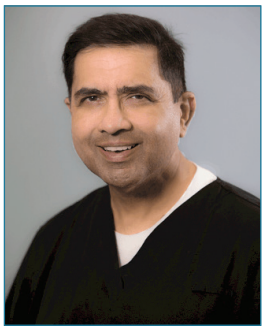
Jeffrey S. Epstein, MD, FISHRS | *Miami, Florida, USA* | forumeditors@ishrs.org

The *Forum* has been receiving a large number of submissions, and we continue to encourage original articles, letters to the editors, and commentary. All items worthy of inclusion will be published and will support a collection of strong regular columns including Literature Review, Hear from the Assistants, Hair Sciences, How I Do It, Hair's the Question, Conversations with ABHRS Diplomates, and more. Have you read something with which you disagree or have an alternative perspective? Let us know and your comments can help further educate our members and initiate stimulating debate.

Our members have been busier not only writing, but I assume also doing more surgeries as the pandemic seems to have driven up demand for cosmetic procedures. Articles published in the lay press have described how at least in the U.S. aesthetic surgery is experiencing a boom, with the most common explanation, as journalists will typically view the world with pop-culture blinders, attributed to the latest trend—social media. As people look at themselves more during Zoom get togethers or on Instagram selfies, so the story goes, they become more critical of appearances, particularly facial. While I think there is some credibility in this explanation, I believe it is a combination of a variety of factors that have all worked to drive up the demand for aesthetic surgery. First, certain parts of our economy have done very well this past year, resulting in people with large amounts of income for discretionary spending. Second, with travel and dining and social events limited, there is more disposable income allocatable to aesthetic surgery. Finally, in times of turmoil, people seek ways to allow themselves to feel better or more attractive, and priorities get diverted from work and more towards using one's money to enjoy life more.

I hope that, at least for those who wish to be as hair restoration surgeons (I know I do), you are experiencing the kind of boost to your practice that I am describing, and if not, assuming this is a goal of yours, I suggest you seek out the advice of those clinicians whose practices you admire. You all are "in the know" and should be able to select out those who are providing the highest level of work in the most professional and caring environment. Most likely these colleagues specialize in FUE, perhaps supplemented with BHT, to meet the demand of patients who in most cases are in fact best treated by this approach, although certainly there is, in my experience, a subset of patients who can also be appropriately treated with FUT. Follow these busy colleagues' lead and spend less time worrying about what others are doing and more on optimizing your techniques. Mauro Speranzini's cover article is a wonderful place to start for it covers every step of decision-making and execution of the FUE procedure from start to finish.

➢ CONTINUES ON BOTTOM OF PAGE 41



Aditya K. Gupta, MD, PhD, FISHRS | *London, Ontario, Canada* | forumeditors@ishrs.org

I can hardly believe it has been one year since COVID-19 was declared a pandemic. It sometimes feels that this has been one of the longest years in recent memory, and at other times, it feels the shortest. We have lost many medical heroes during this time, including one of our own, Dr. Cándido Ulíses Mejía, who worked on the front lines against this virus. I wish his family, friends, and colleagues all the best during this trying time.

The COVID-19 pandemic has forced us to find new ways to work and collaborate, including the organization and administration of the upcoming ISHRS 2021 World Congress. That being said, our president, Paul McAndrews, has encouraging news regarding the upcoming congress, and I invite our readers to refer to Marie Shambach's message for further updates. ABHRS president Sam Lam also provides an update on the now-online oral and written exams.

Aside from the many negative aspects of this past year, we have also seen opportunities for further research in a variety of fields, including hair loss. Many articles in this issue touch on this research, including a letter from Carlos Puig, who invites us to report on his website our patients with COVID-19-related hair loss. As well, our literature review summarizes an interesting review article that discusses the possible association between COVID-19 and androgenetic alopecia.

Our lead article this issue, "Forty Steps to Harvest a Graft" by Mauro Speranzini and Solon Eduardo Gouveia Souza, is a great "back to basics" article describing the multiple steps to harvest grafts that many experienced surgeons may take for granted. Rodney Sinclair also discusses more "basic" science in his article, "Minoxidil: What It Is and How It Works," in which he provides insight into the biological and biochemical processes that are affected by this often used drug. Continuing this "back to basics" theme, Editor Emeritus Robert Haber reminds us of one of the basic tenets of the ISHRS.

Lastly, our columnists have outdone themselves once again, providing interesting commentary and expertise; I encourage all to check out this issue's columns by Timothy Carman, Sara Wasserbauer, Gregory Williams, and Marwan Noureldin. An additional thank-you to Jeffrey Epstein, my co-editor, Cheryl Duckler, our managing editor, and Victoria Ceh, our executive director, for their constant collaboration and excellent work. ■



Notes from the Editor Emeritus, 2005–2007

Robert S. Haber, MD, FISHRS | *Cleveland, Ohio, USA* | Bobhaber2@gmail.com

I belong to a number of Facebook groups limited to board certified dermatologists. Recently, someone posted to a group that he was about to perform his first NeoGraft® case, and he wanted to know if he should offer exosomes as well. It became clear that he intended to delegate the entire procedure to the presumably unlicensed personnel provided by NeoGraft. There are several ISHRS members in this group as well, and we politely but effectively explained the surgical nature of a hair transplant, and the risks of inappropriate delegation. He eventually stated that he would reconsider his choice, and is currently in the process of applying for membership in the ISHRS. So clearly while some people choose to follow the illegal delegation model out of greed, others do so out of ignorance, and this underscores the importance of educating our colleagues and bringing them "into the fold."

In Ohio alone, physicians in at least 40 offices, mostly plastic surgeons, follow the model this poster was about to embark upon, not one of which had any prior experience in hair surgery. This is the U.S. version of the Black Market at its worst, an insidious cancer invading our field. I'm certain most of these physicians are fine people who would never deliberately put their patients at risk of harm, but the lure of easy money, and the ignorance of the complexities of hair restoration, sent them on a pathway to the dark side of medicine. In the United States, possibly the only pathway available to us to combat this trend is to convince the state Boards of Medicine to explicitly identify the surgical aspects of a hair transplant and the credentials an individual must possess in order to perform these steps. Only then will physicians be held accountable and potentially face consequences. It is up to each of us to try to achieve this goal, which has been an elusive one for several years.

I write this column close to the one-year anniversary of the COVID-19 shutdowns in the U.S. I don't think anyone thought that not only would we still be wearing masks today, but that some are predicting we have another year or more of the same ahead of us, in spite of the slowly growing number of vaccinated individuals. A year ago, some of our respected colleagues believed that COVID-19 was less of a concern than the flu, yet the death toll in the U.S. recently passed the 500,000 mark, and only cancer and heart disease killed more Americans in the past year. The virtual ISHRS meeting of 2020 was by all measures a success, and while I know we all crave a face-to-face meeting for 2021, it's quite possible that we will once again be forced to see each other from a distance. Someday we will all be together again, and I hope that ample social time is scheduled for that meeting!

All this time prevented from traveling due to COVID has allowed a stronger focus on "Life Outside of Medicine." For me that means tending to my beehives and developing novel beekeeping equipment, which has also required me to start learning woodworking. There is something immensely satisfying about the smell of freshly cut wood, and when a design fits together perfectly and functions properly, it's not unlike the feeling that comes with a well-designed and executed hair transplant. My chickens are healthy, and the automatic feeding system I created keeps us from having to venture outside quite so often in the frigid months of a Cleveland winter. And this week I tapped my Maple trees and my Black Walnut. The next several weeks will involve daily sap collection and lots of boiling, but the end result will be a gallon or so of delicious syrup to enjoy for the following year. I also recently purchased a 3D printer, and I'm teaching myself to design and 3D print items for my bees, chickens, trees, and woodworking projects, as well as items that help solve long-standing problems in my medical practice. The ability to go from idea to design to prototype in a matter of hours is very gratifying, and watching a part being built and listening to the whirring and other peculiar sounds emitted by the machine is mesmerizing!

I miss all my ISHRS friends from around the world; I hope everyone is staying healthy and busy, and I look forward to when we can all be together again! ■

➢ CONTINUED FROM PAGE 40

Resist being seduced into believing that anything is more important than achieving the best results for your patients—at least the type of patients who will value your quality work. There are plenty of them out there, informed self-educated individuals who can distinguish excellent from mediocre work, appreciative of your expertise and caring much more than your efforts to take down disreputable clinics or clinicians. Become the best technician and diagnostician you can, and complement that expertise with managing your office to make sure that your patients are properly cared for and educated. It really is not rocket science, merely the fundamentals.

In addition to the techniques and knowledge of surgery and medical management, be attentive to what is one of the most exciting developments: regenerative medicine. There is a need for committed researchers, clinicians, and educators to emerge, and as hair restoration surgeons we need to nurture and welcome these innovators who come both from within our field as well as from other fields who wish to share their knowledge. As a society, the ISHRS must retain its core founding values of education and comaraderie, and welcome all who have something to offer and who wish to learn. Consistent with this open invitation is Rodney Sinclair's thought-provoking article on the alternative administration of minoxidil sublingually. ■

CONTINUED FROM PAGE 37

The 40 steps can be broken down into five phases:

1. Prior to Surgery — Steps 1 To 5
2. Prior to Scoring the Graft — Steps 6 To 31
3. Scoring Phase — Steps 32 To 36
4. Excision Phase — Steps 37 And 38
5. Post Excision Phase — Steps 39 and 40

PHASE 1: PRIOR TO SURGERY

STEP 1: Identify the size, density, and hair color of the entire head. Before partial or full shaving, it is important to observe the size, density, and hair color of each region of the donor area. Differences like straight or curly hair or thin or thick hair types can guide the selection of FUE equipment and the type and diameter of the punch. Circumvent low-density scalp areas to avoid accentuating the appearance of thinning hair (Figure 1A). Different hair colors in the donor and recipient areas (Figure 2) may lead to undesirable results. When considering the patient's future progression of baldness, it is necessary to recognize the Norwood pattern of hair loss and the relationship between the donor and recipient areas.

FIGURE 1. (A): Lower density in the temporal area (left); (B): higher density in the occipital area.

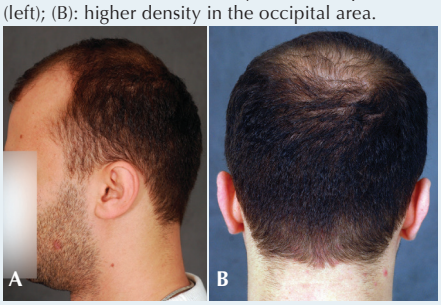
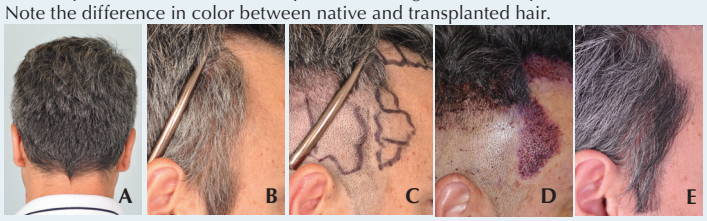


FIGURE 2. Occipital hair in (A) is darker than temporal hair (B) to (D). Darker hair from the occipital donor area was transplanted to a lighter-hair recipient area (front) (E). Note the difference in color between native and transplanted hair.



Key point: *Before shaving the hair, pay attention to the hair characteristics of each region. This will help in choosing the correct FUE device, setting device parameters, determining the type and diameter of the punch, and identifying the best strategies for that patient during surgery.*

STEP 2: Cut the hair to prepare for surgery. To prepare the donor area for harvesting the grafts, the hair should be cut to the ideal length, around 1mm. This length allows optimal scoring and harvest rates. Ideally, use an electric hair clipper to uniformly cut the hair shaft to the correct length. Not all clippers are the same, and we recommend the Wahl Peanut brand (Wahl Professionals, Sterling, Illinois, USA). If the hair length is too short, it may be difficult to observe the exit angle of the hair shaft, which will hinder the physician's ability to assess the hair shaft during the scoring stage of the harvest. If hair length is too long, it may be difficult to judge the correct angle or to engage the FU (Figure 3). In addition, this can cause the hair shafts to open or overlap, making it difficult for the punch to fit properly on the skin to harvest the FU (Figure 4).

Key point: *Choose a clipper that cuts the hair to the ideal height: neither too long nor too short. In exceptional cases, it may be necessary to have a clipper that leaves hair longer, like in hair transplanted to the eyebrow, so more of the natural hair curl can be assessed.*

FIGURE 3. (A) Patient with head shaved to short length (left side) and at long length (right side), (B) close-up view of hair shaved to short length (ideal), (C) close-up view of hair shaved to too-long length.

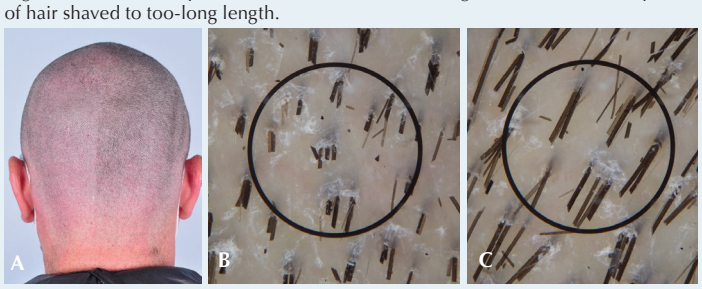


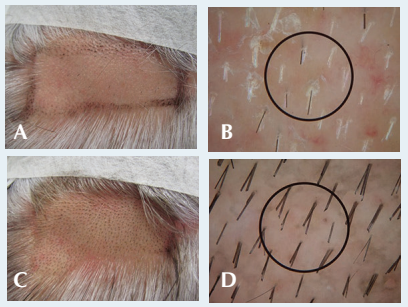
FIGURE 4. Representation of hair length suitable for engagement (left), and hair length that is too long for proper engagement (right).



STEP 3: Prepare the hair with dye. Under strong LED or other type lamp in the operating room, it can be difficult to observe and identify white or blond hair. In this case, the standard practice is to use a temporary dye after shaving the hair (Figure 5). We prefer black beard dye applied to both the donor area and the recipient area for 10 minutes. The hair can be dyed the day before or immediately before the operation.

Key point: *Dye white or blond hair to improve visualization of the FUs, decrease visual fatigue, and increase the accuracy and speed of follicular excision.*

FIGURE 5. White hair (A and B), dyed hair (C and D)



STEP 4: Take photos using dermoscopy. After shaving the donor area, photos are taken with a dermatoscope to identify the unique qualities of the FUs. Dermoscopy shows the characteristics of FUs, such as the cross-sectional diameter of the hair shaft, the grouping of hair follicles, and the proportion of hair per FU. This information can help determine the FUE equipment to use and the type of punch and its diameter. In case of parallel and close together hair shafts, for example, smaller diameter punches can be used (Figure 6). Larger follicular groups require larger punch diameters (Figure 7). Complex donor area may require *in vivo* splitting (explained in detail in Step 27), an advanced skill acquired through experience. *In vivo* splitting may increase the chance of hidden transection (Figure 8). Hair shafts and FUs with larger

FIGURE 6. A simple donor area is shown; FUs can be easily identified and require smaller punches.

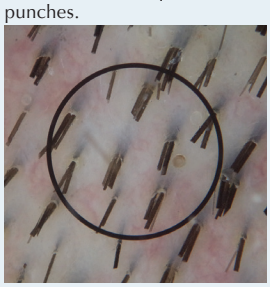


FIGURE 7. Wide FUs, like shown here, require larger punches.

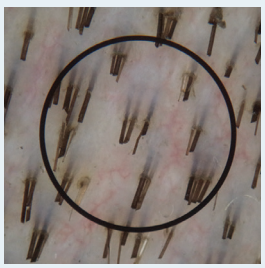


FIGURE 8. Complex donor areas, like shown here, with FUs close together require larger punches.

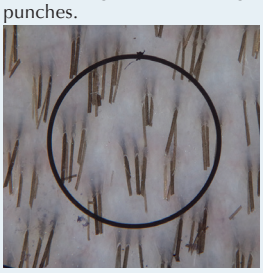


FIGURE 9. FUs with crossing hairs, like shown here, require larger punches.



cross-sections may require a larger diameter hybrid punch (Figure 9). An important finding that should be studied carefully is the percentage of miniaturized hair in the donor area. Although some miniaturization is considered a normal finding, excessive miniaturization may limit harvesting.

Key point: *Dermoscopy helps in selecting the FUE device, the device parameters, the type and diameter of the punch, and the ideal strategies for the patient during surgery.*

STEP 5: Use magnification when observing the scalp. It is especially important to observe the scalp correctly with appropriate magnification because it improves visualization, reduces graft transection rate, and increases harvest speed. A high-quality magnifying loupe should be used to magnify 5× to 6×, although some may prefer 8×. The choice of working distance is a personal decision. We prefer a distance of 30cm. The use of a through-the-lens (TTL) flip up or helmet loupe is also a personal decision (Figure 10); however, loupes with the same magnification and different working distances will display different images. A larger working distance reduces the size of the object, requires arms to be extended, and may cause shoulder fatigue (Figure 11). In addition, the smaller head movement makes image stabilization more difficult and increases the visible jitter that is exacerbated under magnification. At a short working distance (e.g., using an 8× Zeiss loupe) the working distance is only 18cm. Therefore, the doctor's head needs to be very close to the subject, which requires greater effort from the neck and can lead to muscle fatigue. The surgical assistants must also use high-quality loupes to pull scored grafts quickly and effectively, load implanters, or place grafts with forceps into premade incisions. Although some teams only use 2× or 2.5× magnification, we prefer 4.5× to 5×.

Key point: *Good quality loupes and an increase of 5× or 6× for the physician and 4× or 5× for technicians are essential for comfort and precision.*

FIGURE 10. (A) Flip-up loupe, (B) through-the-lens (TTL) loupe, (C) helmet loupe.



FIGURE 11. (A) Long working distance requires outstretched arms; (B) with a very short working distance, the physician bends over the patient.



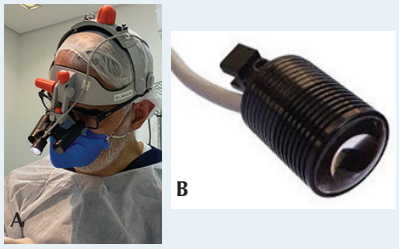
PRIOR TO SCORING THE GRAFT

STEP 6: Ensure an adequate environment. A good start to the operation depends on the patient's comfort and a welcoming environment. The team needs to know the patient's name, drug/food allergies, the patient's relevant medical history, the surgical harvesting goals, the recipient area to be addressed, and the appropriate sedation. Ambient lighting; the appearance, organization and cleanliness of the operating room; proper ambient temperature and humidity; ambient music; and dialogue between team members also are critical to the patient's experience. The patient may find excessive or inappropriate interpersonal communication disturbing. The music selection should be suitable for the surgical environment and should please the patient. Some patients may find that TV distracts them in a positive way. Obviously, during the operation, you should continually address the patient's needs asking about such things as whether they are hungry, thirsty, in pain, and need to rest.

Key point: *For a successful procedure, it is important to operate under ideal conditions. Your Operating Room should maintain an excellent standard of hygiene and sterilization, have good lighting, have well-maintained equipment, and be set to a temperature that is comfortable for both the patient and the medical team.*

STEP 7: Select correct lighting. Equally important is the choice of lighting. A ceiling, floor, or single LED light connected to the loupe can be used (Figure 12). This is our first choice because it has a good cost-benefit ratio and can be used by both doctors and surgical assistants. The light intensity can be fixed or variable. Ideally, it should be polarized to reduce unnecessary glare and enhance the comfort of the loupes. This is only possible under powerful LED lights, because polarization will reduce brightness.

FIGURE 12. (A) LED light attached to the loupe with polarized lenses, (B) close-up view.



Key point: *Choose the type and intensity of light that best meets the needs of all team members.*

STEP 8: Position the patient. Some doctors prefer to operate on patients in a prone or sitting position. Our preference is to start the harvesting of the occipital area in the prone position, and later the temporal harvesting is done with the patient lying on the side. For each position of use, a suitable and comfortable cushion must be used (Figures 13 and 14). When lying on the side, we recommended using

FIGURE 13. (A) Lateral, (B) ventral.

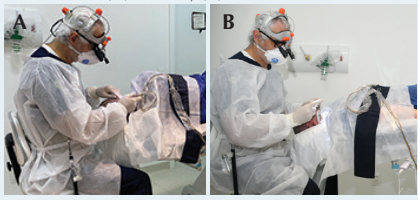


FIGURE 14. (A) Lateral decubitus with roll pillow between the legs and pillow under the head, (B) ventral decubitus with roll pillow under the feet and face-cradle cushion under the face, (C) face-cradle cushion.



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CONTINUED FROM PAGE 43

a tall and narrow head pillow and place a roll or knee pillow between the knees. In the prone position, use a face cradle pad and an anti-roll pillow under the feet.

Key point: *When choosing the extraction position, take into account patient and team fatigue, hypotension risks, and speed and efficiency of extraction.*

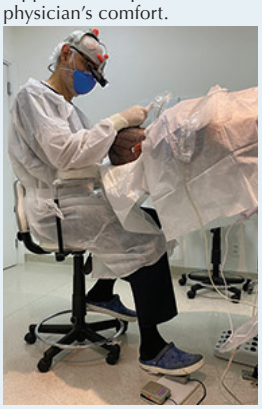
STEP 9: Set the operating table height. Every time the position is changed, the height of the operating table must be sufficient to ensure the comfort and efficiency of the physician and assistants. We typically try to choose technicians of similar heights and to set to the height of the tallest (Figure 15).

FIGURE 15. The height of the operating table ideally should be appropriate for the entire team.



Key point: *Adjust the height of the operating table so that it is comfortable for both the doctor and the technicians.*

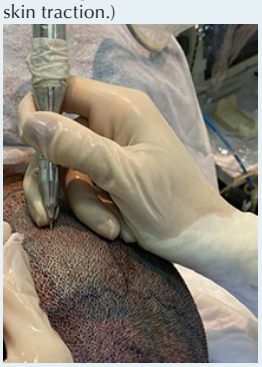
FIGURE 16. Elbow and back support are important for the physician's comfort.



STEP 10: Set chair height and elbow support. It is also important to have a variable height chair and provide support for the elbows (Figure 16). These adjustments are essential because each doctor has different needs according to height. The proper height allows the physician to place feet, legs, back, arms, and neck correctly.

Key point: *Choose a comfortable chair with variable height adjustments for both the seat and the elbow support.*

FIGURE 17. Resting the support of the surgeon's hands and wrists on the patient's scalp increases hand stability during donor harvesting. (My right hand holds the handpiece, and my middle finger limits the scoring depth. My left hand holds a gauze and performs skin traction.)



STEP 11: Support the wrist. During scoring, it's crucial to keep hand position stable. In addition to the elbow on the armrest of the chair, the stability of the hand also depends on the wrist support over the patient's head allowing fine adjustments in the angle during donor harvesting (Figure 17).

Key point: *Support the wrist over the patient's head to provide the necessary stability for efficient follicular excision.*

STEP 12: Position FUE device foot pedal. The foot control of the FUE device should be placed in an appropriate position so that the surgeon's foot engages the punch with less movement and ergonomic stress. The thighs should be supported and make full contact with the seat, and the heels should be placed on the floor and feet on the pedals (Figure 18).

Key point: *Position the pedal in a location within easy reach of your foot and reposition it as necessary.*

STEP 13: Ensure proper anesthesia and vasoconstriction. The first harvested grafts should be scored in areas where sufficient anesthesia and vasoconstriction have been achieved (Figure 19). Insufficient anesthesia can cause pain, and poor vasoconstriction can cause increased bleeding in the donor area. Proper vasoconstriction can improve the color contrast between skin and hair shafts by giving the skin a fairer appearance. Proper vasoconstriction further improves the visualization of the grafts and helps to effectively establish proper harvest parameters.

FIGURE 18. Supporting only the tip of the foot on the pedal and thighs on the seat of the chair allow for a comfortable position.

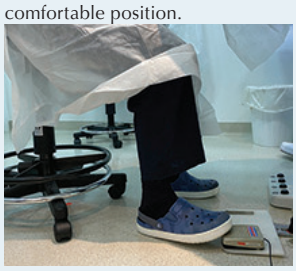
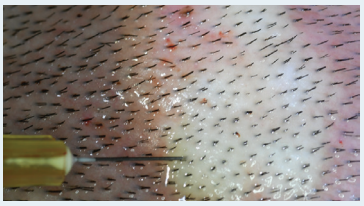


FIGURE 19. Note in the area with adequate anesthesia and vasoconstriction of the skin, there is a whiter appearance to the scalp. This contrasts with the adjacent skin erythema, which is secondary to inadequate vasoconstriction.



Key point: *Keep the donor area with adequate anesthesia and vasoconstriction to avoid bleeding or involuntary movement of the patient. The increased turgor also straightens the FU and facilitates dissection.*

STEP 14: Set the FUE device. If the device has a display screen and parameters that can be changed during operation, it should be placed within the reach of the physician (Figure 20). It is necessary to choose the most suitable equipment, the type of movement (rotation, oscillation, or rotational/oscillation), and the sequence and duration and speed of the movement (for multiphase equipment). No single device is always suitable for all patients. In general, in the same patient, equipment and a specific type of punch may be better in one area and worse in another area. For example, in elderly patients, the hair shaft may be more fragile. In this case, low-speed equipment is preferred. In simpler cases, it is better to use equipment that allows for faster removal.

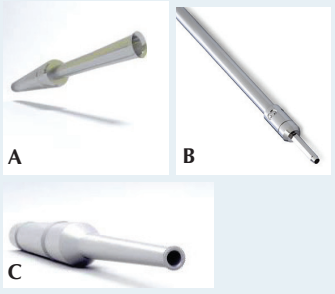
FIGURE 20. The device should stay within reach of the physician so parameters can be changed at any time.



Key point: *Keep the FUE device within the reach of the physician so that the necessary parameter changes can be made quickly at any time.*

STEP 15: Select punch type. At the beginning of every case, a trial or test of 5-10 harvest attempts should be performed to identify the ideal FUE device and also the punch's size and type. There are sharp, dull, and hybrid punches with differing diameters that should be chosen according to the FU characteristics found in the first punctures (Figure 21). For more fibrous dermis that is difficult to penetrate when scored, a sharp punch can be the best option. A hybrid punch may be more ideal for curved follicles.

FIGURE 21. (A) Sharp punch, (B) dull punch, (C) hybrid punch



Key point: *Choose the type and diameter of punch and choose the ideal length for each region of the donor area.*

STEP 16: Select punch diameter. More compact FUs allow the use of smaller (outer) diameter (0.85-0.90mm) punches. For more complex family groupings or FUs with larger shaft diameters and curved follicles, larger diameter punches (0.95-1.00mm) may be preferable (Figure 22). For the extraction of beard hairs that usually have more single-hair FUs, choose a diameter range of 0.7-0.8mm. Small changes in diameter can result in huge differences in partial and total transection rate. Although larger diameters may produce larger scars, there does not seem to be a direct relationship between the increase in diameter and the appearance of white spots (called hypopigmentation). Individual susceptibility and heredity seem to be the most important factors.

FIGURE 22. Punch appearance from left to right: 0.8mm, 0.9mm, 0.95mm, 1.00mm, and 1.05mm



Key point: *When choosing the punch diameter, take into account the transection index but also keep in mind the hidden transection and the resulting scars in the donor area.*

STEP 17: Determine punch incision depth. The depth of the incision must be sufficient to allow skin scoring and subsequent dissection of the surrounding follicular tissue. The depth of the incision will vary from patient to patient. In an individual patient, there is great variability from one area of the scalp to another. To successfully extract an intact graft, the anatomy and histology of the follicular unit must be known.

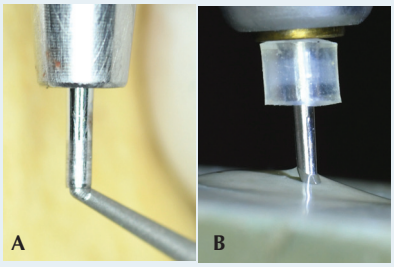
FIGURE 23. Demonstration of the relationship of the punch length and the harvested graft.



Generally, the depth or length of the incision should be shorter than the length of the graft (Figure 23). If the bulb shows signs of trauma, it is recommended to reduce the depth of the punch cut. However, shallow incision depth will lead to a higher incidence of capping. If the depth is too shallow, there may be residual tissue attachments in the hair follicles, requiring more forceps pressure during the removal phase. This ultimately increases the risk of injury or harm to the FU, and usually results in lower graft survival and poor growth.

STEP 18. Sharpen the punch. If the punch is heat-treated and made of high-quality steel, it can be sharpened and reused. The free edge of the punch is sharpened by the high-speed rotation of the diamond drill. For hybrid punches, whetstones with low abrasive content are preferred. In this case, the punch is rubbed at a 90-degree angle for friction (Figure 24).

FIGURE 24. (A) The diamond drill sharpens the sharp punch, (B) the sandstone can be used to sharpen hybrid punches.



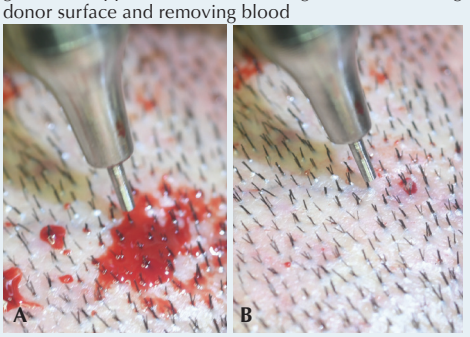
STEP 19: Hold the gauze in left hand (if right-handed). The right-handed doctor holds the gauze in his/her left hand (Figure 17) so as to remove blood (Figure 25) and perform skin traction to promote and stabilize the scoring. For the left-handed doctor, the reverse is true.

STEP 20: Hold the handpiece in dominant hand. The right-handed doctor holds the handpiece with his/her right hand. The thumb forward and two or three fingers backward can stabilize the handpiece (Figure 17). If the punch does not have depth control, the middle or ring finger can also be used to limit the depth of the score. For the left-handed doctor, the reverse is true.

STEP 21: Determine operator working distance. The loupe's working distance determines the distance and comfort of the physician's position during surgery. In our opinion, 30-35cm of working distance is usually ideal for good operator ergonomics.

STEP 22: Clean the skin. The surface of the skin must be kept clean of blood and ink remnants (methylene blue or gentian violet when used) to facilitate visualization of FUs during the surgery (Figure 25). The use of hair dyes in the pre-operative period (for coloring light hair) can also leave residue on the skin and must be carefully removed.

FIGURE 25. (A) Donor area immediately after harvesting grafts, (B) appearance of donor region after cleaning donor surface and removing blood



STEP 23: Target 2- or 3-hair grafts. At the beginning of procedure, it's preferable to harvest FUs with 2- or 3-hair shafts (Figure 26) for adequate evaluating of the necessary parameters for subsequent scoring. The 1- and 4-hair shafts should be avoided during this stage because they do not permit this kind of analyses.

FIGURE 26. In the green circle, the target FU shows a 2-hair shaft FU. FUs with 4-hair shafts (red circle) should be avoided during the first attempts when starting a surgical case.



STEP 24: Avoid white/dyed hair color at initial harvesting. White and dyed hair are not adequate to evaluate transection and should be avoided when harvesting at the beginning of the procedure (Figure 27).

FIGURE 27. (A) Dyed white hair shaft, (B) shaft before dying, (C) shafts after dying (It's still possible to identify the FUs with natural black hair that should be preferred for harvest in the first scoring [green circle].)



STEP 25: Select parallel hair shafts. Parallel hair shafts within the same FU should be chosen over splayed FUs to

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decrease the risk of transection. Splayed follicles with hair shafts that cross over each can be harvested but should be left for more experienced surgeons (Figure 28).

STEP 26: Avoid miniaturized hair shafts. Avoid harvesting miniaturized hair (Figure 29), as well as healthy FUs in an area with predominance of miniaturized hair, because these units will most likely become miniaturized in the coming years with the progression of baldness. Telogen hair is very delicate and prone to trauma during harvesting or placement, so should also be avoided during harvest.

FIGURE 28. The ideal FU with parallel hair shafts (in the green circle). The FUs with crossed hair shafts (in orange circle) should be avoided by novice to intermediate practitioners owing to a higher risk of transection during harvesting.

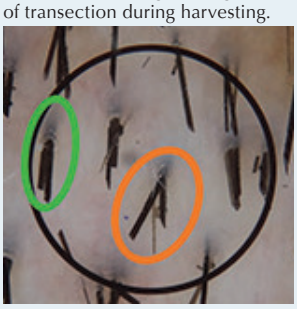


FIGURE 29. Harvesting of miniaturized hair (purple circle) should be avoided.

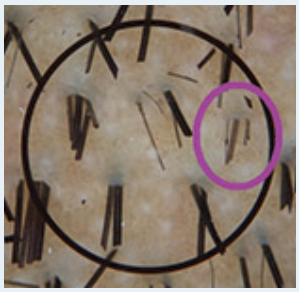
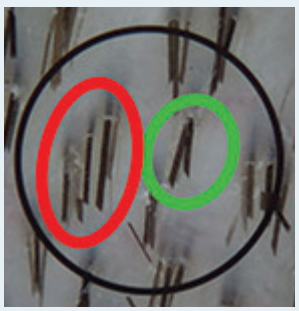


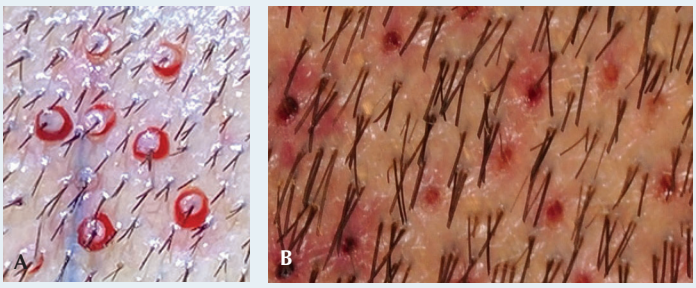
FIGURE 30. *In vivo* splitting must be avoided (red circled graft) because of the risk of hidden transection. It is preferred to choose FUs with hair shafts that are parallel and close to each other (green circle graft).



STEP 27: Avoid *in vivo* splitting. Patients with a complex pattern in the donor area offer a greater challenge when choosing the FUs to be harvested. Hair shafts that are parallel and close to each other are preferred to decrease the transection rate. *In vivo* splitting (Figure 30) must be avoided by novice physicians, as it is more difficult to perform and can lead to higher hidden transection rates.

STEP 28: Harvest FUs in random pattern. Great care is required to create a natural harvest pattern that will result in an aesthetically pleasing donor area. When choosing FUs, do not harvest adjacent ones (Figure 31) and avoid creating horizontal or vertical patterns. It is best to harvest FUs in a random pattern. Along the periphery of the donor area, avoid a rough transition of harvested area for the unharvested area; instead create a smooth progression in hair density.

FIGURE 31. (A) Typical appearance of properly scored and dissected grafts. Note the graft is above the skin surface, which typically reflects an intact FU. (B) Post-operative appearance of donor region after 3 days.



STEP 29: Adjust punch angulation. Deviations in the anteroposterior angle during scoring will lead to transection in the dorsal and ventral part of the FU (Figure 32). Lateral-to-lateral deviations will cause damage to the lateral part of the FU (Figure 33). The first FUs harvested should be carefully examined with loupes or microscopy for integrity and for characteristics of angulation, curvature, and grouping of the hair shafts in the same unit. If they present partial transection, evaluate which part was injured to determine whether a change in punch angulation is necessary at the time of scoring. Sometimes, there is significant difference in the angulation of the hair shafts in their deep, dermal part from their superficial part.

FIGURE 32. (A) Sebaceous gland situated at the concave part of the FU, (B) the ideal graft, (C) ventral injury due to too acute scoring angle, (D) dorsal injury due to a greater than ideal anteroposterior scoring angle

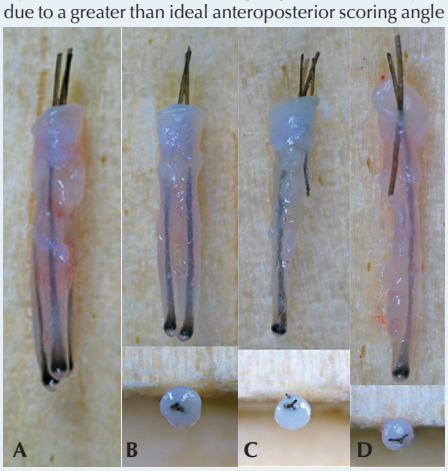
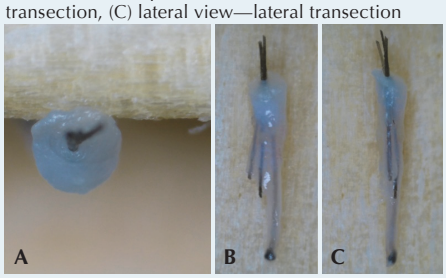


FIGURE 33. (A) Superior view, (B) convex view—lateral transection, (C) lateral view—lateral transection



STEP 30: Ensure anteroposterior centralization. The anteroposterior centralization of the punch during the scoring minimizes the chance of ventral/dorsal injury to the FU (Figure 34). The injuries resulting from errors in centralization are mainly total and partial transection, sheath injury (paring), and naked and fractured grafts. A correct scoring angle (Figure 35) without a correct centering of the unit decreases the success rate of the harvesting.

FIGURE 34. This is a well-centered excision. In any position (A–E), the color of the hair shaft inside the dermis is uniform.

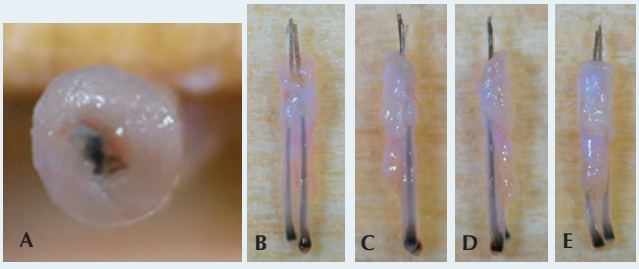
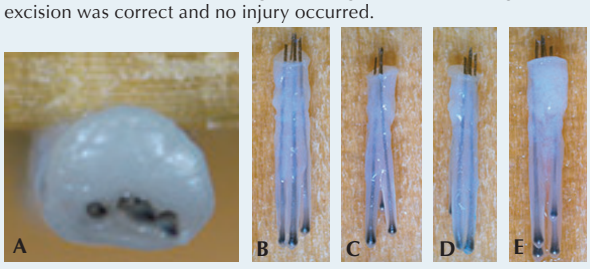
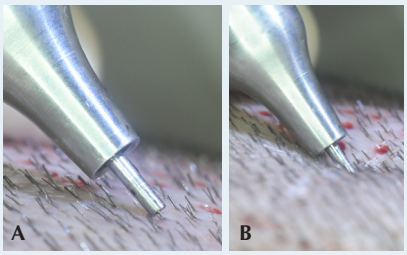


FIGURE 35. In spite of scoring not being centered, the angle of the excision was correct and no injury occurred.



STEP 31: Ensure lateral centralization. Centralization in the lateral dimension of the FU is also very important, especially in units containing 3 or more hairs, avoiding injury to the most peripheral hair shafts of the FUs. The injuries resulting from errors in centralization are mainly total and partial transection, paring, and naked and fractured grafts.

FIGURE 36. (A) The punch engages the FU; (B) the handpiece depresses the skin before the punch movement starts.

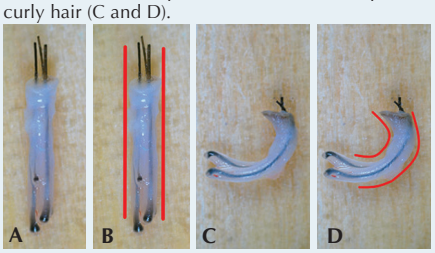


SCORING PHASE

STEP 32: Apply handpiece pressure on the skin. After centering the FU, at the correct angle, it's recommended to apply pressure to the skin with the handpiece prior to the scoring (Figure 36). The amount of pressure will depend on the elasticity of the patient's skin and may vary from region to region of the donor area. Usually, the weight of the handpiece is enough to engage the FU with stability. Thus, when punch movement starts, there is no change in these parameters during the scoring phase. The skin is cut exactly, and the pressure relief facilitates the rise of the FU in the punch with a correct angle and centralization. Advancing the punch in motion against the skin without this prior pressure can lead to inadvertent mismatches in these parameters and failure in harvesting.

STEP 33: Follow the hair-shaft curvature during dissection. Straight hair usually has a linear descending path, but it is necessary to check if this pattern is repeated in all portions of the donor area during harvesting (Figure 37, A and B). Curly-haired patients need constant adjustments to the punch's angle during scoring. The curvature of the hair begins in the epidermis and extends to the deep dermis or subcutaneous layer. It can be divided into mild, moderate, or severe curvature. The dissection should be adjusted gradually to match the angle change of the follicle in its various parts (Figure 37, C and D). The curlier the patient's hair is, the larger the caliber punch (up to 1mm) usually preferred.

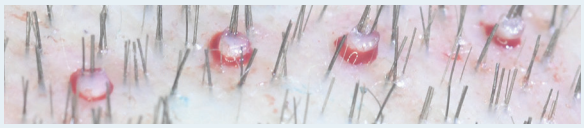
FIGURE 37. Characteristic simple scoring of straight hair (A and B) compared to the dissection path of curly hair (C and D).



STEP 34: Maintain a firm hand. Maintain a firm hand position during the entire procedure. In this way, fine motion control is acquired to dissect the FUs. In some patients, the follicle has deep attachments in the dermis or in the subcutaneous tissue, and it can be necessary to apply additional pressure at the end of the scoring, with the punch no longer moving, to be able to loosen them without injury to the bulb.

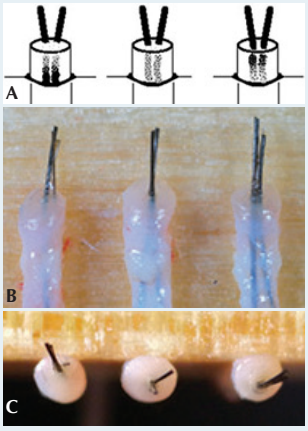
STEP 35: Elevate the epidermis. A good indication of success in the scoring phase is the appearance of the FU after the puncture: there is a slight elevation of the follicle epidermis, about 1 or 2mm above the skin, meaning loosening of the anchoring structures and success in tissue dissection (Figure 38).

FIGURE 38. In successful scoring, the epidermis/dermis is typically elevated above the skin level 1 to 2mm.



STEP 36: Examine hair-shaft color within the dermis. Another sign of successful harvesting is the color of the hair shaft within the FU. It can be seen through the portion of the follicle that rises from the skin after a puncture. If the color is uniformly opaquer compared to the color of the hair shaft above the epidermis, the scoring was probably well centered and there was no injury to the FU. If the color gets more similar and vivid, the hair is very close to the edge of the FU and was probably dorsal damaged during the puncture. If it gets opaquer, the hair is close to the edge and there was probably ventral damage during the puncture (Figure 39).

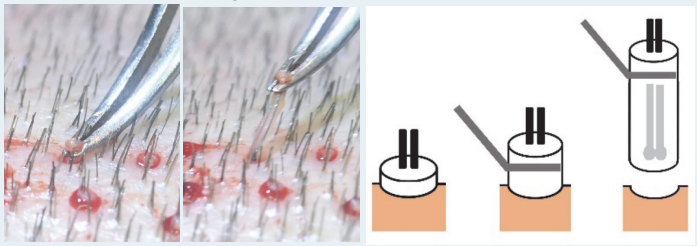
FIGURE 39. (A) Hair shafts inside the dermis when they are progressively opaquer may indicate possible ventral injury. (B) The ideal graft of the hair shaft inside the dermis looks uniformly opaque. (C) Hair shafts inside the dermis that are progressively darker and may indicate possible dorsal injury.



EXCISION PHASE

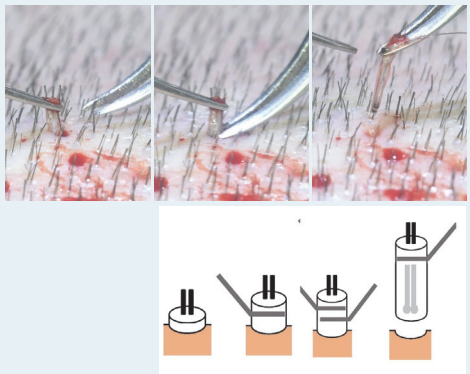
STEP 37: Extract the graft. FUs can be harvested from the scalp by different techniques. If the units are very loose and with few deep adhesions, they can be pulled out in a single step using forceps: the FU is held in its portion below the epidermis and a delicate traction is performed in the direction of the hair leading to the extraction of the FU (Figure 40).

FIGURE 40. Extraction using one-step extraction mode.



The most accurate method is extraction in two steps: one forceps holds the epidermal portion of the FU and asserts a slight upward pull while the second forceps holds a lower portion of the FU and pulls it in the direction of the hair. This way there is less chance of FU decapitation due to the extraction technique (Figure 41).

FIGURE 41. Extraction using two-step extraction mode.

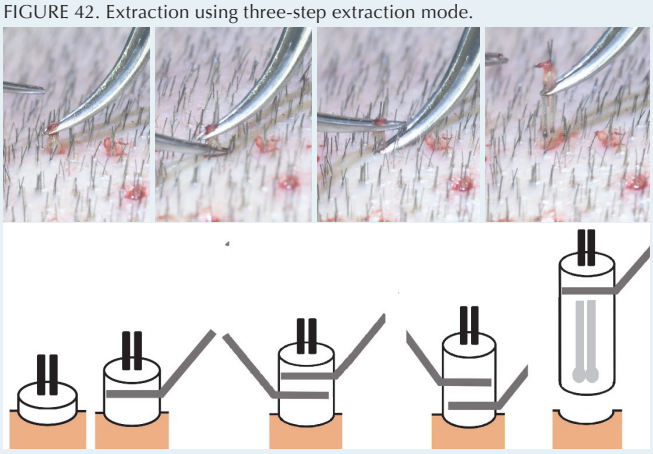


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For cases in which there are deep adhesions or difficulty in removal, the 3-step method can be used: one forceps holds the epidermal portion of the FU and makes a slight upward pull while the second forceps holds a lower portion and pulls the FU further, making room for the first forceps to return and hold an even lower portion of the FU and thus complete extraction, making traction in the direction of the hair shaft (Figure 42).

FIGURE 42. Extraction using three-step extraction mode.



The type of forceps that can be used depends on personal factors and it is possible to use different forceps in each hand according to the technique used to extract the FUs. The combination of toothed forceps, diamond forceps, or forceps with serrated or smooth tips follows the preference of each surgeon.

This stage of the surgery is commonly delegated to surgical assistants, but the surgeon must be always present, including performing the extraction in each quadrant of the donor area to monitor the quality of the FUs, the difficulty of extraction, and the transection rate, which may require adjustments in harvesting strategy.

STEP 38: Build tactile sensation. During the surgery, several delicate movements are performed in a well-defined order, and thus manage to create a tactile memory, which will help the physician adjust movement in each subsequent FU harvest. These movements last for a few seconds while deepening the punch in the millimeters that comprise the FU. Initially, there is greater resistance during scoring of the epidermis and dermis, followed by less resistance, with smooth progression between deep tissues. In some patients, the punch will slide effortlessly through the dermis, without the need for any pressure, leaving the punch to follow the path of the FU. Other cases will require a sudden push at the end of the movement to release deep adhesions, which generate a different tactile sensation from the sensation that occurs at partial or total transection (sudden loss of resistance). FUs should continually be evaluated, creating ongoing quality control during surgery. Sudden changes in this tactile sensation may require investigation of the newly scored FUs to verify if there was transection due to changes in regional characteristics of the donor area.

POST-EXCISION PHASE

STEP 39: Ensure FU integrity. FUs must be continuously inspected during surgery using magnifying loupes or microscopes (Figure 43). Digital microscopy is preferred because it offers better ergonomics for the technicians and constant monitoring by the physician of the team's work. With higher magnification, damage to the follicles is easily seen (Figure 44), facilitating the adequacy of the surgical technique of FU harvesting. Generally, no further dissection of the FUE units is necessary, only the removal of nonviable hair shafts.

FIGURE 43. Digital microscope and stereoscope

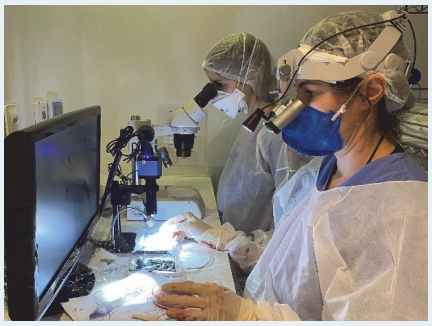
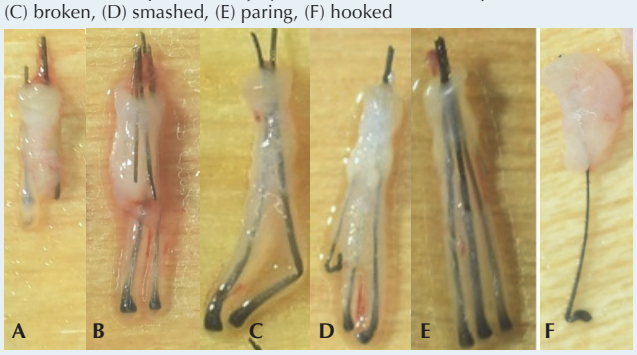
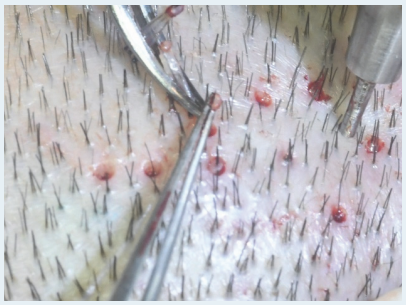


FIGURE 44. Examples of FU injury: (A) total transection, (B) partial transection, (C) broken, (D) smashed, (E) paring, (F) hooked



STEP 40: Determine scoring direction. To optimize the time during surgery, we must adopt positions that allow the simultaneous work of the doctor and the assistant: while the physician performs the scoring from left to right, from cranial to caudal, the assistant should have enough space to collect the FUs (Figure 45). This method works for right-handed doctors; left-handers must do the opposite way. Any abnormalities perceived in the FU extraction by the assistant must be communicated to the surgeon to allow for modification of the technique used.

Figure 45. For right-handed physicians, scoring from left to right and from bottom to top allows for the simultaneous extraction of the FUs by the assistant(s).



DISCUSSION

Harvesting FUs from the donor area is a key step in hair transplantation. The repetition of wrong attempts leads to the gradual destruction of the donor area and therefore the loss of the ability to correct baldness. The physician should understand there is no "one-size-fits-all" technique, and that the technique will vary patient to patient, and even in different areas of a patient's scalp.

We described the 40 steps that we feel when followed will allow the physician to achieve the best results. A physician must constantly be reassessing during the operation in order to recognize subtle changes and make the necessary corrections. Observing the damage in FUs carefully and understanding its cause is essential to changing the strategy

in the effort to obtain perfect harvesting. The diagnosis must be fast and accurate. Knowledge of corrective strategies and the ability to implement these strategies are critical. Only after a lot of training, repetition, persistence, and the pursuit of perfection, can losses be reduced and the success rate maximized.

In this article, we attempted to collect information that is usually scattered through many different sources of scientific articles and describe some of the tips found. After reading and understanding each step, the physician should put it into practice: train, train, and train! Some of the pearls we'd like to emphasize include the following:

- Most patients are more concerned about the results of full and voluminous hair than about scars in the donor area. Therefore, when in doubt between punch diameters, it is best to choose a larger one. The ideal inner diameter is usually between 0.9 and 1.0mm. Beware of punches that use the outer diameter as a parameter. A smaller diameter increases the transection rates and increases poor growth.
- The physician must personally pull out part of the FUs during the operation to identify any difficulties in the extraction and determine the damage and partial or total transection rate. This allows physicians to adapt their strategy as necessary, and to improve their success rate.

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Minoxidil: What It Is and How It Works

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Minoxidil is a piperidine-pyrimidine derivative and a potent vasodilator approved orally for severe hypertension and topically for androgenetic alopecia (AGA).[1] The minimum plasma threshold for induction of hair growth is an order of magnitude below the threshold required for any hemodynamic effect.[2,3]

With respect to its hemodynamic effects, oral minoxidil (OM) is a pro-drug converted by hepatic dehydroepiandosterone sulfotransferase (SULT2A1) into minoxidil sulfate.[4] Heterogeneity in the efficiency of SULT2A1 activity influences its antihypertensive efficacy.[5] There are many mammalian SULT isoforms that differ in tissue expression and substrate selectivity.[6] OM is well absorbed through the gastrointestinal system (>90%). Oral doses of 2.5mg and 5mg of minoxidil provide peak plasma concentrations (CMAX) of 18.5 and 41ng/mL, respectively, one-hour post-dose.[7] OM in doses of 5mg to 100mg daily produces a dose-dependent reduction in blood pressure (BP) in hypertensive patients but has minimal effect on the BP of normotensive individuals.[8] Reflex tachycardia and sodium retention can occur.[9] The plasma concentration threshold of minoxidil for any hemodynamic response is 18ng/ml.[2]

With respect to hair growth, minoxidil is also a pro-drug converted by follicular thermostable phenol sulfotransferase (SULT1A1) into minoxidil sulfate.[10-12] There is considerable inter-subject variability in follicular SULT1A1 and low SULT1A1 predicts a weak response to minoxidil.[13,14]

Minoxidil is poorly soluble. The maximum concentration stable in solution is 5% (50mg/ml). Percutaneous absorption ranges between 1.5-4%.[15] Mean CMAX after twice daily application of 2% minoxidil lotion (20mg/ml) is 0.7ng/ml and 1.8ng/ml with 5% minoxidil (50mg/ml). Application frequency higher than twice daily does not further increase absorption as the initial dose saturates the skin for a period of time longer than the dosing interval.[3] Patients in whom maximal minoxidil therapy produces sub-therapeutic plasma levels will not respond to minoxidil.

Minoxidil lotion is considered to be a topical therapy; however, the demonstration that OM produces dose-dependent hair growth and that OM used in doses that produces similar serum levels to minoxidil produces equivalent hair regrowth suggest that minoxidil is in fact a systemic therapy with a transdermal delivery mechanism.[16]

This is supported by the following findings:

1. Follicular SULT1A1 (and not hepatic SULT2A1) bio-activates both OM and minoxidil and predicts hair growth response.[11,14,17]
2. SULT1A1 expression is restricted to the keratogenous zone of the hair bulb.[10,12] minoxidil promotes growth of both terminal and vellus hairs, but terminal anagen bulbs are mostly located in the subcutis, inaccessible to topical therapies.[18]
3. The observations of distant hypertrichosis in patients who apply minoxidil to the scalp[19] and that the pattern and distribution of hair regrowth seen with oral minoxidil is the same as that seen with minoxidil lotion.[20,21]

Hair formation occurs as a two-stage process. In the first stage, hard α keratin intermediate filaments assemble to form a cytoskeleton.[22] The second stage involves the synthesis of cysteine rich interfilamentous keratin-associated proteins (KAPs) that form the matrix in the keratinized hair cortex.[23] The SULT1A1 enzyme is juxtaposed with the second stage of fibre synthesis, but its function is unknown in the absence of minoxidil treatment.

Cysteine is an essential prerequisite for the second stage of hair growth[22,23] and cysteine availability is the rate limiting step for fibre formation.[23,24] Minoxidil sulfate is 14 times more potent than minoxidil in stimulating cysteine incorporation into the keratogenous zone of the follicle above the dermal papilla.[25] Cysteine has a role in determining fibre diameter and linear growth rate[24,26,27] and is also involved in the synthesis of glutathione and coenzyme A that increase and induce epithelial cell proliferation in the bulb.[23]

Cysteine is actively transported into the follicle by the Alanine/serine/cysteine/threonine transporter 1 (ASCT1), a sodium-dependent, neutral amino acid transporter, expressed in the outer root sheath and hair cortex of the keratogenous zone of the bulb.[28-30] Expression of both ASCT1 and SULT1A1 is restricted to the keratogenous zone of the bulb. ASCT1 enables uptake of cysteine in the blood supply against the concentration gradient.[28-30] Minoxidil also binds to SUR2 sulfonylurea receptors on the KATP channels in the dermal papilla, stimulating them to open[31] and directly activates prostaglandin endoperoxide synthase-1 (PGHS-1) in the dermal papilla. PGHS-1 is cytoprotective and promotes hair growth through increased production of PGE2.[32,33] The relative contribution of these actions to hair growth is unknown.

Approximately 50% of the population has low SULT1A1 activity and overall approximately 50% of patients treated with minoxidil fail to achieve any regrowth.[11,18] Increasing the concentration of minoxidil lotion or the frequency of application does not increase regrowth due its low solubility, poor percutaneous absorption, and saturation absorption kinetics. Maximal minoxidil therapy may be sub-therapeutic in patients with low SULT1A1, and minoxidil non-responders generally require systemic administration of minoxidil for hair growth.

OM produces dose-dependent hair growth even in patients with low SULT1A1 activity.[21] OM undergoes first-pass hepatic metabolism to minoxidil sulfate by SULT 2A1, simultaneously increasing the risk of hemodynamic side effects and reducing hair follicle bioavailability of minoxidil. Minoxidil sulfate is only stable in the circulation for a maximum of 30 minutes and diffuses poorly from the circulation into the skin due to its higher molecular weight.[34] There is no known correlation between SULTs1A1 and 2A1 activity.

We have investigated sublingual minoxidil as an alternative to OM.[34] Sublingual dosing bypasses hepatic first pass metabolism and therefore might be expected to increase the follicular minoxidil sulfate bioavailability and consequently hair growth.[34] As hepatic sulfation of minoxidil enhances the hemodynamic effect, sublingual dosing might also reduce the risks of postural hypertension, fluid retention, and tachycardia. We anticipate publishing additional results from our sublingual minoxidil trials in the near future.

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Protecting Healthcare Workers from Exhaled Air of Patients Undergoing Hair Transplant during COVID-19

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ABSTRACT

In spite of proper history taking and examination, as well as conducting different types of laboratory tests including reverse transcription polymerase chain reaction (RT-PCR) for COVID-19 and high-resolution computed tomography (HRCT) lung scans, the pre-surgical diagnosis of COVID-19 may be missed. Asymptomatic patients with the potential to unknowingly transmit infection could cause a disastrous situation for the entire surgical team. A planned operative procedure such as hair transplant surgery involves prolonged operative hours and proximity of operating team to the patient, increasing the chance for contracting the infection. In absence of total protection for health care workers from potentially contaminated air exhaled by the patient, the authors have innovated a device/technique that may help further protect staff during the prolonged surgical hours.

Keywords: COVID-19, N95 mask, reverse transcription polymerase chain reaction (RT-PCR) test

INTRODUCTION

The COVID-19 pandemic brings new challenges to safely performing hair transplant procedures. The surgical team is at significant risk of contracting COVID-19 from a patient given the proximity of the surgical site to the nose, and given the fact that the procedure is performed under local anaesthesia.

In patients with Norwood grades V-VII baldness or in younger patients with a family history of a higher grade of baldness, hair follicles from the beard and other body sites are often harvested and implanted due to a lack of androgen-resistant follicles on the scalp.[1] Harvesting beard hair increases the risk of contracting COVID-19 due to the physician's increased proximity to the patient's nose. In addition, an infected patient who is asymptomatic or tested negative on a reverse transcription polymerase chain reaction (RT-PCR) test or on a high-resolution computed tomography (HRCT) lung scan can unknowingly infect the healthcare workers working in the Operating Room (OR).[3,4]

Although pre-operative history taking, RT-PCR, antibody tests for COVID-19, and HRCT of the lungs can help diagnose COVID-19, they are not always accurate and may sometimes miss the diagnosis.[5] An RT-PCR test won't show a positive result until 48-72 hours after a patient has contracted COVID-19, and the patient can transmit infection during this period. In a study of patients who were screened pre-surgery using the RT-PCR test, which claims to have up to 70% sensitivity,[5] 2%-9% of negative RT-PCR tests were later found to be positive on repeat testing.[6] Asymptomatic carriers may be as contagious as symptomatic patients.[4] The sensitivity of HRCT of the lungs is approximately 88%-97%.[7,8]

To reduce infection risk during the procedure, different types of high efficiency particulate air (HEPA) filters, high-vacuum suction apparatus, and negative pressure ORs are some of the options available to physicians; however, none of these provide adequate protection against exhaled air from an infected patient. To reduce the potential infection risk during surgery, the authors conceptualized that exhaled air should be diverted to outside the OR and disinfected before being released to the atmosphere. With this aim, the authors developed a simple technique that is replicable, easy to set up, and cost effective. The authors have already published the preliminary reports of the study on patients who were operated on under spinal, epidural, or regional anesthesia using this innovative technique.[9]

OBJECTIVE

While ensuring that patient safety was maintained, we used readily available resources to make a customized device/technique to protect the surgeon and other healthcare workers in the OR from coming into contact with a patient's exhaled air, which potentially could be infected with COVID-19. Our goal was to devise a device/technique that would be cost effective, easy to replicate, and would consistently deliver the desired result of protecting staff from patients who may have tested negative for COVID-19 when in fact they were contagious.

METHOD & MATERIALS

The patient is provided with a nasal cannula as a source for inhaled air and a suction catheter (Figure 1). In addition, the patient wears an N95/FFP2/KN95 mask during the entire procedure. The mask can be cut and fashioned into a shape so that it fits snugly to the face of the patient but remains out of the operating field. The patient's nose and mouth are covered with the mask, and the edges of the mask are taped to the face to provide an airtight seal. The patient's jawline is marked with a marker, and the beard above the line is shaved. A clean-shaven area improves the adhesiveness of the tape.

FIGURE 1. Nasal cannula and suction catheter are fixed to patient's face and jaw line marked.



FIGURE 2. Patient is fitted with an N95 mask.



The suction catheter is then incorporated into the mask, and the mask is covered by a sterile drape (Figure 2). The

exhaled air from the suction catheter is diverted to outside the OR and passed through two sequential suction jars containing hypochlorite solution. This helps disinfect the air of any infective particles that may have been exhaled by the patient. Finally, the air is released to the atmosphere.

Study Design

Two groups of patients were divided based on the time period during which they were operated on. This distinction was made as the availability of the tests to detect COVID-19 infections was limited during the initial period; later on, the tests were more easily available.

Group 1 consisted of 21 patients that were operated on during the period from 1 May 2020 to 31 July 2020. All patients were asymptomatic and reported negative HRCT results. Of these 21, we harvested beard hairs in 7 cases. For 3 weeks, all patients were followed for the symptoms of COVID-19. No rapid antigen tests or RT-PCR tests were performed for these patients because of limited availability of the tests during this time period.

Group 2 consisted of 53 patients that were operated on during the period from 1 August 2020 to 31 December 2020. All patients were asymptomatic and reported negative for COVID-19 with RT-PCR as well as HRCT of the lungs. Of these 53 patients, we harvested beard hairs in 22 cases. Post procedure, the inner and outer surfaces of the patients' masks were swabbed and sent for rapid antigen tests. All patients were followed for 3 weeks for symptoms of COVID-19. Rapid antigen test of the inner surface of mask was positive in one patient who became RT-PCR positive the next day; the swab from the outer surface was negative for this patient.

On follow-up, 2 of the 21 patients in Group 1 and 1 of the 53 patients in Group 2 became symptomatic; later, using RT-PCR, each tested positive for COVID-19 and was treated successfully. During this period from May to December 2020, none of our staff became symptomatic. They received RT-PCR and antibody tests, which remained negative.

A video demonstrating the described technique is available at https://www.youtube.com/watch?v=yZfQw_xLtAM.

CONCLUSION

The technique devised by the authors may help protect staff working in the OR from becoming infected from the exhaled air of a potentially infected/asymptomatic COVID-19 patient. Having a source of oxygen/air for inhalation and an outflow pathway for the exhaled air underneath the mask ensures that the patient is comfortable despite having a tightly sealed mask on their face. The exhaled air is passed through suction jars (containing hypochlorite solution) placed in a well-ventilated room outside of the OR before being released to the atmosphere. This further ensures that the exhaled air is disinfected. In our study, despite 3 out of 74 patients becoming symptomatic and testing positive on RT-PCR, none of our staff became symptomatic or tested positive for COVID-19 on RT-PCR. A check for antibodies for COVID-19, done on 25 January 2021, was also negative for all staff.

Note: It is the responsibility of the surgeon to ensure that this technique is permissible in their jurisdiction of practice. The views of these authors are not necessarily those of the ISHRS or *Hair Transplant Forum International*.

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Invited Commentary

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First, I commend the authors for their efforts to protect staff against infection from unrecognized, asymptomatic COVID-infected patients, but also for alluding to a feature of some N95 masks that has received little attention: the one-way exhaust valve that allows for egress of exhaled CO_2, which can pose a risk of COVID virus release by an infected wearer, though it could also be used as a port for the disinfection process described in this paper. In fact, while evidence shows that no mask—cloth, surgical, or N95 respirators—will protect against release of infected aerosols produced by the force of a sneeze or cough[1]— the one-way exhaust valve in some N95 masks releases air from the wearer during passive respiration (personal observation

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with my own 3M brand N95 mask) providing the potential escape of virus into exhaled air of an asymptomatic carrier. While these are important considerations when evaluating protections provided by masks, this paper specifically evaluates a method of possible disinfection of exhaled air from asymptomatic COVID infected patients wearing an N95 or other similar mask and suction/filtration apparatus. Established virucidal efficacy of antiseptics against COVID 19 include hypochlorous acid as used in this study.[2] However, only an infected patient poses a risk of infection to staff, and only 3 of 74 total patients were identified as being infected with COVID 19. Among the 3 patients representing asymptomatic infection, only 1 was found to have contaminated the internal surface of the mask, and none of the 3 patients had virus permeate to the outside of the masks. Notably, the escape of COVID virus into the exhaust air from the mask was not established, which would have been necessary to prove that the hypochlorite filtration mechanism had eliminated it. While no members of the staff were infected during the study period, it is not clear whether this was a function of the intervention or of minimal exposure (3 of 74 patients for 4% infection exposure risk), or possibly other protective processes such as social distancing, masks, and hand antiseptics or other disinfection efforts. Ultimately, the sample size of infected patients and small number of potential exposures make it impossible to assess the clinical efficacy of the reported intervention in this survey.

Furthermore, there may be easier and comparably effective ways of protecting staff that do not result in potential contamination of equipment or risk the release of virus into air extraneous to the patient. For example, masks such as N95 or KN95 and even surgical masks without exhaust valves can provide a moderately effective antimicrobial barrier to prevent viral transmission from asymptomatic patients to staff when both wear a barrier mask.[3,4] Finally, another approach currently being studied to protect healthcare workers and others against asymptomatic COVID spread is the use of antiviral topical antiseptics in nasal spray and gargle to sterilize the viral reservoirs of the nose and oropharynx and reduce or eliminate viral burden and infectiousness in asymptomatic carriers.[5] The latter is an easy and inexpensive approach I use with staff and patients in my own clinic.

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Letter to the Editors

Carlos J. Puig, DO, FISHRS | *Houston, Texas, USA* | cpuig@hairdoctexas.com

Re: Hair loss from COVID: Is it telogen effluvium or something more?

In the last month or two, I have seen a small increase in the number of female patients presenting with Telogen Effluvium (TE), which is likely to be expected because of pandemic-induced stress. I also have four patients, three of whom are hospital-based health care workers, who had a COVID infection in July or August of 2020 and experienced dramatic shedding of hair in September and October. The timeline from their COVID infections to the onset of hair loss is consistent with a TE etiology; however, their rate and extent of hair loss is somewhat excessive and inconsistent with my TE experience. This makes me wonder if this is just TE, or is this hair loss of a different etiology and/or a potential long-term complication post-COVID infection.

I did a casual survey of experienced hair restoration surgeons about these patients. I found several others who have seen an increase in TE of late, although they were not sure about a true association with COVID infection. This increase in the incidence of TE may be no more than a result of the stress of the times in which we live.

I think we need more information, so please help. Please monitor your TE patients closely; ask about a history and dates of a documented (positive test) COVID infection. In classical TE, the stress occurs then hair loss starts about 3-4 months after the stress, continuing on for about 3-4 months, then the loss stabilizes and remains the same for about 3-4 months, then regrowth commences. If regrowth does not begin 9-12 months after the stress, one should consider biopsy of these patients to see if there is an alternative pathology present. If the loss seems excessive for your experience, or does not follow a classical TE timeline, scalp biopsy looking for an alternative pathology may be indicated.

To facilitate information gathering on this topic, I am starting a COVID Hair Loss Patient Registry. A visit to our PHRC COVID Registry website will allow you to initiate patient tracking and show you how to report and follow your observations. Below is an example of what you will find on the website.

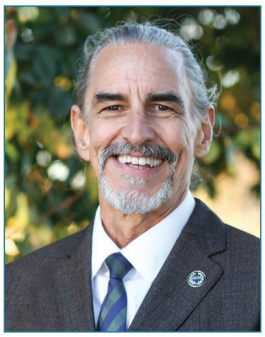
Thank you for entering your patients in the **COVID Hair Loss Patient Registry**. Hopefully, your participation will help us to identify and define the nature of hair loss associated with a COVID infection. Below is a data collection for that, which is self-explanatory. Note that we do not want the patient's name, only their initials, and we are tracking the dates of COVID diagnosis (+ Test), onset of hair loss, and quarterly follow-up dates.

Please fill out the grey portion of the form, then cut and paste it into an email to send to Covid.Hair.Registry@HairRestorationHouston.com. After each follow-up visit, enter your findings into the yellow fields, cut and paste the entire form into an email, and send it to the same email address.

Note the preliminary entries are in grey fields, and the follow-up visits are in yellow fields. Please indicate any treatments you prescribe and progress observations—especially the onset of hair regrowth—in the follow-up fields. Once you enter the date the hair loss started, the recommended follow-up dates auto-populate. If you elected to do a biopsy, please report the date and the diagnosis you found.

Our primary end point here is to determine if this hair loss is a temporary telogen effluvium or a new form of long-term or permanent hair loss.

Patient ID#	Patient Initials	Physician Name	Physician Phone	Date of COVID Diagnosis (DOS)	Date Hair Loss Started (DHLS)	DHLS + 90 Days	DHLS +180 Days	DHLS+270 Days	DHLS+365 Days	Biopsy? Diagnosis
20-####	MX	XXXXX	XXX.XXX.XXXX	8/15/2020	6/15/2020	9/13/2020	12/12/2020	3/12/2021	6/15/2021	
			Exam, Tmt, Progress, Observations			Regrowth?	Regrowth?	Regrowth?	Regrowth?	



How I Do It

Timothy Carman, MD, FISHRS | *La Jolla, California, USA* | tcarmanmd@mac.com

In this issue, Dr. Sara Wasserbauer addresses a very challenging patient presentation involving the treatment of an apparent cicatricial alopecia. Along with the clinical particulars, what is especially poignant about this case is the close doctor-patient relationship based upon clear and informed choices. This constitutes informed consent, the bedrock of an ethically sound medical and surgical practice.

Sharing our ideas with one another makes us clinically stronger as a collective group in the ISHRS. Please feel free to email me your ideas at tcarmanmd@mac.com for consideration for publication.

Periodic Surgery as Maintenance for Brow Loss in "Simmering" Mystery Alopecia

Sara Wasserbauer, MD, FISHRS | *Walnut Creek, California, USA* | drwasserbauer@californiahairsurgeon.com

FIGURE 1. Patient in 2009 at age 54



I first saw this 66-year-old female in 2009 (at age 54 years) when she presented with brow loss (Figure 1). The area involved both brows and had been present since shortly after bilateral blepharoplasty and brow lift surgery. She had tried various medical remedies and cosmetic methods to camouflage this loss but was not satisfied with the results. She had stopped all "brow shaping" and did not pull at any other hair on her body. She was very clear that her brow loss negatively impacted her self-esteem.

A biopsy of the brow was done in 2010 that was suspicious for a post-inflammatory "burned out" alopecia areata, but not conclusive. Confusing the issue further, cicatricial alopecia was not ruled out by the biopsy, though her physical exam was definitely consistent with frontal fibrosing alopecia (FFA) (perifollicular erythema at hairline). After reviewing her history of hair loss, and asking for details like burning sensation or itching coinciding with the loss, the patient agreed with the probable diagnosis of an inflammatory alopecia. She further understood that the inconclusive biopsy meant both a diagnosis and thus a treatment strategy would produce uncertain results.

FIGURE 2. Patient in 2010, 697 single-hair FUs



Nevertheless, she wanted to attempt replacing the brows. Having just spoken to Dr. Bobby Limmer on his strategy for brow transplant in cases of alopecia areata, we decided to try brow transplant with monthly steroid injections post-op. Her first brow surgery comprised a total of 697 single-hair follicles in 2010 via linear excision (Figure 2). At 14 days post-op, the area appeared to be healing well although it appeared erythematous (Figure 3). She was subsequently lost to follow-up, and therefore no additional steroid injections were given.

FIGURE 3. Patient in 2010, 14 days post-op



In early 2017, she returned to our clinic with only a few non-native brow hairs remaining, and, as well, the hairline had receded further (Figures 4 and 5). She reported that the brows had stayed for years and she had been very pleased with the results. She was not sure when they had started falling out again, but she was certain that nothing had regrown or worsened for at least 2 years. Since she felt the area might be "burned out" as previously described to her in 2010, she expressed a desire to try transplants again. Given the lack of intervening photo evidence, we agreed to perform a more limited surgery. We decided to try 20 test grafts (via FUE) on each side, with close clinical follow-up to assess growth (Figure 6).

FIGURE 4. Patient in 2017, brows lost



FIGURE 5. Hairline recession measurement, 2017



Unfortunately, the patient left the area 3 months following the procedure, and was, again, lost to follow-up. She returned in 2019 with demonstrable graft growth—more on the left than the right—accompanied by perifollicular erythema. She mentioned that she had accidentally "destroyed"

FIGURE 6. Patient in 2017, FUE test grafts



grafts on the right during the immediate post-op period when her scissors pulled instead of trimmed! Nonetheless, she stated she was pleased with the grafts that did grow. Additionally, she expressed she would be willing to go through a full surgery again, even if it meant a repeat of the 2010 brow transplant loss: "I know the risks," she wrote in an email. She also felt she did not need as many brow hairs placed, remarking "just enough that there is something there."

FIGURE 7. Patient in 2020, after second surgery



In early 2020, a second full transplant was performed with 308 single-hair grafts via linear excision (Figure 7). At her suture removal appointment, she was given low potency steroid cream for the brows. Unfortunately, the COVID-19 pandemic prevented her return for monthly checkups. She continued to use the steroid cream "whenever the area was pink." Recently, at her 1-year follow-up, the brows showed good growth throughout (Figure 8). She has stated categorically that even though this is likely cicatricial alopecia (with the most likely diagnosis being FFA), and even though it is expensive to do so, she would choose to have the brows replaced via surgery every few years as needed.

FIGURE 8. Patient in 2021, at 1-year follow-up



Invited Commentary

Francisco Jimenez, MD, FISHRS | *Gran Canaria, Spain*

The case reported by Dr. Wasserbauer represents the typical evolution of eyebrow transplant in a patient with FFA: initial good short-term result, no different than in any non-cicatricial alopecia, followed by a variable period of stabilization, then a progressive loss of the transplanted hair, which can be partial or complete.

What should our recommendation be to these FFA patients with eyebrow loss asking for hair transplantation? The good news is that the short-term (< 2 years post-op) results are successful in the vast majority of patients, but the bad news is that we cannot guarantee the long-term permanence of the transplanted hair, and in fact the long-term outcome is unfortunately a failure in most cases.

How short is a short-term good result and how long is a long-term result? This is difficult to answer, because the results are variable and the evolution unpredictable. In some patients, the disease is more active than in others, and some patients may respond better to therapies than others. Some patients lose the transplanted hairs more rapidly than others, and a minority may maintain their hairs for more than a decade with minimal loss.

In addition, most articles published on hair transplantation in FFA patients are single cases with short follow-up periods that do not contribute much to the understanding of the long-term evolution of the transplant in these patients, and most of them involve frontal hairline transplantation and not the eyebrows. In a recent article by Audickaite et al (Eyebrow hair transplantation in frontal fibrosing alopecia: pitfalls of short and long-term results. *Dermatol Surg.* 2020; 46:922-925), they noted that 8 out of 10 FFA patients with eyebrow transplantation achieved good short-term (< 2 years) results. Of the 8 patients who responded satisfactorily, 4 were followed for more than three years. Of those 4 patients, 3 began to lose the transplanted eyebrow hairs in a slow but progressive manner, and only one still had excellent long-term growth four years after the transplant.

In conclusion, it is important to inform the FFA patient with eyebrow loss about the variable results that might occur and the high chance of losing the transplanted hairs after 3-4 years even if the short-term results are good. In my experience, many patients get such good results that they do not find it a bother to repeat the procedure every few years, which is feasible given that all you need is to harvest 100-200 single hairs per eyebrow. I have had a patient who I have done three sessions with and who is still interested in having another session if needed. However, I have also had patients who tried the transplant just once but subsequently opted to have their eyebrows tattooed. Since I always inform the patient about the different possible outcomes and the non-guarantee of success, and then let the patient decide what to do, I have not had any problem with any patient.

This is exactly what happened with Dr. Wasserbauer's patient; she was so happy with the short-term results that she felt it worthwhile to undertake a repeat procedure, although she knew the high possibility of losing the transplanted hairs several years later. Good choice and good work! ■



In Loving Memory Cándido Ulíses Mejía, MD

Marie A. Schambach, MD | *Guatemala* | mas@schambachmedical.com

Dear Colleagues,

I am tremendously saddened to let you know that Dr. Cándido Ulíses Mejía passed away on February 3rd due to COVID-19 complications. He started his battle against this virus on January 21st at the San Pedro Sula, Honduras Social Security Hospital; however, pulmonary complications caused his passing.



This is very sad news not only for his family and patients, but also for all of us who knew him. It will take a long time to come to grips with this loss. Our immediate thoughts and prayers are with Cándido's family and his colleagues and close co-workers; we offer them our condolences. A huge procession accompanied his remains from the mortuary to the hospitals where he worked and finally to the cemetery. Through all the route, a large conglomeration of people clapped and released white balloons as he was highly esteemed by the local community. His wife and children accompanied him all the time.

Cándido will be remembered as an extremely humble and polite doctor, able to seamlessly blend the knowledge acquired to an ever-expanding practice.



He not only dedicated his career to the hair restoration field, where he was first introduced at the 2000 Orlando Live Surgery Workshop, but also to dermatology, acting as Chief of the Dermatology Department at the Mario Catarino Rivas Hospital in San Pedro Sula, Honduras, his hometown.

He also studied Internal Medicine in São Paulo before his dermatology training. This is why this past year he dedicated his time and knowledge to battle COVID-19, offering his consultations completely FREE of charge, providing alternative treatments for this heinous virus. At the hospital where he worked, he was involved in a proposal for a domiciliary treatment for COVID patients during the first and second phase of the disease with the purpose of reducing hospital saturation of patients. He gained the respect of his colleagues and the general population, and his line "the best vaccine for COVID-19 is to stay home" was popularized in his area.



But to us, his colleagues, Cándido was much more than an outstanding doctor. He will be remembered as a warm and caring friend, a dedicated surgeon who always gave credit to his friends. We will have him in memory for his love of travel, good food and coffee, all best shared with the company of others, and, also, for his very gentle and stimulating comments to his peers. He will be dearly remembered.

At times like these, we are reminded that a society such as ours is truly a family, and that we must rely on one another and support one another under these difficult circumstances.

House of Delegates

HELP THE ISHRS KEEP ITS VOICE IN MEDICINE POLICY

All ISHRS U.S. Members Urged to Join the AMA

The American Medical Association's (AMA) House of Delegates is considered THE house of medicine in the United States. All specialties are represented. Resolutions are proposed and debated. Those accepted become principles and can help affect legislation. We find commonalities with other specialties facing similar issues and can join together to stand up and effect change.

Having a voice with the AMA is critical—more important than ever due to our specialty's issues with the unlicensed practice of medicine. For the past 5 years, the ISHRS has held one voting seat in the AMA House of Delegates permitting the ISHRS to propose and vote on resolutions and align with organizations to support important initiatives. This year, the ISHRS will be up for its 5-year eligibility review. Without at least 100 AMA members, we lose this seat.

AMA Delegate Dr. Carlos Puig states, "Working with Alternate Delegate Dr. Sara Wasserbauer, we play a vital role in having organized medicine understand the issues of importance to hair restoration surgeons and the ISHRS. We need our members eligible for AMA membership to join."

ACTION – HELP ISHRS RETAIN ITS AMA SEAT AND RECEIVE $100 OFF ISHRS DUES

Last year, the ISHRS Board of Governors reviewed in detail and discussed the benefits versus costs and strategic importance to retain its seat. The ISHRS Board unanimously agreed to move forward to retain its seat. As we continue to combat the proliferation of the unlicensed practice of medicine, the ISHRS's relationship with the AMA House of Delegates may prove to be very important.

We need a minimum of 60 additional ISHRS members to join the AMA. We encourage U.S. members to please join the AMA. AMA annual dues are $420 USD. Because of the importance of this campaign, we are offering an incentive of $100 off 2021 ISHRS dues. Just send us your AMA Member number to receive this discount.

The AMA is a member of the World Medical Association (WMA), and plays an important role in international health topics and challenges from a physician perspective. The WMA advocates for physician views within the World Health Assembly, which is the decision-making body of the World Health Organization (WHO). In addition, AMA leaders participate in the WHO as advisors to the U.S. Delegation. Through this support, the opportunity exists to advocate internationally on policies important to the AMA and its members.

Your prompt action is appreciated:
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Why join the AMA?

I have been an AMA member since medical school. You got the JAMA for free, and financial perks like discount rental cars and insurance. I loved the policy debates. They seemed to have the pulse of the medical world.

Then, for a while there, the AMA became less of a presence in my solo practice. I was consumed with staffing and specialty concerns—but along came COVID.

Suddenly the AMA was my go-to source for so many things—providing reliable sources of PPE, new and ACCURATE data. I had exclusive video chats with Anthony Fauci and the experts at the CDC. I checked their website often, and they emailed me with updates.

So now "eyes are opened" once again to the benefits of being a part of the larger medical picture. Sometimes it takes a catastrophe to see how much we need our team, and this is a team worth having.

Join today and get on the team with the ISHRS and the AMA!

Warm Regards,
Sara Wasserbauer MD, FISHRS



Literature Review

Aditya K. Gupta, MD, PhD, FISHRS | *London, Ontario, Canada* | agupta@execulink.com

Minimum Requirements for Reporting Clinical Trials Evaluating the Therapeutic Potential of Platelet-Rich Plasma[1]

This letter to the editor[1] addresses the work published by Shapiro and colleagues that described the results from a randomized controlled trial (RCT) evaluating platelet-rich plasma (PRP) as a treatment for androgenetic alopecia (AGA).[2] PRP is a product of concentrating platelets, growth factors, and other molecules from a patient's blood, which is then injected into (often) the same patient to promote wound healing, decrease inflammation, and improve hair thickness and density. In the RCT by Shapiro et al, 5mL of PRP was prepared via centrifugation and injected 3-4mm into one side of the scalp of 35 AGA patients, with placebo injected into the other half. Both hair density and diameter increased in both PRP and placebo treated areas, with no significant difference between the two. Shapiro et al suggest this is due to 1) the spreading of the PRP treatment into the placebo area of the scalp, and 2) the micro-wounds created by injection, which has been shown to promote hair growth by itself. Shapiro et al also mention the difficulty of comparing their results to those from other trials, due to the heterogeneity of PRP preparations and treatment protocols.[2]

Sharun and Pawde utilize Shapiro and colleagues' work to suggest the need for implementation of a PRP classification or coding system, which would clarify the PRP preparation and application methods, as well as the exact concentrations of various cell types and molecules in the final PRP preparations.[1] The authors refer to the new editorial policy regarding PRP treatment for the journal "Platelets," which states the aforementioned details are rarely fully defined, which is further complicated by the individuality of each PRP sample and the various available PRP preparation methods. Specifically, they mention that some bioactive factors have opposing effects on cellular regeneration, thus the need for analysis of the final PRP makeup.[3] The authors also mention the work of Kon et al, who describe the ongoing debates about the role of specific cells in PRP and how their concentration may affect treatment efficacy: 1) platelets, specifically the mean platelet volume, may reflect the capability of platelets to store growth factors; 2) leukocytes, which may be detrimental due to their pro-inflammatory capabilities or could be manipulated to become anti-inflammatory; and 3) erythrocytes, which may also have a detrimental effect.[4] Shapiro and colleagues responded to this letter in agreement with the need for more details regarding PRP protocols, and encourage further research into the role of PRP constituents in hair growth, while warning against further split-scalp studies.[5]

Columnist's note: This cordial communication between scientists exemplifies the value of sharing knowledge and opinions in the literature. There is much left to be elucidated regarding PRP, its preparation, application, and constitution. A PRP categorization system that includes biochemical and biological analysis of the final PRP product would be a useful addition to PRP research.

Combining Deep Learning with Optical Coherence Tomography Imaging to Determine Scalp Hair and Follicle Counts[6]

Optical Coherence Tomography (OCT) uses infrared light to create high-resolution images of the skin, showing cross-sections up to 3 mm deep, which allows visualization of the epidermis, upper dermis, blood vessels, and skin appendages such as hair follicles. Such up-close analysis of the hair would be useful for hair restoration experts when determining pre- and post-treatment status. However, human analysis of these images can take a lot of time, and the disparity between different humans analyzing the same image can be up to 22%. Thus, Urban et al[6] developed, trained, and tested a convolutional neural network (CNN) in the detection of hair follicles and estimation of local hair density from OCT images. The 3-dimensional images were first flatted to a 2D image perpendicular to the scalp, with the image depth denoted by color, calculated using a "height"-map of the scalp. The CNN was designed with 21 convolutional layers, and trained on OCT scans from 14 different patients (70 images in total). The CNN-predicated data (total number of hairs, hair-bearing follicles, and non-hair bearing follicles) was compared to human-labeled objects in 20 of the 70 images. The CNN predicated total correct number of hairs to within 2-6%, and total number of follicles within 0.1-15%, compared to an 8-18% discrepancy between two human raters. The CNN falsely identified 633-692 hair objects, compared to 432 between two human raters. Therefore, the CNN can analyze OCT images in a comparable manner to humans, at a much faster rate. The authors note that future work could predict the stage of hair cycle in individual follicles using depth of bulbi, thus enabling the calculation of telogen:anagen ratio in a timely and non-invasive manner.

Columnist's note: As deep learning technology continues to advance, tedious and time-consuming work, such as hair counting, can be expected to be further regulated to artificial intelligence. It is fascinating to observe this development, and one can only imagine how such technology will assist all manner of work in the near future.

Dr. Natasha Mesinkovska, a co-author of this article, will be presenting on this topic as a Featured Guest Speaker at the ISHRS 2021 World Congress.

COVID-19, Androgens, and Androgenic Alopecia[7]

In this article, Wambier et al provide a comprehensive review of the literature regarding the relationship between androgenic alopecia (AGA) and a patient's susceptibility to infection by the SARS-CoV-2 virus, which causes COVID-19. SARS-CoV-2 enters human cells via interaction of its spike protein with the membrane-bound angiotensin-converting enzyme 2 (ACE2); in order to interact with ACE2, the SARS-CoV-2 spike glycoprotein must first be "primed" via transmembrane protease serine 2 (TMPRSS2). TMPRSS2 transcription is regulated by the androgen receptor (AR), which plays a vital role in many diseases, such as prostate cancer and AGA. Higher AR sensitivity to androgens, or a higher concentration of androgens, may cause an upregulation of TMPRSS2, thus increasing spike protein cleavage and entry of SARS-CoV-2 into the cell. Racial polymorphisms in the AR may affect its signaling capabilities, perhaps explaining the racial disparities in the clinical outcomes of COVID-19. Lower AR sensitivity, such as that in female adults and children of both sexes, may explain lower COVID-19 severity in these populations. Older, male adults hospitalized for severe COVID-19 have a higher incidence of AGA compared to male adults in the general population. Hyperandrogenic women also presented increased incidence of COVID-19 symptoms. Multiple studies using anti-androgenic drugs, such as spironolactone, canrenone, 5Ari, and dutasteride showed overall improved COVID-19 outcomes compared to placebo or other similar medications. Other trials studying the effects of anti-TMPRSS2 drugs, including bromhexine hydrochloride (BRH) and its metabolite ambroxol, also show promising results.

Columnist's note: This review article is a great summarization of the current literature regarding the interesting connection between androgens, AGA, and COVID-19. Hair restoration specialists should keep abreast of this developing area of research, as it appears to directly concern the majority of our patients. Work such as this emphasizes the importance of cleanliness, social distancing, masks, and air filtration when interacting with older men, who may be more at risk for COVID-19.

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Please join the ISHRS Annual Giving Fund and help in our Fight the FIGHT campaign with a donation!

It is crucial that we have member support.

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Conversations with the ABHRS Diplomates

Gregory Williams, MBBS, FISHRS | *London, England, UK* | dr.greg@farjo.com

There are many advantages of being an ABHRS Diplomate, one of which is access to a WhatsApp group where any Diplomate can ask a question or seek advice and get replies from experienced colleagues. This column aims to share some of the topics covered in the "conversations."* Techniques, controversies, questions, top tips, and ethical dilemmas are discussed here, with the exception of those that were accompanied by photos and videos. I encourage you to comment on any of the subjects by writing a Letter to the Editors.

**Please note we have slightly edited the grammar and sentence structure of some questions/comments to improve readability.*

ETHICS

Has anyone had a patient who had frontal hairline work, but has then come back a couple of weeks later requesting further lowering of the hairline. The transplanted hairline is not unreasonable but having seen it over the last couple of weeks he feels that he would like it lower. I understand his reasoning for not wanting to further "delay" the time frame to the final end point. Has anybody had this request and how did you handle it?

Responses

"What was the original surgical plan including the hairline design? If the patient agreed with your original plan, then I would do nothing at the moment and wait and see in the future."

"I tell the patient that hairlines always look lower than where the design is because properly angled grafts are low at 30 degrees so they shingle and do not need to go lower."

"Talk to him, give him support but don't change your original plan and do not perform a second surgery."

"I will give somewhat different advice. If in fact his request is reasonable, from a patient satisfaction basis there is no reason to wait if he appropriately regrets not having done some hairline lowering work. From a surgical perspective, as long as you're not transplanting into an area that had been recently transplanted I see no contraindication"

PRACTICE CONTROVERSIES

Please discuss Regenera.*

Responses

"I talked with 3 esteemed colleagues at the last ISHRS meeting and all of them got zero results with Regenera."

"My experience with Regenera is not very encouraging. Most of the patients whom I did it on did not benefit. The few who benefited had only a temporary decrease in shedding and went back to square one in 4-5 months."

"There is now a widespread opinion that Regenera has very limited value."

"Regenera with small samples of hair follicles has limited value in my experience, but when used to process fat from left over strip tissue and inject after grafting, I have had great results."

"Almost all my Regenera patients improved. Most of them had moderate improvements, the rest had mild improvement. I did it for myself and had an obvious improvement in the miniaturised hairs."

****Column Editor's note:*** Regenera refers to the micrografting technique marketed by Regenera Activa. Further details can be found at https://www.regeneraactiva.com/en-regeneraactiva.

TOP TIPS

Does anybody do PRP without a ring block? If so, what needle or numbing? If ring block, what do you use?

Responses

"I use the U225 mesotherapy gun. Patients love it because it is so comfortable without any anaesthetic. It is rather slow though—it can take up to 45 minutes for a treatment. It also has needed a repair 3 times in 18 months. The needle depth can be adjusted between 1-10mm."

"We do PRP without giving local anaesthesia or a ring block using a 30g needle at a depth of 2-3mm (in deep dermis) along with the use of vibrator. Patients don't complain of much pain. I believe the pain of giving a block is much more than PRP injections."

"What is the frequency of vibrations required to produce the distracting effect to a painful stimulus according to the gateway theory of pain?"

"It doesn't matter. The faster and harder the vibrations, the better. Also, the closer the vibrations to the site of the injection, the better"

HAIR AND SCALP BIOLOGY

Do you think women make better strip scars than men?

Responses

"Absolutely!"

"Probably, but we must consider that we are taking much thinner strips in females."

"Black patients are the best with regards to thinner scars. I have noticed the more subcutaneous fat, the better scar. Also, I have noticed even thin Black patients tend to have higher subcutaneous fat in the scalp."

"I agree about better scarring in ladies vs gentlemen."

"For me, women always have better strip scars vs men."

"Women tend to clean their donor region sutures better than men who are afraid to touch them. The more post-op scabbing or crusting, the wider the linear scar. Men have more sebaceous activity than women. The more sebum, typically the more crusting and again the wider the scar. I have noticed wider scars in male patients with bad seborrheic dermatitis and those who have an oily skin type."

"I also think a higher amount of subcutaneous fat has an important role in better healing and thinner scars."

MEDICAL ISSUES

I have a patient with Type 4 AGA planning to have 2,000 grafts, but he has a dissecting aorta Type B (descending aorta). I asked him to consult his vascular surgeon to confirm if he is fit for hair transplant. The answer was yes. May I have your opinion: Are there any precautions before and during the procedure that I need to take?

Responses

"I feel there will not be a problem. Keep his pulse and blood pressure within normal limits."

"If you can limit the epinephrine/adrenaline in your anaesthesia, it would be safer too"

"We would require/request a cardiology clearance prior to surgery. We always send our intra- and post-operative medication protocol to their cardiologist in order to obtain signed cardiac clearance forms. I would also speak personally with their cardiologist to discuss any details or patient-specific issues."

"Keep the staff aware of the situation; the patient's vital signs should to be monitored more often than in usual cases and of course the crash cart and defibrillator should be ready at all times."





Hair's the Question

Sara Wasserbauer, MD, FISHRS | *Walnut Creek, California, USA* |
drwasserbauer@californiahairsurgeon.com

*The questions presented by the author are not taken from the ABHRS item pool and accordingly will not be found on the ABHRS Certifying Examination.

Hair Zebras are some of my favorite quiz columns to write because strange hair diagnoses are literally everywhere. This one was inspired by a waiter at a restaurant (pre-COVID, when one could actually go to a restaurant) who had an interesting hair pattern…on his arm! The other was from the desert safari ride in UAE (ISHRS Dubai Regional meeting). Others are combed from the world of online doctor quizzes. Questions 2, 4, and 5 are reproduced from eMPR.com/Haymarket Media, Inc. with permission.

None of these will be on the ABHRS exam…test yourself for fun!

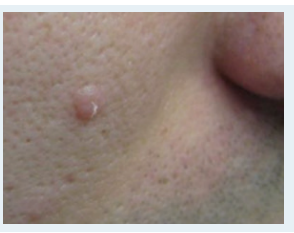
Hair Zebras

1. A 40-year-old male patient comes to you for a consult for his head hair. His hair is Norwood class IIv, so after prescribing minoxidil and finasteride to slow his androgenetic alopecia, he mentions that he has other hair loss. He shows you hair loss on the lateral aspects of his distal shin. No pain or erythema. No inciting event. He tells you that it happened over the past year and he thought it was caused by his socks since it goes up about that high on his shin. However, it is only on the lateral half of the lower leg. Under microscopy, you note perifollicular erythema on the rest of his legs. When you point it out, he says, "Oh, I have that on my arms too!" and shows you the backs of both triceps. He does not have much hair on his arms, but overall, he doesn't have a lot of body hair to begin with. He denies pulling at his hair. What is your diagnosis?



   A. Diffuse alopecia areata
   B. Anterolateral leg alopecia
   C. Early alopecia universalis
   D. Trichotillomania

2. A 35-year-old man is referred for evaluation of a growth on his right cheek. The growth does not itch, hurt, or have any other symptoms, but is notable for a white hair growing out of the center of it. His primary care physician thought it looked suspicious for basal cell carcinoma. The lesion has been present for at least 1 year and is asymptomatic, although the patient is often bothered by it. Examination reveals a flesh-colored papule with a central, white hair. No similar lesions are noted.



   A. Trichoepithelioma
   B. Basal cell carcinoma
   C. Syringoma
   D. Trichofolliculoma

3. Your patient is a 45-year-old man with Norwood Class VII (familial) hair loss. He has had 4 surgeries to fill in the top of his head, 3 linear excision surgeries, and 1 FUE, and he wants more grafts transplanted for density. His donor area is exceedingly thin and he has already had several rounds of SMP to make it appear more dense. You tell him body hair transplant may be an option, and he tells you that he only has body hair in one spot on his arm. This lesion represents:



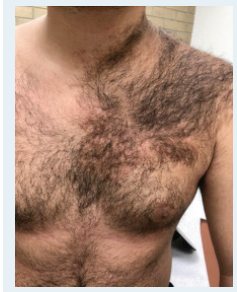
   A. Congenital hairy nevus
   B. Wooly blue nevus
   C. A likely cancerous growth and needs a biopsy
   D. A benign growth that should still be removed

4. A 76-year-old man presents for his hair transplant pre-operative exam with a growth on his scalp. He denies history of skin cancer and is in good health. The lesion has been present for as long as the patient can remember. The growth is asymptomatic although occasionally traumatized when he combs his hair. Examination reveals a 2cm flesh-colored plaque with filiform projections. No similar lesions are noted elsewhere. What is your diagnosis?



   A. Squamous cell carcinoma
   B. Verruca
   C. Sebaceous nevus
   D. Basal cell carcinoma

5. A 20-year-old man presents with hair loss hoping for a body hair transplant to his Norwood Class IIIv hair loss. A large hyperpigmented patch with increased hair growth is on his left shoulder. The patient reports that the area is asymptomatic but has slowly increased in size since appearing in high school (puberty). He denies radiation or chemical exposure, excessive sun exposure, or family history of skin cancer. What do you tell him he has?



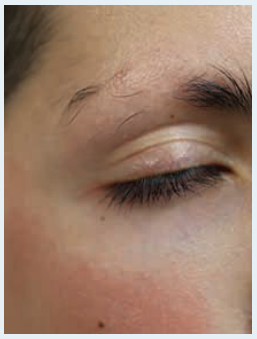
A. A giant congenital melanocytic nevus and the hair will not survive transplantation.
B. A Becker nevus (or Becker melanosis) and it is unknown if the hair can be used for transplant.
C. A café au lait spot and he can use the hair for transplant.
D. A nevus of Ito, and it is unknown if the hair can be used for transplant.

6. This 28-year-old man wants to transplant his beard hair to his head because he is constantly getting folliculitis barbae when he shaves. On examination, you note an unusual pattern of growth. What does this growth of beard hair represent?



A. Ophiasis pattern
B. CVG (cutis verticis gyrata)
C. Folliculitis barbae
D. Congenital whorl

7. Your 38-year-old patient presents with Class IV hair loss and a family history of androgenetic alopecia. In the course of your consultation, he asks if you can perform a simultaneous eyebrow transplant. He has been losing his lateral eyebrows for a while, but has recently worsened and begun to involve his cheeks with little bumps. What is the likely cause of his eyebrow loss?



A. Keratosis pilaris atrophicans
B. Ulrythema oophrygenes
C. Abnormal keratinization of the follicular infundibulum
D. All of the above

➤ ANSWERS ON PAGE 66

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Answers

1. **B.** This is anterolateral leg alopecia.[1] Progression is rare, but the cause is not yet known. It does predominantly occur in males, and spontaneous resolution is known to occur, even though some physicians have shown a lack of hair follicles in the area.

   When I asked my fellow hair doctors for their other differential diagnoses, the list included LPP, follicular mucinosis, alopecia medicamentosa, vitamin deficiency, and alopecia areata—many of which I had to look up! So, if you are reading this, definitely give yourself a brief re-education. A big "thank you" to Tim Carman for making the diagnosis for me and finding this great reference article to explain what it is.
2. **D.** "A tuft of fine, white, wool-like hairs is characteristic of trichofolliculomas. Trichofolliculoma is an uncommon malformation of the pilosebaceous unit. Lesions are benign; however, differential diagnosis often includes basal cell carcinoma similar to other hair follicle neoplasms.[2,3] Trichofolliculomas usually develop spontaneously on the face—most frequently around the nose—as small, solitary, dome-shaped, flesh-colored or white papules ranging in diameter from 0.2 to 1.0cm. A central pore may drain sebaceous-like material. Microscopic examination reveals numerous vellus hair follicles embedded in connective tissue.[4]

   Trichofolliculomas do not require therapy, and treatment is usually for cosmetic reasons. Complete local excision is curative, and malignant transformation is rare."[5]
3. **A.** This is a congenital hairy nevus, which is also referred to as congenital melanocytic nevus (or CMN). Small and medium nevi are fairly common (1:1,000) but the "giant" versions (>2 inches or >6-7cm on a newborn) are relatively rare (1:20,000). They are usually harmless and do not require biopsy, but giant versions carry the highest risk (5-10%) for becoming cancerous. It may grow, particularly in puberty. I have read no reports of them being used successfully for a hair transplant so this patient may be out of luck.
4. **C.** "A Sebaceous Nevus (also known as nevus sebaceous of Jadassohn) is a benign hamartoma that most commonly presents as a waxy yellow- to orange-colored patch or plaque on the scalp or face. The nevus develops a verrucoid appearance over time and remains devoid of hair. Lesions are present at birth or arise in early childhood and basal cell carcinoma (answer D) may rarely develop from these although not squamous cell carcinoma (Answer B). The condition usually is not associated with other findings…"
5. **B.** B, for Becker nevus, is the correct answer. It is a benign congenital epidermal nevus that usually appears after puberty and is typically involves the shoulder or upper trunk.[6,7]

   Although congenital melanocytic nevus and Becker nevus are characterized by hypertrichosis and hyperpigmentation, the age of presentation helps distinguish the two conditions. The common congenital melanocytic nevus appears at birth rather than after puberty. Café au lait spots differ from Becker nevus because of the lack of hair growth with the mole. Although nevus of Ito can occur in the same distribution as Becker nevus and appear during adolescence, nevus of Ito is differentiated from Becker nevus by its distinct blue or gray discoloration.[8] I was unable to find evidence of this being used as a reservoir of hair for body hair transplant.
6. **D.** This is a whorl. Commonly found on the vertex of the scalp, whorls are usually clockwise in direction, as this one is, and are a benign pattern that represents no pathology. In this patient's case, it is likely the cause of his ongoing folliculitis barbae. Cutis verticis gyrata would appear as folds of scalp, and "ophiasis pattern" refers to a form of alopecia areata that typically involves hair loss in a band of scalp at the nape of the neck.
7. **D!** Keratosis pilaris atrophicans (also known as ulerythema ophryogenes) causes abnormal keratinization of the follicular infundibulum, which in turn causes inflammation and retards the growth of the hair shafts. Lateral brow involvement is classic, but chronic or severe cases will spread to the cheeks (as in this photo) and even other body areas (arms, legs, buttocks etc.). It is hereditary, associated with a deletion in chromosome 18p, and there is no cure although several treatments including lasers, topical retinoids, and laser hair removal can be tried.

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Question #2 online source (accessed 11/2/20 at 10:19AM):
https://www.empr.com/slideshow/clinical-quiz/clinical-challenge-asymptomatic-lesion-with-a-white-hair/?utm_source=newsletter&utm_medium=email&utm_campaign=mpr-dailydose-hay-20200220&cpn=&hmSubId=Cg7IDBPpbN81&hmEmail=Pgj06Ah9CFajBzwSU_z6vK2bcZxKvaspir_GktT3Qv_mvPb4hZzzog2&NID=1174559074&c_id=&email_

BOTTOM OF PAGE 67



Chair: Shady El-Maghraby, MD, MSc, FISHRS | Egypt
Co-Chair: Jennifer Krejci, MD | USA

This year's Basics Course is the perfect way to learn about the comprehensive aspects of hair restoration from the comfort of your home or office.

It will take you through the foundation of this specialty through the principles of hair loss consultation and hairline design to assessing donor and recipient areas. This course will also empower you to build a strong and balanced practice around the core knowledge and skills of both Follicular Unit Transplantation (FUT) and Follicular Unit Excision (FUE) that you will acquire from the most seasoned and knowledgeable international faculty.

This year's course is structured to provide you with the basic concepts in lecture format, and each session is coupled with videos from experts in the field. These lectures and videos can be accessed after the live session dates, until December 31, 2021. Plus, every participant has the opportunity to ask questions to the presenters, on and offline.

This Basics Course will serve as the launching pad of long-lasting relationships between you and the esteemed faculty. They will show you how hair transplant combines both artistry and technology to improve the lives of patients and inspire you so that one day you may lead the way forward for future generations of hair restoration experts.

➤ FROM PAGE 66

Question #4 online source (accessed 11/2/20 at 4:27PM):
https://www.empr.com/slideshow/slides/clinical-challenge-asymptomatic-filiform-plaque-on-the-scalp/?utm_source=newsletter&utm_medium=email&utm_campaign=mpr-dailydose-20200220&cpn=&hmSubId=Cg7IDBPpbN81&hmEmail=Pgj06Ah9CFajBzwSU_z6vK2bcZxKvaspir_GktT3Qv_mvPb4hZzzog2&NID=1174559074&c_id=&email_

Question #5 online source (accessed 11/2/20 at 3:42PM):
https://www.empr.com/slideshow/slides/clinical-challenge-large-hyperpigmented-patch-with-hypertrichosis/?utm_source=newsletter&utm_medium=email&utm_campaign=mpr-dailydose-hay-20200227&cpn=&hmSubId=Cg7IDBPpbN81&hmEmail=Pgj06Ah9CFajBzwSU_z6vK2bcZxKvaspir_GktT3Qv_mvPb4hZzzog2&NID=1174559074&c_id=&email_ba597a10a948f11b99a68a17607a063f&dl=0&mpweb=1323-85144-881067hash=ba597a10a948f11b99a68a17607a063f&dl=0&mpweb=1323-49929-881067 ■



Chair: Samuel M. Lam, MD, FISHRS | USA
Co-Chair: Georgios Zontos, MD, PhD, FISHRS | Denmark

The curriculum is aimed at two audiences:

1. The practitioner who wants to do well on the written and oral American Board of Hair Restoration Surgery (ABHRS) exams.
2. The intermediate/advanced hair surgeon who wants to learn sophisticated and new techniques to improve his/her surgical expertise and understanding.

This year's Advanced/Board Review Course will be comprised of:

- Two two-hour live virtual meetings (that can also be viewed after the live session is over)
  - Saturday, May 15, 2021
  - Saturday, August 21, 2021
- Extensive on-demand video lectures covering a diverse range of topics that will offer advanced pearls that can transform your practice.
- Recorded live sessions from the 2020 Advanced/Board Review Course
- Mock Oral Exams recorded from the 2016 World Congress

Registration Opening Soon

2021 ABHRS Online Board Exam Dates
Written Exam: September 18, 2021
Oral Exam: September 25, 2021
For more information: https://abhrs.org/join/



ABHRS President's Corner

Samuel M. Lam, MD, FISHRS | *Plano, Texas, USA* | drlam@lamfacialplastics.com

Online Written & Oral Exam Format Finalized

This has been a tremendously busy year at the ABHRS. The biggest initiative we are working on is the online Board Exam to be held on September 18 for the written exam and September 25 for the oral exam. Now you will be able to take the exam from the comfort of your own home with no travel expenses or time away from work and family. With the cloud of COVID still in the air, we are poised for a successful exam no matter what transpires in the coming months. As an update to last issue's article that touched upon the nature of the exam, after extensive research and vetting, we have now formally selected the platforms that we will be using for the written and oral exams.

The most serious concern we had when we interviewed various platforms was maintaining the integrity of our exam. ProProctor™ tests 7 million candidates annually in more than 160 countries and has reinvested millions of dollars to tweak and improve the quality of what it offers. The platform ensures exam security through both artificial intelligence (AI) and live proctors at a ratio of 1:8 (proctor:examinees). First, the candidate is verified using standard government-issued identification. The laptop camera is then used to scan the entire room for any irregularities that could pose a security breach. The candidate is asked to show empty hands and pockets before continuing and is continually evaluated during the entire course of the exam for evidence of suspicious activity; the exam can be stopped any time as deemed necessary. The entire exam is recorded and stored for 30 days to review for any problems. In addition, the individual's browser is entirely locked down during the test to prevent the viewing of external content. ProProctor is part of Prometric centers (www.prometric.com), and examinees are also allowed to take the exam at one of their testing centers. We are confident that this platform will provide the comfort, convenience, quality, and security that we are seeking for our written examination this year.

The National Board of Osteopathic Medical Examiners (NBOME) has helped the ABHRS create a fair, psychometrically validated, and clinically focused written examination for the past few years. The NBOME will also host our online oral exam this year. Fortunately, the American Board of Cosmetic Surgery (ABCS) has already paved the way by using the NBOME for their online oral examination, which was tremendously successful in 2020. The oral exam will most likely be held using the Zoom platform, which would be both heavily tailored/structured prior and quarterbacked during the session by the NBOME, as the NBOME did for the ABCS exam. The format that worked for the ABCS involved an intricate web of moving candidates from waiting rooms into examination rooms then back out to waiting rooms, etc. A huge surge of enrolled candidates is anticipated this year due to the popularity of this format, making the fluidity of these candidate and examiner interactions more complicated and thereby requiring absolute precision hosting by the NBOME staff. Further, all the presentation and reporting materials, such as oral case presentation and examiner reports, would be delivered and shared through a highly encrypted server managed by the NBOME, again already proven successful by the ABCS.

In order to be best prepared to sit for the board exam, you are encouraged to take the Advanced/Board Review course on May 15 and August 21, 2021 for the ISHRS as it will include two live online mock exam sessions. Co-chair Georgios Zontos has done an incredible job at expanding the online lectures that cover advanced topics, which will be offered to those enrolled in this course.

You are encouraged to take this year's exam and benefit from not having to pay travel expenses or take time away from work or family, as this option may not be offered again next year. ■

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ISHRS 2021 Surgical Assistants Program



Co-Chair: Laura Krys, RN | Spain
Co-Chair: Marwan Noureldin, MD | Egpyt

This year's Surgical Assistants Program will take place virtually via Zoom meeting and will be an excellent opportunity to watch and learn from experts around the world as they demonstrate the different steps of the hair restoration process via video and lecture. Participants can watch live and engage in discussion. The program will be available for registered participants on demand through December 1, 2021.



October 2, 2021

8:00 AM CT (Chicago)

Zoom Meeting

ISHRS.org/surgical-assistants

#ISHRSEducation

Call for Proposals for 2022 ISHRS Regional Workshops

Due: June 1, 2021

Are you an educator?
Do you have a good idea for a workshop in your area?
Can your surgery center host a live surgery workshop?

If you would like to partner with the ISHRS and host a local, live surgery workshop in 2022 or first quarter 2023, please submit your completed application to info@ishrs.org by June 1, 2021. Direct questions to Regional Workshops Subcommittee Chair, Dr. Conradin von Albertini or ISHRS Programs Director, Melanie Stancampiano, at: info@swisshairdoctor.ch or mstancampiano@ishrs.org.

Application materials may be obtained on the ISHRS website: www.ishrs.org. Log in to the "Member Login" section, then under "Programs & Awards" in the navigation bar, click "Regional Workshop Programs."

Regional Workshops focused on a specialty topic or audience level are typically the most successful. One goal of this program is to bring education to various parts of the world, and as such, to target physicians in your geographic region.



Hear from the Assistants

Marwan Noureldin, MSc | *Cairo, Egypt* | marwannoureldin@hotmail.com

If you would like to nominate an assistant from your practice to be interviewed for this column, please email me.

I am delighted to introduce you to Patcharee Thienthaworn, a registered nurse from Bangkok. I met Patcharee in 2019 during the Surgical Assistants meeting and workshop in Bangkok at which she gave a beautiful talk. It was astonishing to watch her demonstrate such speed and precision during the workshop.

Patcharee has a biography of tens of pages of conferences and workshops attended, has contributed to many books, and gives talks around the world. I asked her to tell me a little about the changes she's seen in the field:

"I am lucky to be working with Dr. Damkerng Pathomvanich and learning a lot for the past 31 years. Change is a fact in life, with many developments in FUT and then the introduction of the FUE with its many upgrades in devices and punches, all contributed to shaping the field in its current form so far. I feel that the hybrid punch makes the surgery smoother and with less transection, besides, the scar is smaller when compared with the sharp punch."



"When I see patients return for their follow-up with a head full of hair, that makes me happy."
—Patcharee Thienthaworn

I next noted that her colleague gave an interesting talk last year about the dilator. I asked Patcharee to tell me more about this interesting tool:

"We always used the forceps for placing the grafts, now we changed to the dilators and it took a while to master it before teaching my assistants how to use it. I believe it is a beautiful tool and easy to use once you master it. They are one of the most economical methods for implanting when you compare them with the implanters."

At the workshop, I noticed that Patcharee had a big team. I asked her to tell me more about how the work flows during surgery at her office:

"Yes, we are a lot. We have three registered nurses, including myself, and six more assistants. The nurses do the slivering and the implantation process, while the assistants help with the cutting process. Having a big team is helpful to keep the flow as quick and efficient as possible. For a regular 2,000 grafts FUE without complications, the whole surgery could take only 5 hours. So, in a FUT procedure, the doctor does the slits on the left side first of the recipient area, and when he completes them, one of my nurses stops cutting and starts placing the grafts on that side. If as well we are doing the crown area, then we will be having two nurses placing the grafts up front while the doctor is creating the crown incisions. Then all three nurses will be placing together. And we have another trick for the FUT we do now. If we need more grafts at the end, instead of taking another strip, we harvest the grafts by FUE, and this did make a lot of difference. This combo of FUT and FUE minimized the complications of both."

I inquired if the same flow is followed when doing FUE:

"In the past, the doctor did the incisions first before extracting. Now, the doctor extracts 2,000 grafts, does the incisions, and afterwards we place them all. If more grafts are needed, then he can extract more after implanting those first ones, and the maximum we do in one day is 3,000-3,500 grafts."

I then asked Whether she had ever witnessed a major error:

"I can't recall any big mistakes made, but asymmetric hairlines after completion of graft placing is a common error that the doctor can easily adjust at the end. So, that's why I usually keep 100 extra 1- and 2-hair grafts for the doctor to define the hairline at the end."

Finally, I wondered after 31 years in the field, if Patcharee had any advice she would like to give the doctors:

"I would like to have the doctor stay in the OR as long as possible during placing the grafts, as many patients like to have some grafts placed by the physician. Also, I ask the doctor to check all the implanted grafts at the end by himself and to check the hairline at the sitting position for any asymmetry to be corrected. Lastly, I think the doctor should not promise the patient regarding the final result of having a head full of hair as his teenage years, as the expectation of each patient is different." ■

ISHRS 2021 CME WEBINAR SERIES



The ISHRS 2021 CME webinar series is underway! Each two-hour webinar focuses on a central theme or topic of interest to hair restoration surgeons derived from the Core Curriculum in Hair Restoration Surgery and based on professional practice gaps. Available for CME credit, the webinars include presentations selected from the 2020 ISHRS Virtual World Congress interspersed with new presentations and live discussion. Each webinar in this series will be broadcast live and then available on demand through December 31, 2021. Registration is open to ISHRS member physicians and non-member physicians.

NEXT UP: The Patient and Non-Surgical Treatments / April 10, 2021

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- Physician Attendee of ISHRS 2020 Virtual World Congress, $0.00 USD
- ISHRS Physician Member, Non Attendee of ISHRS 2020 Virtual World Congress, $50.00 USD
- ISHRS Physician Pending-Member, Non Attendee of ISHRS 2020 Virtual World Congress, $75.00 USD
- Physician Non Member, Non Attendee of ISHRS 2020 Virtual World Congress, $100.00 USD

SAVE THE DATE!

Remaining 2021 live webinar dates:

April 10, 2021, at 9:00AM Central Standard Time (Saturday) — The Patient and Non-Surgical Treatments

May 12, 2021, at 6:00PM Central Time/Chicago (Wednesday)

June 5, 2021, at 9:00AM Central Time/Chicago (Saturday)

July 14, 2021, at 12:00PM Central Time/Chicago (Wednesday)

September 8, 2021, at 9:00AM Central Time/Chicago (Wednesday)

November 17, 2021, at 6:00PM Central Time/Chicago (Wednesday)

NOW AVAILABLE ON DEMAND

Donor Area Considerations for Strip and FUE Harvest, moderated by Dr. James Harris (live webinar held on February 13, 2021).

Hairline Design and Recipient Area, moderated by Drs. Jeffrey S. Epstein and Mauro Speranzini (live webinar held on March 17, 2021)

The Patient and Non-Surgical Treatments
April 10, 2021
9:00AM – 11:00AM Central Time/Chicago

This 2-hour CME activity is a live webinar that will be recorded with the intention to be rewatched or viewed as on-demand education. The program is intended for physicians who perform hair transplantation surgery. This webinar is being conducted to provide physicians knowledge on foundational principles related to the evaluation, consultation, and relationship building with patients as well as non-surgical options for the treatment of hair loss. As a result of this activity, learners will be able to describe how to evaluate and assess a patient as well as how to formulate a plan for managing patient expectations. Learners will also be able to discuss non-surgical treatment options, such as minoxidil and finasteride, as well as view on PRP for hair loss. The online live component will include presentations, panel discussion, and audience participation via verbal questions and discussion, typing chat Q&A, and polling.

To register, go to **https://ishrs.org/2021-cme-webinars/**.

The International Society of Hair Restoration Surgery is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The International Society of Hair Restoration Surgery designates this Other Activity (blended synchronous and enduring) for a maximum of 2.00*AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Note: CME Credit may only be claimed one time for each webinar.

ACCME ACCREDITED



Message from the ISHRS 2021 World Congress Program Chair

Marie A. Schambach, MD | Guatemala | mas@schambachmedical.com

Dear Colleagues,

As vaccination rollouts continue worldwide, and slowly the world awakens again, we are excited to confirm we are still planning for a hybrid meeting so those who are able to travel can gather in Lisbon, and those who are unable to or do not desire to travel can attend virtually! This is why we want to share with you one of the Featured Guest Speakers. As I don't want to spoil you with all of them just yet, I will share only one at this time. I will keep you posted on other speakers and topics in future columns. Dr. Natasha Mesinkovska, from the Department of Dermatology, School of Medicine, University of California, Irvine, California, and also the Beckman Laser Institute in Irvine, California, will be speaking to us about her work. Dr. Mesinkovska is a Mayo Clinic and Cleveland Clinic trained dermatologist and dermatopathologist who is developing non-invasive optical imaging and image-guided molecular therapies for hair diseases. She has particular interest in chemotherapy-induced hair loss and the role of the immune system in modulating and controlling conditions, such as alopecia areata. She currently serves as Chief Scientific Officer for the National Alopecia Areata Foundation.



Natasha Mesinkovska, MD, PhD

She recently participated in the study "Combining Deep Learning with Optical Coherence Tomography Imaging to Determine Scalp Hair and Follicle Counts." This study may help us bring new strategies for better planning surgeries in the short and long term. I am looking forward to her presentation and learning how this can improve our practices.

This year we have received close to 100 abstracts, and I've been told that quality of abstracts has increased from previous years, so congratulations to all who submitted. The committee is continuing their review, and soon I will begin planning scientific sessions to make your experience unforgettable. I am looking forward to a hybrid meeting, and I encourage you to send me your ideas on how we all can be together in Lisbon, even though some of us will not be attending in person. We know that outside of the scientific sessions so much is gained from the tips from colleagues we get during side chats and by having the opportunity to see and purchase new instruments, devices, books, etc., from the vendors.

Please email me any suggestions you have to enhance our experience as all are more than welcome. I look forward to "seeing" everyone at the World Congress! ■



The Palace of Sintra (Portuguese: Palácio Nacional de Sintra), also called Town Palace (Palácio da Vila), is located in the town of Sintra, in the Lisbon District of Portugal. It is a present-day historic house museum.

It is the best-preserved medieval royal residence in Portugal, being inhabited more or less continuously from at least the early 15th century to the late 19th century. It is a significant tourist attraction, and is part of the cultural landscape of Sintra, a designated UNESCO World Heritage site.

Description from Wikipedia, Accessed 4 April 2021.

INTERNATIONAL SOCIETY OF HAIR RESTORATION SURGERY
MEMBERS ONLY

Welcome to the New ISHRS Members Only Section

Improved User Experience
Mobile Friendly
Expanded Content
Access to ISHRS Educational Products

As a value-added benefit to your ISHRS membership, you are provided access to many resources exclusive to ISHRS Members, including:

- Surgical video library
- Recorded sessions from ISHRS World Congresses
- Membership Directory PDF
- Online Buyer's Guide
- ISHRS logos
- Content for your website
- Social media tips
- Webinar replays
- Access to your purchased educational courses (Learning Management System)
- COVID-19 resources
- Information on programs & awards
- ISHRS News – member e-newsletter and more!

member.ishrs.org

Plan your 2021 meeting schedule!

2021 Qualifying Meetings for Member Educational Maintenance Requirement

As a reminder, there is an educational maintenance requirement for the membership categories "**Member**" and "**Fellow Member**." This does not apply to membership categories Associate Member, Resident Member, Emeritus Member, or Surgical Assistant Member.

Educational Maintenance Requirements

ISHRS Member and ISHRS Fellow Member membership categories must attend one ISHRS-approved meeting every 3 years, otherwise that member will be changed to Associate Member. The impacted member may revert back to their previous category after attendance at an ISHRS-approved meeting.

2021 Qualifying Meetings

July 23-24, 2021
12th Annual Hair Transplant 360 Cadaver Workshop
St. Louis, Missouri, USA
https://www.slu.edu/medicine/medical-education/continuing-medical-education/pase

October 21-23, 2021
29th World Congress of the ISHRS
Lisbon, Portugal – HYBRID
www.29thannual.org

The qualifying meetings are also listed at
https://ishrs.org/physicians/list-ishrs-approved-meetings-meet-additional-minimum-educational-requirement/

12th Annual **JULY 23-24, 2021**
St. Louis, Missouri, USA

Hair Transplant 360 WORKSHOP

Comprehensive Hair Transplant Course: FUT & FUE Hands-on Course

Two Parallel Courses for Physicians & Staff
Sign Up Your Staff for The Intensive Hands-On Assistant Course!

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- *Unique Training Models*





- Hairline Design
- Donor Harvest/Closure
- Recipient Site Creation
- Graft Dissection
- Graft Placement
- PRP, Laser, Etc.
- Crown Design
- Female Hairline Design
- Temporal Point Design
- Graft Calculation
- Marketing
- Consulting
- Medical Treatment
- Critical Thinking
- Quality Control
- FUE & FUT

Course Director:
Samuel M. Lam, MD, FACS, FISHRS

Assistant Course Director:
Emina Vance, MD

Honored Guest Speakers:
Ricardo Mejia, MD, FAAD
Ken Washenik, MD, PhD, FISHRS
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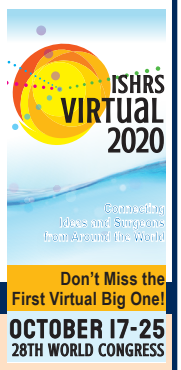
An offering through: Practical Anatomy & Surgical Education, Department of Surgery
Saint Louis University School of Medicine

In collaboration with

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2020 VIRTUAL WORLD CONGRESS SESSIONS FOR ISHRS MEMBERS

Select Recorded Sessions from Virtual World Congress



As a value-add for ISHRS Members we have made one General Session and two Focused Sessions of the 2020 Virtual World Congress available for viewing. There is no extra charge, this is offered as an additional benefit for being an ISHRS member. To view these sessions, go to the Members Only section of ishrs.org.

Under the Education tab, you will find video recordings from past World Congresses, webinar replays, and more Watch from your computer, tablet, or phone.

2020 RECORDED SESSIONS AVAILABLE FOR VIEWING

GENERAL SESSION 3 – DONOR AND RECIPIENT

Presented on Sunday | October 18, 2020
Total Session Length: 1:40:42

Moderator Introduction
Georgios Zontos, MD, PhD, FISHRS | Denmark
David S. Josephitis, DO, FISHRS | USA

Sagittal Versus Coronal Incisions: How to Reduce the Injury to the Recipient Area by 300%
Georgios Zontos, MD, PhD, FISHRS | Denmark

Post-operation Forehead Edema after Hair Transplant Surgery: Biology, Mechanism, Preventing and Treatment
Gholamali Abbasi, MD, FISHRS | Iran

Depth Control Analysis in 30 FUE Patients
Otavio Boaventura, MD | Brazil

Alternative Strategies for Use of Hair Harvested Outside the SAFE Zone
Robert H. True, MD, MPH, FISHRS | USA

Questions & Answers
Georgios Zontos, MD, PhD, FISHRS | Denmark
David S. Josephitis, DO, FISHRS | USA
Gholamali Abbasi, MD, FISHRS | Iran
Otavio Boaventura, MD | Brazil
Robert H. True, MD, MPH, FISHRS | USA

Revisited: Longitudinal Study on Transected Hairs 2000-2001
Jennifer H. Martinick, MBBS, FISHRS | Australia

Pulley Stitch in Strip FUT Wound Closure
Kongkiat Laorwong, MD, FISHRS | Thailand

Resolving the Laxity Paradox of Scalp Skin Stretched Scars
Greg Williams, MBBS, FISHRS | United Kingdom

FUT: How to Remove a Strip with Minimal Donor Scarring
Robert S. Haber, MD, FISHRS | USA

Questions & Answers
Georgios Zontos, MD, PhD, FISHRS | Denmark
David S. Josephitis, DO, FISHRS | USA
Robert S. Haber, MD, FISHRS | USA
Kongkiat Laorwong, MD, FISHRS | Thailand
Greg Williams, MBBS, FISHRS | United Kingdom

FOCUSED SESSION 101 – THE ART OF HAIRLINE DESIGN: MALE, FEMALE, AND TRANSGENDERED

Presented on Monday | October 19, 2020
Total Session Length: 1:32:23

Introduction and Welcome (with polling questions and discussion)
Jeffrey S. Epstein, MD, FISHRS | USA

Design of the Male Hairline
Jeffrey S. Epstein, MD, FISHRS | USA

Design of the Female Hairline
Jae-Hyun Park, MD, PhD | South Korea

Design of the Transgender Hairline
Russell Knudsen, MBBS, FISHRS | Australia

Questions and Answers
Moderator: William R. Rassman, MD | USA
Jeffrey S. Epstein, MD, FISHRS | USA
Russell Knudsen, MBBS, FISHRS | Australia
Jae-Hyun Park, MD, PhD | South Korea
Mauro Speranzini, MD | Brazil
Piero Tesauro, MD | Italy

Hairline Design – Live vs. Computer Simulation
Piero Tesauro, MD | Italy

Who Designs the Hairline – Patient or Physician?
Mauro Speranzini, MD | Brazil

Questions and Discussion
Moderator: William R. Rassman, MD | USA
Jeffrey S. Epstein, MD, FISHRS | USA
Mauro Speranzini, MD | Brazil
Piero Tesauro, MD | Italy

FOCUSED SESSION 303 – DESIGN YOUR OWN RESEARCH PROJECT: TIPS ON WRITING CLINICAL TRIALS, PROTOCOLS, AND ABSTRACTS

Presented on Wednesday | October 21, 2020
Total Session Length: 1:35:25

Welcome and Introductory Remarks
Marco N. Barusco, MD, FISHRS | USA
Dow B. Stough, MD | USA

Terminology of Clinical Trials
Marco N. Barusco, MD, FISHRS | USA

ICH and GCP's: What's That Got to Do with Me?
Dow B. Stough, MD | USA

Transforming an Idea into a Good Research Project
Jerry E. Cooley, MD, FISHRS | USA

Discussion and Questions & Answers
Marco N. Barusco, MD, FISHRS | USA
Dow B. Stough, MD | USA
Jerry E. Cooley, MD, FISHRS | USA

How to Compose a Research Grant Proposal
Greg Williams, MBBS, FISHRS | United Kingdom

Reporting Research Results: Badly Designed Studies and Ethical Considerations
Aditya Gupta, MD, PhD, FISHRS | Canada

The ISHRS Research Grant Process: Tips to Get Your Protocol Funded
Carlos J. Puig, DO, FISHRS | USA

Discussion and Questions & Answers
Marco N. Barusco, MD, FISHRS | USA
Dow B. Stough, MD | USA
Aditya Gupta, MD, PhD, FISHRS | Canada
Carlos J. Puig, DO, FISHRS | USA
Greg Williams, MBBS, FISHRS | United Kingdom

Classified Ads

Seeking Hair Transplant Physician and Technicians

Anderson Center for Hair in Atlanta, Georgia, is looking for a full-time hair restoration physician and full-time technicians. We are a state-of-the-art, brand-new boutique center. We perform one procedure per day, with emphasis on quality, ethics, and natural results…not quantity. On-the-job training available for physicians. Technicians will require experience, with references required. Outstanding, friendly working environment, salary, benefits, insurance, 401k, vision, dental, etc.

Please email your résumé to jobs@andersonhsc.com.

Seeking Experienced Hair Transplant Physician

New hair transplant clinic in St. Louis, MO is seeking an experienced Hair Transplant Physician. Candidate must be proficient with manual or motorized hand held FUE. This is an ideal position for a physician looking to supplement their income or for someone looking to grow with the company. Schedule is flexible. Excellent compensation.

If you are interested or would like more information, please send your résumé to Info@stlouishairrestoration.com.

For Sale: ARTAS® Robotic System with Chair

2015 ARTAS Robotic System for sale. System includes patient chair and was only used a few times. The system was originally purchased in 2015 for $250,000 and is in excellent condition. Asking price of $50,000 or best offer.

Email info@parsamohebi.com for more details or to make an offer.

Join our private Facebook group.

Search: "Official ISHRS Physicians Group"

Calendar of Hair Restoration Surgery Events

http://www.ishrs.org/content/upcoming-events

DATES	EVENT/VENUE	SPONSORING ORGANIZATION(S)	CONTACT INFORMATION
APR 10, 2021 9AM Central Time/Chicago	CME Webinar: The Patient and Non-Surgical Treatments	International Society of Hair Restoration Surgery www.ishrs.org	https://ishrs.org/2021-cme-webinars/
MAY 12, 2021 6PM Central Time/Chicago	CME Webinar: Topic TBA	International Society of Hair Restoration Surgery www.ishrs.org	https://ishrs.org/2021-cme-webinars/
MAY 28-30, 2021	5th Annual Congress of CAHRS *Hangzhou, China*	China Association of Hair Restoration Surgery (CAHRS) http://www.cahrs.com.cn/	cahrs_info@126.com
JUNE 5, 2021 9AM Central Time/Chicago	CME Webinar: Topic TBA	International Society of Hair Restoration Surgery www.ishrs.org	https://ishrs.org/2021-cme-webinars/
* **JUL 23-24, 2021**	12th Annual Hair Transplant 360 Cadaver Workshop *St. Louis, Missouri, USA*	Saint Louis University School of Medicine, Practical Anatomy & Surgical Education In collaboration with the International Society of Hair Restoration Surgery http://pa.slu.edu	pa@slu.edu
* **OCT 21-23, 2021**	29th World Congress of the ISHRS *Lisbon, Portugal – HYBRID*	International Society of Hair Restoration Surgery www.ishrs.org	www.29thannual.org
* **MAR 2022**	ISHRS Regional Workshop: Cowgirl Hair Loss Workshop—Art & Perfection, Female Hair Loss *Houston, Texas, USA*	International Society of Hair Restoration Surgery Hosted by Carlos J. Puig, DO, FISHRS http://www.cowgirlhairloss.com/	cpuig@hairdoctexas.com

* Meetings that qualify for the ISHRS member educational maintenance requirement

REMINDER

ISHRS full **Members** and **Fellow Members** are required to attend 1 ISHRS-approved meeting every 3 years to maintain their member category.

ISHRS WORLD CONGRESS SCHEDULE

29TH WORLD CONGRESS	30TH WORLD CONGRESS	31ST WORLD CONGRESS
October 21-23, 2021 Lisbon	Portugal	October 26-29, 2022 Panama City	Panama	Dates to Be Determined, 2023 New Delhi	India

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Editorial Guidelines for Submission and Acceptance of Articles for the *Forum* Publication

1. Articles should be written with the intent of sharing scientific information with the purpose of advancing the art and science of hair restoration and improving patient outcomes.
2. If results are presented, the medical regimen or surgical techniques that were used to obtain the results should be disclosed in detail. If intra-operative or immediate post-operative photos are presented, please submit photos that show results (at least 6 months after surgery) of the procedure being presented.
3. Articles submitted with the sole purpose of promotion or marketing will not be accepted.
4. Authors should acknowledge all funding sources that supported their work as well as any relevant corporate affiliation.
5. Trademarked names should not be used to refer to devices or techniques, when possible.
6. Although we encourage submission of articles that may only contain the author's opinion for the purpose of stimulating thought, the editors may present such articles to colleagues with experience in the area in question for the purpose of obtaining further opinions to be published alongside the original article. Occasionally, a manuscript might be sent to an external reviewer who will judge the manuscript in a blind fashion to make recommendations about its acceptance, further revision, or rejection.
7. Once the manuscript is accepted, it will be published as soon as possible, depending on space availability.
8. All manuscripts should be submitted to **forumeditors@ishrs.org**.
9. An Author Authorization and Release form must be individually completed by every author listed on the byline and the Word document (not a fax) submitted at the time of article submission. The form can be obtained in the Members Only section of the ISHRS website at **www.ishrs.org**. This release is meant to be signed electronically directly in the Word document. Simply open on your computer, fill in the highlighted fields, and return the Word document with your submission.
10. All figures and tables should be sized down to no greater than 6 inches in width and sent as separate attachments to your email.

11-17. For the complete list of instructions and downloadable checklist, go to: **https://ishrs.org/wp-content/uploads/2020/06/ISHRS_Forum_ArticleSubmission_checklist_Fillable.pdf**.

Submission deadlines:
June 5 for July/August 2021 issue
August 5, for September/October 2021 issue
October 5 for November/December 2021 issue

Classified Advertising Guidelines for Submission

To place a Classified Ad in the *Forum*, email cduckler@ishrs.org. In your email, include the text of what you'd like your ad to read. You should include specifics in the ad, such as what you offer, the qualities you're looking for, and how to respond to you.

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October 21-23, 2021 IN-PERSON & VIRTUAL





HYBRID 29TH WORLD CONGRESS

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HAIR RESTORATION SURGERY

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Expect a fully engaging and valuable experience whether you join us in person or through our virtual congress center

Three days of the best education from the top minds in the field of hair restoration surgery

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October 21-23, 2021

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