

Hair Transplantation in the Cicatricial Alopecias

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Abstract

Cicatricial alopecia (CA) causes irreversible hair loss and negatively affects self-image and self-esteem of patient. Cicatricial alopecias are divided into two main groups as "primary" and "secondary" cicatricial alopecias. Spontaneous regrowth of hair in case of cicatricial alopecia can rarely occur. Cicatricial alopecias can be treated by certain surgical procedures such as excision, flap surgery, scar reduction with gradually tissue expansion, and hair transplantation. The most important determining cause for surgery success of cicatricial alopecia surgery is the low blood flow of the recipient region. Follicular Unit Extraction (FUE) method is preferred for hair transplantation for cicatricial alopecia. FUE method is mostly preferred in patients who have large areas of scattered cicatrices in recipient region. Cicatricial alopecia patients with no active disease signs should have more alternative therapeutic options. One of those options can be hair neogenesis from autologous adult hair follicle cell populations in the future.

Keywords: Cicatricial alopecia; Hair transplantation; Follicular unit extraction method

Introduction

Cicatricial Alopecia (CA) causes irreversible hair loss and negatively affects self-image and self-esteem of the patient. Cicatricial alopecia leads to permanent damage of the stem cells in the hair follicle bulge. Clinically, there is effacement of follicular orifices, always in patchy or focal distribution. A biopsy is confirmative, showing replacement of follicles with fibrotic stellae and either fibrosis or hyalization of surrounding collagen. Cicatricial alopecias are divided into two groups as "primary" and "secondary" cicatricial alopecias [1,2].

Primary cicatricial alopecias

Primary cicatricial alopecia consists a diverse group of inflammatory diseases that has an unknown etiology. They lead to permanent loss of both hair shafts and visible follicular ostia and cause pathological replacement of follicular structures with fibrous tissue [1]. Table 1 shows the most common diseases causing cicatricial alopecia [3].

Secondary cicatricial alopecias

The secondary cicatricial alopecias can be caused by almost any cutaneous inflammatory processes of the scalp skin or by physical trauma, which damages the skin and skin appendages. Table 2 shows main diseases causing secondary cicatricial alopecia [1].

On the other hand, according to the clinical course, cicatricial alopecias are divided into two groups as "unstable" and "stable" cicatricial alopecias. Unstable Cicatricial Alopecias (UCA) may have increased recurrences and, disease can occur intermittently over time. Many disorders including lichen planopilaris, pseudopelade of Brocq, and discoid lupus erythematosus can cause unstable cicatricial alopecia. Stable Cicatricial Alopecias (SCA) are secondary to isolated traumas that cause stable scarring in a hairy skin regions. Unlike UCA, after successful correction by surgery, there is no need for the constant vigilance in case of stable cicatricial alopecia. The common causes of SCA include trauma, burns, infection, radiation, and prior surgeries of head and facial areas [4].

Treatment Options

Spontaneous regrowth of hair in case of cicatricial alopecia hardly ever occurs. Therefore, aim of treatment in primary cicatricial alopecias is to reduce the symptoms of the disease and, to prevent the formation of a scarring. As a general rule, lymphocyte-predominant subgroup of

primary cicatricial alopecias is treated with immunosuppressive agents. Neutrophil-predominant subgroup of primary cicatricial alopecias is treated with antimicrobials or dapsone. Surgical treatment of stable cicatricial alopecia includes hair transplantations, primer excision of affected area, flap surgery, or scar reduction with tissue expansion [5,6].

Hair transplantation

Hair transplantation has become popular in recent years as a method of treating hair loss. Reports of successful hair transplants began in the 1930s in Japanese literature. In 1968, Stoch et al. have reported the use of autologous hair transplantation for the treatment of cicatricial alopecia. The large graft which are used throughout the 1960s and 1970s are eventually replaced by mini-grafts in the 1980s and mini-micrografting in the early 1990s. 'Follicular Unit Transplantation'

Lymphocytic
Chronic cutaneous lupus erythematosus
Lichen planopilaris (LPP)
• Classic LPP
• Frontal fibrosing alopecia
• Graham little syndrome
Classic pseudopelade
Alopecia mucinosa
Central centrifugal cicatricial alopecia
Keratosis follicularis spinulosa decalvans
Neutrophilic
Folliculitis decalvans
Dissecting cellulitis
Mixed
Acne keloidalis
Acne necrotica
Erosive pustular dermatosis
Non-specific

Table 1: Primary cicatricial alopecias.

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Trauma
Burns
Radiation-induced alopecia
Prior hair transplantation
Traction alopecia
Trichotillomania
Congenital
Aplasia cutis congenita
Conradi-Hunermann Syndrome (Chondrodysplasia punctata)
Incontinentia pigmenti (Bloch Sulzberger disease)
Ankyloblepharon
Hallerman-Streif Syndrome
Generalized atrophic benign epidermolysis bullosa
Others
Infections
Metastatic primary neoplasm
Graft-versus-host disease

Table 2: Secondary cicatricial alopecias.

(FUT) method first introduced to the medical literature in 1995. Subsequently, in 2002, 'Follicular Unit Extraction' (FUE) method was described by Rassman and Bernstein [7-9].

Follicular Unit Extraction method is the process that nearly 1 mm diameter micrografts taken from the donor area are placed into pre-drilled holes in the recipient region. This technique has provided a less invasive method for graft production, without the formation of a linear scar and it results in much less pain and discomfort at the donor site. Follicular Unit Extraction method the main disadvantage of hair transplantation is the increased time required to extract grafts. Donor harvesting in the same area may be limited because of the "punched out" sites. Scar tissue formation can occur on the punched out sites, and it is the real limitation factor for that treatment. And higher rates of transection can cause higher possibility of inflammation and cyst formation [4,9].

Cicatricial alopecia and hair transplantation

Prior to hair restoration process, one must demonstrate that cicatricial alopecia is not active and causing scarring alopecia. However, decision of choosing which treatment method depends on the type of cicatricial alopecia, and also on additional interdependent factors: the availability of donor hair, scalp laxity, the patient's healing characteristics, vascular supply, and the location of the subsequent scar [2,4,10].

FUE method is preferred for hair transplantation in cicatricial alopecia. FUE method is a more preferable method for the patients with large areas of scattered cicatrices in recipient region. The most important determining factor for surgery success of cicatricial alopecia surgery is the low blood flow of the recipient region (Figure 1). In addition to, low blood flow can cause infection, tissue ischemia and necrosis after surgery [2,4].

Several authors advised the use of topical minoxidil solution (2-5%) on the recipient area for two weeks before, and at least five weeks after surgery. The effects of minoxidil are accepted increased vasodilation and blood flow, long lasting anagen phase, and finally graft survival improvement. Pentoxifylline used 400 mg three times a day with meals, for 2 weeks before surgery can be another alternative method for expanding oxygenation of the scalp tissue [4,11,12].

In addition to that, thermal ablative lasers can be used for a faster wound healing and a better cosmetically accepted result. The new vascular formation, certain growth factors and cytokines occurring during the wound healing process after laser therapy speed up hair

growth. If CO₂ laser is used before the hair transplantation, the blood flow of recipient area can increase [13].

Anesthesia

Anesthesia for non-cicatricial hair transplantation is usually provided with a ring block technique. The injections involve the use of 0.5% lidocaine, 0.25 bupivacaine which is mixed with epinephrine on the day of surgery to obtain a solution of 1/200.000 epinephrine. Epinephrine should be minimized in cicatricial hair transplantation because it may decrease the blood supply and therefore graft survival. Approximately 0.75 ml of anesthetic substance is injected into the subcutaneous fat layer 1 cm below the lower portion of the clipped area per centimeter of donor area. This anesthesia can extend several centimeters beyond on each side [7,14].

Donor selection and harvest

The donor area is accepted as the region containing hair and unaffected by hair loss. In males and females, the donor areas are different from each other. In males, the best donor area is the middle of the most dense region of hair and these areas are usually on the occipital, parietal, and posterior temporal regions. In females, the donor areas are the occipital and postero-parietal areas. The main factors that determine the amount of hair to be harvested are the largeness of the recipient area, the density of follicles per cm² in the donor area, and the slackness of the scalp (Figure 2) [15,16].

Recipient site sizes

Vascular perfusion is very important in creation of recipient area



Figure 1: Before hair transplant in the area of cicatricial alopecia.



Figure 2: Hair follicles.

to get enough adequate tissue. The recipient area holes can be opened with the help of minute punch, scalpel, different sorts of needles, CO₂ or Er:YAG lasers. While choosing which technique to use, one should consider the diameter of the recipient area. Although there are many viable options, the followings are used by many practitioners:

- 21-Gauge hypodermic needle for one-hair follicular unit grafts
- 20-Gauge for thin two-hair follicular unit grafts.
- 19-Gauge needle for thick multi-hair follicular unit graft.
- 18-Gauge for very thin hair [7].

Also ablative laser methods can be used for opening the recipient holes. Er:YAG laser treatment has been demonstrated to be effective for opening recipient holes in cicatricial alopecias. Er:YAG laser can do that by heating the tissue up to 70°C. Er:YAG laser pulse must be below the thermal relaxation time of skin for protection of epidermal layer [8,17,18].

Recipient site density

In cicatricial alopecia surgery, one of the most difficult decision of the surgeon is to decide the number of incisions (grafts/cm²) created in the recipient area (Figures 3 and 4). In case of non-cicatricial alopecia, transplanting up to 25-30 Follicular Unit (FU) per cm² is generally recommended. The number of incisions (grafts/cm²) is determined according to the perfusion feature of recipient area. Regions with less blood supply should have site at most 15–20 FU/cm². For the regions with better perfusion it is generally safe to increase the concentration



Figure 3: After transplantation in the area of cicatricial alopecia.



Figure 4: Seven days after transplantation in the area of cicatricial alopecia.

of follicles to as high as 20–30 FU/cm². As a general rule, higher FU densities are not recommended in areas of cicatricial alopecias [4,7].

Complications

The most important complications of the cicatricial alopecias include ischemia, tissue necrosis and infection. It is very important to be aware of what to do when necrosis develops. Firstly, the area should be debrided. And secondly, it must be left to heal by secondary intention. The other choice, during initial procedure is being produced the lower graft density and performed a second surgery on the same area. The time of second surgery can be 9-12 months later.

The other possible complications can be postoperative hypo- or hyperaesthesia in surgically treated areas (lasting 6-18 months), postoperative edema, postoperative telogen effluvium in hair-bearing areas. Most of these complications are not crucial for the patients and they resolve spontaneously [19].

Conclusion

Cicatricial alopecia patients having no active disease signs should have more alternative effective therapeutic options. These options can be hair neogenesis from autologous adult hair follicle cell populations in the future.

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