Optimizing the efficiency of recipient area estimation: a comparative study

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Planning of the recipient area requires an artistic hairline design as well as an accurate outline of the thinning area that needs cosmetic improvement in order for each step of the surgery to be as precise as possible. Based on the total area of coverage, the size of donor area that should be harvested can be decided. From the size of donor area, the number of grafts, which depends on the size of the grafts, can be determined. This sequence is very important for planning the surgery (Figure 1).[1]

In the past, hair transplant surgeons have used different shaped stencils with predetermined areas to superimpose over the proposed recipient zone. Farjo, et al. suggested the principle of measuring the size of the recipient area by dividing it into simple geometric shapes, such as triangles, rectangles, squares, or circles.[2] Cole proposed using the formula for the surface area of an ellipse to measure the total area of the forelock and crown = pi (A)(B), where A is one-half the length and B is one-half the width.[3] Farjo further suggested that if only the forelock needs to be measured, then one could simply divide the total of the above calculation by 2.[4]

Where should the area of thinning hairs be marked and measured?

Figure 1. Preoperative assessment photos. *Left:* Wet hair; *right:* zoning and marking.

Chang, et al. published the use of a polyurethane wrap (i.e., Saran Wrap) on a circular embroidery ring to trace the recipient area and utilize a 1cm² grid for the area estimation.[5] The method described by Chang is simple and easy to apply.[6] One method is to count the intersections in the grid using the principle of morphometrics,[5] and the number of intersections will closely approximate the area inside the tracing in centimeters squared.[6] However, for a more accurate estimation, counting the actual number of blocks is preferred.[6]

We have adopted Chang's method since 2001, however, we have noted some problems in using this method of calculation:

1. Skin markings are not clearly visible on all skin or hair types, especially with existing hair.
2. Rocking of the Saran Wrap on the three-dimensional scalp curvature limits the ability to precisely trace the marked line and results in poor reproducibility.
3. There is inadequate estimation of the traced area via the 1cm² grid scale, especially at the periphery of the markings.

All these variables led to variations in area calculation among staff members of our clinic.

It is important that the area estimation be valid, be as precise as possible, and be reproducible at all times. For example, a slight difference of 5cm² (especially if we are planning dense packing with 50 grafts per square centimeter) could make a difference in estimation of 250 grafts.

To develop an efficient, accurate, and reproducible methodology for scalp recipient area measurement, we have refined Chang's method and compared results with the existing methods of area estimation. Our results were displayed during the free abstract paper presentation at the ISHRS Regional Live Surgery Workshop in June 2010 in Bangkok, Thailand.