SURGICAL AND MINIMALLY INVASIVE REPIGMENTATION STRATEGIES IN STABLE VITILIGO: COMPARATIVE EFFICACY OF MELANOCYTE TRANSPLANTATION TECHNIQUES IN CLINICAL PRACTICE

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Annotation: *This study comparatively evaluates the clinical efficacy and safety of three invasive repigmentation methods - split-thickness skin grafting, suction blister epidermal grafting, and cultured nonautologous melanocyte-keratinocyte transplantation - in patients with stable nonsegmental vitiligo refractory to conventional pharmacological therapy. Objective colorimetric analysis, dermoscopic monitoring, and patient-reported outcomes confirm distinct efficacy profiles and optimal indication criteria for each surgical modality.*

Keywords: *vitiligo surgical treatment, suction blister grafting, melanocyte-keratinocyte transplantation, split-thickness grafting, stable vitiligo, repigmentation, dermoscopy, colorimetric analysis, autologous cell suspension, Melanocyte Keratinocyte Transplantation Procedure.*

Nowadays, a substantial proportion of vitiligo patients - estimated at 20-30% of the affected population - present with pharmacologically refractory stable disease unresponsive to phototherapy, topical calcineurin inhibitors, and systemic immunomodulatory agents, necessitating consideration of invasive repigmentation strategies. Stability criteria, defined internationally as the absence of new lesion development and absence of existing lesion expansion over a minimum period of two years, represent the essential precondition for

surgical candidacy, as active autoimmune melanocyte destruction would predictably ablate transplanted cells and preclude durable repigmentation. Recent advances in cell culture technology and minimally invasive delivery systems have significantly expanded the clinical applicability and outcome predictability of surgical repigmentation procedures.

Three invasive repigmentation modalities were comparatively assessed in this prospective controlled study enrolling 108 adult patients with stable nonsegmental vitiligo confirmed by serial clinical, dermoscopic, and Wood's lamp examination. Lesion sites were stratified by anatomical location - face, trunk, and acral regions - and randomly allocated to one of three surgical interventions: split-thickness skin grafting, suction blister epidermal grafting, or cultured Melanocyte Keratinocyte Transplantation Procedure utilizing a non-trypsinized epidermal cell suspension.

Split-thickness skin grafting, performed using a dermatome calibrated to 0.2-0.3 millimeters harvesting depth from the gluteal donor site, yielded complete repigmentation defined as greater than 90% color restoration in 61.4% of facial lesions at the twelve-month evaluation, with significantly inferior outcomes observed in acral locations where repigmentation rates declined to 28.3%, consistent with established literature on reduced follicular melanocyte reservoir density in glabrous skin.

Suction blister epidermal grafting, employing negative pressure of 200-250 millimeters of mercury applied for 90-120 minutes to generate epidermal blisters on the inner thigh donor site, demonstrated superior cosmetic color matching due to preservation of native melanocyte-to-keratinocyte ratios within the transferred epidermal sheet, achieving excellent colorimetric concordance as quantified by Mexameter melanin index measurement in 74.1% of facial and neck recipients. The Melanocyte Keratinocyte Transplantation Procedure produced the highest overall repigmentation rates across all anatomical sites, achieving complete repigmentation in 79.6% of facial, 68.4%

of truncal, and 47.8% of acral lesions, with the additional advantage of treating lesion surface areas up to tenfold larger than the donor harvest area. Dermoscopic follow-up at six months confirmed perifollicular and marginal repigmentation patterns preceding confluent pigment restoration, confirming that transplanted melanocytes successfully colonized the follicular reservoir and initiated centrifugal repigmentation. No graft rejection episodes, hypertrophic scarring at donor sites, or Koebner phenomenon were recorded during the observation period across all three intervention groups.

Invasive repigmentation techniques demonstrate anatomical site-dependent efficacy profiles in stable vitiligo, with the Melanocyte Keratinocyte Transplantation Procedure providing superior coverage efficiency and repigmentation rates, establishing surgical melanocyte restoration as an evidence-based and clinically indispensable component of comprehensive vitiligo management protocols.

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