

Review Article

Dystrophic Fat Lipoplasty in HIV Patients. Focus on lower Limb Lipodystrophy and Introduction of Fat Assisted Body Sculpturing (FABS)

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Abstract

Background: With increasing prevalence of acquired immune deficiency syndrome (AIDS) and improved prognosis of patients due to chronic use of highly active antiretroviral therapy (HAART), multiple adverse effects have been also reported, especially lipodystrophy. This study was done to check the effectiveness of fat assisted body sculpturing for lipodystrophy in HIV positive patients.

Methods: Between October 2010 and October 2013, 125 patients (85 females and 40 males) who presented with lipodystrophy of lower limbs, underwent liposuction with fat assisted body sculpturing (FABS). Mean age and seropositivity history were of 44 and 17 years, respectively.

Results: A questionnaire was given to all 125 patients, to assess patient's satisfaction for the results obtained at the end of the follow-up period a 1 to 5 scale was allocated to each parameter. For persistence of volumetric correction at 1 year, the score 3, 4 and 5 was given by 25, 76 and 24 patients, respectively. For overall surgical experience, the score 3, 4 and 5 was given by 32, 75 and 18 patients, respectively. The majority of patients expressed satisfaction for the management of lipodystrophy. The great majority of the patients scored 4 (good result).

Conclusions: Patients demanding volume adjustments found that FABS is an effective method for adipose tissue manipulation and further studies in the future will clarify the findings of the present study.

INTRODUCTION

Prevalence and survival of HIV positive patients increased during last decades due to availability of more effective antiviral drugs. Along with improved effectiveness, antiviral drugs produce an extended profile of adverse effects, especially when used in different combinations. One of such adverse effects is the appearance of clinically evident lipodystrophy [1]. Increased focus for the research, care and management of lipodystrophy has been noticed during the last decade. Co morbidities and disabilities induced by HIV are also a major focus.

The lipodystrophy syndrome (LDS) is the most common

physical long-term side effect that is caused by antiretroviral therapy [2] and it is associated with the highly active antiretroviral therapy (HAART). Somatic features for LDS include excavated cheeks and temples, abdominal excess fat, buffalo hump, arm lipodystrophy, gluteal hypotrophy and asymmetry, dorsal fat accumulation and pubic lipodystrophy that render fat manipulation necessary for this population of patients. HAART has reduced both short-term morbidity and mortality due to disease and the transformation of this fatal disease into a chronic illness led to the emergence of metabolic complications secondary to long-term use of this chronic therapeutic regimen. The first description of LDS was reported in 1998 in HIV patients

receiving at least one protease inhibitor [3,4].

The aim of this study was to follow the clinical presentation, diagnosis, and management of the body shape abnormalities in HIV patients in Italy.

Somatic features of LDS include peripheral lipodystrophy, hollow cheeks and temples, abdominal excess fat, buffalo hump, arm lipodystrophy, gluteal atrophy and asymmetry, dorsal fat accumulation and pubic lipodystrophy but also hyperlipidemia, diabetes, insulin resistance, [4-6]. While treatment of buffalo hump and facial atrophy has been extensively described [7,8] to our knowledge, no report/study has been published on the treatment of lower limb lipodystrophy by extensive fat transfer and this represents the focus of the current study. Management of patients affected by facial lipodystrophy and buffalo hump differs because these evident *stigmata* relegate patients in a discriminated population cluster and corrective surgical procedures (facial lipofilling and buffalo hump liposuction) are clearly described and indicated for such patients [9].

The prevalence of LDS varies from 18% to 70% after the use of several years of HAART, in relation to the classification used [6].

Overall, affected persons complain about social problems, mainly because of the loss of their characteristic appearance [10]. It is well known how stigmatization is one of the central problems in the lives of HIV positive and AIDS patients [11,12]. This condition renders fat manipulation necessary for these patients as it represents a well defined, widespread and reliable surgical procedure in both aesthetic and reconstructive surgery.

METHODS

In this study our focus was on the lower limb (leg and thigh) of affected patients that have been disfigured and affected by gross abnormalities:

1. The knees are skeletonized and the muscular fascia is evident subcutaneously under a translucent and thin, dehydrated skin.
2. Vein varicosities are present, dramatically evident and hypertrophic.
3. Normal thigh roundness is altered towards a more concave shape.

A search on Pubmed for (fat transfer hiv) indicated 18 articles published between 1995 and 2012 was done. A focus on therapeutic surgical strategies and brief review of literature was necessary to address and provide indications for surgical correction of these anatomical abnormalities.

In our study, we retrospectively reviewed the early results of the 125 patients treated for lower limb lipodystrophy after 13.8 months of average follow-up. An early assessment of the technique as well as patient's perception of the treatment at the end of the study is also provided.

Patients included in this study were affected by severe lower limb lipodystrophy and received prior medical clearance (anesthesia consult and infectious disease referral letter). Preoperative counseling was accurate and informed consent was

obtained before the procedure. Furthermore, patients included in this study, presented with evident lipodystrophy that was carefully analyzed by three plastic surgeons on staff during a preliminary consultation. Baseline photographs were obtained and a surgical plan was discussed with the patient. We excluded patients with body dysmorphic disorder, patients requiring multiple surgical dermolipectomies for other body parts and patients who did not receive medical clearance.

RESULTS

From October 2010 to October 2013, 125 patients were treated. Patient population counted 85 females and 40 males, with an average age of 44 years. The average HIV seropositivity history was 17 years (Table 1). The shortest and longest follow-up time was 12.4 and 15.1 months, respectively, with an average of 13.8 months. Preoperatively, the legs were marked indicating where volume was depleted (Figure 1). Fat was harvested with a 3 mm Tulip Medical® (4360 Morena Blvd, Suite 100 San Diego, CA 92117) atraumatic aspiration cannula from areas in the body where it was available and with a 3 mm Bluegerman tip aspiration cannula manufactured by Miller Medical® (4727 E. Bell Rd #45-122 Phoenix, AZ 85032). 10 cc luer-lock syringes were filled with fat which was centrifuged for 3 minutes at 4,000

Table 1: Demographic and surgical data of patients treated.

Patients treated	Mean age	Mean Harvested Fat volume	Mean re-injected Fat volume	Mean Seropositivity history
125	44.3 y.o.	700 cc	390 cc	17.5 y
85 female	42 y.o.	735 cc	420 cc	16.8 y
40 males	46.6 y.o.	665 cc	360 cc	18.2 y

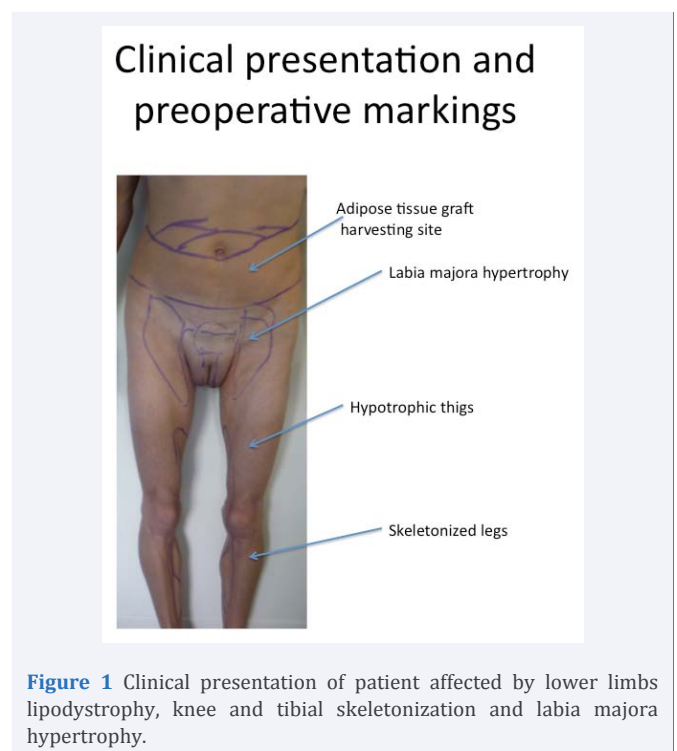


Figure 1 Clinical presentation of patient affected by lower limbs lipodystrophy, knee and tibial skeletonization and labia majora hypertrophy.

revolutions per minute. Liquid part was discharged and fat was then injected using 1.2-1.4 mm straight and curved cannulas in volumes of 100 to 750 cc. It was re-injected in selected regions of the buttocks, inner thighs, knees, calves and ankles. Elasto compressive dressings with Tensoplast® were left in place on treated areas for the first 5-7 days after the procedure on the harvesting site while the receiving site was dressed with medpore. Use of elastocompressive garments was subsequently recommended for patients for a period of 4 weeks.

If further fat volume removal was required, a second fat transfer was scheduled during the follow up visits. 82 surgical procedures were performed under IV sedation anesthesia, 43 under general anesthesia after waiting 20 minutes to ensure the local anesthetic and vasoconstrictive action. We found that infiltration of even diluted lidocaine in patients undergoing general anesthesia reduced the postoperative pain. Each procedure lasted average of 1.5 hours. On all patients, infiltration with tumescent solution of the areas involved was performed and prophylactic cefazoline (1g) was administered preoperatively if no history of allergies was documented. Fat volume aspirated varied from a minimum of 200 cc to a maximum of 1000 cc, per patient in each session, with a global mean volume of harvested fat of 700 cc, where 735 and 665 cc represents the average fat harvested in the female and male group, respectively. The global re-injected fat volume was 390 cc, with 420 cc and 360 cc for female and male group, respectively. Demographic and surgical data are shown in Table 1. Every patient was provided with a questionnaire during the first control or later on through mail/email. The goal of the questionnaire was to asses patient's satisfaction for the results obtained at the end of the follow-up period (see result section for details) exclusively in relation to the lower limb treatment. The patients that did not comply in returning the questionnaire at the end of the study were excluded from the study.

Data collection from the questionnaire returned at the end of the follow-up period provided the results in terms of the following:

- Persistence of volumetric correction at 1 year on a 1-5 scale.
- Overall surgical experience on a 1-5 scale.
- Aesthetic correction of varicosities of lower limbs on a 1-5 scale.

Where in the questionnaires 5 indicate excellent result, 4 good, 3 satisfactory, 2 poor and 1 disappointing.

Results are shown in Table 2 and clinical examples are presented in Figures 2, 3 and 4. Patients were overall satisfied

Table 2: Results Age and volumes of harvested adipose tissue in relation to sex and mean seropositivity history.

Score	1	2	3	4	5
persistence of volumetric correction at 1 year	0	0	25	76	24
overall surgical experience	0	0	32	75	18
Correction of varicosities of lower limbs	0	0	22	88	15



Figure 2 lower limb fat transfer on 42 y.o. female.
 A: preoperative picture, front view. Note calf hypertrophy, knee skeletonization and evident varicosities
 B: preoperative picture, posterior view. Note calf hypertrophy and varicosities.
 C: front view, postoperative 12 month follow up of fat transfer to lower limbs. Volume injected 200 cc per leg.
 D: posterior view, postoperative 12 month follow up of fat transfer to lower limbs. Volume injected 200 cc per leg. Note drastic improvement of venous varicosities and underlying muscular fascia visibility.

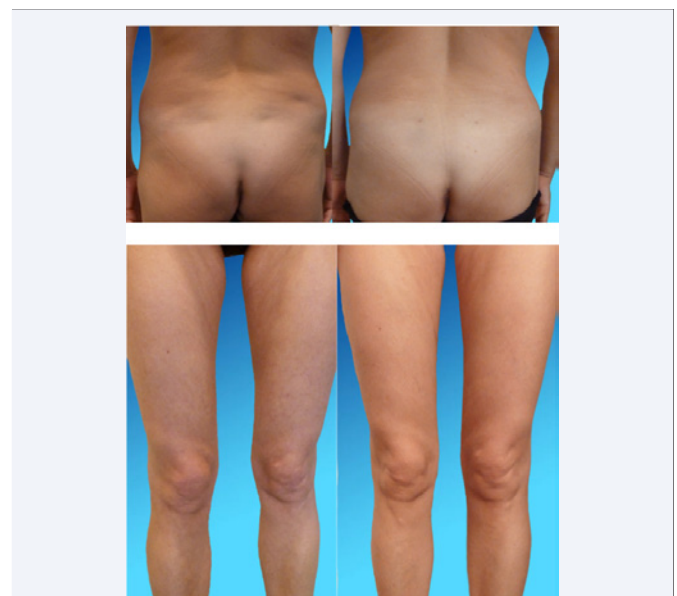


Figure 3 lower limb and outer gluteal region fat transfer on 39 y.o. female.
 A: preoperative picture, gluteal excavation and hypotrophy
 B: preoperative picture, anterior view. Note skeletonization of inner legs and thigh hypotrophy.
 C: anterior view, postoperative 12 month follow up after 180 cc fat transfer to legs and thighs.
 D: posterior view, postoperative 12 month follow up after 150 cc of fat tissue injected in the gluteal region.

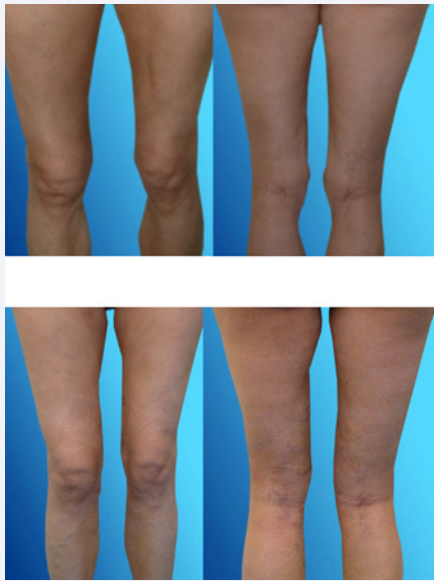


Figure 4 lower limb fat transfer on 45 y.o. female.
A: preoperative picture front view note skeletonized knees.
B: preoperative picture posterior view of lower limbs.
C: anterior view, postoperative 12 month follow up after 180 cc fat transfer to legs and thighs. Improvement of knee skeletonization and thigh hypotrophy is evident.
D: posterior view, postoperative 12 month follow up after 180 cc fat transfer to legs and thighs. Improvement of knee skeletonization and thigh hypotrophy is evident.

from the results obtained in effectively correcting the lower limb areas affected by evident signs of lipodystrophy. No complications occurred during the course of the study for any patient.

DISCUSSION

We assessed the effectiveness of fat assisted body sculpturing for lipodystrophy in HIV positive patients. Satisfactory improvement was reported by most of the patients. Patients affected by LDS need aggressive surgical correction considering the long term pharmaceutical regimens they have to continue in order to stay alive. From the first description of LDS in 1998 [5], this clinical condition has been described and refined in its characteristics. Morphological abnormalities resulting from alterations in the distribution of fat are manifested in various ways. Lipoatrophy (loss of adipose tissue) is noted on face, buttocks and limbs; especially here the venous circulation becomes more prominent along with a thin, delicate and dehydrated skin. Fat accumulation (lipohypertrophy) is seen in the central abdominal region, in addition to deposits in the breasts (both in males and females) and dorsocervical region, also called the buffalo hump [13-15]. Often fat loss and accumulation can occur simultaneously in different regions of the body of the same individual in the so called mixed form [16].

The prevalence of LDS varies in relation to the classification used with a global prevalence between 18% and 70% in HAART treated patients [6]. Miller et al. reviewed the Australian population, showed that about 50% of the patients receiving antiretroviral therapy are affected by body changes resulting from LDS [17]. Among Brazilian patients, the prevalence described was

of 55% [18]. The LDS thus results in the appearance of *stigmata*, problems in social activities, alterations in sexuality, hence has a great impact on quality of life.

The treatment of buffalo hump and facial atrophy has been extensively described in the literature [7,8]. Good results are obtained in facial lipoatrophy with either liposuction or synthetic fillers [19,20]. Unfortunately, the lack of thick subcutaneous and dermal layer in the lower limbs makes the use of synthetic fillers not advisable in these areas where the *stigmata* are well represented. Fat transfer is thus the only therapeutic possibility in these patients and to our knowledge there is no report on lower limb reconstruction with fat transfer in LDS patients in the current literature. Our experience demonstrates that surgical correction of lower limb defects allows patients affected by lower limb lipodystrophy to appreciate their own body harmony like years before onset of anatomic abnormalities. Patients with satisfactory results have been happy to fill the questionnaires and review it with medical staff. Data provided showed an excellent response in terms of all the main aspects inquired through the questionnaire: persistence of volume correction, overall surgical experience and correction of varicosities in the lower limbs. On the 1 to 5 scale, the great majority of the patients scored 4 (good result). Interestingly, a very high score in the response was given in regards to the correction of varicosities as a consequence of the treatment. It does deserve a consideration about the fact that overall aesthetic appearance is greatly improved and noticed by the reduction or improvement of the varicosities in the lower limbs mainly by the restoration of the subcutaneous layer. Female patients regained self confidence that allowed them to dress and expose their bodies as adult women, like they were doing years before, before the illness. In men, we were able correct leg shape according to classical beauty parameter such as round, regular and muscular consistence. Recent studies, sampling an HIV-infected population have investigated the relationship between appearance concerns and clinical *sequelae*, such as anxiety and depression. Negative body image in HIV-infected individuals has been linked with self reported and clinician assessed depression, as well as self reported anxiety [21-23].

With the progression of the illness and the relative treatment, the morphologic alterations of the body became more and more evident with time, raising appearance related concerns among HIV positive individuals. Blashill *et al* [24] retrospectively found a significant relation between the concerns related to appearance related HIV symptomatology and an increased depression and severe anxiety. In this perspective, interventions targeting body dissatisfaction amongst HIV positive individuals would likely reap secondary benefits by indirectly reducing depressive and anxiety symptoms. The present study focused on the early results obtained from lower limb lipodystrophy treatment with FABS as well as the patient's subjective evaluation of the results obtained. A limit of this preliminary study is the lack of data in terms of costs; considering the social and financial impact of AIDS and LDS as one of its consequences, it would be interesting to evaluate such aspect especially in such a relatively unexplored niche of the LDS affecting the lower limbs.

Our strategy to provide volume adjustments in the lower limbs with the method described, that we refer to as fat assisted

body sculpturing (FABS), has proven to be a reliable, reproducible and an effective procedure. Our experience gained rapid popularity among Italian HIV positive patients due to the quality of the services offered (many spontaneous letters of appreciation were received). This study has evident results, on a reasonable sample size with follow-up of one year. Other studies worked out facial atrophy and liposuction of various areas but specificity to lower limbs is unique to this study. Social networks and on line word of mouth, facilitated also by non-profit organizations on dedicated forums played a key role in spreading the news of the professional activity in our department and our center became a referral center for adipose tissue manipulation, in central Italy.

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