Chapter 1
New Concepts in Abdominoplasty: Origin and Evolution

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Introduction

The roots of the origin of my new concepts in abdominoplasty arose a long time ago since the time that I started performing traditional abdominoplasty and later liposuction. In fact, when I learned from Prof. Pitanguy, during my period of residence, and later from Prof. Illouz, respectively, how to perform abdominoplasty and liposuction procedures, I already thought of searching for a safer approach. In my private practice, beginning in 1974, I used to have a rate of local and systemic complications after abdominoplasty similar to that mentioned by other plastic surgeons. According to Grazer and Goldwyn [47] and later Guerrerosantos et al. [48], complications after abdominoplasty were a constant problem among plastic surgeons. With the combination of traditional abdominoplasty and a liposuction technique, the complications became even more frequent, as reported by Goldwyn [46] a few years after liposuction was introduced and popularized by Illouz. No longer was I so disappointed with all the complications that used to occur with most plastic surgeons. In my judgment the troubles were related to vascular damage during surgery, and as there was no adequate solution for the problems I then made the decision of not performing such combined operations anymore [16]. Of note, Hetter et al. [49], Dellerud [43], and later Flageul et al. [45] reported that seroma formation, hematoma, sloughing of the skin, minor and major areas of panniculus necrosis of the abdominal wall, thromboembolism, and unesthetic scars around the umbilicus were some of the most frequent complications after abdominoplasty. Since the earlier period of the practice, these kinds of complications concerned me so much that I was motivated to study and research the anatomy of the abdominal panniculus, searching for a new method in order to avoid these complications. In

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2006, Matarasso et al. [56] reported the findings of the American Society for Aesthetic Plastic Surgery's 2004 Cosmetic National Data Bank: during the previous 7 years, the number of abdominoplasty operations performed had increased by 344%. This is important information; due to safety procedures, surgical results have improved, with minimal rates of complications, encouraging plastic surgeons to perform abdominoplasties.

Technique

Among the complications after abdominoplasty, the creation of a new umbilicus was a constant task that used to be reported by most plastic surgeons. It bothered me so much that during my first 2 years of practice, I developed a personal approach to create a new umbilical area during abdominoplasty [2–6]. The main surgical principle of my procedure is to avoid a circular scar around the umbilicus during surgery. The first reference for transposition of the umbilicus is credited to Vernon [62], who performed a circular incision around the umbilicus during surgery for abdominal panniculus, and for its reimplantation, he removed a circle of skin on the abdominal flap and sutured the wound. All procedures described afterward were similar to that, since with a vertical, horizontal, or a curved incision, the final scar around the new umbilical area is a circular one. Until my publications all authors used to make a circular incision around the umbilicus according to Vernon's method. Instead of a circle, I proposed creating three cutaneous flaps on the umbilicus, and another three cutaneous flaps on the abdominal panniculus in order to suture alternately between them. The final scar, instead of a circular one, is an asymmetric triple Z-plasty which avoids retraction and contraction, which were frequent complications in an worldwide survey reported by Grazer and Goldwyn [47]. Therefore, in my operations the problems regarding creation of the new umbilicus were adequately solved.

Nevertheless, other complications occurring perioperatively and also after abdominoplasty were a constant challenge for several years. Regarding the origin of my new concepts, an important step occurred in August 1975 when I participated in the Sixth Congress of the International Confederation of Plastic and Reconstructive Surgery (IPRS) held in Paris. During that meeting I was invited to attend a private reception at a plastic surgeon's office. That surgeon was Dr. Illouz. As soon as we met each other, a strong friendship developed between us. As he was an active member of the French Society of Aesthetic Plastic Surgery, he invited me to speak at the next congress, to be held in Paris in 1976. My talks were about umbilicoplasty and negroid nose procedures [3]. So, due to my original publications, I met Dr. Illouz some years before his first publication concerning the liposuction technique [50].

Later, I quite often used to hear about a French surgeon who had developed a new technique for fat removal. In 1980 Dr. Illouz came to speak about it at the Brazilian Congress of Plastic Surgery (held in Fortaleza, Ceara State), which was quite controversial since most surgeons were not convinced about the method. In the meantime, I often heard about his procedure. Early in 1982 I called him with the purpose of learning his technique. For 1 week I attended several surgeries and I saw some patients in

postoperative recovery showing very good results. I was impressed and convinced about his technique. During my stay he gave me a copy of his publication printed in a public journal (tabloid) with a clear description in French of his methodology; this is still at my institute as a special souvenir (Fig. 1.1). At that time I was the President of the Brazilian Society of Plastic Surgery (São Paulo State region), and I invited him to come to São Paulo to give a course to introduce his technique. So, in November 1982 he came to give a course, and he performed six surgical demonstrations with excellent results, which were a success; the course was a memorable event [51]. As I had already learned his technique, during the first course, I introduced to Dr. Illouz some of my patients who had undergone the procedure on the abdomen, neck, and torso. Afterward I invited him again several times to come once a year to teach his technique at other courses and also to give lectures at the Brazilian Congress of Plastic Surgery [52]. As he used to come to São Paulo quite often, and as we were so involved in introducing and teaching his technique, we decided to publish our book, in which we described the basic fundamentals and advanced technical information.

During that period of introduction, learning, practising, and teaching the liposuction technique, several questions about it came to mind:

1. The limit of the patient's age for undergoing liposuction
2. The limit of fat tissue to be removed in each operation
3. Criteria of indications for overweight patients
4. The anatomy of the panniculus
5. The clinical and metabolic alterations after liposuction
6. Redundancy of the skin secondary to the liposuction procedure
7. Liposuction combined with traditional procedures
8. Behavior of the remaining fat tissue after surgery.

The first three questions mentioned above led to the establishment of adequate rules and criteria for plastic surgeons; these have been useful from that period to the present.

However, regarding the anatomy of the panniculus, I devoted much time to research in cadavers in order to know fat tissue, as well as its distribution in all regions of the human body (Fig. 1.2) [12]. That knowledge was a good support at that time, providing proper conditions to employ the new technique of liposuction. Even nowadays that anatomical information is still very useful when fat-suction is done.

Regarding clinical and metabolic alterations, I demonstrated, in a comparative study with patients who underwent esthetic procedures (reduction mastoplasty, abdominoplasty, rhytidoplasty), that there was no specific disturbance in patients after liposuction [7–9, 12, 14, 15]. Apart from my research, other surgeons studied the same subject and had similar results [1].

To solve the problem concerning redundancy of the skin after the liposuction procedure, it became mandatory to remove such skin in order to achieve a good balance of the regions with harmony in body contouring. In fact, the traditional abdominoplasty described by Callia [42] and popularized by Pitanguy [57] used to be the fundamental procedure for combination with the liposuction technique developed by Illouz [50, 51]. However, when such a combined procedure was performed on the abdomen, several kinds of local complications were seen quite often: seroma

Fig. 1.1 First Illouz publication. Photos (**a**, **b**) in the French journal in 1978. Photos (**c**, **d**) on other pages in the French journal in 1978

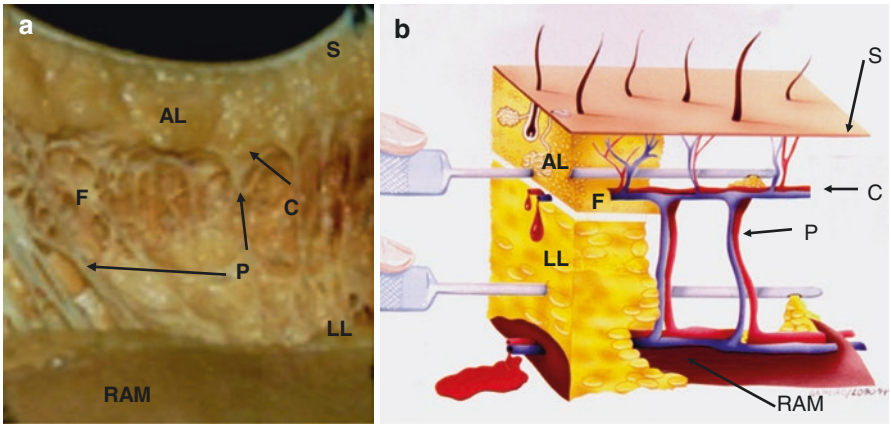

Fig. 1.2 Sophisticated structures of the abdominal panniculus. Photo (**a**) after liposuction procedure on a cadaver showing: skin (*S*), areolar layer (*AL*), fascia superficialis (*F*), communicating vessels (*C*), perforator vessels (*P*), lamellar layer (*LL*), and rectus abdominalis muscle (*RAM*). Drawing (**b**) showing the same structures

formation, hematoma, cutaneous sloughing, and skin and panniculus necrosis. As well, systemic complications and even, unfortunately, deaths, were reported worldwide. Although that combined procedure was performed by most plastic surgeons, I was deeply concerned about the procedure, as described in my publications [10, 11].

The behavior of the remaining fat tissue after liposuction, the selection of patients, and the indications for liposuction are meticulously emphasized in my publication [17]. It is described that the fibrotic and thick tissue developed secondarily to fat-suction is very difficult to dissect and to undermine, and even makes it difficult to move the panniculus for resection [10]. It is mentioned that in cases of a secondary liposuction on the abdominal wall, the procedure must be done carefully, since the cannula may accidentally perforate the muscular structures, causing severe damage to the internal organs.

Besides these situations, several other problems used to occur during and after liposuction procedures. Bleeding during operation was a frequent problem, requiring transfusion of donated or autologous blood [61]. Nowadays, most of these problems have been adequately solved. But during that time it was my obsessive pursuit to learn widely and very broadly about these problems. Nevertheless, performing liposuction on the abdominal wall used to be even more complex than previously, since physical abnormalities as well as expectations of the results were a constant challenge.

Undoubtedly a very high incidence of local complications used to occur after liposuction in conjunction with conventional procedures with most surgeons, as reported by Goldwyn [46], Hetter et al. [49], and Dellerud [43]. These problems intrigued me so much that I became discouraged from performing combined approaches due to the psychological repercussions for the patients [15], [58]. So, in

1988 (only 6 years into my practice in the use of the fat-suction technique), even after the publication of our book [13], I decided not to perform such associated procedures anymore [16]. During a period of 10 years, from 1988 to1998, I used to perform only conventional abdominoplasty in patients without localized adiposities, or isolated fat-suction in young patients to remove only localized adiposities without skin resection. Although I no longer performed the combined procedure, I followed my research in my previous study of the anatomy and behavior of the remaining fat tissue [12, 14, 15, 17]. As well as studying these complications, I was looking for a new approach to solve both deformities – flaccidity with the excess skin associated with treatment of localized adiposities on the abdominal wall.

During a long period of anatomical studies and analyzing the complications of conventional abdominoplasty, I concluded that most of the problems were caused by venous and lymphatic stasis, due to the cutting of the perforator vessels (Fig. 1.2). However, after the liposuction procedure the perforator vessels coming from the rectus abdominalis to the remaining panniculus were preserved, as demonstrated in some slides that Prof. Callia gave me. He had performed conventional abdominoplasty in a group of female patients 6 months after liposuction because of their complaints about the redundant skin. I analyzed his slides in comparison with mine, taken from my previous anatomical research in cadavers, and came to the conclusion that it would be possible to perform panniculus resection combined with liposuction, as long as the perforator vessels coming from the rectus abdominalis would be preserved. That is the basis of my new concepts, which I pursued in order to perform abdominoplasty safely.

Due to my conclusion, I was motivated to perform, on cadavers, full-thickness suction of the subcutaneous tissue in an elliptical area on the suprapubic region and on the medial thigh. Afterwards skin resection was done and I identified structures similar to those I had found on cadavers after liposuction procedures in my previous anatomical research, which was a fundamental support of information [12, 17]. Later, liposuction was done below the fascia superficialis that is underneath the areolar layer of the panniculus which is moved from one border to another to facilitate the suture of the surgical wound. At that moment I was sure that such an operation could be performed safely without any bleeding during or after surgery.

My first patients were operated in early 1998, 10 years after my radical decision of not performing combined procedures of liposuction with skin resection. My first operation was done in a female patient presenting unesthetic and deep surgical scars in the suprapubic region. The second patient was another female, with dark, thick skin with localized adiposity on the medial thigh region. First, I demarcated the excess skin that should be removed and also the area to perform fat-suction. The operations were successfully done through a liposuction procedure on a full thickness area of the skin which was removed afterward without bleeding. Following the operation liposuction was done underneath the remaining panniculus without undermining, and the wound was sutured.

It was clear to me that a new procedure could be performed, with minimal complications, in order to suction the accumulated fat, combined with skin resection of the redundant cutaneous covering after the fat-suction. In my original publications

[18–21], this method was employed for treatment of the abdominal wall, medial thigh lifting, flanks, and axilla, as well as in a closed vascular system, since no vessels are damaged.

Therefore, the final conclusions of my new approach were to treat not only the abdominal wall, since the whole body may present localized adiposities and redundant skin as well. Due to my anatomical investigations, several segments of the human body were adequately repaired with minimal complications using the same surgical principles, which are to preserve the perforator vessels to work as multiple pedicles for the abdominal wall, medial thigh, flanks, and torso, as well as in the axillary regions. I have also employed similar surgical principles to perform face lifting, ear reconstruction, and reverse lower blepharoplasty, and to treat other segments of the human body. Also I perform rhytidoplasty with reduced cutaneous undermining by tunnelization preserving the perforator vessels to assure adequate blood supply. My technique for ear reconstruction involves the same surgical principles as those described for abdominoplasty. The reconstructed auricles present a vascular and nervous pedicle through which an adequate blood supply and adequate sensibility are provided. My reverse lower blepharoplasty approach is performed using the same surgical principles, since no liposuction procedure is done, nor is there cutaneous or muscle undermining.

Apart from my publications in 1999, I presented the new concepts at a congresses in Brazil [22] and abroad ([23]). In early 2000 Prof. Callia's unit invited me to demonstrate the new concepts in abdominoplasty at a course at the Municipal Hospital in São Paulo City. Apart from my classes, I also performed a surgical demonstration [24]. In 2000 I was invited to speak about my abdominoplasty procedure at several meetings in Brazil [25–27] and abroad. It is referred to by Matarasso [55] as new concepts in abdominoplasty. Also I presented again at other international congresses [28–30]. In October 2000, I organized The Second Course of Abdominoplasty at the Heart Hospital (Hospital do Coração) in São Paulo when several of the plastic surgeons who had attended the First Course presented their experience in the use of the new technique [31]. Among these plastic surgeons, Erfon introduced the plication of the aponeurosis below the umbilicus to reduce the extent of the final scar of the abdominoplasty [44]. Also, Leao presented, during the Second Course, plication of the superior segment of the abdomen creating a tunnel from the umbilicus to the xiphoid process, preserving the perforator vessels on each side [53]. Following my presentations, I spoke again at the 37th Brazilian Congress of Plastic Surgery [32]. At the Brazilian Congress, Leão presented his procedure for plication of the superior abdominal wall without panniculus undermining [54]. In 2001 I was invited to participate in many congresses abroad-- in Spain [33, 34], at the Balkan Congress in Belgrade [35], at the American Congress in New York [36], and again at the International Society of Aesthetic and Plastic Surgery (ISAPS) Course in Rio de Janeiro [37]. Also, early in 2002, details of my findings were published in the American Aesthetic Journal [38], presented at the ISAPS Congress in Turkey [39], and again presented at the American Congress in Boston [41].

My descriptions in publications and my presentations at congresses, symposiums, and courses were very clear, convincing other plastic surgeons to perform abdominoplasty combined with liposuction, so that in December 2001 there were

other reports [59]. My first publication and presentations were in 1999; therefore, the long period of 2 years was enough for other surgeons to learn, to employ, and to confirm the basic principles of my new concepts in abdominoplasty.

Discussion

Abdominoplasty is an important procedure to improve the harmony of the body contour. The treatment must be done through a technique that achieves esthetic, reconstructive, and functional results. For this reason patient selection, correct indications, and the choice of a suitable surgical technique are essential steps before surgery. Therefore, before any esthetic procedure is performed on the abdomen, the patients must be well evaluated in order to analyze all abnormalities according to the scientific knowledge and sense of beauty of the surgeon.

For various reasons, all layers covering the abdominal wall--skin, subcutaneous tissues, aponeurosis, and muscles--may be damaged, resulting in deformities that require surgical repair. Such deformities may be caused by repeated pregnancies, cutaneous flaccidity, striae, retracted scars secondary to previous operations, severe local trauma, hernia, diastasis of the rectus abdominalis, localized adiposities, and weight loss, among others. It is well known that several kinds of complications may occur after abdominoplasty, as well as after combined procedures with liposuction. All complications were quite common before the liposuction era introduced by Illouz [50, 51]. However, in the combined surgeries the rate of complications increased very much, which prompted me to search for an adequate solution. During a few years of practising the associated procedure, I made the radical decision of not performing the procedure anymore until I developed a new approach avoiding such complications. I was greatly concerned about all the problems occurring after surgeries, encouraging me to study and research the anatomy of the panniculus and the behavior of the remaining fat tissue following my previous studies on cadavers [12, 14, 15, 17].

I devoted much time to research on anatomy dissection to study the subcutaneous compartment, which was not well known previously, since few surgical procedures needed knowledge about it. As the cannulas used to perform liposuction work specifically on the level between the skin and muscles underneath, I became motivated to study and research this segment of the human body. The anatomy of the panniculus is formed by the areolar layer and lamellar layer divided by the fascia superficialis (Fig. 1.2). After my anatomical studies of the abdominal panniculus, it seemed suitable to mention that the fascia superficialis is a symbol of the new concepts in lipoabdominoplasty, since it covers whole regions of the body and is particularly important in the abdominal wall. The perforator vessels come from the muscles passing through the lamellar layer until they reach the fascia superficialis, where a strong arch of channels of communicating vessels is created. From that arch small vessels cross the areolar layer perpendicularly until they reach the subdermal level. Therefore, preservation of the perforator vessels is the main surgical principle, as this preservation provides adequate blood supply to the areolar layer and to the fat tissue remaining after liposuction.

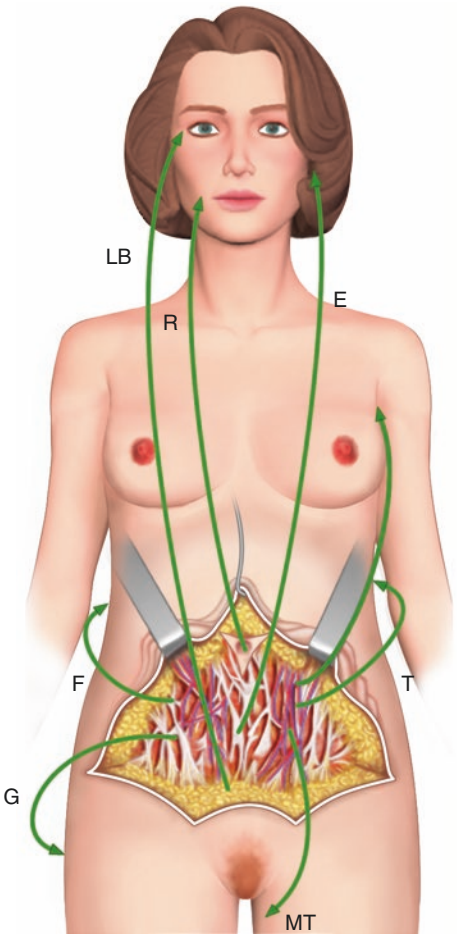

Fig. 1.3 Further applications of the surgical principles of new concepts in abdominoplasty. *LB* lower blepharoplasty, *R* rhytidoplasty, *E* ear reconstruction, *T* torso, *F* flanks, *G* gluteus, *MT* medial thigh

According to the American Society for Aesthetic Plastic Surgery's 2004 Cosmetic Surgery National Data Bank, the number of abdominoplasties increased by 344 % between 1997 and 2004. This increase is a result of the combination of abdominoplasty with the liposuction technique, which is a safe procedure with a minimal rate of complications after operation. Therefore, the minor complications occurring during and after such combined abdominoplasties have stimulated patients and plastic surgeons to perform the combined procedures.

Other authors have also searched for suitable procedures for abdominoplasty, as mentioned by Shestak, with his marriage of liposuction combined with abdominoplasty [60].

The surgical principles of lipoabdominoplasty are also employed to perform medial thigh lipoplasty, face-lifting procedures (rhytidoplasties), ear reconstruction, reverse lower blepharoplasty, torso and flank lipoplasty, and gluteus lipoplasty (Fig. 1.3).

My ideas in searching for new concepts in abdominoplasty did not come immediately. In fact, I was wondering and thinking about the problems for some time, and more than that, I was looking for a safe procedure. My previous publications in a wide field concerning abdominoplasty before the liposuction era, as well as my publications on the use of combined procedures, are permanent witnesses to my scientific activities.

I am deeply thankful to Prof. Pitanguy for giving me a good level of specialization, to Prof. Illouz for the opportunity to learn his technique, and to Prof. Callia for his useful support during the period of researching a new approach for abdominoplasty. They gave me great sensibility and the scientific spirit for searching for a new way in plastic surgery. It was a privilege to give Prof. Illouz some commemorative plaques in recognition of and gratitude for his outstanding scientific contribution to plastic surgery (Figs. 1.4 and 1.5).

Conclusions

The first operation for esthetic treatment to reinstate the abdominal wall is credited to Kelly (1899). During all of the period since then, much attention has been focused on finding a procedure through which good results could be achieved. However, the very high incidence of complications in abdominoplasty was a problem to be solved, since the perforator vessels were cut in order to achieve wide undermining.

When the liposuction technique was developed and popularized worldwide by Illouz ([50, 51], 1992), I found a new way to improve my surgical results, performing this technique in association with traditional abdominoplasty [10, 11, 40]. Several complications after abdominoplasty were reported by all plastic surgeons; however, with the use of the liposuction procedure combined with conventional techniques, the rate of these complications became even higher and the complications more complex. I was concerned about these problems, since seroma formation, hematoma, skin sloughing, cutaneous infection, and panniculus necrosis, as well as systemic complications, were a constant challenge.

After reports in my publications [18, 19, 24–32], abdominoplasty showed significant technical improvements, because it became possible to perform it in combination with a liposuction technique, in which preservation of the perforator vessels is the main surgical principle of the lipoabdominoplasty. In fact, during this operation, the perforator vessels are not cut, providing blood supply to the remaining abdominal panniculus, working as multiple pedicles. This is a major surgical contribution, with a minor rate of complications, because the operation can be carried out without panniculus undermining and resection.

These surgical principles are essential for the lipoabdominoplasty procedure to improve body contouring; as well, the principles are employed in several other regions, according to my original descriptions for flankplasty, torsoplasty, medial thigh lifting, and esthetic surgery of the axillary regions [18–21].

Fig. 1.4 During the 45th Brazilian Congress of Plastic Surgery held in Brasília in 2008, the "Prof. Illouz Association" gave Prof. Illouz a gold plaque in recognition of his superb improvement of technique through the liposuction procedure. (**a**) Photo of the moment Prof. Illouz received the homage with a plaque; (**b**) the gold plaque is a map of Brazil; (**c**) on the plaque a cannula is pointed from Fortaleza (Ceara) to São Paulo to demonstrate that it was the place of the first Prof. Illouz conference. Afterward he came to São Paulo several times to teach the liposuction technique; (**d**) another plaque was given to Prof. Illouz in gratitude for his wonderful scientific contribution

Similar surgical principles may also be employed to perform face lifting, ear reconstruction, reverse lower blepharoplasty, and plastic surgery procedures in other segments of the human body. Such a combined approach, with its suitable physiological surgical principles, in which the vascular nervous pedicles are not cut, is very important in plastic surgery, as these structures contain arteries, veins, lymphatics, and nerves. . As long as these structures are properly preserved, they provide smooth and esthetic results with good sensibility for the remnant abdominal panniculus.

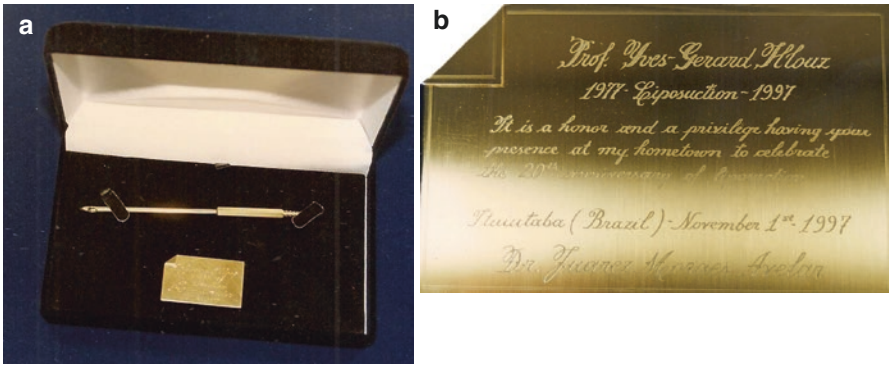

Fig. 1.5 A gold cannula with a plaque was given to Prof. Illouz in celebration of the twentieth anniversary of the creation and development of the liposuction technique. (**a**) Photo of the cannula and plaque; (**b**) photo of the plaque

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