



RESTORING CONTOUR WITH LONOLF VOLUMETRIC DOSING PROTOCOL: SUCCESSFUL REVERSAL OF STEROID-INDUCED LIPOATROPHY IN A TODDLER USING INTRALESIONAL SALINE

Dermatology

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ABSTRACT

Background- Steroid-induced lipoatrophy and dyspigmentation can occur following intramuscular or intralesional corticosteroid administration, particularly when delivered superficially. We report the case of a 1.5-year-old female child who developed localized gluteal lipoatrophy and hypopigmentation after receiving an intramuscular triamcinolone acetonide injection. Three sessions of intralesional normal saline resulted in near-complete restoration of contour and color. Based on available literature and cumulative clinical experience, we propose a practical, size-based dosing approach for intralesional saline, addressing an area where a standardised protocol currently does not exist.

KEYWORDS

Steroid-Induced Lipoatrophy, Intralesional Saline Therapy, Injection-Site Atrophy

INTRODUCTION

Triamcinolone acetonide remains widely used for inflammatory and immunologic conditions but may cause localized adverse effects such as lipoatrophy and dyspigmentation if inadvertently injected too superficially. Although spontaneous partial recovery may occur; cosmetic deformity (especially in children) often warrants active treatment. Intralesional normal saline (ILNS) has emerged as a simple, inexpensive, safe, and effective intervention for reversing steroid-induced atrophy by dispersing residual corticosteroid crystals and promoting tissue hydration and fibroblast-mediated remodelling [1].

Despite increasing use of ILNS, no formal dosing guideline exists, and clinicians frequently rely on empirical judgment. This case presents successful treatment in a toddler and introduces a pragmatic, size-adjusted dosing approach based on published evidence and real-world patterns.

Case Presentation

A 1.5-year-old female child presented with a two-month history of a depressed, hypopigmented lesion over the right gluteal region. The lesion developed approximately three weeks after an intramuscular triamcinolone acetonide injection administered at a peripheral facility by an unqualified practitioner for an undocumented indication. It is important to note that, if left untreated, this lesion had the potential to progress to a significant deformity in the future, potentially necessitating surgical correction.

Clinical Examination

A 6 × 4 cm sharply demarcated atrophic plaque with central depression and hypopigmentation was visible on the right gluteal area. The surface was smooth and non-tender, without erythema or induration (Figure 1).

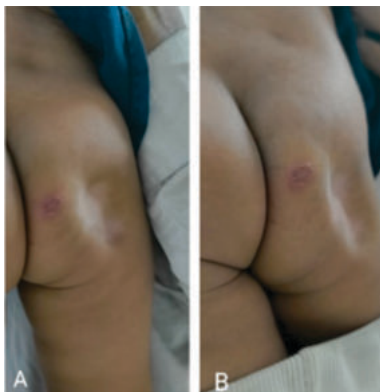


Figure 1: Atrophic Plaque with Depigmentation Front View (A), Visual Assessment of Lesional Depth (B).

Systemic and other cutaneous examinations were unremarkable except for a small annular erythematous plaque of 1 x 1.5 cm size surmounted with a few crusts.

Differential Diagnosis - The following differentials were considered-

- Steroid-induced lipoatrophy
- Idiopathic localized lipoatrophy
- Localized scleroderma (morphea)
- Atrophic nevus

The temporal correlation and the characteristic morphological features were consistent with a diagnosis of steroid-induced lipoatrophy accompanied by hypopigmentation. The additional annular plaque was diagnosed as tinea corporis. The tinea corporis lesion was managed according to standard therapeutic guidelines.

Treatment and Outcome

Procedure

- After informed assent and counselling of parents, the child underwent Three ILNS sessions at 4-week intervals.
- At initial two sessions, 6 mL and in last session 4 mL of sterile 0.9% normal saline was injected.
- Using a 24-gauge needle, saline was delivered intradermally and into the subcutaneous tissue with fanning technique.
- A fanning technique ensured uniform tumescence and hydration of the atrophic area.

Clinical Response

- It is noteworthy that the clinical assessment performed one month after the initial treatment session demonstrated no significant improvement in either lesion size or pigmentation. The lesion appeared essentially unchanged from its baseline presentation (Figure 1).
- Following the second treatment session, early elevation of the depressed plaque along with initial re-pigmentation was observed (Figure 2).



Figure 2: Initial Repigmentation and Early Elevation After 2nd Treatment Session

- After the third session, there was near-complete restoration of normal contour, texture, and pigmentation (Figure 3).



Figure 3: Image Demonstrating Near-complete Resolution of the Lesion (A) And Visual Assessment of Improved Lesion Depth (B).

- Notably, once early improvement became evident after the second session, subsequent sessions produced a markedly accelerated therapeutic response.
- No complications were noted.

DISCUSSION

Pathophysiology

Steroid-induced lipoatrophy occurs due to prolonged retention of triamcinolone crystals within subcutaneous fat, causing adipocyte apoptosis and dermal thinning. Children, due to smaller gluteal muscle mass, are particularly prone to superficial deposition errors [2].

Role of Intralesional Normal Saline

ILNS disperses insoluble steroid crystals, rehydrates tissues, and stimulates fibroblast remodeling. Multiple recent studies and case reports document successful reversal of steroid-induced atrophy using ILNS [1,3-5].

Rationale Behind the Proposed Dosing Protocol

Why no Standardized Dosing Exists:

A review of recent literature highlights that ILNS administration typically uses variable volumes depending on lesion size, clinician preference, and patient tolerance:

- Biswas et al. (2023) used saline “until adequate tumescence was achieved,” without specifying volume [3].
- Daruwalla et al. (2020) used approximately 10–12 mL for larger lesions in children [4].
- Birnbaum et al. (2020) used around 5 mL for adult post-steroid atrophy affecting the elbow [5].
- Dhinsa et al. (2021) documented improvement with variable volumes across multiple saline sessions for dyspigmentation and atrophy [1].

None Provide a Lesion-based Volumetric Guideline.

How our Dosing Approach was Derived

Using collective data from recent literature and observed clinical patterns, we formulated a practical, size-dependent dosing model:

Lesion Diameter	Suggested Volume	Reasoning
<2 cm (small)	1–2 mL	Smaller area requiring limited tumescence
2–4 cm (moderate)	3–5 mL	Matches typical volumes in case reports, ensures uniform tissue expansion
>4 cm (large)	5–8 mL divided	Mirrors larger-lesion dosing as studied by Daruwalla et al.[4].

Key Principles Supporting this Protocol

1. Volume should be enough to achieve uniform tumescence, which is the accepted therapeutic endpoint.
2. Over-dosing offers no added benefit; under-dosing may leave steroid crystals undisrupted.
3. Clinical literature consistently shows that volume correlates with lesion size.
4. Here is a refined, authoritative academic version suitable for a scientist introducing a new concept:
“We hereby propose the designation ‘LONOLF Volumetric Dosing Protocol’ for this newly formulated dosing framework.”

Application to this Case

The lesion measured 6×4 cm, categorizing it as moderate-sized. The chosen dose of 6 mL/session aligns with published patterns and achieved excellent results. Further, in subsequent sessions, the dose was titrated as per the residual size of the lesions.

Limitations

The proposed Lonolf volumetric dosing protocol is theoretically derived and requires validation through studies involving larger sample sizes.

CONCLUSION

This case demonstrates that intralesional normal saline is a safe, inexpensive, and effective therapy for reversing steroid-induced lipoatrophy and dyspigmentation in young children.

The proposed size-based dosing protocol, though empirically derived, offers a rational framework for clinicians in the absence of formal guidelines and may serve as a basis for future standardized recommendations.

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