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# Novel Treatment of Burn Scars using Autologous Fat, Preliminary Results

**Sudhanva H.K.[a], Mohapatra D.P.[b], Chittoria R.K.[c]**

[a]Senior Resident [b]Additional Professor [c]Professor & Head, Department of Plastic Surgery, Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER), Pondicherry 605006, India.

**Abstract**

Burns scars leave a significant impact on patients affecting their physical, social & psychological wellbeing. They are usually complicated by hypertrophy, keloid, contractures & may be associated with pain or itching. Autologous fat is known for its regenerative properties. We present the preliminary results of an ongoing study on application of autologous fat grafting in burn scars conducted between Dec 2015 to Oct 2016 on 8 patients. The preliminary results reveal effectiveness of autologous fat grafting in burn scars.

**Keywords:** Autologous Fat Grafting; Burn Scars; Lipoaspirate.

## Introduction

Burns scar are always heal as hyper or hypopigmented scars and can either be elevated, depressed, atrophic or ulcerated. In about 30-70 % of burns patients, complications like hypertrophy, keloids, unstable scars and contractures may develop which may be associated with pain or itching [1]. Adipose Derived Mesenchymal Stem Cells (ADSCs) which are present in autologous fat are known for its regenerative properties [2]. ADSCs has been studied extensively for its application in various aspects on medicine including cardiology, gastroenterology, etc [3]. Recent studies on application of autologous fat grafting in burn scars which have demonstrated improvement in colour, texture, thickness, elasticity and volume of burns scars [4]. This study was conducted to assess this novel treatment modality inburns scars for improvement in aesthetic and functional outcome of scar and its complications.

**Corresponding Author: Ravi Kumar Chittoria,** Professor & Head, Department of Plastic Surgery, Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER), Pondicherry 605006, India.
E-mail: drchittoria@yahoo.com

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## Material and Methods

These are the preliminary results of an ongoing study conducted over a period of 10 months from December 2015 to October 2016. Ethical clearance was obtained prior to commencing the study. 8 patients were studied in this timeframe. Patients with well healed burns scars more than 21days post burns however less than 1 year duration, patients age group 12-60 years were included in this study. Patients with lower abdominal burns, established contractures, pregnancy, co-morbid factors like diabetes mellitus, hypertension, haematological diseases & patients on medication like steroids, anticoagulantswere excluded from the study. The study was funded by an intramural grant provided by JIPMER.

The procedure of Autologous fat grafting was performed under local anaesthesia as a day care surgery. Autologous fat was harvested from the abdomen by Coleman's technique through a sub-umbilical incision.

The lipoaspirate was centrifuged at 3000rpm for 3 mins to obtain purified fat. Purified fat was injected 1-1.5ml/3cm$^2$ burns scar area at the dermo-hypodermal junction. Scar assessment was done by POSAS Scar Scale by the patient and observer. The POSAS Scar Score was recorded pre-operatively and at 1, 3 and 6 weeks. The patient history and demographic details were recorded into study proforma and a photographic record for clinical documentation was maintained.

## Results

*Results*

The preliminary results of our study Eight patients (2 male and 6 female) were treated with autologous fat grafting for burns scars adjoining areas over a period of 10 months. The mean age was 26.62 years. The most common etiology of burn scarring was following thermal burns injury. The most common area involved was cheek followed by forehead. The average time of presentation was 7.75 months post burns. Average size of burns area treated was 6.5cm x 6.75 cm. Average amount of autologous fat injected was 3ml. Post fat grafting most common areas of improvement were in the pliability, stiffness and itching with minimal improvement in pigmentation, thickness, pain & colour. No improvement was noted in vascularity, relief, surface area, thickness & irregularity. No complications were noted in the patients.

**Table 1:** Demographic, Clinical & Procedure Details

| Sl. No | Age | Sex | Etiology | Location | Time of presentation | Size of burns area treated | Amount of Lipoaspirate injected |
|---|---|---|---|---|---|---|---|
| 1. | 32 | F | Thermal burns | Cheeks | 2 months | 13 x 9cm | 6ml |
| 2. | 16 | F | Thermal burns | Cheeks | 11 months | 7cm x 10cm | 5ml |
| 3. | 18 | F | Thermal burns | Forehead | 6 months | 3cm x 3cm | 1.5ml |
| 4. | 41 | F | Scald burns | Forehead | 10 months | 4cm x 3 cm | 1.5ml |
| 5. | 21 | F | Thermal burns | Hand | 7 months | 6cm x 4cm | 2ml |
| 6. | 28 | M | Thermal burns | Left arm | 10 months | 12cm x 15cm | 6ml |
| 7. | 24 | F | Thermal burns | Neck | 7 months | 4cm x 6cm | 1.5ml |
| 8. | 33 | M | Thermal burns | Cheek | 9 months | 3cm x 4cm | 1ml |

**Table 2:** POSAS score

| Sl. No | Average POSAS Parameters | POSAS Pre-op | 1 wk Postop | 3 wks Postop | 6 wks Postop |
|---|---|---|---|---|---|
| 1. | Vascularity | 5.5 | 5.5 | 5.5 | 5.5 |
| 2. | Pigmentation | 7 | 7 | 7 | 6.5 |
| 3. | Thickness | 5 | 5 | 5 | 4.5 |
| 4. | Relief | 7 | 7 | 7 | 7 |
| 5. | Pliability | 4.5 | 4.5 | 4.5 | 3.5 |
| 6. | Surface area | 4 | 4 | 4 | 4 |
| 7. | Overall opinion Patient | 6.5 | 6.5 | 6.5 | 6 |
| 8. | Pain | 3.5 | 3.5 | 3 | 3 |
| 9. | Itching | 4.5 | 4 | 4 | 3.5 |
| 10. | Colour | 6 | 6 | 6 | 5.5 |
| 11. | Stiffness | 6.5 | 6.5 | 6 | 5.5 |
| 12. | Thickness | 6 | 6.5 | 6 | 6 |
| 13. | Irregularity | 7 | 7 | 7 | 7 |
| 14. | Overall Opinion Observer | 6.5 | 6.5 | 6.5 | 6 |

**Fig. 1:** Pre- operative marking of burns scar over cheek

**Fig. 2:** Autologous fat grafting into burns scar

**Fig. 3:** Result after 6 weeks

## Discussion

Autologous fat grafting was first performed over a 100 years ago in 1893 when Adolf Neuber, a german surgeon used autologous fat to fill soft tissue defects [5]. Autologous fat was widely used to correct multiple conditions like hemifacial atrophy, breast deficiencies in the early part of 20th century. However its popularity increased with the development of liposuction techniques in 1980s. Liposuction aspirate fat transfer was first reported by Illouz in 1984 [6]. Autologous fat is currently extremely popular among plastic surgeons as fillers for facial atrophy, breast augmentation, rhitids, scars, facial rejuvenation and augmentation.

Klinger et al [7] were the first to use autologous fat for chronic burn scars and demonstrated improvement in skin thickness and texture with evidence of tissue regeneration. An improvement in texture, thickness, softness, elasticity and colour of skin was noted in a study by Brongo et al who studied the role of lipofilling for severe burn outcomes [4]. An improvement of clinical appearance in chronic facial burns scars on fat grafting was noted by R. Viardet al [8].

Adipose tissue is a reserve of ADSCs which has a wide range of regenerative capabilities which can be used to improve scars. Autologous fat grafting is a safe procedure and can be repeated if necessary. In our study, early results reveal an improvement in pliability, stiffness and itching associated with burn scars. However final results of the study and detailed analysis shall reveal a clearer picture of the role of autologous fat in improving the aesthetics and functional problems associated with burn scars.

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