Binocular stereoscopic dissecting microscopes: Should we all be using them?

by David Seager, Scarborough, Canada

Since December 1995, we have prepared every single graft using binocular stereoscopic dissecting microscopes. This entails a lot of extra trouble, time and expense. Why?

Four good reasons:

1. One can dissect 20 percent extra donor hairs from the same sized donor than by using the usual simple magnifying loops. The combination of the extreme magnification and the bright light that one uses with the microscope, permits one to actually see hair shafts and structures further through the donor tissue. This increased translucency, enables one to better dissect AROUND each individual hair shaft, causing less transaction of hairs and damage and therefore less wastage. In fact, an important part of the training in the use of the microscope is monitoring of the amount of waste tissue (especially bits of hair shaft and hair bulbs) remaining on the tongue depressor. This waste is not thrown away but saved and measured. When one switches from magnifying loop dissection of the donor tissue, to binocular stereoscopic dissecting microscope dissection, there is a spectacular reduction of wastage, which improves as one gets more skillful in its use. Along with reduction in wastage, there is a correspondingly greater increase in the number of grafts/hairs obtained from a same sized donor area. We now take 20 percent less donor strip for transplantation of the same number of hairs as we needed before using our microscopes.

2. One can get "better quality" grafts that have a higher incidence of survival. This mainly refers to micrografts. Through the microscope one can more obviously identify follicular clumps and the pilosebaceous anatomy than with magnifying loops. I believe that the transplantation of intact follicular clumps is the key to better survival of micrografts. More importantly, one can see vital structures, such as the sebaceous glands, obviously with the microscope, but only with great difficulty (and often not at all) with simple magnification. With greatly increased visibility, we cut our micrografts "pear shaped" or "tear drop shaped" (see figure 1). The epidermis is trimmed to almost nothing where the hairs exit the skin. The sebaceous glands are carefully preserved intact. Enough dermis and fat, which can be more precisely gauged and trimmed under the enormously greater magnification of the microscope is left around the shafts and especially the hair bulbs. This is to protect and nourish the grafts. It is especially important to leave enough fat around the hair bulb(s) to grasp with jeweller forceps during planting to avoid crush injury. When cutting "slit" grafts, one can more easily and accurately cut them rectangular in shape. This is the secret of how to avoid compression in slit grafting -- you cannot compress one hair.

3. For the creation of (as close as possible to) perfect hairlines, especially with dark hair on white skin, it is important to use ONE HAIR ONLY micrografts in at least the front 2-3 rows. Without the microscope one can never be sure that an apparently one haired micrograft is going to grow only one hair. My own hairline was transplanted with micrografts which my staff meticulously chose as definitely having only one hair. Several, inexplicably at the time, grew 2-3 hairs. Now we readily spot many "one haired" micrografts with associated TELOGEN HAIR–invisible to the naked eye. Such grafts–because they look one haired to the naked eye and simple magnification, but will grow 2 or more hairs–are now placed behind the hairline. Therefore, with the microscope one can create more natural hairlines than without in patients with dark, coarse hair.

4. Cutting small grafts from donor tissue on patients with white fine hair is extremely difficult without the microscope, but one can actually see what one is doing to the hair shafts with grafts with fine white hair through the microscope. The microscope permits one to see fine white hair shafts below the epidermis that one often cannot see at all with the naked eye or simple magnification.

Figure 1 *Left two micrografts are slender and trimmed, but one-hair, two-hair and three-hair follicular clumps show sebaceous glands and adequate protection.*

Case study

Before we started using microscopes, almost all our micrografts were prepared as single haired "micros," usually obtained

continued on page 4

by splitting follicular clumps (because only about 10 percent of clumps naturally contain as few as one hair). The survival of my micros was fairly variable. A prominent member of our profession had his first two-hair transplant sessions performed by two different well-known and highly respected hair transplant surgeons. He had 50 micros inserted by each. One year later, only 50 micros could be found growing. I believe this 50% survival rate would be pretty standard–even good–for any hair transplant facility without the use of microscopic dissection.

Last March, I performed a study to investigate micrograft survival further. Another prompt for my study was visiting a recent live surgery workshop where I saw single hair micrografts cut to almost the bare hair shaft. We used to cut them almost that slender, leaving minimal protective dermis and fat, and trimming off the sebaceous glands.

On the left side of a patient's crown, we planted 84 one-hair and one two-hair micros cut as we used to prepare all micros (see the left two micros in photo 2). On the right side of the patient's scalp, 78 two-haired intact follicular clumped two-haired micrografts were inserted.

Both sides were planted at the same density, 32 micros per square cm., and all micros into 19 gauge needle "sites." The difference in hair growth between the two sides was spectacular (see figure 3). The total number of hairs inserted into the left side was 86, but at 3½ months, only 47 could be counted growing. A total of 157 hairs within intact follicular clumps, complete with sebaceous glands and adequate tissue protection were inserted into the area on his right side, here at 3½ months

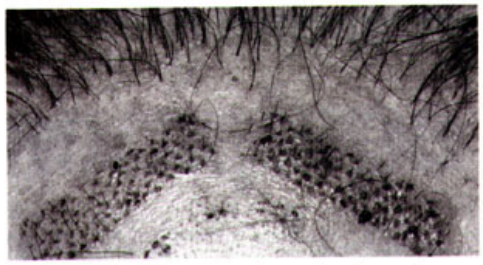

Figure 2 *Right and left study sites, four months post-op.*

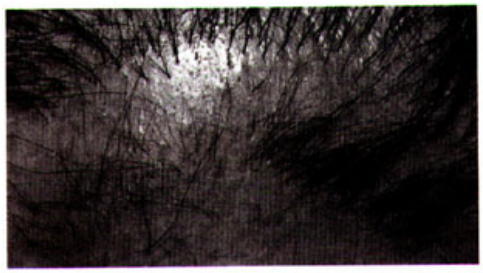

Figure 3 *Test patches growing hair four months post-operatively.*

141 were counted growing. This study proves to my mind that micrograft hair survival is much greater when micros are prepared as chubby follicular clumps complete with their sebaceous glands, and much less with closely trimmed single-hair micros.

Dense packing

I have previously regarded dense packing as possibly jeopardizing the survival of patients' precious, nonrenewable resource. I now believe that graft survival in dense packing (i.e. 35 to 40 micros per square cm.) will produce survival rates of well over 90 percent, provided that:

A. The grafts are meticulously dissected and carefully treated.
B. The grafts are kept chilled, and crush injury and excessive manipulation are avoided.
C. There is less than six hours between donor harvesting and planting. The last 10 percent of hairs may take up to one year to grow.

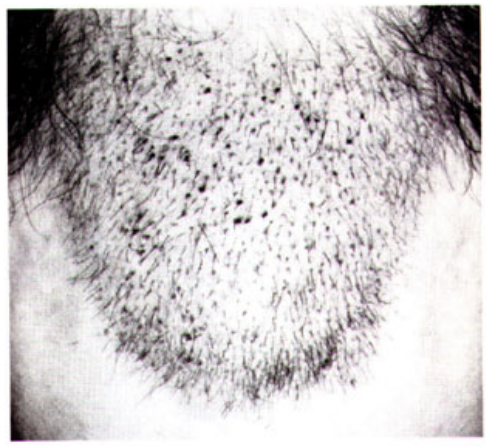

Figure 4 *2,000 grafts one week later.*

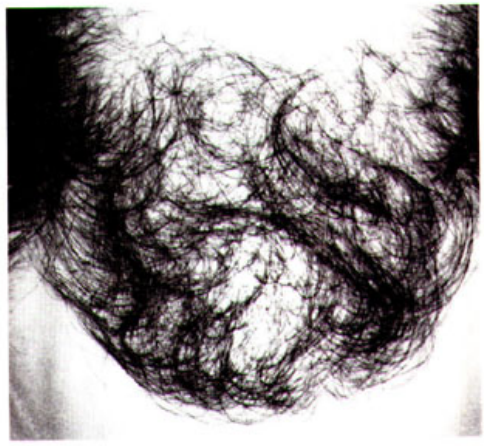

Figure 5 *Later, after 2,000 grafts, seven months post-op.*

Dr. Bob Limmer and I have dense packed micros up to 40 per square cm., (see figure 4) and after seven months using a plastic stencil have counted (almost) complete survival (see figure 5).

Difficulties changing to binocular stereoscopic dissecting microscope

The difficulty for the doctor is that he is going to need more staff. We have found that cutting grafts through the microscope takes twice as long to produce the same number of micros than the traditional way. Hair transplantation for the doctor using microscopes is more expensive and less profitable. More staff, physical room and more expensive equipment are required, and there are the additional management problems that will inevitably come with more staff. Existing staff will be very resistant to changing to the slower and more tedious microscopic dissection. Other physicians have written to me mentioning that they are going to buy a micro-

scope and "try." If one has existing staff, microscopic dissection is not the sort of thing one can "try." Microscopic dissection has to be presented to the existing staff as: "This is the only way it is going to be done from now on."

How we do it

We use the Meiji-EMT Microscope as does Dr. Bob Limmer, who was the first to think of and start using the microscope. There are many other varieties and makes of binocular stereoscopic dissecting microscopes available with better optics and additional features such as zoom, etc. These more expensive options are not necessary; one can dissect just as good grafts, just as easily with the basic Meiji-EMT version. We have tried cheaper ones, but they have all lacked width in the field of vision or the depth of focus necessary to dissect grafts.

For our recipient sites, our staple is the 19 gauge hypodermic needle. For coarse hair, we will sometimes revert to the 18 gauge needle. For three and four-hair micrografts we use a 16 gauge needle. The staff actually decide as they go which needle they are going to use for which sized micrograft. I would say at least 80 percent of our micros are inserted into 19 gauge needle holes. We put all the grafts in immediately, rather than make all the sites before filling. Shortly after a 19 gauge needle is withdrawn, the "hole" closes and often cannot be found. The graft has to be slipped in the moment the needle is withdrawn. Also, it is technically much more difficult to dense pack to 35 to 40 micros per sq. cm., making all the sites first. How to dense pack is a whole topic itself and really needs to be demonstrated.

New patients now seem to be averaging between 1,000 to 2,500 micrografts per session. One year ago it was 500 to 600 grafts per session on average. I do all micrograft megasessions for patients who want a more perfect look and are content to have a relatively thin look over a smaller area. The results look really beautiful, usually indistinguishable from naturally existing hair. The cost per session for the patient is much greater, but fewer sessions are necessary and the results are more natural looking than with minigrafting.

Conclusion

The binocular stereoscopic dissecting microscope enables one to produce up to 20 percent more hairs from the same sized donor area. Although it is not good for the doctor's business, it is essential to maximize the patient's potential for the ultimate beneficial result of his hair transplantation. Bear in mind that the most limiting factor in hair replacement surgery is the limited amount of permanent donor hair each individual possesses.

Transplanting hair in follicular clumps even in jet black hair and white skin, produces the most natural results I have ever seen, including laser hair transplantation done by experts. I believe the hair transplant profession will look back in a few years' time from now and credit Dr. Bob Limmer for his introduction of the binocular stereoscopic dissecting microscope. It will be regarded as one of the greatest leaps forward in techniques our profession has seen. ■