


Clinical Applications of Punch-Based Techniques in Dermatologic Surgery

Mingtu Du, Haiyan Qin, Lianbo Zhang 

Department of Plastic Surgery, China-Japan Union Hospital of Jilin University, Changchun, Jilin Province, People's Republic of China

Correspondence: Lianbo Zhang, Department of Plastic Surgery, China-Japan Union Hospital of Jilin University, Changchun, Jilin Province, People's Republic of China, Tel +86 136 6430 0999, Email lianbo@jlu.edu.cn

Abstract: Punch-based techniques are widely used minimally invasive surgical procedures in dermatologic surgery. Beyond diagnostic use, punch-based procedures are increasingly applied therapeutically across multiple conditions. This review summarizes the current therapeutic applications of punch-based techniques and discusses the strengths and limitations of existing evidence. Current literature supports the use of follicular unit extraction (FUE) for androgenetic alopecia, with generally predictable and reproducible outcomes. In contrast, applications of punch-based techniques for scar improvement, vitiligo repigmentation, chronic wound repair, pilonidal sinus management, and keloid volume reduction are more heterogeneous, and their efficacy often depends on disease stability, combination treatment strategies, and operator experience. Punch elevation, as an adjunctive technique, may improve outcomes in selected atrophic acne scars. In benign cutaneous and subcutaneous lesions, punch excision offers favorable cosmetic advantages due to its limited incision length. Across different indications, most evidence derives from small observational studies or case series, and long-term controlled data remain limited. Overall, punch-based techniques provide precise and tissue-preserving therapeutic options in dermatologic surgery; however, their clinical value varies substantially depending on the specific indications. Further standardized and prospective studies are needed to clarify their long-term efficacy and optimal positioning within treatment algorithms.

Keywords: Minimally invasive dermatologic techniques, skin transplantation, keloid, follicular unit extraction

Introduction

Punch-based techniques refer to surgical procedures that use a cylindrical blade to create a controlled circular defect in the skin. These techniques have a long history and are widely applied in dermatologic surgery. As early as the late 19th century, punch instruments were introduced for diagnostic purposes such as biopsy.¹ In the mid-20th century, their use gradually expanded to therapeutic applications, including lesion excision, scar revision, and autologous skin grafting.^{2,3} In the 1970s, Orentreich et al reported clinical experience using punch techniques for skin grafting, laying the foundation for the widespread adoption of punch grafting.^{4,5}

The core advantages of punch-based techniques include procedural simplicity, limited tissue trauma, and relatively small scar size. They can be applied to various dermatologic surgical indications, including lesion excision, tissue grafting, and management of pressure ulcers or chronic wounds. As a diagnostic tool, punch biopsy provides full-thickness skin samples and remains essential for the pathological evaluation of inflammatory and neoplastic skin diseases.^{6,7} Although punch biopsy continues to play an indispensable role in dermatologic diagnosis, this review focuses specifically on the therapeutic applications of punch-based techniques.

In surgical hair restoration, follicular unit extraction (FUE), which removes follicular units through microcircular punches, has become a mature and widely accepted treatment for androgenetic alopecia, with high graft survival rates and favorable donor-site healing.^{8,9} In pigmentary disorders, mini-punch grafting has achieved sustained repigmentation in stable vitiligo and other refractory depigmented lesions. In the management of chronic wounds and keloids, punch-based techniques have been used for wound volume remodeling, graft implantation facilitation, and in combination with

other treatments to improve structural and functional outcomes. These diverse cross-indication applications reflect the broad potential value and clinical importance of punch-based techniques in dermatologic surgery.¹⁰

Although punch-based techniques have demonstrated clinical potential across multiple fields, their efficacy, optimal technical parameters, and evidence strength across different indications have not been fully integrated. Some areas (such as androgenetic alopecia) are supported by relatively abundant experiential data, whereas other exploratory applications (such as autoimmune alopecia and complex chronic wounds) rely primarily on small observational studies or case reports.^{11,12} Existing literature is often presented as isolated reports, lacking a cross-disease synthesis based on mechanistic rationale and comparative evidence strength. Therefore, this review aims to provide a structured overview of the current applications, efficacy characteristics, and research limitations of punch-based techniques in major dermatologic surgical indications from the perspectives of technical principles, clinical evidence, and mechanistic considerations, thereby providing a clear framework and reference for future clinical practice and research in this field.

Punch Grafting Hair Restoration

In the field of androgenetic alopecia (AGA), follicular unit extraction (FUE) based on punch harvesting has become a well-established and widely applied surgical approach. Multiple retrospective studies and large case series consistently report graft survival rates exceeding 90%, with some large single-session transplantation studies demonstrating survival rates approaching 95% and patient satisfaction rates exceeding 80%.^{13–17} In female pattern hair loss populations, FUE has also demonstrated high graft survival rates and favorable donor-site recovery.¹⁸ Overall, current evidence supports that FUE provides stable efficacy and good reproducibility in AGA, with a high degree of clinical predictability.

In contrast, the application of FUE for scarring alopecia is more selective. Some small case series report graft survival rates exceeding 80% during the stable phase of the disease; however, due to substantial variation in vascular supply within scarred areas, treatment outcomes fluctuate considerably.^{19,20} Existing studies are limited by small sample sizes and are predominantly retrospective observations, with a lack of standardized disease classification and long-term follow-up data.^{21–25} Therefore, the role of FUE in scarring alopecia is more appropriately regarded as an individualized reconstructive option for patients in the stable phase, rather than a universally applicable strategy.

For alopecia areata and temporal triangular alopecia, current evidence is primarily derived from case reports or small cohort studies.^{26,27} Although isolated cases have achieved long-term hair growth following transplantation during the stable phase, the inherent fluctuating and immune-mediated nature of these diseases makes sustained efficacy difficult to ensure through transplantation alone. Currently, systematic investigations evaluating long-term safety and recurrence risks are lacking. Therefore, the application of FUE in these conditions should be considered exploratory and should not be equated with the mature level of evidence available for AGA (Table 1).

Scar Repair and Pigmentary Disorders

Punch grafting has also been used to treat atrophic scars and stable vitiligo. Most studies report improvement in appearance and promotion of repigmentation. A clinical case utilizing modified punch excision combined with subcision and grafting successfully improved atrophic acne scars.²⁸ For linear hypopigmented scars, punch grafting with 0.6-mm micrografts achieved uniform repigmentation after a mean follow-up of approximately one year, without significant complications. In addition to pigment improvement, SCAR scale scores demonstrated significant improvement in scar expansion and overall appearance.²⁹

In stable vitiligo, punch grafting-related techniques have developed a relatively concentrated evidence base. Overall, existing studies consistently demonstrate high rates of repigmentation, typically exceeding 80%, with some studies approaching complete repigmentation and generally favorable cosmetic outcomes.^{30–33} Differences among technical approaches are mainly reflected in the speed of repigmentation onset, uniformity of pigment distribution, and post-operative aesthetic details, rather than in the final repigmentation success rate itself.³⁴

With regard to graft source, epidermal grafting generally shows faster initiation of repigmentation, although some studies suggest a relatively higher incidence of cobblestone changes. Follicular unit grafting may offer advantages in

Table 1 Clinical Studies Evaluating Punch-Based Techniques in Hair Restoration and Alopecia Reconstruction

Author	Disease	Design	Patients (n)	Technique	Follow-Up	Primary Endpoint	Main Findings	Limitations
Ekrem Civas ¹⁸	Female AGA	Retrospective cohort study	62	FUT vs FUE	Median 20 months	Efficacy, safety, patient satisfaction	Comparable efficacy and safety; higher patient satisfaction with FUE	Potential recall bias
Luciana Takata Pontes ¹⁴	AGA	Retrospective self-controlled study	87	FUT vs FUE	Immediate	Hair density parameters; follicular unit characteristics	Higher proportion of ≥3-hair follicular units and increased hair-to-FU ratio with FUE	No follow-up
Kai-Tao Li ¹³	Male AGA	Prospective case series	273	FUE	3 months to 1 year	Graft survival rate, patient satisfaction	High graft survival; high patient satisfaction	Non-controlled, short follow-up, severe AGA only
Meihua Di ¹⁵	Male AGA	Retrospective case series	36	FUE	≥6 months	Hair naturalness; satisfaction; safety	Improved hair naturalness; high patient and physician satisfaction; no major complications	Non-controlled, short follow-up, severe AGA only, small sample
Fang Wang ¹⁷	Male AGA	Retrospective case series	158	FUE	12 months	Graft survival; complications; satisfaction	High graft survival; low complication rate; high patient satisfaction	Non-controlled
Kavish Chouhan ¹⁶	Male AGA	Retrospective case series	820	FUE	24 months	Patient satisfaction	High patient satisfaction; favorable frontal and mid-scalp outcomes	Attrition bias, non-controlled
Hyokyung Yoo ²¹	CA	Retrospective case series	15	FUE	12 months	Graft survival; POSAS score	Improved graft survival; improved scar assessment scores	Small sample, non-controlled
Yanchao Niu ²²	CA	Retrospective case series	11	FUE	12 months	GAIS, complications	Moderate aesthetic improvement; no major complications	Small sample, non-controlled, limited to pediatric patients
De-Cong Zhu ¹⁹	CA vs nonscarring alopecia patients	Prospective cohort study	107	FUE	12 months	Graft survival; complications; patient satisfaction	Lower survival in CA vs nonscarring alopecia; similar complication and satisfaction rates	Selection Bias
Ling Zhu ²³	CA	Retrospective case series	14	FUE	12 months	Satisfaction; complications	Variable satisfaction; uneven density reported	Non-controlled, small sample
Yanchao Niu ²⁵	Postburn CA	Retrospective case series	41	FUE	12 months	Satisfaction; complications	High satisfaction; low complication rate	Non-controlled
Yanchao Niu ²⁴	Infection-related CA	Retrospective case series	9	FUE	12 months	Satisfaction; complications	High satisfaction; isolated postoperative infection	Small sample, non-controlled
Ali Fouad Elariny ²⁰	CA	Randomized Controlled Trial	20	FUE vs FUE+PRP	12 months	Graft survival rate	No significant difference between groups	Small sample
Roberto Vieira ²⁷	TTA	Retrospective case series	15	FUE	12 months	Satisfaction; complications	High patient and surgeon satisfaction; no major complications	Small sample, non-controlled

Abbreviations: AGA, Androgenetic Alopecia; FUT, Follicular Unit Transplantation; FUE, Follicular Unit Extraction; CA, Cicatricial Alopecia; POSAS, Patient and Observer Scar Assessment Scale; GAIS, Global Aesthetic Improvement Scale; TTA, Temporal Triangular Alopecia; PRP, Platelet Rich Plasma.

pigment distribution uniformity, although the onset of effect may be slightly slower.³¹ Cell suspension techniques theoretically improve melanocyte distribution uniformity, with repigmentation rates comparable to those of conventional grafting methods; however, procedural workflows and cell processing standards remain insufficiently standardized.³² Within-patient comparative studies further suggest that adjunctive stimulation measures such as needling may enhance local repigmentation responses.

Although variations exist among studies in technical details and outcome assessment measures, the overall trend indicates that punch grafting in stable vitiligo achieves high rates of repigmentation with a favorable safety profile. However, there is currently insufficient evidence to determine whether any specific graft source confers a definitive advantage, and follow-up durations are mostly limited to within one year. Therefore, at present, punch grafting provides an effective and reproducible treatment pathway for stable vitiligo; however, the optimal technical approach requires clarification through standardized randomized controlled trials (Table 2).

Chronic Wounds and Ulcers

Existing evidence suggests that the role of punch grafting in chronic wound repair may extend beyond simple wound coverage alone. Its potential mechanisms are currently understood from two main perspectives: first, the promotion of epithelial coverage and structural reconstruction, and second, modulation of the local neuro-inflammatory microenvironment, thereby alleviating chronic pain.

At the level of structural reconstruction, split-area comparative studies have shown that punch grafting applied to weight-bearing areas following tumor excision can achieve superior scar quality compared with full-thickness skin grafting.³⁵ A retrospective cohort study of chronic lower-limb ulcers reported a 12-month healing rate approaching 90%, suggesting stable effectiveness in promoting wound closure.³⁶ Similar reparative trends have also been observed in various chronic wound types, including diabetic foot ulcers, arterial ulcers, post-infectious tissue defects, and pyoderma gangrenosum. Although most related studies consist of small observational cohorts or case reports, overall findings consistently indicate reductions in wound area and promotion of epithelial regeneration.^{37–45} Recently proposed automated micro–full-thickness island grafting techniques have even been suggested to partially restore cutaneous adnexal structures; however, high-quality controlled validation remains lacking.⁴⁶

From the perspective of neuro–pain modulation, a prospective case series reported complete pain relief in approximately two-thirds of patients, and the analgesic effect showed no significant correlation with the graft survival rate. This finding suggests that therapeutic benefits may result from neural reinnervation or modulation of the inflammatory

Table 2 Clinical Studies Evaluating Punch Grafting for Vitiligo

Author	Design	Patients (n)	Technique	Follow-Up	Primary Endpoint	Main Findings	Limitations
Xiaolan Ding ³⁰	Retrospective split-body study	23	Punch graft vs SBEG	3 months	Repigmentation rate	Comparable repigmentation rates	Short follow-up, small sample
Mennah Mokhtar ³¹	Prospective split-body study	25	FUE vs punch skin grafting	6 months	Repigmentation rate	Slightly higher repigmentation in punch skin grafting group	Small sample
Mohamed Ibrahim ElGhareeb ³²	Randomized controlled trial	48	FCS transplantation vs punch skin grafting	6 months	Repigmentation grading	No significant difference	Small sample, ordinal scale limiting precision
Dong Seok Kim ³³	Randomized controlled trial	50	Epidermal vs dermal orientation	3 months	Repigmentation grading	No significant difference	Short follow-up, ordinal scale limiting precision
Magdy Ragab ³⁴	Randomized controlled trial	20	Punch graft vs transverse needling	6 months	Repigmentation rate	No significant difference	Small sample

Abbreviations: SBEG, Suction Blister Epidermal Graft; FCS, Follicular Cell Suspension.

microenvironment rather than simple mechanical coverage, although direct experimental evidence supporting these mechanisms remains insufficient.⁴⁷ This observation provides a potential biological explanation for its application in chronic wounds associated with persistent pain, such as diabetic foot ulcers.

Notably, mechanistic exploration has predominantly focused on structural coverage, whereas investigations on pain modulation remain comparatively sparse. It should also be noted that existing study populations are highly heterogeneous in etiology, interventions are not standardized, and multicenter randomized controlled comparisons with standard wound care are lacking.⁴⁸ Therefore, despite a degree of mechanistic plausibility, punch grafting is currently more appropriately positioned as an adjunctive reconstructive strategy for selected chronic wounds rather than a replacement for standard treatment pathways.

Applications in Reconstructive Surgery

In reconstructive surgery, punch-based techniques are used for pretransplant preparation of donor tissues. Case series involving patients with low hairlines have demonstrated that the removal of hair follicles from the donor area followed by scalp expansion allowed successful use of hairless flaps for auricular and nasal reconstruction.⁴⁹ Multicenter retrospective studies have reported similar applications of depilated expanded flaps.⁵⁰ Compared with other indications, reconstructive applications remain supported by relatively limited case series and primarily demonstrate technical feasibility rather than outcome-driven evidence.

Punch Elevation

Punch elevation is primarily used to improve deep atrophic acne scars, particularly well-defined boxcar scars. Overall, evidence supporting its efficacy as a standalone treatment remains limited; however, within combination treatment frameworks, it may provide structural optimization that enhances the effectiveness of subsequent remodeling procedures.

Existing clinical studies suggest that in split-face comparative designs, combining punch elevation with fractional CO₂ laser treatment achieves greater scar improvement than laser treatment alone.⁵¹ These findings indicate that mechanical elevation of the scar base may partially correct depressed scar architecture, thereby providing a more favorable tissue foundation for laser-induced collagen remodeling.

Nevertheless, current studies are limited by small sample sizes and relatively short follow-up durations and are largely confined to acne-related atrophic scars, with insufficient validation in other scar types. In addition, direct comparisons between punch elevation and other physical release techniques, such as subcision or filler-based treatments, remain scarce. Therefore, punch elevation is more appropriately regarded as an adjunctive technique for specific scar types rather than an independently established therapeutic modality.

Punch Excision for Cutaneous Lesions

Debulking Treatment of Keloids

Overall, punch-based techniques in the treatment of keloids primarily serve a “debulking” function. They are typically implemented as part of a comprehensive therapeutic strategy and are combined with intralesional injection or radiotherapy. Existing studies collectively suggest that, compared with injection therapy alone, punch-assisted debulking combined with adjunctive treatment may improve short-term efficacy and help reduce the risk of recurrence. However, evidence directly comparing long-term control outcomes and the relative advantages of different technical approaches remains lacking.

With respect to single-punch techniques, split-lesion comparative studies have shown that, compared with intralesional triamcinolone injection alone, single-punch excision combined with injection achieves higher clinical improvement rates and a lower tendency toward recurrence, with more pronounced improvement in scar scale scores.⁵² Nevertheless, these studies are limited by relatively small sample sizes, and most did not employ blinded outcome assessment, leaving a potential risk of observational bias.

Regarding multi-punch techniques, a randomized controlled trial has also demonstrated that multi-punch debulking combined with postoperative radiotherapy and injection therapy can reduce the frequency of maintenance treatments and

achieve more stable improvement in scar scores during follow-up.⁵³ These findings suggest that multi-punch approaches may exert an additive effect within a combined treatment framework. Additional support comes from multiple non-randomized studies and case series, which indicate the potential value of punch-based techniques as a core step in combination therapy. In specific anatomical locations or complex cases, punch-assisted debulking combined with photodynamic therapy or radiotherapy has achieved noticeable cosmetic improvement and relatively low short-term recurrence rates.^{54–59} Nevertheless, most of the available evidence originates from single-center studies with limited follow-up duration, and long-term stability remains to be determined. Moreover, substantial variation in adjunctive treatment protocols across studies makes it difficult to isolate the independent contribution of punch-assisted debulking itself.

Current literature more frequently reports multi-punch debulking strategies, whereas evidence for single-punch techniques remains relatively limited. It should be emphasized that direct comparative studies between single-punch and multi-punch techniques are currently lacking. Differences in treatment combinations and outcome assessment criteria across studies also substantially limit the feasibility of cross-study comparison. Therefore, at this stage, it is more appropriate to position punch-based techniques as debulking adjuncts within comprehensive keloid management. Their principal value lies in optimizing local tissue architecture and enhancing the effectiveness of combined therapies, rather than replacing standardized multimodal treatment strategies (Table 3).

Cosmetic Excision of Small Benign Cutaneous Lesions

In the treatment of small benign cutaneous lesions, the core value of punch-based techniques lies in precise tissue sampling, controllable tissue trauma, and relatively favorable cosmetic outcomes. Existing evidence suggests that punch excision can achieve high patient satisfaction in small, well-demarcated lesions; however, the overall level of evidence is primarily based on observational studies, with a lack of randomized controlled trials.

With respect to indications, punch-based techniques have been reported for the management of small benign lesions such as melanocytic nevi, warts, and keratoacanthoma.⁶⁰ A case series focusing on small facial melanocytic nevi demonstrated that, following punch excision, overall scar scores were low and patient satisfaction was high, suggesting favorable aesthetic outcomes in cosmetically sensitive areas such as the face.⁶¹ These findings support the use of punch excision as a minimally invasive alternative to traditional elliptical excision in anatomical locations with high cosmetic demands.

For the treatment of warts, in addition to conventional excisional approaches, case reports have proposed a strategy involving punch sampling without complete lesion removal, with in situ tissue preservation to expose antigens and thereby induce a delayed-type immune response that promotes lesion regression.⁶² This strategy demonstrates a degree of mechanistic innovation; however, its therapeutic rationale more closely resembles immunomodulatory intervention rather than purely “excisional treatment.” Moreover, incomplete lesion removal may carry a risk of residual disease or recurrence, and therefore this approach is not suitable for malignant or potentially malignant lesions.⁶³ Given that the available evidence is limited to individual case reports, its reproducibility and stability of efficacy remain uncertain.

Notably, although the above studies report high satisfaction rates or favorable cosmetic outcomes, the existing literature shares several common limitations. These include the absence of randomized controlled comparisons with traditional excision or other minimally invasive techniques, generally limited follow-up durations with insufficient evaluation of the long-term scar formation process, and reliance on subjective satisfaction scores as primary outcome measures with a lack of standardized objective cosmetic assessment criteria.

Therefore, from the perspective of evidence hierarchy, the advantages of punch-based techniques in small benign cutaneous lesions are currently supported mainly by experiential reports and case series. While their potential in cosmetic excision is worthy of recognition, the evidence is not yet sufficient to establish them as standard alternatives, particularly in lesions involving potential malignant risk, where complete excision and histopathological evaluation should remain the guiding principles.

Cutaneous Adnexal and Functional Disorders

In cutaneous adnexal and functional disorders, punch-based techniques are primarily used to remove structures such as hair follicles or sweat glands. The evaluation of efficacy is largely based on case series or retrospective studies.

Table 3 Clinical Studies of Punch-Based Volume Reduction Techniques in Keloids in Keloid Treatment

Author	Study Design	Patients (n)	Technique	Control	Follow-Up	Primary Endpoint	Main Findings	Limitations
Bingbing Liu ⁵²	Prospective split-body study	50	Single-hole punch excision + steroid injection	Steroid injection alone	1 year	Effective rate, VSS score	Higher effective rate and lower VSS in the observation group	Limitations in procedural precision, no patient satisfaction assessment
Shen Hou ⁵³	Randomized controlled trial	81	Punch excision + steroid injection	Steroid injection alone	180 days	Keloid thickness, POSAS score, VSS score	Reduced thickness and improved scar scores	Limited to thin keloids
Jin Woong Jung ⁵⁴	Retrospective cohort study	22	Punch excision + cryotherapy	Core excision	1.8–49 months (non-uniform)	VSS score, complete healing time	Comparable outcomes between groups	Short follow-up, small sample
Xiaomei Cui ⁵⁵	Retrospective cohort study	89	Punch technique + photodynamic therapy	Punch therapy alone	12 months	VAS, DLQI	Greater improvement in scores	Non-randomized allocation
Xian Yan Luo ⁵⁶	Prospective case series	20	Punch technique + photodynamic therapy	Self-controlled	12 months	VSS score	Improved VSS compared with baseline	Small sample
Tae Hwan Park ⁵⁷	Prospective case series	30	Punch excision + triamcinolone acetonide injection+ radiation therapy	Self-controlled	12 months	Recurrence	No recurrence during follow-up	Limited applicability to thick lesions
Liang Chen ⁵⁸	Retrospective cohort study	48	Punch technique + radiation therapy	Nonsurgical treatment (medication, injection, laser)	6–12 months	VSS score, POSAS score	Improved scores compared with nonsurgical treatment	Subjective inclusion criteria

Abbreviations: VSS, Vancouver Scar Scale; POSAS, Patient and Observer Scar Assessment Scale; VAS, Visual Analog Scale; DLQI, Dermatology Life Quality Index.

In the treatment of bromhidrosis, case series have shown that, following punch removal of hair follicles, apocrine gland structures are identified in the majority of specimens, suggesting a relatively high efficiency in adnexal clearance.⁶⁴ Multicenter retrospective studies have also reported high patient satisfaction in the removal of excessive facial hair.⁵⁰ In addition, in the management of scrotal calcinosis cutis, punch excision has demonstrated advantages including limited tissue trauma, reduced intraoperative bleeding, and milder postoperative pain.⁶⁵

Case reports have further documented its successful use in removing tufted hairs in acne keloidalis nuchae and in achieving complete excision of trichofolliculoma, with no evident recurrence during follow-up.^{66,67} Another case report described its use in combination with photodynamic therapy for the treatment of persistent erythema following rosacea, demonstrating marked improvement and no recurrence during a short-term follow-up. The potential mechanism may be related to the mechanical disruption of dilated vessels and enhanced penetration of photosensitizing agents, thereby improving symptoms through both vascular debulking and modulation of inflammation.⁶⁸ However, the above evidence is primarily derived from single-center experiences or individual case reports and lacks controlled study designs and standardized efficacy evaluation.

Therefore, in the field of adnexal and functional disorders, punch-based techniques should be regarded primarily as structural removal approaches. Their feasibility has been supported by multiple observational studies; however, high-quality evidence clarifying their advantages over conventional methods remains insufficient.

Punch Excision for Subcutaneous Lesions or Establishment of Subcutaneous Access Pathways

Overall, the value of punch-based techniques in subcutaneous lesions lies mainly in enabling lesion management or the establishment of operative access through limited skin incisions, thereby minimizing surface scar burden while maintaining therapeutic effectiveness.

Minimally Invasive Excision of Benign Subcutaneous Masses

In benign subcutaneous masses with clear boundaries and relatively limited volume, punch-based techniques have demonstrated relatively consistent cosmetic advantages. A retrospective study of pediatric pilomatricoma showed that, compared with traditional elliptical excision, punch excision significantly reduced scar length without a noticeable increase in recurrence rate.⁶⁹ Another prospective randomized controlled study of epidermoid cysts similarly demonstrated that the two techniques were generally comparable in operative time and recurrence rate, while punch excision provided an advantage in reducing postoperative scar length.⁷⁰

Taken together, these studies suggest that, provided complete lesion removal is not compromised, punch-based techniques may help optimize postoperative cosmetic outcomes. However, it should be noted that the current evidence has limitations: the pilomatricoma study was retrospective in design and may be subject to selection bias; the randomized controlled study of epidermoid cysts involved a limited sample size; and follow-up duration and long-term recurrence data were not systematically reported. Therefore, these conclusions cannot yet be extrapolated to larger or poorly demarcated deep lesions.

Management of Sinus Tracts and Fistulous Diseases

In sinus tract and fistulous diseases, punch-based techniques are more often reflected in limited cavity debridement and minimally invasive channel creation. In addition to pilonidal sinus, case reports have described its application in the management of cutaneous–visceral fistulas such as gastrocutaneous fistula, suggesting a potential scope of indication in selected channel-type lesions.^{71,72}

Studies on pilonidal sinus disease consistently indicate that punch-based techniques can achieve acceptable mid- to long-term recurrence control. Large retrospective series of trephine- or biopsy punch-based procedures have reported durable outcomes over extended follow-up in pilonidal sinus, with recurrence rates comparable to other minimally invasive approaches, although some studies suggest that recurrence may be influenced by operative experience.^{73–82} Comparative analyses in pilonidal sinus management further demonstrate similar healing and recurrence profiles between punch-based procedures and

endoscopic techniques, while punch approaches may offer advantages in operative simplicity and lower cost.⁸³ In recent years, punch excision has also been integrated with adjunctive modalities such as laser ablation or topical phenol application in selected cases of pilonidal sinus, emphasizing outpatient feasibility and rapid postoperative recovery.^{84–87} However, most available evidence in pilonidal sinus treatment remains retrospective in nature, and heterogeneity in operative technique, adjunctive protocols, and recurrence definitions limits definitive comparison across studies.

Compared with other punch-based indications discussed in this review, studies on pilonidal sinus disease generally involve substantially larger patient cohorts, with several series including hundreds to more than 2000 patients. Despite these relatively large sample sizes, most available data are derived from retrospective case series or cohort studies, and randomized controlled trials specifically evaluating punch-based procedures remain lacking. In addition, reported recurrence rates vary considerably across studies, suggesting that outcomes may be influenced by differences in surgical technique, patient selection, follow-up duration, and operator experience (Table 4).

Establishment of Subcutaneous Access Pathways and Modified Drainage Techniques

In addition to direct lesion excision, punch-based techniques may be used to establish subcutaneous access pathways. In certain diseases in which conventional drainage is ineffective, they have also been proposed as modified strategies.^{88,89}

In the treatment of auricular hematoma, reported recurrence rates following traditional incision and drainage vary widely. Lamb et al proposed a “fenestration punch technique,” which involves partial excision of the cartilage layer with compression fixation to promote adhesion between the soft tissues on both sides of the cartilage. In a small case series, no

Table 4 Clinical Studies of Trephine Techniques for Pilonidal Sinus Disease

Author	Design	Patients (n)	Technique	Follow-Up	Primary Endpoint	Main Findings	Limitations
Moshe Gips ⁷³	Prospective case series	1358	Trephine	Mean 6.9 years, median 6.6 years	Recurrence rates, disease-free probability	Low early recurrence; declining disease-free probability over time	Non-randomized, non-controlled, attrition bias
Angelo Di Castro ⁸¹	Retrospective case series	2347	Trephine	Median 16 months	Complications, wound healing time, recurrence rate	Low recurrence; low complication rate; rapid healing	Non-randomized, non-controlled, Short follow-up
Luigi Basso ⁷⁴	Retrospective case series	848	Trephine	12–60 months	Recurrence rate	Time-dependent recurrence increase	Non-randomized, non-controlled, attrition bias
Saed Khalilieh ⁷⁵	Prospective cohort study	203	Trephine	Mean 31.1 months	Recurrence rate	Relatively high recurrence	Risk of selection bias, attrition bias
Itay Zoarets ⁷⁶	Retrospective case series	169	Trephine	Median 29 months	Recurrence rate	High recurrence rate	Selection bias, attrition bias
Yael Dreznik ⁷⁷	Retrospective case series	565	Trephination	Median 1.9 years	Recurrence rate	Low recurrence rate	Limited to pediatric patients, Short follow-up
Catalin Iacob ⁷⁸	Retrospective case series	100	Trephination	Median 31.4 months	Reoperation rate	Moderate reoperation rate	Small sample
Katherine C Bergus ⁷⁹	Retrospective case series	63	Trephination	12 months	Wound healing, recurrence rate	Moderate healing rate; moderate recurrence rate	Small sample, limited to adolescents, Selection bias
James M Prieto ⁸⁰	Retrospective cohort study	105	Trephination vs wide excision	Mean 4.6 months	Recurrence rate, complications	Comparable recurrence; fewer complications	Non-randomized, Limited to pediatric patients
Moshe Gips ⁸²	Retrospective cohort study	1260	Trephine vs wide excision	Mean 7.2 years	Recurrence rates, disease-free probability	Comparable recurrence; similar disease-free survival	Recurrence estimates derived from extrapolated data

evident recurrence was observed during follow-up, and cauliflower ear deformity was avoided.⁹⁰ In the treatment of hidradenitis suppurativa, recurrence rates after simple incision and drainage are relatively high, whereas punch-based techniques that precisely excise the roof of the abscess and thoroughly curette the cavity wall have demonstrated a lower tendency toward recurrence in some studies.^{91,92}

These applications suggest that, in certain recurrent conditions or diseases in which simple drainage fails to address the underlying pathology, punch-based techniques may reduce the recurrence risk through more thorough lesion management. However, it should be recognized that evidence for auricular hematoma is derived from extremely small case series, and recurrence rates reported in hidradenitis suppurativa vary substantially across studies, most of which lack long-term follow-up. Treatment outcomes are also influenced to some extent by operator experience. Therefore, these approaches are currently better regarded as exploratory minimally invasive modifications rather than established standard treatment pathways.

Overall, the application of punch-based techniques in subcutaneous lesions reflects three distinct rationales: cosmetic optimization, channel reconstruction, and technical modification. Their advantages are primarily concentrated in reducing cutaneous scarring and minimizing tissue trauma, while evidence regarding long-term recurrence control or curative effectiveness remains to be further strengthened.

Discussion

This review provides a comprehensive overview of the diverse applications of punch-based techniques in dermatologic surgery. Based on the available evidence, their clinical value primarily lies in the precise handling of localized tissue, whereas their impact on the overall disease course appears relatively limited. Consequently, substantial differences in efficacy are observed across indications, which may be closely related to the underlying pathological basis of each disease and the specific mechanisms through which the techniques exert their effects.

When the available evidence is examined across different indications, punch-based techniques appear to occupy different clinical positions rather than representing a single uniform strategy. In some settings, such as follicular unit extraction for androgenetic alopecia, the punch-based step itself constitutes the core therapeutic procedure and is supported by relatively stable clinical experience, standardized protocols, and predictable outcomes.¹⁷ In other conditions, including keloids and selected scar revisions, punch techniques are more commonly used to reduce tissue volume or modify local structure in combination with adjuvant treatments such as radiotherapy or intralesional therapy; here, their contribution is adjunctive, and long-term recurrence control remains insufficiently defined.^{53,57} A further pattern is observed in sinus tract disorders such as pilonidal sinus and hidradenitis suppurativa, where punch-based procedures facilitate limited lesion clearance or drainage pathway reconstruction with minimal tissue sacrifice, but reported outcomes vary and are highly operator-dependent.^{36,47,74,92} These distinctions suggest that the clinical value of punch-based techniques depends less on the instrument itself than on how it is positioned within disease-specific treatment strategies. It should also be noted that in the pilonidal sinus literature, punch-based procedures are commonly described as trephination or trephine excision, referring to the use of cylindrical cutting instruments similar to dermatologic biopsy punches for selective removal of sinus openings and tract debridement.^{73,78}

Notably, punch-based techniques demonstrate a certain degree of biological plausibility in selected pigmentary disorders and chronic wounds. For instance, micrografting in stable vitiligo and localized tissue replacement in chronic ulcers may exert effects through structural coverage and modulation of local inflammation.³² Nevertheless, existing studies commonly suffer from small sample sizes, substantial etiological heterogeneity, and reliance on subjective outcome measures, making it difficult to establish clear independent advantages over standard therapeutic strategies. Therefore, these applications should be regarded as evolving practices within an accumulating evidence base rather than established standard treatments.

An additional feature of the current literature is the marked imbalance in the distribution of evidence across indications. Applications such as follicular unit extraction for androgenetic alopecia, punch grafting in stable vitiligo, and punch-based management of pilonidal sinus are supported by relatively larger observational cohorts and, in some instances, comparative studies. In contrast, reconstructive uses, cosmetic excision of small benign lesions, and punch elevation for atrophic scars rely predominantly on isolated case reports or small case series. Even within specific disease

categories, the research emphasis is uneven. In chronic wound management, most studies focus on structural coverage and epithelial regeneration, whereas mechanistic investigations into pain modulation remain limited. In keloid treatment, multi-punch debulking strategies are more frequently described than single-punch approaches. These disparities underscore the necessity of interpreting therapeutic claims within the context of indication-specific evidence density.

From a methodological perspective, several common limitations are evident in the current literature. First, a large proportion of the evidence originates from retrospective studies or case series, with a relatively limited number of randomized controlled trials. Second, punch diameter, spacing, and combination treatment protocols lack standardized definitions, increasing the inter-study heterogeneity. Third, most studies have follow-up durations of less than one year, limiting the assessment of long-term recurrence rates and functional outcomes. In addition, operator experience exerts a considerable influence on treatment outcomes, which may restrict external generalizability. Collectively, these factors indicate that future research should, based on clearly defined indication boundaries, employ standardized procedural parameters and multicenter prospective designs to further validate the independent contribution of punch-based techniques.

Overall, the core advantages of punch-based techniques in dermatologic surgery lie in their minimally invasive nature, precision, and controllable tissue injury. Their clinical applications currently reflect a coexistence of mature substitution, combined debulking, and pathway optimization patterns. Importantly, the therapeutic effect of punch-based approaches appears to vary according to whether the primary pathology of a disease is structural, inflammatory, or immune-mediated. Their efficacy depends strongly on disease type and application context rather than on inherent technical superiority. Therefore, evaluating the strength of evidence within specific disease settings is essential for more rational delineation of their clinical role.

Conclusion

In summary, the clinical scope of punch-based techniques in dermatologic surgery continues to expand; however, their clinical value is highly dependent on the specific indications. In areas such as follicular unit extraction for androgenetic alopecia, the procedural workflows are well established and outcomes are predictable. In contrast, in the management of keloid debulking, chronic wounds, and sinus tract disorders, punch-based techniques more often function as components of combined therapeutic strategies.

Given the substantial variation in evidence quality and follow-up data across different diseases, these techniques should not be regarded as universal substitutes. Future studies employing standardized procedural protocols and prospective designs are required to clarify their long-term efficacy and optimal boundaries of application.

Funding

This study was funded by the Jilin Scientific and Technological Development Program (20250601014RC) and the Jilin Provincial Special Program for Health Research Talents (2024SCZ55).

Disclosure

The authors report no conflicts of interest in this work.

References

1. Keyes EL. The cutaneous punch. *J Cutan Genitourin Dis*. 1887;5:98–101.
2. Shiell RC. A review of modern surgical hair restoration techniques. *J Cutan Aesthet Surg*. 2008;1(1):12–16. doi:10.4103/0974-2077.41150
3. Dzubow LM. Scar revision by punch-graft transplants. *J Dermatol Surg Oncol*. 1985;11(12):1200–1202. doi:10.1111/j.1524-4725.1985.tb03097.x
4. Selmanowitz VJ, Rabinowitz AD, Orentreich N, Wenk E. Pigmentary correction of piebaldism by autografts. I. Procedures and clinical findings. *J Dermatol Surg Oncol*. 1977;3(6):615–622. doi:10.1111/j.1524-4725.1977.tb00368.x
5. Orentreich N. Hair transplantation: the punch graft technique. *Surg Clin North Am*. 1971;51(2):511–518. doi:10.1016/s0039-6109(16)39394-x
6. Akiyama Y, Norimatsu Y, Ohno Y. Prophylactic antimicrobials may not be needed to prevent surgical site infection after skin biopsy: a retrospective study. *Antimicrob Resist Infect Control*. 2022;11(1):35. doi:10.1186/s13756-022-01077-z
7. Kislavitz M, Wamsley C, Bartels M, et al. Clinical Translation of Scarless 0.33-mm Core Microbiopsy for Molecular Evaluation of Human Skin. *Aesthet Surg J*. 2021;41(11):np1710–np1720. doi:10.1093/asj/sjaa332

8. Jimenez F, Alam M, Vogel JE, Avram M. Hair transplantation: basic overview. *J Am Acad Dermatol.* 2021;85(4):803–814. doi:10.1016/j.jaad.2021.03.124
9. Xiao R, Lee LN. Updated Review of Treatment of Androgenetic Alopecia. *Facial Plast Surg Clin North Am.* 2024;32(3):417–423. doi:10.1016/j.fsc.2024.02.006
10. Laufer-Britva R, Vathananai W, Jimenez F. Therapeutic Applications of Hair Follicle Transplantation Beyond Hair Restoration: a Comprehensive Review. *Dermatol Surg.* 2025;51(6):615–621. doi:10.1097/dss.0000000000004571
11. Yii V, Moussa A, Triwongwanat D, Smith BRC, Bhoyrul B. A Systematic Review of Follicular Unit Graft Survival Rates After Hair Transplantation in Primary Cicatricial Alopecia. *Dermatol Surg.* 2025;51(11):1052–1057. doi:10.1097/dss.0000000000004707
12. Chew MW, Limbu S, Kemp P, Higgins CA. Hair follicle-inspired therapies for wound healing and scar remodelling. *J Plast Reconstr Aesthet Surg.* 2026;112:34–43. doi:10.1016/j.bjps.2025.07.023
13. Li K-T, Qu Q, Fan Z-X, et al. Clinical experience on follicular unit extraction megasession for severe androgenetic alopecia. *J Cosmet Dermatol.* 2020;19(6):1481–1486. doi:10.1111/jocd.13156
14. Takata Pontes L, Ruston A, de Moraes AM. Strip Harvesting Follicular Unit Transplantation Versus Follicular Unit Excision: comparing the Number of Hairs and the Ratio of Hairs to Follicular Unit. *Dermatol Surg.* 2024;50(9):851–854. doi:10.1097/dss.0000000000004230
15. Di M, Liu Q, Liu C, Zhu S, Jiang B, Wu W. Follicular unit extraction megasession treatment of high-grade androgenetic alopecia in Asians: introducing novel principles for surgical design. *J Cosmet Dermatol.* 2023;22(12):3395–3404. doi:10.1111/jocd.15858
16. Chouhan K, Roga G, Kumar A, Gupta J. Approach to Hair Transplantation in Advanced Grade Baldness by Follicular Unit Extraction: a Retrospective Analysis of 820 Cases. *J Cutan Aesthet Surg.* 2019;12(4):215–222. doi:10.4103/jcas.Jcas_173_18
17. Wang F, Chen Y, Yang C, et al. Using the follicular unit extraction technique in treatment of male androgenetic alopecia. *BMC Surg.* 2024;24(1):358. doi:10.1186/s12893-024-02655-1
18. Civas E, Akpınar Ü, Hayran Y, Aksoy B, Fişek Izci NM, Aksoy HM. Hair Transplantation in Women: a Retrospective Study of Surgical Outcomes and Patient Satisfaction Using FUT and FUE Techniques. Article. *Turk J Dermatol.* 2025;19(4):217–226. doi:10.4274/tjd.galenos.2025.36349
19. Zhu D-C, Liu P-H, Fan Z-X, Hu Z-Q, Miao Y. Extensive Scarring Alopecia Treated Through a Single Dense-Packing Follicular Unit Extraction Megasession. *Dermatol Surg.* 2021;47(1):e15–e20. doi:10.1097/dss.0000000000002454
20. Elariny AF, Ghozlan N, Wasief S, Moussa AE, Eldeeb ME. Evaluation of efficacy of follicular unit extraction versus follicular unit extraction with platelet rich plasma in treatment of cicatricial alopecia. *J Cosmet Dermatol.* 2022;21(11):5931–5937. doi:10.1111/jocd.15213
21. Yoo H, Moh J, Park J-U. Treatment of Postsurgical Scalp Scar Deformity Using Follicular Unit Hair Transplantation. *Biomed Res Int.* 2019;2019:3423657. doi:10.1155/2019/3423657
22. Niu Y, Zhu L, Feng Y, et al. Efficacy and Safety of Autologous Follicular Unit Excision in Pediatric Secondary Cicatricial Alopecia: a Retrospective Case Series. *Clin Cosmet Invest Dermatol.* 2025;18:1521–1527. doi:10.2147/ccid.S523182
23. Zhu L, Niu Y, Chi L, Zhang J, Wang J, Ren C. Optimal Treatment for Post-Surgical Cicatricial Alopecia: autologous Hair Transplantation? *J Craniofac Surg.* 2025;36(2):e211–e214. doi:10.1097/scs.00000000000010957
24. Niu Y, Ren C, Liao H, Jin Z, Zhu L. Clinical effects of autologous follicular unit extraction transplantation in the treatment of secondary cicatricial alopecia after infections. *J Cosmet Dermatol.* 2024;23(2):585–590. doi:10.1111/jocd.15996
25. Niu Y, Ren C, Jin Z, et al. Autologous follicular unit extraction transplant for postburn cicatricial alopecia: a single-center’s retrospective case series. *J Cosmet Dermatol.* 2024;23(6):2209–2214. doi:10.1111/jocd.16237
26. Kerure A, Deshmukh N, Bansod S, Sharma A. Successful follicular unit extraction in a case of inactive, recalcitrant alopecia barbae. *Dermatol Ther.* 2021;34(6):e15156. doi:10.1111/dth.15156
27. Vieira R, Vieira J. Surgical treatment of temporal triangular alopecia using follicular unit excision and implantation coverage value: a case series. *J Am Acad Dermatol.* 2026;94(3):962–963. doi:10.1016/j.jaad.2025.10.148
28. Savant SS Jr. Modified acne scar revision - Punch excision, punch-in-subcision with shoulder dermabrasion followed by dermal grafting. *Indian J Dermatol Venereol Leprol.* 2025;91(1):139–141. doi:10.25259/ijdv1_914_2023
29. Wang W, Liu H, Xia L, Chen Z, Wu X, Gao Z. Ultramicro skin grafting technique for the treatment of intractable linear scars using adjacent normal skin. *J Plast Reconstr Aesthet Surg.* 2025;102:225–227. doi:10.1016/j.bjps.2025.01.078
30. Ding X, Zhao M, Li M, Du J. A self-controlled comparative study of mini punch graft versus suction blister epidermal graft in the treatment of stable vitiligo. *J Dermatolog Treat.* 2021;32(6):585–589. doi:10.1080/09546634.2019.1687827
31. Mokhtar M, El-Ashmawy AA, Mostafa WA, Gamei MM. Clinical and dermoscopic evaluation of follicular unit transplantation vs. Mini-Punch grafting in the repigmentation of resistant and stable vitiligo: a comparative study. *J Cosmet Dermatol.* 2022;21(11):5837–5851. doi:10.1111/jocd.15127
32. ElGhareeb MI, Kandeel AH, Attia SA. Combination of autologous FCS and MPG versus each technique alone in the treatment of stable vitiligo. *Arch Dermatol Res.* 2024;316(7):358. doi:10.1007/s00403-024-03045-6
33. Kim DS, Ju HJ, Lee HN, et al. Skin seeding technique with 0.5-mm micropunch grafting for vitiligo irrespective of the epidermal-dermal orientation: animal and clinical studies. *J Dermatol.* 2020;47(7):749–754. doi:10.1111/1346-8138.15390
34. Ragab M, El Zagh O, Farid C. Transverse Needling After Autologous Mini-Punch Grafts Improves Repigmentation in Stable Non-Segmental Vitiligo. *Clin Cosmet Invest Dermatol.* 2021;14:827–835. doi:10.2147/ccid.S315407
35. Lee SG, Nam KA, Oh BH, Chung KY, Roh MR. Comparison of full-thickness skin graft and punch grafting in the reconstruction of plantar defects. *J Dermatol.* 2024;51(1):76–80. doi:10.1111/1346-8138.17018
36. Neuenschwander J, Mayer DO, Lang R, Staub-Buset C, Nägeli M, Hafner J. Effectiveness of Punch Grafting in Promoting Healing and Reducing Pain in Hard-to-Heal Leg Ulcers. *Wound Repair Regen.* 2026;34(1):e70126. doi:10.1111/wrr.70126
37. García-Madrid M, Sanz-Corbalán I, Tardáguila-García A, Molines-Barroso RJ, López-Moral M, Lázaro-Martínez JL. Punch Grafting for the Management of Hard-to-Heal Diabetic Foot Ulcers: a Prospective Case Series. *Int J Low Extrem Wounds.* 2023;22(3):542–547. doi:10.1177/15347346211031085
38. Conde-Montero E, Pérez Jerónimo L, Peral Vázquez A, Recarte Marín L, Sanabria Villarpando PE, de la Cueva Dobao P. Early and Sequential Punch Grafting in the Spectrum of Arteriopathy Ulcers in the Elderly. *Wounds.* 2020;32(8):E38–E41.
39. Ceolin C, Rui M, Barcaro F, Sergi G, Baù P. Punch grafting for necrotising fasciitis: a case report. *J Wound Care.* 2025;34(11):941–943. doi:10.12968/jowc.2023.0033

40. Grado Sanz R, Conde-Montero E, Pérez Jerónimo L, et al. Clinically inactive pyoderma gangrenosum successfully treated with negative pressure therapy and punch grafting. *Int Wound J.* 2020;17(2):516–518. doi:10.1111/iwj.13303
41. Conde-Montero E, Horcajada Reales C, Peral Vázquez A. Punch grafting for skin tears with total flap loss. *J Tissue Viability.* 2022;31(4):761–762. doi:10.1016/j.jtv.2022.07.012
42. Orbea Sopena A, Conde Montero E. Punch grafting for the treatment of ulcerated atrophie blanche. *Phlebology.* 2023;38(10):695–697. doi:10.1177/02683555231198993
43. Quintana-Castanedo L, Feito-Rodríguez M, Pérez-Conde I, Maseda-Pedrero R, Chiloeches-Fernández C, de Lucas Laguna R. Chronic sole ulcer in a child with dyskeratosis congenita: an atypical wound successfully treated with punch grafting. *Pediatr Dermatol.* 2020;37(6):1131–1134. doi:10.1111/pde.14316
44. Song A, Hwang GH, Kim SE, et al. Revertant Mosaic Skin Punch Grafting in Recessive Dystrophic Epidermolysis Bullosa. *JAMA Dermatol.* 2024;160(10):1132–1134. doi:10.1001/jamadermatol.2024.2543
45. Martínez ML, Escario E, Poblet E, et al. Hair follicle-containing punch grafts accelerate chronic ulcer healing: a randomized controlled trial. *J Am Acad Dermatol.* 2016;75(5):1007–1014. doi:10.1016/j.jaad.2016.02.1161
46. Ottoman C, Buntrock G, Gatz K, et al. SkinDot: a modified full-skin transplantation technique. *Ann Anat.* 2020;229:151454. doi:10.1016/j.aanat.2019.151454
47. Conde-Montero E, de Farias Khayat Y, Pérez Jerónimo L, et al. Punch grafting for pain reduction in hard-to-heal ulcers. *J Wound Care.* 2020;29(3):194–197. doi:10.12968/jowc.2020.29.3.194
48. Belatti A, Bertarini F, Pombo V, Mazzuocolo L, Ferrario D. Follicular unit grafting in chronic ulcers: a valuable technique for integrated management. *An Bras Dermatol.* 2024;99(4):568–577. doi:10.1016/j.abd.2023.08.012
49. Le D, Gan Y, Mao X, et al. Hair follicle extraction combined with an expanded scalp flap for facial organ reconstruction. *J Plast Reconstr Aesthet Surg.* 2023;87:295–302. doi:10.1016/j.bjps.2023.10.078
50. Liu Z, Zhou Y, Fan Z, et al. Follicular Unit Excision Hair Removal of Unwanted Facial Terminal Hair in Five Facial Areas: a Retrospective Multicenter Cohort Study. *Aesthetic Plast Surg.* 2025;49(3):635–642. doi:10.1007/s00266-024-04420-4
51. Faghihi G, Nouraei S, Asilian A, et al. Efficacy of Punch Elevation Combined with Fractional Carbon Dioxide Laser Resurfacing in Facial Atrophic Acne Scarring: a Randomized Split-face Clinical Study. *Indian J Dermatol.* 2015;60(5):473–478. doi:10.4103/0019-5154.159616
52. Liu B, Lin H, Zhang M. The clinical efficacy of single-hole punch excision combined with intralesional steroid injection for nodular keloid treatment: a self-controlled trial. *Sci Rep.* 2024;14(1):9793. doi:10.1038/s41598-024-60670-x
53. Hou S, Chen Q, Chen XD. The Clinical Efficacy of Punch Excision Combined With Intralesional Steroid Injection for Keloid Treatment. *Dermatol Surg.* 2023;49(5s):S70–S74. doi:10.1097/dss.0000000000003776
54. Jung JW, Jung YW, Oh BH. Benefits of Punch Excision Followed by Immediate Cryotherapy for Recalcitrant Keloids: a Comparison With Core Excision. *Dermatol Surg.* 2024;50(12):1227–1229. doi:10.1097/dss.0000000000004391
55. Cui X, Ji J, Fan L, et al. Efficacy of photodynamic therapy combined with cross-punch technique for the treatment of keloid. *Photodiagnosis Photodyn Ther.* 2024;49:104348. doi:10.1016/j.pdpdt.2024.104348
56. Luo XY, Wu XG, Xu AE, Song XZ, Peng JZ. The Combination of the Mini-Punch Technique and Photodynamic Therapy for the Treatment of Mandibular Keloids and Hypertrophic Scars. *Dermatol Surg.* 2022;48(12):1294–1298. doi:10.1097/dss.0000000000003621
57. Park TH. A Triple Combination Therapy Using 2-mm Biopsy Punch for the Treatment of Multifocal Keloids. *Dermatol Surg.* 2024;50(1):41–46. doi:10.1097/dss.0000000000003955
58. Chen L, Qin XM, Wang LQ, Wang QY, Yang KC. Clinical Effect of Dermatologic Trephination Combined With Radiotherapy in the Treatment of Keloids. *Aesthet Surg J.* 2024;44(10):np730–np736. doi:10.1093/asj/sjae119
59. Li X, Wei Y, Ruan Z, Wei G, Yao Z. Successful treatment of a keloid on the upper lip by trepanation and radiotherapy: a case report. *J Dermatolog Treat.* 2025;36(1):2451394. doi:10.1080/09546634.2025.2451394
60. Donnarumma M, Scalvenzi M, Fabbrocini G, Ferrillo M, Peduto T. Keratoacanthoma occurring in a recent skin tattoo and self-involved after a punch biopsy. *Ital J Dermatol Venereol.* 2021;156(Suppl. 1 to No. 6):75–76. doi:10.23736/s2784-8671.19.06407-1
61. Cao Z, Li SH, Shan XJ, et al. A Novel Punch Technique for Facial Pigmented Melanocytic Nevus. *J Craniofac Surg.* 2023;34(2):743–746. doi:10.1097/scs.0000000000009019
62. Ralph J, O'Grady C, Boggs J, Barry R. Remission of verruca vulgaris following incisional punch biopsy. *Clin Exp Dermatol.* 2021;46(6):1163–1165. doi:10.1111/ced.14613
63. Berglund S, Johansson Backman E, Baldawi Z, et al. Incomplete Excisions of Melanocytic Lesions: rates and Risk Factors. *Acta Derm Venereol.* 2021;101(3):adv00421. doi:10.2340/00015555-3784
64. Li H, Zhang X, Wei W, et al. An innovative application of follicular unit extraction technique in the treatment of bromhidrosis. *J Eur Acad Dermatol Venereol.* 2021;35(11):2300–2304. doi:10.1111/jdv.17571
65. Rout AN, Pradhan S, Sirka CS. Pinch-punch technique for scrotal calcinosis cutis. *Indian J Dermatol Venereol Leprol.* 2021;87(6):858–860. doi:10.25259/ijdv1_274_2021
66. Zekey E, Kurtipek GS. A Rare Cutaneous Hamartomatous Adnexal Tumor: trichofolliculoma. *Skin Appendage Disord.* 2023;9(2):121–125. doi:10.1159/000527981
67. Lo TK, Yang CC, Lee JY, Hsu CK. Serial punch excisions followed by second-intention healing for acne keloidalis papules. *J Am Acad Dermatol.* 2023;89(4):e147–e148. doi:10.1016/j.jaad.2021.07.061
68. Qiu Y, Yang P, Zhao X, Luo Y, Wu L, Zhong J. Successful treatment of rosacea by trephination combined with photodynamic therapy: a case report. *Photodiagnosis Photodyn Ther.* 2025;51:104470. doi:10.1016/j.pdpdt.2024.104470
69. Choi H, Shim DH, Na CH, Shin BS, Kim MS. Surgical experiences in pediatric pilomatricoma: punch incision and elliptical excision. *J Dermatolog Treat.* 2023;34(1):2133534. doi:10.1080/09546634.2022.2133534
70. Cheeley J, Delong Aspey L, MacKelfresh J, Pennie M, Chen S. Comparison of elliptical excision versus punch incision for the treatment of epidermal inclusion cysts: a prospective, randomized study. *J Am Acad Dermatol.* 2018;79(2):360–361. doi:10.1016/j.jaad.2017.12.011
71. Mullens CL, Twist J, Bonasso II PC, Parrish DW. The PEET procedure: punch Excision of Epithelialized Tracts for gastrocutaneous fistula closure. *J Pediatr Surg.* 2021;56(10):1900–1903. doi:10.1016/j.jpedsurg.2021.06.002

72. Sanal M. Excision of an Anovestibular Fistula with a Normal Anus Using a Biopsy Punch. *Case Rep Surg.* 2022;2022:4348806. doi:10.1155/2022/4348806
73. Gips M, Melki Y, Salem L, Weil R, Sulkes J. Minimal surgery for pilonidal disease using trephines: description of a new technique and long-term outcomes in 1,358 patients. *Dis Colon Rectum.* 2008;51(11):1656–1662. doi:10.1007/s10350-008-9329-x
74. Basso L, Pietroletti R, Micarelli A, et al. The impact of experience on recurrence rates after biopsy punch excision for pilonidal disease. *Colorectal Dis.* 2022;24(8):984–991. doi:10.1111/codi.16126
75. Khalilieh S, Horesh N, Cordoba M, et al. Surgical Outcomes of Minimally Invasive Trephine Surgery for Pilonidal Sinus Disease and Risk Factors for Recurrence. *J Laparoendosc Adv Surg Tech A.* 2022;32(3):288–292. doi:10.1089/lap.2021.0097
76. Zoarets I, Nevo Y, Schwartz C, et al. Trephine Minimally Invasive Procedure for Pilonidal Sinus. *Isr Med Assoc J.* 2022;24(2):96–100.
77. Dreznik Y, Sher C, Baazuv A, Yekutieli G, Kravarusic D. Recurrence rates of pilonidal sinus disease in the pediatric population following trephine surgery. *World J Surg.* 2024;48(5):1261–1265. doi:10.1002/wjs.12167
78. Jacob C, Niazov E, Zmora O. Trephination for primary pediatric pilonidal sinus disease: medium term functional and recurrence outcome of a large cohort. *Pediatr Surg Int.* 2024;41(1):39. doi:10.1007/s00383-024-05941-4
79. Bergus KC, Lutz C, Bricker J, et al. Evaluating Outcomes in Adolescents With Pilonidal Disease Treated With Pilonidal Sinus Trephination. *J Surg Res.* 2025;310:331–339. doi:10.1016/j.jss.2025.04.010
80. Prieto JM, Checchi KD, Kling KM, et al. Trephination versus wide excision for the treatment of pediatric pilonidal disease. *J Pediatr Surg.* 2020;55(4):747–751. doi:10.1016/j.jpedsurg.2019.06.014
81. Di Castro A, Guerra F, Levi Sandri GB, Ettorre GM. Minimally invasive surgery for the treatment of pilonidal disease. The Gips procedure on 2347 patients. *Int J Surg.* 2016;36(Pt A):201–205. doi:10.1016/j.ijso.2016.10.040
82. Gips M, Bendahan J, Ayalon S, Efrati Y, Simha M, Estlein D. Minimal Pilonidal Surgery vs. Common Wide Excision Operations: better Well-Being and Comparable Recurrence Rates. *Isr Med Assoc J.* 2022;24(2):89–95.
83. Gulcu B, Ozturk E. Minimally Invasive Pilonidal Sinus Treatment: EPSIT Versus PEBAI Method. *Surg Laparosc Endosc Percutan Tech.* 2024;34(1):48–53. doi:10.1097/sle.0000000000001245
84. Evirgen S, Cetin S. The Efficacy of Punch Biopsy and Diode Laser Combination in the Treatment of Pilonidal Sinus: a Comparative Study Across Different Patient Groups. *J Clin Med.* 2025;14(9):3052. doi:10.3390/jcm14093052
85. Demirel AHP, Polat M. Long-Term Outcomes of Crystallized Phenol Application after Punch Excision for the Treatment of Pilonidal Sinus Disease. *Am Surg.* 2019;85(11):1219–1223.
86. Horesh N, Maman R, Zager Y, et al. Surgical outcomes of minimally invasive trephine surgery for pilonidal sinus disease with and without laser therapy: a comparative study. *Tech Coloproctol.* 2023;28(1):13. doi:10.1007/s10151-023-02897-w
87. Ram E, Zager Y, Carter D, et al. Efficacy and safety of RD2 Ver.02, a whole blood clot therapy, coupled with a minimally invasive procedure in pilonidal sinus: a Phase II study. *Tech Coloproctol.* 2024;28(1):97. doi:10.1007/s10151-024-02973-9
88. De Villeneuve Bargemon JB, Niddam S, Morand A, Mattei JC, Jaloux C. A simple painless technique to drain subungual hematoma. *J Am Acad Dermatol.* 2021;85(5):e283–e285. doi:10.1016/j.jaad.2020.03.062
89. Blum FR, Paci KM, Sayed CJ. Use of a punch biopsy tool as an alternative approach for incision and drainage of abscesses. *J Am Acad Dermatol.* 2022;86(4):e141–e142. doi:10.1016/j.jaad.2021.11.005
90. Lamb MM, Mims MM, Clark JM. “Hole-Punch” Technique for Recurrent Auricular Hematomas. *Laryngoscope.* 2023;133(4):814–817. doi:10.1002/lary.30298
91. Mansour MR, Rehman RA, Daveluy S. Punch debridement (mini-deroofing): an in-office surgical option for hidradenitis suppurativa. *J Am Acad Dermatol.* 2024;90(6):e193. doi:10.1016/j.jaad.2023.12.050
92. Molina-Leyva A, Salvador-Rodriguez L, Martinez-Lopez A, Cuenca-Barrales C. Effectiveness, safety and tolerability of drainage and punch-trocar-assisted cryoinsufflation (cryopunch) in the treatment of inflammatory acute fluid collections in hidradenitis suppurativa patients. *J Eur Acad Dermatol Venereol.* 2019;33(5):e221–e223. doi:10.1111/jdv.15406

Clinical, Cosmetic and Investigational Dermatology

Publish your work in this journal

Clinical, Cosmetic and Investigational Dermatology is an international, peer-reviewed, open access, online journal that focuses on the latest clinical and experimental research in all aspects of skin disease and cosmetic interventions. This journal is indexed on CAS. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/clinical-cosmetic-and-investigational-dermatology-journal>

Dovepress
Taylor & Francis Group