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Donor Harvesting by Direct Visualization of the Hair Follicle

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Abstract

***Background*: There are several methods for harvesting donor hair such as punch excision, single-bladed knife excision, and multibladed knife excision. All of these procedures are blind and thus resulted in transection of hair follicles and fewer follicles being available for transplantation that detrimentally affect the final cosmetic results.**

***Objective:* To explore a new method of donor hair harvesting called "donor dissecting". This new procedure is an open technique as hair follicles are directly visualized during the harvesting process.**

***Materials and Methods:* The technique of donor dissecting utilizes a #15 scalpel blade for single strip harvesting from the occiput while maintaining meticulous hemostasis. This enables individual hair follicle to be visualized and protected from transection during the harvesting process. Once the single strip is harvested, it is then further divided into individual follicular unit or mini- and micro-grafts using direct visualization of individual follicles to again prevent transection.**

***Result:* The technique of donor dissecting was utilized in 50 consecutive hair transplant patients. Utilizing this new technique, only 1.9% of hair follicles in the donor strip were transected during the harvesting process. At the dissection of donor strip 1.2% follicles were transected in the grafts cutting process. Combining the donor dissecting technique with dissection of the individual grafts, the transection of hair follicles was 1.59%.**

***Conclusion:* The technique of donor dissection minimizes the transection of hair follicles in the donor hair harvesting phase of hair transplantation. This technique is superior to the blind methods of donor harvesting which have been plagued by the problem of excessive hair follicle transection.**

Successful hair transplantation is often limited by a finite supply of donor hairs. Minimizing the number of hair follicles that are transected during the harvesting procedure is a critical step in ensuring optimal hair transplant results. There are several methods for harvesting donor hairs.[1-7] These methods include punch excision,[8-11] single-bladed knife excision,[12-18] and multibladed knife excision.[11,19-29] But all of these procedures are blind techniques that do not directly visualize hair follicles. Though mutlibladed knives make the donor hair harvesting procedure more efficient, this tech-nique clearly jeopardizes many hair follicles during the harvesting procedure.[30] Several studies have demonstrated that some transected hair follicles continue to grow, but the quality of these hairs is often poor.[31-32] Careful examination of the occiput reveals that this region of the skull is quite irregular in topography and the hair follicles are, in fact, somewhat

randomly arranged (Figure 1). Because of this, a small change in the angle of the scalpel or punch can result in transection of many hair follicles.

Minimizing the number of transected hair follicles using currently available methods depends on the surgeons' efforts to make incisions parallel to the line of donor hair follicles. This attempt is essentially a guess of the angle of the follicles in one dimension.[33] It is virtually impossible to make the blade parallel to the hairshaft due to a significant difference in size. Excising donor follicles around the scar from a previous surgical scar or incision is even more challenging because the direction of the hair follicles near the scar is often altered.

Materials and Methods

Donor dissection is performed as follows. The area of donor tissue to be removed is marked. The area is anesthetized with 0.5% lidocaine with epinephrine utilizing the tumescent technique. A #15 scalpel blade is used to make a small 1 cm superficial incision between several hair follicles until the incision is large enough so that a pair of skin hooks can be inserted into the incision. The skin hooks are used to retract the tissue so that individual hair follicles can be visualized (Figure 2A). In patients with dense hair, an assistant applies pressure superior to the incision in order to change the angle of the hair follicles from acute to

Fig. 1 Photograph showing close-up of the hair follicles. Note the direction of the hairs in the scar nearby are diverted.

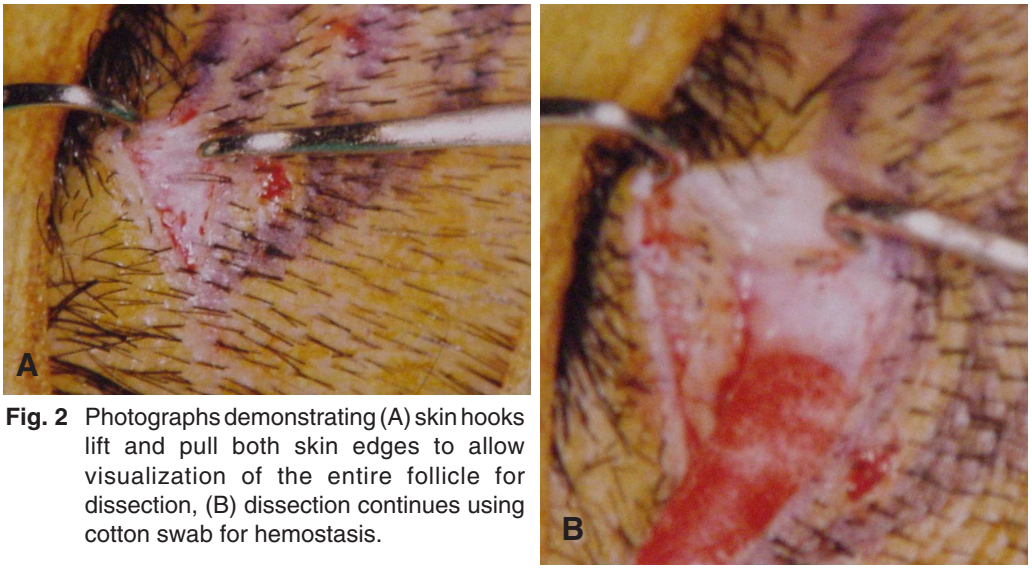

Fig. 2 Photographs demonstrating (A) skin hooks lift and pull both skin edges to allow visualization of the entire follicle for dissection, (B) dissection continues using cotton swab for hemostasis.

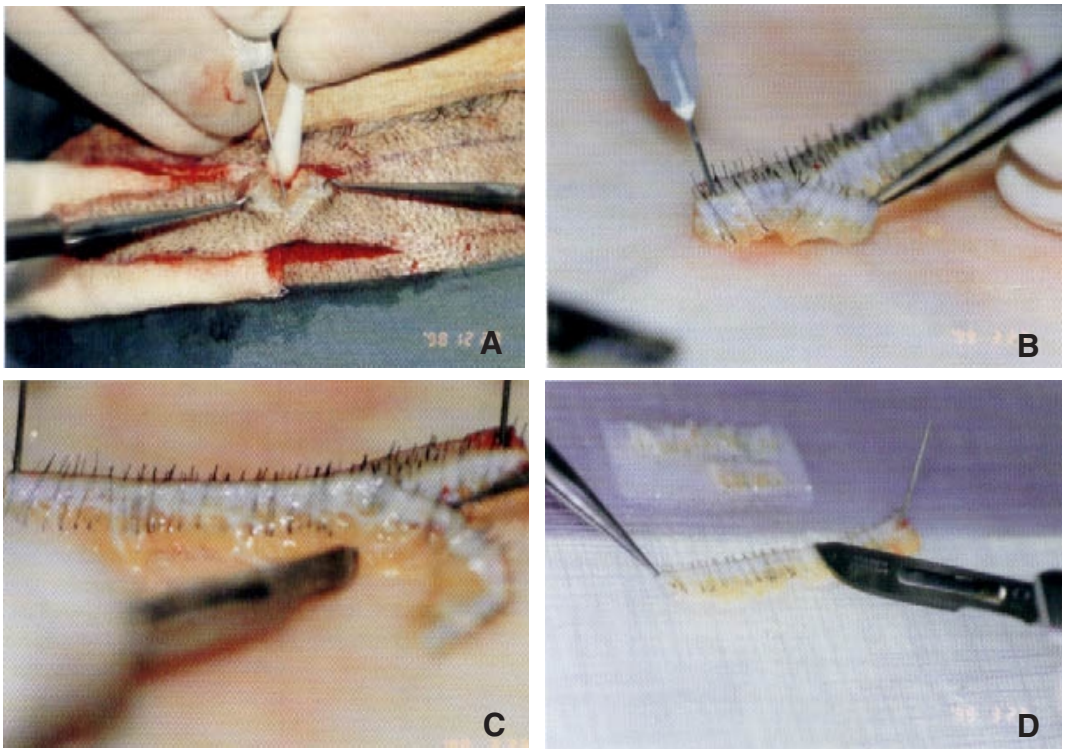

Fig. 3 Photographs illustrating steps in donor hair grafts preparation.
(A) : After 7 cm of ellipse is dissected on both sides, it is divided and given to the technician for further dissection.
(B) : The ellipse is dissected into narrow strips of one, two, or three rows of the follicles.
(C) : The operator pulls and abducts the strip around 90-140 degrees.
(D) : The narrow strip is dissected into mini-and micrograts as desired.

obtuse. Careful dissection is performed in a forward and downward motion or slivering using cotton swabs to maintain meticulous hemostasis (Figure 2B). The skin hooks are gradually repositioned as the dissection continues. A small roll of damp gauze may be used to pack the incision for better hemostasis.

In patients with average hair density, a # 10 blade may be used to place a superficial incision along the entire length of the planned excision. Once this superficial incision is completed, the surgeon and the assistant then use skin hooks to complete a careful dissection through the full thickness of the hair follicles. If a follicle is encountered in the incision, dissection can be altered around the follicle to prevent transection. The donor ellipse can be removed in several strips or sections using the same technique. The technicians can begin cutting individual grafts while the remainder of the donor ellipse is excised (Figure 3A).

Maintaining a dry field is critical to the successful application of this technique. The author recommends utilizing the phrase "cut what you see and see what you cut". Donor hairs should be trimmed prior to excision, and the use of x 2 magnification is recommended.

Once the donor tissue has been excised, individual graft dissection may proceed by the method described by Limmer,[5] or by our own method which involves dissecting the large excised piece of tissue into multiple narrow strips and then cutting them into mini - or micrografts utilizing transillumination. This is accomplished by first fixing the excised tissue to a sterile piece of silicone using 23 gauge needle which is embedded in the sterile saline to prevent the dryness in the small container (Figure 3B). The nurses or technicians dissect the tissue utilizing # 15 scalpel blades and loop for magnification. Modified hook forceps are used to place the tissue under tension and facilitate careful dissection between hair follicles. The large piece of donor tissue is initially divided into thin strips of 1-3 mm in thickness (Figure 3C). These thin strips will allow the transmission of light through the

Table 1 Data of hair follicles transection during donor site harvestment in 50 consecutive patients

Patient		Surface area* (cm^2)	Density+ (per cm^2)	Transection from donor harvesting (%)	Total number of mini- micrografts	Transection from ellipse to mini- micrograft (%)
1	Mr. J	17.30	170	0.68	747	0.65
2	Mr. T	22.05	165	1.24	1,478	0.56
3	Mr. R	24.58	125	1.75	1,498	1.65
4	Mr. R	20.70	1.40	3.31	1,069	2.02
5	Mr. P	26.84	137	1.77	1,233	0.89
6	Mr. P	20.45	145	1.52	905	0.88
7	Mr. P	30.30	165	0.80	1,490	1.37
8	Mr. B	13.90	162	1.11	767	0.90
9	Mr. K	21.90	145	4.15	1,099	1.70
10	Mr. N	15.30	205	1.12	985	1.28
11	Mr. S	21.55	122	0.57	1,049	0.49
12	Mr. P	37.40	160	0.75	2,103	0.69
13	Mr. A	32.50	150	0.21	1,571	0.92
14	Mr. V	16.05	232	1.21	1,171	1.56
15	Mr. S	11.80	180	0.47	746	1.29
16	Mr. V	4.85	170	1.21	470	1.31
17	Mr. P	5.85	180	1.42	466	0.92
18	Mr. P	13.90	265	0.81	1,219	1.60
19	Mr. J	10.25	170	1.15	682	1.04
20	Mr. C	16.30	172	1.43	1,152	1.08
21	Mr. K	17.10	177	3.30	761	1.75
22	Mr. Y	26.60	147	1.53	1,263	1.26
23	Mr. A	26.25	132	2.02	1,401	1.57
24	Mr. N	21.15	150	4.73	1,243	2.28
25	Mr. M	13.40	230	4.00	1,057	1.90
26	Mr. V	15.25	182	2.34	1,222	1.40
27	Mr. C	19.58	132	2.51	1,101	0.79
28	Mr. C	15.70	135	1.65	963	1.08
29	Mr. M	29.30	135	1.64	1,522	1.00
30	Mr. V	16.75	225	3.71	1,076	1.71
31	Mr. A	8.40	150	1.58	784	1.14
32	Mr. C	20.65	165	1.61	1,416	0.88
33	Mr. L	22.80	160	3.15	1,540	1.85
34	Mr. P	7.95	182	0.95	881	1.40
35	Mr. B	22.30	155	1.22	1,083	0.65
36	Mr. A	26.00	160	1.05	1,368	1.04
37	Mr. N	8.45	160	4.16	661	1.36
38	Mr. K	3.80	175	2.85	380	2.36
39	Mr. P	21.00	165	2.66	1,237	1.17
40	Mr. B	24.00	165	3.17	1,311	1.54
41	Mr. L	18.95	165	1.60	1,079	0.86
42	Mr. T	17.48	190	1.84	1,081	0.66
43	Mr. P	11.75	210	3.43	963	0.80
44	Mr. N	5.04	170	2.35	539	1.80
45	Mr. T	26.09	145	0.40	1,359	0.60
46	Mr. P	9.25	200	3.33	883	1.25
47	Mr. S	25.20	140	2.23	1,506	0.67
48	Mr. M	19.75	157	2.12	1,315	0.79
49	Mr. K	10.20	225	2.45	1,013	1.54
50	Mr. I	12.30	160	2.55	924	1.15
Total				**1.97**		**1.21**

Overall rate of transection for entire hair transplant procedure = (1.97 + 1.21) ÷ 2 = 1.59%

**Surface area = total surface area measured by the nurse after the ellipse was removed.*

+Density = counted by the doctor with Rassman densitometer

tissue and facilitate dissection (Figure 3D). Throughout the dissection process, the operator utilizes skin hooks to open the tissue and directly visualize follicles as they are dissected.

One disadvantage of this technique is that it is time consuming. However, with experience, the entire donor area can be harvested within 10-15 minutes. The author currently utilizes two registered nurses and two technicians to divide the donor tissue into follicular grafts.

Results

Careful study in 50 consecutive patients revealed 1.97 per cent of hair follicles being transected during the harvesting of the donor ellipse.

The most common site of transection was in the dermal papillae. Dissection of the donor tissue into individual grafts resulted in a transection rate of 1.21 per cent. The overall rate of transection for the entire hair transplant procedure was 1.59 per cent (Table 1).

Discussion

Donor dissection is an open technique for harvesting and dissecting donor hair follicles for transplantation. The results of this analysis demonstrate minimal transection of hair follicles in 50 consecutive patients. This technique also minimizes injury to neurovascular bundles during the donor hair harvesting procedure because they can be visualized and avoided. Hemostasis is maintained during this procedure as one packs the incision while proceeding with the dissection. Although initially the technique may be time consuming, ultimately the procedure can be accomplished in 10-15 minutes. In the author's experience with this technique of more than 600 hair transplant procedures compared to the past, speeding up the transplant procedure is not worth sacrificing hair follicles, as patients often have limited donor hair supplies. It is worthwhile to spend several extra minutes and save nearly 10 per cent of the hair follicles that may be inadvertently transected. As we have used blind techniques for harvesting donor hairs over the past several decades, it is time to open our eyes and change to this open technique of donor hair harvesting especially in a very curly hair situation.

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