

# Histological Alterations Following Bariatric Surgery: Pilot Study

Franco Carlo Migliori · Giacomo Robello ·  
Jean L. Ravetti · Giuseppe M. Marinari

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## Abstract

**Background** Macroscopic clinical evidence of tissue damaging following bariatric surgery pushed plastic surgeons to presume microscopic alterations as well.

**Methods** Five preliminary cases studied randomly, and compared with healthy tissues, confirmed these initial suspects. A deeper and wider study has then been structured.

**Results** Preliminary results are so evident to encourage us to carry on an estimated 2–3 years multidisciplinary study.

**Conclusions** What we want to study is if histological post-bariatric alterations are confirmed, and if these can be considered responsible for higher complication rate in body contouring following bariatric surgery.

**Keywords** Body contouring · Dermis · Fat · Bariatric surgery · Histological alterations

## Introduction

Massive weight loss (MWL) bariatric patients pass through dramatic body mass reduction and astonishing lifestyle changing in few months. According with these macroscopic aspects, microscopic modifications were supposed to take place.

Malabsorptive bariatric procedures (like biliopancreatic diversion) are “non-cosmetic” operations, which result in massive weight loss (70% of overweight) within 12 to

18 months. Metabolisms and chemical equilibrium incur in deep permanent changes, persisting whole life long and needing therapeutical support.

The plastic surgeon, while performing body contouring on this kind of patients, has got a clear clinical evidence of macroscopic differences within dermal and adipose tissue structure, compared with non-bariatric patients [1]. Color and texture are pretty different as probable consequence of malabsorption: Nutritional deficiencies subsequent to bariatric surgery are well demonstrated by literature [2–4].

Dermis and fat are very important tissues in all plastic surgery procedures, frequently involved in the main healing processes and possible post-operative complications (necrosis, lipo-necrosis, seromas, etc.).

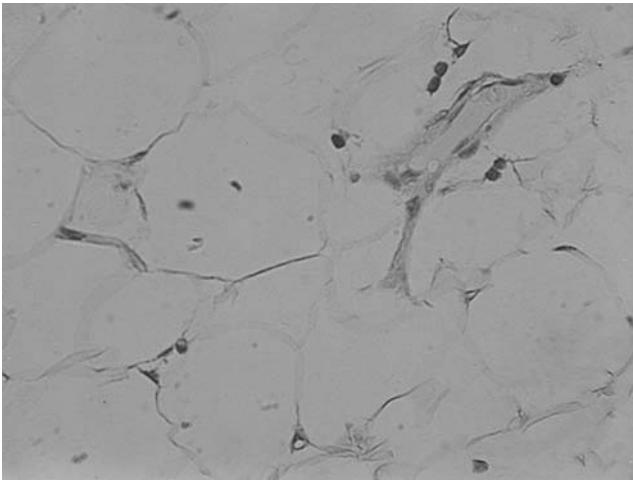
That’s why, following an evidence-based medicine (EBM) concept, we decided to analyze few cutaneous specimens taken from body-contouring patients, previously undergone through bariatric surgery.

## Materials and Methods

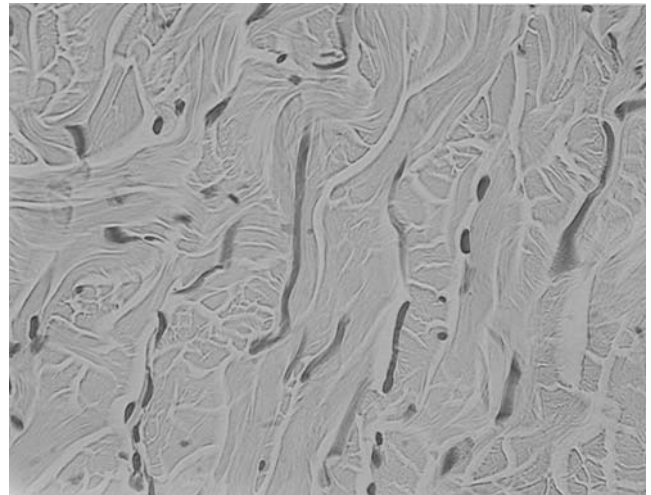
We preliminary analyzed five patients (4 female, 1 male, average age 38, all Caucasian, all specimens from abdominal wall), asking the pathologist to give us details about dermis and fat structure, compared with the average normal ones (taken from healthy people, same sex, race, and age). The pathologist gave us this kind of results:

- Fat tissue histological alterations after BPD (Figs. 1 and 2):
  - Collapsed adipocytes
  - Cytoplasmatic membrane thickening
  - Visible nucleus
  - Fibrous septum thickening

F. C. Migliori (✉) · G. Robello · J. L. Ravetti · G. M. Marinari  
San Martino University Hospital, Genova, GE 16132, Italy  
e-mail: franco.migliori@fastwebnet.it



**Fig. 1** Normal fat tissue (hematoxylin and eosin stain, 300 $\times$ )

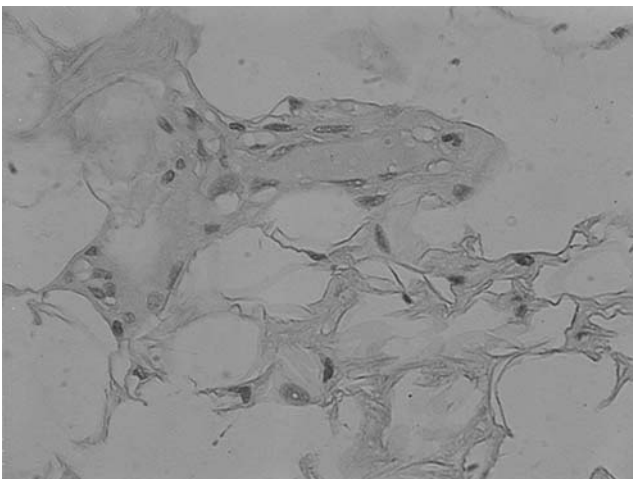


**Fig. 3** Normal dermal tissue (hematoxylin and eosin stain, 400 $\times$ )

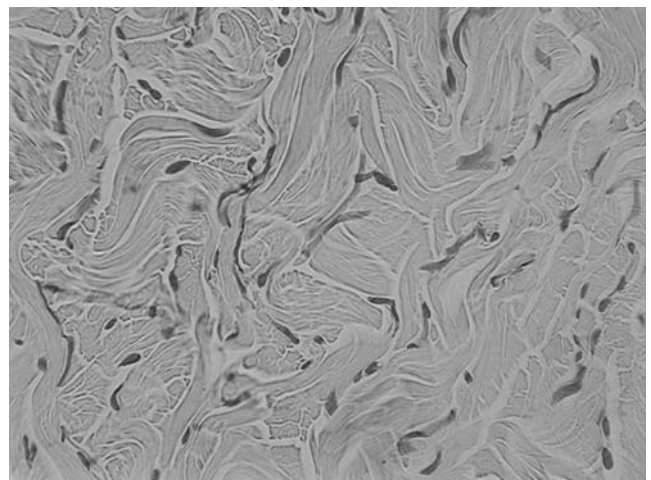
- Dermal tissue histological alterations after BPD (Figs. 3 and 4):
  - Fibrous net thickening
  - Hypertrophic vascular net (perhaps compensation reaction, similar to tissue expansion one)
  - Presumed elastic fibers loss (histochemistry e E.M. needed to confirm it)

## Results

What we want to analyze are the changes of dermal and adipose tissue structure, on the same patient, before and after bariatric surgery. Histological dermal and epidermal characteristics will be examined in each patient previously and following bariatric surgery in order to fix which kind of changes happens in the same patient and if these changes are the same for all patients.



**Fig. 2** Post-bariatric fat tissue (hematoxylin and eosin stain, 300 $\times$ )



**Fig. 4** Post-bariatric dermal tissue (hematoxylin and eosin stain, 400 $\times$ )

General surgeon, while approaching laparotomic bariatric surgery (mainly malabsorptive), takes a full thickness specimen of skin (2 $\times$ 1 cm) with underlying fat. The specimen is sent to the pathologist, processed and colored with routine histological methods, and put by into 10% buffered formalin.

Bariatric surgeon prefers and suggests specimen assembling before laparotomic procedures rather than laparoscopic ones because there could occur two problems:

1. Before surgery, withdrawal creates too big access, letting air getting in.
2. After surgery, withdrawal is not suitable because of too damaged skin due to laparoscopic handlings.

Starting from 12 to 18 months after bariatric surgery, a variable percentage of these group of patients will come to our observation to decide and undergo to body contouring.

At that time, a second skin specimen (coming from the same anatomical site) will be withdrawn and sent to the pathologist. The pathologist will assemble the specimen as well as the first, preparing sections and slides of both pieces and comparing them.

## Discussion

This study, at present time as a preliminary one, is weak because of two defects:

1. Few cases
2. Heterogeneous group (normal patients different from post-bariatric patients)

So, we have planned to conduct the future studies in order to understand:

- (a) If the microscopic alterations evidenced in the preliminary study are confirmed in a higher number of cases and in the same patients

- (b) If these changes in dermal and epidermal tissue can invalidate the wound healing, and play a role in the higher rate of complications of the post-bariatric patients.

The average time passing between bariatric and plastic surgery is 18–24 months. Therefore we plan to present our final results not before 2–3 years. So this must be intended as a preliminary report.

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