

Research article

Normal saline infiltration as a treatment of steroid injection induced tissue atrophy: A clinical study

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Corresponding author: **Loknath Ghoshal**. Email: loknathghoshal@gmail.com**ABSTRACT**

Introduction and Aim: Intramuscular steroid injection is a technique often used by unqualified village practitioners to control symptoms of a variety of disease processes. Such injudicious use of high dosages of steroids results in local side effects. Such side effects include occurrence of tissue atrophy at the site of injection. The treatment of such tissue atrophy includes filling up the gap with injection of autologous fat and other materials. However, these are expensive and require specialised set up. Normal saline infiltration into the atrophic area at varying intervals has been successfully tried by several authors in the past. The aim of the study was to find the efficiency and side effects of normal saline infiltration into acquired lipoatrophy areas as a method of treatment.

Material and Methods: After informed consent, normal saline was infiltrated into the defect till sufficient tumescence was obtained.

Results: Nine children were treated. Most of them had received steroid injections for exacerbation of childhood asthma. The defect had appeared shortly (2 to 4 months) after the last injection was received. The site of the defect was rounded and located on the deltoid region in the majority. Our success rate was 66%. The determination of the success rate of this technique and the factors contributing to the success of the technique requires more studies in this field.

Conclusion: Normal saline infiltration is a safe and effective way for treating steroid injection induced skin and tissue atrophy.

Keywords: Tissue atrophy; injectable steroid; normal saline.

INTRODUCTION

Intramuscular steroid injection is used by unqualified village practitioners to control symptoms of various ailments like acute asthma, viral bronchiolitis, arthralgia and dermatoses. This trick is used thereby to offer magical relief, not once but repeatedly to diminish symptoms. Consequently, a variety of localised side effects afflict the patient apart from the usual systemic ones. They occur not only during but also long after the 'treatment' is over. The steroids used mostly for this purpose are dexamethasone, hydrocortisone and depot preparation triamcinolone acetonide (10 to 40 mg/ml; 1).

Localized reactions occur in less than 0.5% of cases (2), and include tissue atrophy, secondary infection, hypopigmentation, haemorrhage, and panniculitis. Tissue atrophy though innocuous, leaves unsightly depressions. It takes about 3 months to appear and is often followed by natural healing (2). However, this causes considerable anxiety in patients causing them to seek treatment.

The treatment of such tissue atrophy includes filling the gap with injection of autologous fat and other synthetic poly-L-lactic acid and calcium hydroxyapatite; however, these are costly materials and require both expertise and advanced setup (3).

Normal saline infiltration into the atrophic area at varying intervals has been tried with some success with various authors as a method of treatment (4-6). The procedure consisted, at varying intervals, in infiltration of the defect with normal saline to cause tumescence. Slow correction of the defect occurred meanwhile, and often complete healing took place. This, as it seems, is almost a 'no-cost' treatment for this condition.

Our institution is a tertiary care hospital surrounded by villages. Naturally we come across numerous patients seeking treatment for this condition. The study was conducted to evaluate the efficacy of this method of treatment and also to note the adverse effects, if any encountered.

MATERIALS AND METHODS

All patients obtained during the 6-month period following permission by the institutional ethics committee.

All patients with a history of receipt of steroid injection induced tissue atrophy attending the out-patient's department of this tertiary level institution.

Inclusion criteria cum case definition

Patients who have received steroid injection sometime in the past followed by onset of localised depression at the site of injection. This was identified by history,

description of the injection paper chits which were available. The diagnosis was done by the author or any of the co-authors.

Exclusion criteria

The presence of infection over the area of atrophy and unrealistic expectations about the results of the procedure.

Procedure

Patients were examined clinically and eligible patients were informed about the procedure. Informed consent from the patient or guardian (as applicable) was obtained. The study adhered with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans and was approved by the Ethics Committee of the Institution.

Treatment process

The area was numbed with the help of topical eutectic mixture (EMLA cream) with plastic cover for occlusion. After 60 minutes of application, normal saline was infiltrated with a 10 ml syringe into various planes, starting from the subcutaneous tissue and below. This was done till sufficient tumescence was obtained. The patient was kept under observation for an hour to note any adverse effect and told to attend after 2 weeks. The procedure was repeated to a

maximum of 4 infiltrations done fortnightly. Treatment was considered to be successful if cavity replenishment exceeded 50% (patient assessment).

RESULTS

We treated 9 patients with skin and tissue atrophy attributable to injection of steroid preparation (Table 1). There were 5 male and 4 female patients aged between 2 years to 5 years. Much historical data were derived from paper chits (instead of formal prescribing document, as is the common village practice). Deriving from the colour and description of the injectable we understood that patients had been administered either triamcinolone acetonide (10mg or 40 mg/ml, milky white in colour) or dexamethasone (8mg/ 2ml, colourless liquid) intramuscularly. Triamcinolone acetonide injection was used in 6 patients, while dexamethasone in 3 patients. The 'indication' of steroid usage was exacerbation of childhood asthma in the majority (5 patients), 'general weakness and failure to thrive' (1 patient) and generalised dermatitis (3 patients). The number of injections received ranged from 1 to 4 within a relatively short span of time (< 3 months). The defects appeared between 2 to 4 months after the last injection.

Table 1: Demographic, clinical features and outcome of the patients treated (n=9)

Case serial	Age	Sex	Colour of injection given	Indication for which injection was given	Site of defect	Duration of defect (months from last injection)	Size of defect (max dia x min dia in cm)	Shape of defect	Colour of defect	Result after 4 (x weekly) infiltrations with normal saline	Adverse effects
1	2 years 11m	M	colourless	Airway obstructive disease	left buttock	3 month 2 weeks	1cm x 1cm	round	Milky white	Success	Nil
2	10 year	M	white	Generalised eczematous disease	right deltoid	6 months	1.5 x 1cm	round	White	Failure	Nil
3	2 years	F	colourless	Airway obstructive disease	right buttocks	3 months	2 cm x 1.5cm	round	Skin colour	Success	Nil
4	2 Years 6 m	M	white	Generalised eczematous disease	left deltoid	4 months	2 cm x 2cm	oval	White	Failure	Nil
5	1year 11m	M	Milky white	Airway obstructive disease	left deltoid	2 months	1cm x 1.5 cm	oval	Milky white	Success	Nil
6	5 years	F	colourless	Airway obstructive disease	right triceps	6 months	1.5 x 1cm	oval	Milky white	Failure	Nil
7	3years	M	white	Generalised eczematous disease	left deltoid	3 months	1cm x 1cm	round	Milky white	Success	Nil
8	5 years	F	white	General debility; low weight for age	left arm	4 months	1.5 cm x 2 cm	oval	Skin colour	Success	Nil
9	3 years 6m	F	Milky white	Airway obstructive disease	left buttock	2 months	2 x 2cm	round	Milky white	Success	Nil

On examination, the site of the defect was deltoid region (4 patients), buttocks (3 patients), and back of arm (2 patients). The shape of the defect was round (5

patients) and oval (4 patients). The size of the defect ranged from 1 cm x 1 cm to 2 cm x 2 cm. The colour

of the skin over the defect ranged from milky white to hypopigmented in all patients (Fig. 1 & 2).



Fig. 1(a) and (b): Right buttock of the child before and after treatment



Fig. 2(a) and (b): Deltoid region of the left side, before and after treatment

Most children showed mild resistance while being injected. About 10-15 ml of normal saline was required to be injected in each infiltration. The procedure was complete within 2-3 minutes. The tumescence achieved initially subsided by 3 to 4 hours as the normal saline got absorbed locally. Objective improvement was visible from the 2nd infiltration onwards, and was a success in 6 patients (out of 9 total patients). No adverse effects attributable to the procedure were observed.

DISCUSSION

Corticosteroids are useful drugs in inflammatory disorders. When used judiciously corticosteroids impart high success in both acute and chronic conditions (1). However, these drugs are often used injudiciously by unqualified village practitioners in order to offer quick and almost magical symptom relief in both inflammatory and sometimes, in infectious diseases.

The method of administration of corticosteroid thereby is mostly parenteral. This route of administration serves two purposes at the least: firstly, the patient and family members get impressed about the proficiency of the practitioner. Secondly, as the corticosteroid levels reach a high level quickly, the symptoms get resolved in a relatively short time. However, the duration of symptom relief depends on the duration of action of the steroid, which in turn depends on the steroid molecule used and the nature of the preparation. Long acting depot preparations (triamcinolone acetonide) cause prolonged remission, and thus more side effects as compared to short acting ones (dexamethasone).

In general, injected corticosteroids have been seen to cause local reactions in 0.5% cases (2). In a 3-month follow up study involving 27 premenopausal female patients, Fisherman observed persistent localized atrophy in 6 patients (7). These patients had been administered intramuscular or deep subcutaneous injection of corticosteroids for respiratory and dermatological indications.

The mechanism of tissue atrophy following corticosteroid injection has not been understood fully; however decreased type 1 collagen and glycosaminoglycan synthesis may be the basis. The histology of tissue atrophy has been studied by several researchers (8-10). The finding in common was the presence of dermal basophilic granular material with corticosteroid crystal deposits. The granular material is thought to be an altered ground substance. Other changes include collagen homogenization, sebaceous gland degeneration, decreased elastin, epidermal atrophy, involution of subcutaneous fat lobules, and the presence of corticosteroid crystals on polarized microscopy. Corticosteroid crystals have been found to remain in the tissue even 2 years after injection. Goldman observed that the tissue atrophy slowed down in parallel with disappearance of corticosteroid crystals (2).

All our patients were children. Most of them had received steroid injections for the exacerbation of childhood asthma. The defect had appeared shortly (2 to 4 months) after the last injection was received. This 'incubation time' is in conformity with the findings of Goldman (2). The site of the defect follows common sites of intramuscular injection and includes the shoulder area and the buttocks. The colour of the defect ranged from hypopigmentation to depigmented skin. The variation in colour possibly depending on the potency (molecule) and concentration of corticosteroid injection; the deeper injections obviously having had less effect (side effect) on the skin while the superficial injections having more. The mechanism of action of the procedure was likely to be what has been stated above.

We succeeded in two-thirds of patients. More studies are required to enumerate the factors contributing to success and discover refinements to improve outcome.

CONCLUSION

Normal saline infiltration is an effective and safe way for treating steroid injection induced skin and tissue atrophy.

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CONFLICT OF INTEREST

No conflicts of interest were declared by authors.

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