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Original Research Article

Post-Burn Scar Effects of Nanofat Injection in an Indian Hospital

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Abstract:

Background: Burn scars can make daily tasks difficult and negatively impact a person's quality of life. Lipofilling is the process of injecting adipose tissue obtained by liposuction into the desired bodily location's dermis and/or subcutis. It has been recognized as a potentially effective therapy for the correction of volume shortfall, skin renewal, and scar treatment.

Objective: The purpose of this study was to evaluate, using the Patient and Observer Scar Assessment Scale (POSAS), the impact of Nano fat injection on post-burn scar patients at Patna Medical College & Hospital, Patna in Bihar, India.

Methods: This was a randomized controlled clinical trial involving 52 patients with postburn scars at PMCH, Patna in Bihar, India. The position, size, shape, and timing of the scar, along with the patients' complaints of disfigurement, itching, burning, discomfort, or contracture, were all determined during the clinical examination. Each patient underwent abdominal or thigh liposuction. Nano fat was reinjected into the scar following the processing of the fat.

Conclusion: The results of our study showed that Nano fat injection significantly improved the various scar metrics, indicating that it is a viable therapeutic option for post-burn scars and improving the quality of life for patients.

Recommendation: We need more study population at different intervals following to validate our findings and ascertain if these modifications are transient or permanent.

Keywords: Liposuction, Post Burn Scar, Nano Fat Graft.

Introduction

Burns are organic tissue damage that can result by coming into contact with hot liquids or solids, fire, radiation, electricity, or other harmful thermal components [1]. In addition to other psychological issues, anxiety, depression, and low self-esteem are common among burn survivors. Furthermore, some survivors may suffer permanent impairments to their functionality or appearance [2]. Post-burn scars can have a major effect on one's quality of life. They can be either hypo- or hyper-pigmented (as in vitiligo), immature or mature, atrophic, hypertrophic, or keloid, stable or unstable [3].

Evaluations of scars might be objective or subjective [4]. Quantitative assessments give the scar's quantification, as opposed to subjective evaluations that rely on the observer. There are currently at least five scar scales available, the first of which was designed to assess subjective characteristics in an objective manner. The Vancouver Scar Scale, the Manchester Scar Scale, the Stony Brook Scar Evaluation Scale (SBSES), the Visual Analog Scale, and the Patient and Observer Scar Assessment Scale [5]. Tools to measure scars objectively evaluate characteristics such thickness, pliability of the skin, color, perfusion, and rigidity [6].

There are numerous therapies available for the treatment of scars. technically challenging injection of scar tissue. Scar tissue is primarily acellular, stiff, hard, and fibrotic, leaving little room for the insertion of lipo aspirate. Scarred skin is characterized by excess extracellular matrix (ECM), specifically abnormally organized collagen fiber deposition [7]. Because of this, when fat injection is used to treat scars, it is sometimes combined with a percutaneous scar release treatment, wherein needles are used to break up the fibrous extracellular matrix to make space for the injection of lipo aspirate [8]. It has been shown that wrinkles, skin discolorations, and atrophic scars can all be effectively treated using nano fat injections. It improves vascularity and pigmentation just marginally, but it works wonders to heighten and make all scars more plia-

ble [9]. It is easily combined with traditional fat grafting to correct anomalies in post-burn scars, such as atrophic, adherent, and depressed scars. Reddish-brown, slightly elevated scars and discolorations respond favorably to nano fat [10-12].

This study's goal was to assess, using the Patient and Observer Scar Assessment Scale (POSAS), the impact of nanofat injection on post-burn scar patients in The Indian hospital.

Methods

Research design: The investigation was carried out as a randomized clinical trial.

Study population: This trial involving 52 patients with postburn scars at PMCH in Bihar, India mainly complained of pain and disfigurement in their scars from burn injuries.

Inclusion criteria: Patients in their middle years who experienced chemical, flame, or partial thickness burns (2nd degree) and post-burn scarring were eligible for inclusion. Every scar needs to be completely formed.

Exclusion criteria: Skin infections, keloid scars, hypertrophic scars, skin masses at burn sites, etc. are examples of exclusion criteria. Patients having a history of bleeding tendency disorders in the dermis, epidermis, or vascular system; hemoglobin level less than 10g/dl (moderate to severe anemia); corticosteroid use (up to 6 weeks prior to the procedure); non-steroid anti-inflammatory drug use 48 hours prior to the procedure; or extremely old.

Methods: Every patient had a comprehensive clinical evaluation, was asked questions, and had their personal data recorded. This information will contain the names, ages, sexes, phone numbers for follow-up, chronic illnesses, blood disorders, skin diseases, type and timing of burns, and the primary symptoms of scars, such as deformity, itching, burning, discomfort, or contracture. Local examinations were conducted on the following: The position, size, form, and beginning of the scar. medical photos taken prior to surgery with the patient's permission to show the scar.

Operative technique

The patients were operated on while they were in a flat position. The thighs and lower abdomen were identified as possible donor regions due to their higher SVF and ADSC concentrations. After draping and skin preparation, a specific cannula (2 mm) is used to gently and progressively inject tumescent solution (500 ml normal saline + 30 ml 2% lidocaine + 1 mg adrenalin). A 2mm incision was made in the donor area, a minor stab wound was used to puncture the skin, and the tumescent was injected using a 2mm cannula. We waited 20 minutes following tumescent infiltration before starting liposuction in order to optimize the tumescent solution's potential. After that, liposuction was performed in a "spokes-of-a-wheel" fashion using a 3 mm cannula connected to a 20 ml syringe at low pressure. After the fat is gathered, it is treated until it is fully liquefied and emulsified. A nano filter or three-way connection is then used to make nano fat. Nano fat is injected intradermally using a 1.2 millimeter fat injection cannula to produce small papule-like lumps. The results will be evaluated three months after the last session by comparing the pre- and post-improvement photos taken with a digital camera. Scar Assessment Scale for Patients and Observers (POSAS).

Statistical analysis: For analysis, data was imported into the Statistical Package for the Social Sciences (SPSS version 21) program. For every continuous variable, the mean and standard deviation will be computed based on the data score. Depending on the kind of variable, the student t-test and chi-square test will be performed to evaluate the statistical difference between the variables. Tables and graphs will be used to describe the study's findings; Microsoft Word was used to exhibit the data.

Ethical considerations: The ethical aspects of the research were carefully thought out to preserve patient privacy and confidentiality. An institutional research committee ethics clearance letter was obtained before patient data was accessed. In addition, a formal letter requesting authorization to retrieve the necessary data was sent to the diagnostic laboratory. To maintain patient anonymity, only pertinent information about the research topic was obtained, and all patient identifiers were deleted. The data was stored in a password-protected manner and was only accessible by the researcher and supervisor. Every ethical guideline was adhered to in compliance with the Declaration.

Results

Patients with post-burn scars from the Plastic Surgery Department at PMCH in Bihar, India participated in the study, which was carried out as a randomized controlled clinical trial. Fifty two randomly selected individuals, whose mean age was 29, got injections of nano fat. Of these, 44 (84.6%) were females and 8 (15.4%) were males. Of the study population, 30.8 percent had flame burns, 7.7 percent had chemical burns, and 61.5 percent had scaled burns as the cause of the post-burn scar. Six patients (11.5%) had scars in the upper trunk, ten (19.2%) in the head and neck, and thirty-six (69.2%) in the lower trunk. Table 1 describes the scars' location, length, width, and longevity. It indicates that the scars' lengths range from 5 to 30 cm, while their widths range from 5-8 cm. The average fat harvest was 46.54–18.34 cc, with a range of 15–80 cc. The lower abdomen was the most common donor region. Moderate infection (8%) and mild hematoma (3.8%) are among the consequences;

chronic edema lasting more than three weeks (11.54%) is another. Only medical interventions were used to address each problem.

Table 1: Site, length width and duration of scar

	Variants	N=52
Duration of scar (yrs.)	Mean ± SD	4.4 ± 1.75
	Range	2-8
Site of harvesting	Inner thigh	16 (30.8%)
	Lower abdomen	36
Amount of fat injection	Mean ± SD	46.5±18.3
	Range	15-80
Width of scar (cm.)	Mean ± SD	3.15±2.32
	Range	0.5-8
Length of scar (cm.)	Mean ± SD	20.19±7.30
	Range	5-30

Assessment of the scars by the best observer score pre-operatively showed vascularity (3.25+0.95) and the worst score is pigmentation (8.62=1.33). The total score of 6 items is (39.3313.1) which is above 30 and the overall opinion is (7.33:1.5) shown in Table 2.

Table 2: Assessment of scars by best observer score pre-operatively

Before	Mean ± SD	Range
surface area	7.5 ± 1.02	6.2 - 9.6
Pliability	7.6 ± 1.01	3.9 - 9.1
Relief	3.25 ± 0.95	2.2 - 6.3
Thickness	7.9 ± 0.85	5 - 9.9
Pigmentation	8.62 ± 1.33	6.4 – 10
Vascularity	3.3 ± 1.2	1.1 - 5.5
total of six items	39.3 ± 3	25 – 50
overall opinion	7.3 ± 1.5	5 – 9

Post-operatively, the best observer score assessment, is relief (2.1:1.2) and the worst score is pigmentation (5‡1.45), the total score of 6 items is (19.5‡2.5) which is below 30 and the overall opinion is (3.5‡1.2) showed in Table 3.

Table 3: The best observer score assessment post operatively

After	Mean ± SD	Range
Surface area	3.8 ± 0.95	2.7 - 5.2
Pliability	3.4 ± 0.92	2.3 - 6.65
Relief	2 ± 1.2	1 - 3.4
Thickness	3.2 ± 1.01	2.4 - 5.8
Pigmentation	5 ± 1.45	2 – 7
Vascular	2 ± 1.32	1.5 – 3
Total of six items	19.5 ± 2.5	12 – 31
Overall opinion	3.5 ± 1.2	2 – 5

An analysis of the pre- and postoperative observer assessments revealed statistically significant improvements in all items. Table 4 showed that the thickness (CI 4.7) was the item most affected.

Table 4: Preoperative and postoperative score

	Before	After	Confidence interval	Test value	P-value
Itching	3.7 ± 1.3	2.02 ± 0.37	1.7	6.28	0.0001
Color	7.9 ± 0.85	6.04 ± 2.26	11.9	3.99	0.0002
Thickness	7.6 ± 1.01	3.2 ± 1.01	4.38	11.63	0.0001
Pain	3.9 ± 1.23	2.32 ± 0.42	1.07	4.20	0.0001
Stiffness	7.58 ± 1.01	3.06 ± 0.48	4.52	20.61	0.0001
Irregularity	7.9 ± 0.95	2.85 ± 0.35	5.08	25.58	0.0001

Discussion

According to Ishaque et al. [13], the comparison of POSAS was evaluated on patient and observer scores prior to treatment, three months after injection, and six months after injection. At three and six months after therapy, the data revealed very significant changes [13]. In our study, the main locations for fat harvesting were the lower abdomen in 18 patients (69.2%) and the inner thigh in 8 individuals (30.8%). The mean scar duration (years)

in the current study was 4.42±1.75 years, with a range of 2 to 8 years.

Ishaque et al. reported that their aim was to evaluate the impact of autologous nano fat injection on enhancing the appearance of post-traumatic scars and to establish a correlation between the results and pathology [13]. The authors argued that physiologic healing had no bearing on the results since all of the treated scars in their study were mature-that is, older than two years. Most of the victims' faces were scarred [13]. This indicates that the social consequences of face scars are a major reason why people seek therapy.

According to the current study, Itching (2.02±0.37) and color (6.04±2.26) are the best and worst patient scores, respectively, after surgery. observer scale for vascularity, while 44% of the participants obtained ratings between 1 and 3. A POSAS score of more than 6 was not present in any of the patients [15, 16]. Additionally, the current study demonstrates that 52% of patients had a POSAS score on the Observer scale for pigmentation between 1 and 3, and 48% of patients had a score between 4 and 6. The POSAS scores of none of the patients were greater than 6. According to Uyulmaz et al. [14], the majority of post-treatment scars experienced positive outcomes. 74%. Just 8% of the injected scars showed results that remained unchanged following therapy, compared to 18% of scars that had acceptable outcomes. The results of our investigation were in line with those of Lee et al. [17], who came to the conclusion that fat injection and combined scar repair greatly improve the Vancouver scar scale (VSS) [17]. Pallua and Kim's study examined the outcomes of fat injection therapy for facial scarring. The POSAS ratings improved satisfactorily in terms of discomfort, color, stiffness, irregularity, pigmentation, and pliability [18]. According to the current study's findings, there was a highly statistically significant change in the procedure's pain, itching, color, stiffness, thickness, and irregularity between Before and After [18].

Conclusion: For patients experiencing pain, itching, redness, and stiffness, nano fat grafting is a safe and effective treatment option for scars from burns. For patients experiencing pain, itching, redness, and stiffness, nano fat grafting is a safe and effective treatment option for scarring from burns.

Limitations: The primary constraint of the current investigation was the selection of participants solely from hospital patients, rather than from the general population. Selection bias was therefore possible. Furthermore, the patients' diagnoses were made only based on their clinical presentation; no additional techniques, such as histology or patch tests, were employed. One reason for a diverse and overlapping age range could be that the sample size was limited. A large sample study is required for more accurate results.

Recommendation: We need more study population at different intervals following to validate our findings and ascertain if these modifications are transient or permanent. It is necessary to investigate the effects of additional potential causes.

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