

Innovations

Customized short punches for mini punch grafting in vitiligo

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ABSTRACT

Vitiligo, a chronic skin disorder characterized by depigmented patches, often presents challenges in management due to the unpredictable nature of repigmentation. Mini punch grafting, a surgical technique, is a widely accepted treatment for stable vitiligo. This article focuses on the innovative use of customized short punches in mini punch grafting. The aim is to provide insights into their advantages, the customization process, and their role in improving outcomes for vitiligo patients.

Keywords: Customized short punches, Mini punch grafting, Repigmentation, Surgical treatment, Vitiligo

PROBLEM STATEMENT

Vitiligo is a result of disrupted epidermal melanization with an undecided etiology and incompletely understood pathogenesis.¹ Among the commonly employed surgical techniques for vitiligo, tissue grafting methods have gained significant attention for their effectiveness in stable cases. The most widely used techniques include Thin Thiersch's grafting, suction blister grafting, punch grafting, and mini punch grafting (MPG).² Stable vitiligo, where disease progression has halted for at least a year, is a prime candidate for surgical interventions such as MPG. MPG involves the transplantation of small, full-thickness skin grafts from normally pigmented areas to depigmented patches.

Follicular unit extraction (FUE) punches are specialized surgical instruments primarily used in hair transplantation but also adapted for vitiligo surgery, especially in procedures like MPG. The procedure involves harvesting tissue, typically from concealed areas such as the upper thigh or gluteal region. This is done using a punch biopsy tool fitted with a blade, which extracts a cylindrical core of tissue. The process can be performed either manually or with the assistance of a motorized device. The traditional use of punches, ranging from 1.5 mm to 2 mm in length [Figure 1] has shown success in repigmentation but is not without limitations. Cobblestoning, variegated appearance and color mismatch, static graft, depigmentation of graft, perigraft halo, and graft rejection are complications at the recipient site, and hypertrophic scars and depigmentation are complications at the donor site.²

The introduction of customized short punches offers a potential solution by addressing these limitations while enhancing the precision and efficacy of the procedure.



Figure 1: Standard follicular unit extraction punches with longer length.

RECOMMENDED SOLUTION

Punch grafting involves the extraction and transplantation of small circular grafts of pigmented skin, typically harvested using biopsy punches measuring 2–3 mm in diameter and 1.5–2 mm in length.²

We propose using customized short punches that are specifically designed to optimize graft harvesting and placement. The customization of punches involves modifying the standard instruments to produce shorter, more precise punches suited to the delicate nature of MPG in vitiligo. The punches have diameters ranging from 0.9 mm to 2 mm, allowing for precise extraction of small, uniform skin grafts. The length of each punch is limited to 0.5–1.5 mm, [Figure 2] ensuring extraction of only the topmost layers of the skin (epidermis and superficial dermis), which minimizes donor-site trauma while ensuring optimal graft quality and successful repigmentation. Shorter punches also prevent deeper-than-needed cuts, minimizing trauma to the surrounding tissue and reducing the risk of visible scarring at the donor site, which is particularly important when donor areas are exposed or esthetically significant (e.g., face and forearms).

The punches are made from high-grade, sterilizable stainless steel, ensuring durability and sharpness throughout the procedure [Figure 3].

To enhance efficiency, these customized punches are designed with motorized assistance. When attached to a motorized device, the punches significantly reduce the time required for both graft harvesting and recipient site preparation, making



Figure 2: New modified punches with shorter length.

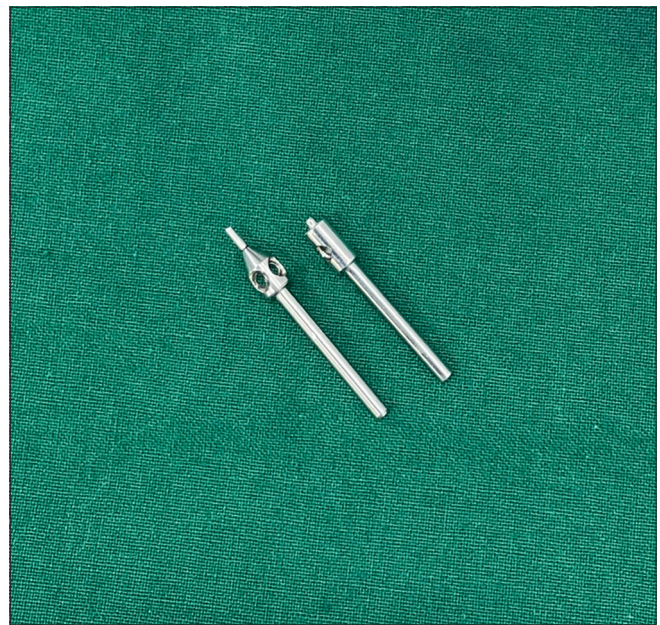


Figure 3: The difference between both the punches.

the procedure faster and less labor-intensive for the surgeon. This motorized option improves consistency, and the precise, shallow punches ensure better integration of grafts by perfectly fitting into recipient sites, thus reducing the risk of complications such as cobblestoning or graft failure.

Employing advanced tools like customized punches helps surgeons stay at the forefront of medical innovation, offering cutting-edge treatments to patients. The use of customized short punches can help surgeons refine their technique with more precise tools, leading to improved outcomes and higher patient satisfaction, which would elevate a surgeon's confidence in performing vitiligo surgery [Table 1].

Table 1: Difference between traditional punch & modified new punch.

Aspect	FUE punches	Modified short punches
Length of the punch	Longer punches designed for deeper tissue access (1.5–2 mm)	Shorter punches for superficial tissue sampling (0.5–1.5 mm)
Depth control	Requires manual or motorized adjustment for depth precision	Naturally limits depth, reducing the risk of over-harvesting
Grafts of different length	Can harvest grafts of varying lengths for diverse needs	Best suited for shorter grafts with limited length variation

FUE: Follicular unit extraction

Shortcomings of short punches

1. High cost: Short punches are more expensive, and their use often increases the overall procedure cost
2. Skill and equipment dependency: They need motorized tools and expert training, making them harder to use in low-resource setups.

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