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FEATURE ARTICLES

Comparison of survival of FU grafts trimmed chubby, medium, and skeletonized

Michael L. Beehner, MD *Saratoga Springs, New York* mlbeehner@spa.net

Introduction

This study was designed to help explore whether there was a difference in FU graft survival when grafts were trimmed "chubby," "medium", or "skinny" (skeletonized). The trend in hair transplantation has been toward increasingly skinny grafts with very little tissue left around the follicles and bulbs so that "dense packing" can be more easily achieved. The Internet and the general hair transplantation marketplace have driven these trends, such that the average practitioner feels that if he is not able to place 50 FUs per cm^2, then he isn't up-to-date and providing first-rate services.

As background to this study, both Dr. David Seager and this author published almost identical studies in 1997 and 1998 in which the growth of "chubby" FU grafts versus "skinny" grafts was compared.[1,2] Dr. Seager stated in his article that he trimmed the dermal papillae extremely close, whereas I left a generous amount of fat beneath the dermal papillae in both types of grafts. Dr. Seager achieved 89% survival in the "skinny" grafts at 6 months and 113% survival in the "chubby." Dr. Beehner, also at the 6-month time point, achieved 103% survival in the "skinny" grafts and 133% survival in the "chubby." It was felt that there were possibly hidden telogen stage follicles in the perifollicular tissue of the "chubby" grafts. Much research (e.g., Kim, et al.) has confirmed that both the bulb of the follicle and the "bulge" area in the upper portion of the follicular structure are important in the germinal growth of a new hair and that there is probably some type of "communication" that occurs between them on a biochemical level.[3]

Study Setup

The patient was a 60-year-old male with a "shiny bald" advanced Norwood VI level of alopecia. He was in good health and was not on minoxidil or finasteride. From left to right in the rear midscalp region, 5 1cm × 1cm boxes were demarcated with light brown tattoo dots at the corners and a 2mm-wide "moat" of bald skin around each box. Slits in the "parallel" orientation were used to make the recipient sites. Our most experienced technician planted all the grafts in the study. From the time of donor harvest until placement, the grafts were stored in iced Petri dishes in Plasmalyte solution. The five boxes were transplanted in the following manner:

Box 1: *(far left)* 55 "skeletonized" 2-hair FUs placed in 0.8mm slits
Box 2: 55 "medium" trimmed 2-hair FUs placed in 0.8mm slits
Box 3: *(center)* 50 "chubby" 2-hair FUs placed in 0.9 mm slits
Box 4: 50 "medium" trimmed 1-hair FUs placed in 0.7mm slits
Box 5: *(far right)* 50 "skeletonized" 1-hair FUs placed in 0.7mm slits

Results

The patient had two hair counts performed, one at 14 months and the other at 19 months. The results were as follows:

Graft Type	14 Month Survival	19 Month Survival
Box 1: "Skeletonized" 2-hair FUs	62/110 (56.4%)	75/110 (68.7%)
Box 2: "Medium" 2-hair FUs	83/110 (75.5%)	88/110 (80%)
Box 3: "Chubby" 2-hair FUs	72/100 (72%)	88/100 (88%)
Box 4: "Medium" 1-hair FUs	33/50 (66%)	49.50 (98%)
Box 5: "Skeletonized" 1-hair FUs	23/50 (46%)	24/50 (48%)

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Comparison of survival

from front page

Photo 1. Bald head with hair transplant pattern and study boxes drawn on it. Five study boxes are marked of in the rear of the midscalp area.

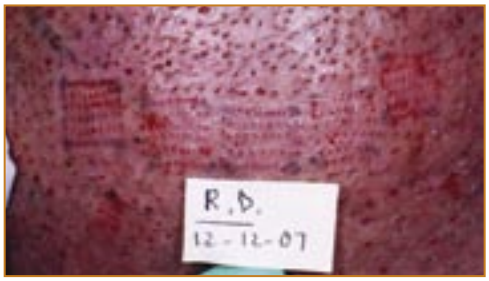

Photo 2. Close-up shot showing tattoo dots and small slits. Slit sites for study have been made. Note tattoo dots marking off study boxes and also the bald "moat" around each box.

Photo 3. Study boxes are walled off with tape and ready for 19-month hair count.

Discussion

A number of things are suggested by this study. First, my original conclusion and that of Dr. Seager that grafts trimmed leaving more tissue around them fare better than grafts "cut to the bone" seems to have been confirmed, however, the previously found very high survival rates were not duplicated. This might be partly due to the fact that those studies were done in open areas of the scalp, as compared to this study in which grafts were tucked within a fairly large transplant pattern.

The "skeletonized" grafts did very poorly in terms of survival, with the 1-hair FUs doing much worse than the 2-hair FUs. This is probably due to the fact that the 1-hair FU is more vulnerable, having the least tissue around it. Even a 2-hair FU necessarily has to include the intervening soft tissue between the two follicles making up the skeletonized graft.

The "chubby" 2-hair FUs did somewhat better than the "medium" 2-hair FUs, although not perhaps statistically significant. The biggest difference was between the skeletonized grafts and those trimmed medium and chubby.

Another interesting finding here was that the number of hairs surviving increased in the five months from 14 to 19 months post-operatively. This would suggest, similar to what Dr. Jennifer Martinick found in a previous study,[4] that some transplanted hairs don't appear until 18 or 19 months, and that perhaps our studies need to be taken out longer if we want to judge the final yield of transplanted grafts in a study.

Except for white-haired patients, in everyday practice I do not trim grafts "chubby." It requires recipient sites that are too large, which perhaps causes too much vascular and certainly precludes getting any kind of decent density of hair distribution. This study confirms for me that the best route to take regarding FU graft trimming is to take the "medium" approach, which creates relatively trim grafts, but with visible tissue surrounding the follicular structure all around and under the dermal papilla.

References

1. Seager, D. Micrograft size and subsequent survival. *Dermatol Surg.* 1997; 23(9):757-761.
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4. Martinick, J. The results at 18 months of the longitudinal clinical research into the importance of transplanting intact follicular units vs. follicular units that have traumatized using a variety of methods including transaction at the bulge. 8th Annual Meeting of the ISHRS, Hawaii, December 2000.✧

A note from Victor Hasson, MD *Vancouver, B.C., Canada*

Thanks again to Dr. Beehner for another interesting study looking at the very important issue of graft survival.

The marked difference between the poor survival of the skeletonized grafts and the much higher survival of the less trimmed grafts is somewhat surprising to me. I had expected survival of the skeletonized grafts to be in the high 90% range—similar to the results obtained by Nakatsui, et al. (*Dermatol Surg.* 2008; 34:1016-25).

I think that this study serves to highlight a very important issue in view of the great disparity of results achieved by different investigators: Surgeons should stick to the technique that they are familiar with and routinely perform. It is far more important for the doctor to have a high graft survival rate than to have the ability to pack at 50 FU/cm^2. There should be no concern about taking two passes to achieve the necessary density as long as the yield remains high.

For physicians who have the desire to use skeletonized grafts for dense packing, the technique should be learned slowly over months or years. This ensures that survival rates remain high and reduces the risk of achieving the kind of poor results that Dr. Beehner shows here.

A note from Melvin Mayer, MD *San Diego, California*

In the 1997-1998 study "chubby" vs. "skinny" presented by Dr. Mike Beehner, there was a 30% difference, and Dr. David Seager's study produced a 24% difference. Both studies revealed significant improved production with "chubby" grafts. BUT with 113% and 133% survival with the "chubby" grafts, there had to be errors in counting the number of hairs that were transplanted; certainly more telogen hairs will be hidden in the "chubby" grafts, giving an erroneous higher percentage survival. Is it the increase in perifollicular tissue, the uncounted telogen hairs, or some other factor that increases hair survival?

There do seem to be some glaring conclusions in Dr. Beehner's current study that are difficult to contest. Skeletonized 1-hair FUs survive less than 50% as compared to the 19-month survival rate of the "medium" trimmed 1-hair FUs at 98%.

Most surgeons believe maximum production is achieved near one year; however, every study box had significantly increased survival at 19 months compared to 14 months. In fact, the average increase was 12%. No minoxidil or finasteride was used during this study.

At the 2005 ISHRS Annual Meeting in Sydney, Australia, Drs. Melvin Mayer, Sharon Keene, and David Perez reported a study using four 1cm^2 boxes, placing 20, 30, 40, and 50 2-haired FUs in the respective boxes. With a 19 gauge needle (1mm), lateral (coronal) incisional sites were made using a "stick-and-place" method. Grafts were neither "skeletonized" or "chubby," but "medium" trim. Hair counts were done at 6 and 12 months. The 12-month hair count survival rates were as follows: 20 FU/cm^2 = 95%, 30 FU/cm^2 = 98%, 40 FU/cm^2 = 90%, and 50 FU/cm^2 = 84%. This correlates well with the 2-haired FUs in Dr. Beehner's 50 FU/cm^2 box, which produced 80% survival.

Nakatsui, et al. published a study of survival of densely packed FU grafts using the lateral slit technique (*Dermatol Surg*. 2008; 34:1016-25). Densities in their single case study ranged from 23-72 grafts/cm^2. Grafts showing growth at 8 months in the 23 grafts/cm^2 box was 95.6%, and in the 72 grafts/cm^2 the survival rate was 98.6%. This is not comparing apples to apples, because they measured "graft" survival not "hair" survival. There is a huge difference. Take for example, if you plant 2-hair grafts and one hair survives in each graft, you can have 100% "graft" survival, but only 50% "hair" survival. This difference is critical, because the only way we can ever begin to compare studies is to have a standardized way of counting and reporting percent "hair" survival, not "graft" survival.

This is a very interesting study, but with the "single case studies," which a number of us have done, it is impossible to draw true scientific conclusions. We can, however, certainly observe trends that support hair transplant logic.