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Aleš Fibír, M.D., PhD.
Editing:
Michaela Malinová
e-mail: malinova@levyn.cz

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ACTA CHIRURGIAE PLASTICAE, 58, 14, 2016, p. 59

It is a pleasure to see how our journal, *Acta chirurgiae plasticae*, changed dramatically under the new editor-in-chief, Aleš Fibír, M.D. The journal is now published more regularly, it is easier to contribute in it, it is peer-reviewed and formally it is more alike famous journals from abroad. It is just less than two years ago when Aleš Fibír, M.D. took over the position of the editor-in-chief and I wish he keeps his enthusiasm for this demanding work to cultivate and increase prestige of this journal.

We, as the members of today's generation of Czech plastic surgeons, take the existence of *Acta chirurgiae plasticae* journal as an obvious grant from previous times (generations), maybe not appreciating correctly it's true value. It has quite a long history that started in 1959; it has connection with internationally recognized name of prof. Burian; it has independence of selection what is going to be published; it provides a unique possibility to share ideas and experience of those of us who want to be known internationally. And it is maintained by quite a small Czech Society of Plastic Surgery CzMA (130 active members). We, as the members of the Czech Society of Plastic Surgery, should be proud to have such a great journal that is so valuable for our professional life. I strongly believe that it will be more and more rewarding to contribute to our journal and finally it will be a privilege to have an article accepted by this journal.

Today's issue is designated to breast reconstruction, the topic that keeps standard and strong position in the specialty of plastic surgery. However, think about breast reconstruction in the eyes of breast oncology professionals and also in the eyes of the patients. How many patients are actually offered to undergo breast reconstruction? My estimation is that only about 200 patients underwent autologous reconstructions and about 500 patients underwent implant reconstruction in 2015. That is probably only 10% of new breast cancer patients, since part of these reconstructions were done after prophylactic mastectomy. And for how many have we performed immediate reconstruction after therapeutic mastectomy? There were very few flaps and not many implants. How many oncological centers offer breast reconstruction performed by plastic surgeons on regular basis? What about evaluation and audit of our results? How many complications do we have, how many happy patients do we have? How efficient is prophylactic mastectomy, which we, as plastic surgeons, perform? Many questions need to be answered and there is still a long way to achieve the highest possible standard of plastic surgery role in the process of prevention, treatment and also recovery from breast cancer disease.

I believe that today's issue of *Acta chirurgiae plasticae* will be a useful contribution to our knowledge about breast reconstruction and also another evidence of viability of this journal.

Assoc. Prof. Luboš Dražan, M.D., PhD.
Department of Plastic and Aesthetic Surgery
St. Anne's University Hospital Brno

TRIDIMENSIONAL DOPPLER ASSESSMENT: A RELIABLE, NON-INVASIVE AND COST-EFFECTIVE METHOD FOR PREOPERATIVE PERFORATOR ASSESSMENT IN DIEP FLAP

Dražan L.[1], Lombardo G.A.G[2]

[1]Clinic of Plastic and Aesthetic Surgery, St. Anne's University Brno, Czech Republic
[2]Breast Unit, Cannizzaro Hospital, Catania, Italy

ACTA CHGIRURGIAE PLASTICAE, 58, 2, 2016, pp.60-63

ABSTRACT

Background. The preoperative perforator mapping is an important step in autologous breast reconstruction, making the flap raising safer, more predictable and time-saving. Although the Doppler exam has proven to be less accurate in locating perforators compared with colour duplex sonography and CTA, it will probably remain of importance in clinical practice. The aim of this paper is to share some advices on how to perform a Doppler exam in preoperative evaluation of a DIEAp flap, increasing its reliability in location of the perforators.

Methods: The study was carried-out preoperatively on 26 consecutive patients. For the evaluation of the matching between Doppler Dot and operative finding was used a Cartesian coordinate system

Results: We have marked preoperatively 145 perforators in 26 patients for a total of 52 semi-abdomens. An average of 5.6 vessels per patient were marked. Of these, 80 (55.17%) were found between 0–1 cm, 36 (24.82%) between 1–2 cm and 5 (3.4%) of these more than 2 cm from each other. We had 24 (16.55%) false positives in which there was no correspondence between the signal and the intraoperative finding.

Conclusion: Although the Doppler exam may not provide the same anatomic details as the other newer modalities, such as CTA and MRA, the HHD remains a very useful and important tool for autologous reconstruction. We recommend performing this exam in our standardized and reproducible method to improve the reliability..

KEYWORDS

Perforator flap, DIEP, ultrasonography Doppler, preoperative perforator detection, autologous breast reconstruction

INTRODUCTION

The deep inferior epigastric artery perforator (DIEAp) flap has become an increasingly popular choice since its introduction in 1989 [1] and its use for breast reconstruction.[2] It is one of the most commonly used perforator flaps for breast reconstruction, becoming the gold standard in few decades. The preoperative perforator mapping is an important step in autologous breast reconstruction, making the flap raising safer, more predictable and time-saving. In these past years, several advanced diagnostic tools have become available, such as Magnetic Resonance Imaging, Computed Tomography Angiography, Digital Subtraction Angiography and Colour Doppler Sonography (Duplex).[3]

These techniques have proven to be accurate in detecting perforator vessels. They are however time consuming, they cannot be performed during operation and most of these techniques are invasive and expensive. Contrariwise, the hand held Doppler (HHD) examination, despite being a less modern device, is practical, hand portable, inexpensive, easy to perform and to interpret.[9]

However there are some limitations with HHD. The sensitivity may actually be too high (false positives), as vessels can be overlooked or, vice versa, they can be missed because of the background noise from larger vessels in the proximity [5].

The literature is poor in reports concerning how to technically perform a Doppler exam, especially for the preoperative study of the DIEAp flap. The authors have used this simple device for 15 years in preoperative mapping of the perforators in breast reconstruction. The aim of this paper is to share some advices on how to perform a Doppler exam in preopera-

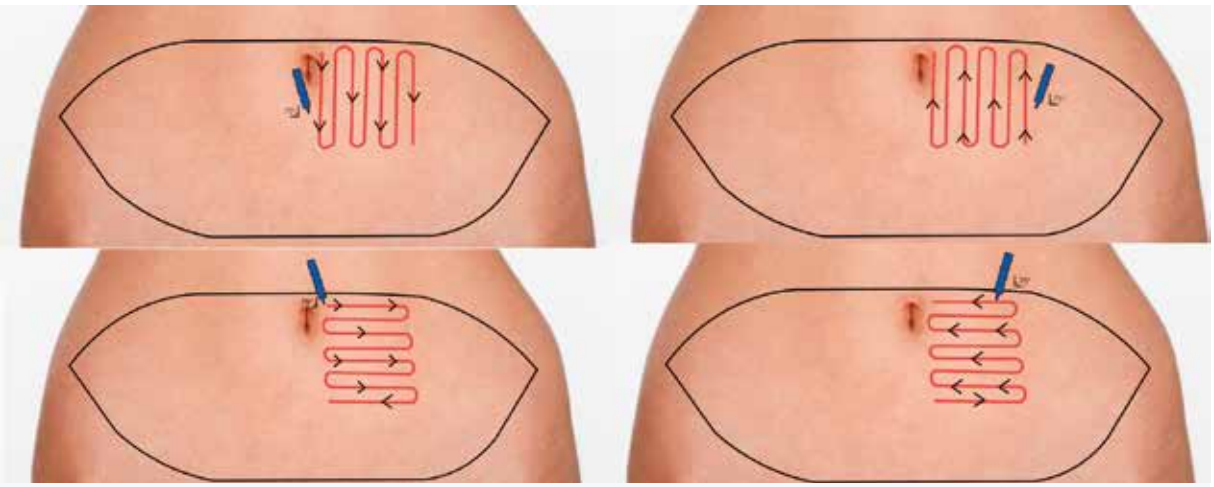

Fig. 1. The preoperative Mapping Method. Each sound signal was marked on the skin in all of the four steps. We incline the probe slightly (≈ 75°). The location with the higher density of marked dots was assigned as the perforator. By this way a preoperative map was created

tive evaluation of a DIEAp flap, increasing its reliability in location of the perforators.

MATERIALS AND METHOD

A Huntleigh Dopplex D900 (Cardiff, UK) with a 5 MHz – 8 MHz – 10 MHz probe and an ultrasound transmission gel were used. The choice of the Doppler probe is based on the thickness of the periumbilical skin evaluated preoperatively by a calliper. Based on our experience the 10 MHz probe is optimal for very thin patients (skin thickness < 3.5 cm), the 8 MHz probe was used for normal weight patients (skin thickness 3.5–5.5 cm) while the 5 MHz Probe's signal runs deeper when the panniculus adiposus is thicker (skin thickness > 5.5 cm). The study was carried-out preoperatively in 26 consecutive patients for a total of 52 semi-abdomens. All the preoperative measurements were performed by a single surgeon (L.D.)

The detection method to map the perforators preoperatively is a four-step process and it is summarized in Fig. 1. All of the preoperative perforators detected were marked on the skin with a marker pen. The flap was then dissected in the usual manner identifying the suitable perforators. The penetration point of a perforating vessel through the fascia was then projected onto the surface of the skin and marked.

For the evaluation of the matching between Doppler Dot and the operative finding was used a Cartesian coordinate system. We compared Preoperative and Postoperative map measuring the distance in cm and using the umbilicus as the origin of the coordinate system, marked as "0" point. We divided the results in three categories as high accurate (0–1 cm), accurate (1–2 cm) and low accurate (>2 cm).

RESULTS

The results are summarized in Table 1. We have marked preoperatively 145 perforators, in 26 patients for a total of 52 semi-abdomens. An average of 5.6 vessels per patient were marked. Of these, 80 (55.17%) were found between 0–1 cm, 36 (24.82%) between 1–2 cm and 5 (3.4%) of these more than 2 cm from each other. We had 24 (16.55%) false positives in which there was no correspondence between the signal and the intraoperative finding. All of the dissected perforators were detected preoperatively so we did not have false negatives in our series.

DISCUSSION

Although the Doppler exam has proven to be less accurate in locating perforators compared with colour duplex sonography [1,3] and computed tomography angiography [4-7], it will probably remain of importance in clinical practice. This is because the device is portable and the examination inexpensive, not invasive and relatively easy to perform and to interpret.

Klasson et al. found in a recent randomized prospective study that there is no significant difference in surgery time and complication rate when Doppler exam is used for preoperative mapping of perforators in comparison with CTA.[8]

Although the device is widely available, only few papers are present in literature on how to perform a Doppler exam in preoperative evaluation of DIEAp surgery.[4,9] They advise to direct it perpendicularly to each perforator being assessed.

The criticism to perform the Doppler exam in this manner is that a tridimensional structure like the skin is commutated in a flat geometric figure like a square. The single direction probe application can be valid only in few cases, where the vessel is exactly perpendicular to the surface of the skin, but in many cases the direction of the vessel is

Intraoperative Findings	High Accurate	0–1 cm	80 (55.17%)
	Accurate	1–2 cm	36 (24.82%)
	Low Accurate	> 2 cm	5 (3.4%)
	False Positive		24 (16.55%)
	All Perforators Detected		145(100%)
	False Negative		0

Table 1. Data collected

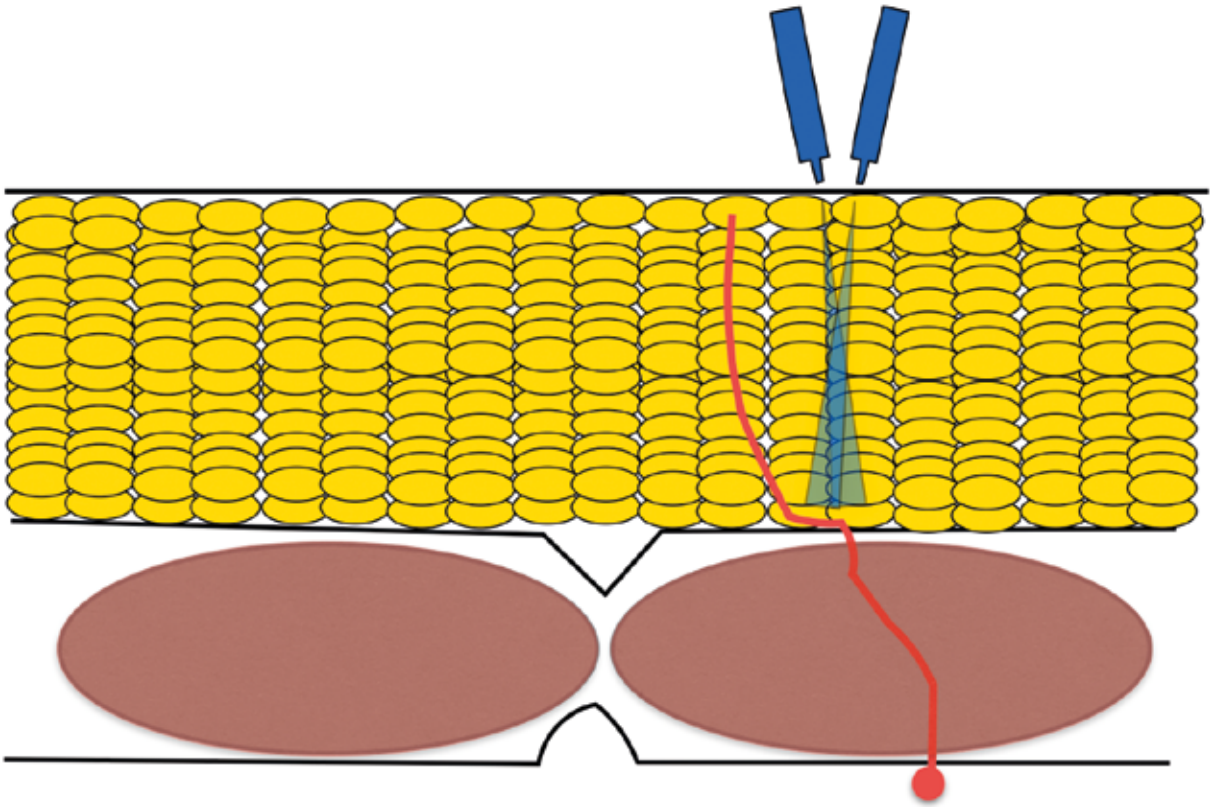

Fig. 2. The tridimensional network of Doppler signals. The tridimensional network of signals crossing the skin is simply explained. We create a dense web of signals with different angles. We know from geometry that a unique straight line passes through two distinct points. This simple axiom could explain the downfall of the false positives in our series (The figures are of our own creation)

not straight. So if we put the probe in a single direction, there is a high chance to get a signal (high sensibility), but it is possible that the signal is picked up by a vessel without a perpendicular course.

For this reason, during the dissection there will be no correspondence with the dot marked preoperatively and the point where the vessel perforates the fascia (false positive). With our method we create a dense tridimensional network of signals with different angles (Fig. 2). In this manner if we detect the perforator in more than one direction, the possibility of matching the perforator location during intraoperative assessment is higher (false positives).

For this reason we could explain the downfall of the false positives in our series (16.16%) compared with Giunta's et al. report, where there was a high percentage of false positives (48.4%). [9] Blondeel et al. also quit the preoperative Doppler exam converting to the colour Duplex scanning because of a high number of false positives. [10]

Besides, in our series there were no false negatives found; this is clinically commutated in less risk to injure accidentally the perforator for a failure in preoperatively identification.

The group 0–1 cm was the most represented with 80 cases (55.17 %) while the 1–2 cm was found in 36 cases (24.82%). Clinically these classes could be linked in a unique class because the take-home preoperative finding is that we must dissect slowly in proximity of the dot.

Based on our results, the preoperative Doppler exam gives us basic information about the location of the perforators allowing us to perform a safer, more predictable and time-saving dissection.

Although the Doppler exam may not provide the same anatomic details as the other newer modalities, such as CTA and MRA, the HHD remains a very useful and important tool for autologous reconstruction. We recommend performing this exam as a standardized and reproducible method to improve reliability.

Declaration of interest: The authors report no conflict of interest. The authors alone are responsible for the content and writing of this article.

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Corresponding author:

Lombardo Giuseppe A.G.
Cannizzaro Hospital
Via Messina 829 Catania IT 95129
Italy
E-mail: giuseppelombardouni@gmail.com

OUR PRELIMINARY EXPERIENCE WITH A NEW METHOD OF DIEAP FLAP DISSECTION

Hýža P.[1], Veselý J.[1], Streit L.[1], Schwarz D.[3], Kubek T.[1], Catalano F.[2], Lombardo G. A. G.[2]

[1]Department of Plastic and Aesthetic Surgery, St. Anne University Hospital, Brno, Czech Republic
[2]Breast Unit, Cannizzaro Hospital, Catania, Italy
[3]Institute of Biostatistics and Analyse, Masaryk University, Brno, Czech Republic

ACTA CHIRURGIAE PLASTICAE, 58, 2, pp. 64-69

ABSTRACT

Background: The abdominal tissue is an ideal source for autologous breast reconstruction. We propose a new approach for intramuscular dissection of a DIEP flap in this paper.
Methods: A total of 84 women underwent breast reconstruction after mastectomy. From this group, 49 patients were treated with traditional DIEP flap of which 21 had unilateral procedure and 28 had bilateral procedure. This new type of dissection was performed in 35 women, with unilateral approach in 14 cases and bilateral approach in 21 cases.
Results: The statistical differences are not significant in the two groups with regards to complications ($p > 0.1$). Mean operative time in this new approach was 3 hours and 10 minutes per flap. Mean operative time in the traditional dissection of DIEP was 3 hours and 41 minutes per flap. The operative time of the new approach is significantly shorter than the dissection of the traditional DIEP flap ($p < 0.01$).
Conclusion: The approach to DIEP flap dissection proposed by the authors is a new concept in autologous breast reconstruction. In this type of dissection no fascia is resected and it is more reliable than a traditional DIEP flap for the ease of dissection and for the presence of a small protective cuff of muscle around the vessel with a lower risk of perforator injury.
It is a reproducible option of dissection, useful also in less experienced hands and it is a time reducing technique compared with the traditional DIEP flap..

KEYWORDS

DIEP flap, DIEP dissection, perforator dissection, perforator flap, autologous breast reconstruction

INTRODUCTION

With an increase of the life expectancy in post-mastectomy patients[1], the request of breast reconstruction doubled from 13 % to 26% between 1998 and 2007[2]. The autologous reconstruction is worthwhile, especially in those with longer life expectancy, when both costs and quality of life are factored together[3].

Utilization of abdominal tissue for autologous breast reconstruction has been long and widely practiced. It is an ideal source, as most patients who develop breast cancer are at the age when they also have excessive abdominal fat and skin. Autologous breast reconstruction has many advantages over implant reconstruction, including reduced risks of infection, capsular contracture, and a more natural and aesthetically pleasing breast.

The muscle-sparing two-transverse *rectus abdominis* myocutaneous (MS2-TRAM) and the deep inferior epigastric perforator (DIEP) free flap are well-established techniques for autologous breast reconstruction. Debate continues regarding the merits of muscle-preserving techniques to minimize abdominal wall morbidity and to maintain flap reliability[4]. This Big game between reliability and morbidity, MS-TRAM flap and DIEP flap is not over yet.

In this *scenario,* the reliability of the DIEP flap can be compromised essentially by two factors: the first one is that actually there is no definitive evidence about the relationship between the number and dimension of the perforator vessels and the prediction of flap survival; the second one is that the vascular anatomy of the DIEP flap is extremely variable and we are far to have an evidence-based approach to perforator selection and intramuscular dissection[5].

In this paper, we propose a new approach for intramuscular dissection of a DIEP flap; this is a new muscle sparing technique enlarging the concepts previously proposed[6,7].

MATERIALS / METHODS

Operative technique

The Operative technique is summarized in Figures 1 and 2.

There are no significant differences in the operative technique between DIEP dissection and our variation. The only different step is the intramuscular dissection; once the deep fascia is incised as much as necessary to gain wide exposure of the perforators, we split the muscle fibres interposed between the vessel and the muscle, showing the perforator course.

After that we proceed cutting a ≈3mm strip of muscle around the vessel.

The cut is conducted parallel to the vessel, which is always kept visible from one side. The cut is "blind" on the other side and if some small branches are accidentally severed during the dissection there is enough space to put

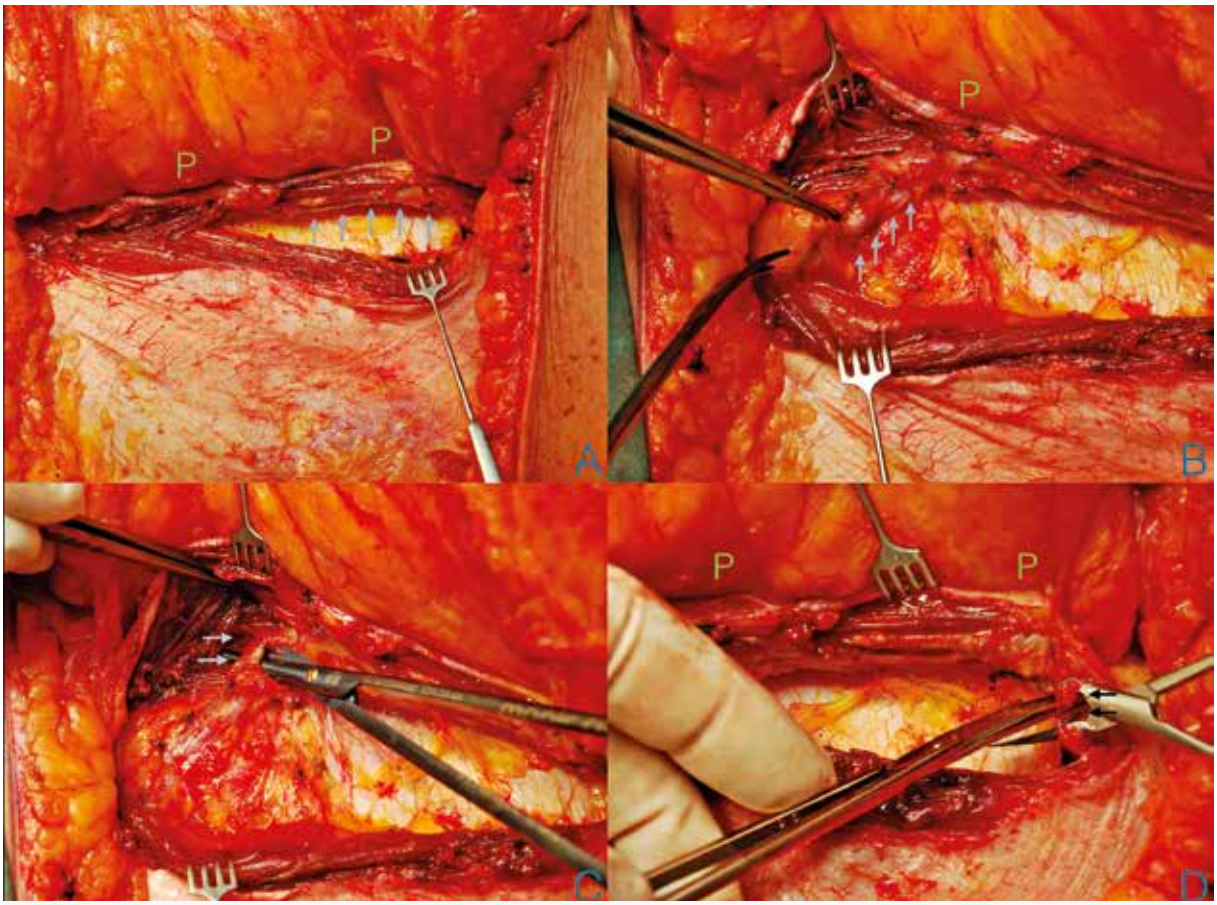

Fig. 1. This figure is a step-by-step representation of the intramuscular dissection of the author's variant. Once we choose the main perforators (P in green), we open the deep fascia as much as necessary to gain a wide exposure of the vessel (A). The grey arrows indicate the main vessel (DIEA). After the complete exposure of the pedicle (B) we proceed to ligate the medial branch of the DIEA (C) and the cranial portion of it (D)

a liga-clip or it is possible to coagulate them with a bipolar forceps considering a safe distance of ≈3 mm from the main vessel with no risk of damaging it.

Preservation of function of the remaining muscle is maximized with minimal sacrifice of the motor nerves (Fig. 3).

Because no fascia is resected, a primary tension-free suture of the fascia with a running non-absorbable 1/0 suture is always possible, just like a traditional DIEP flap (Fig. 4).

Patients

This is a retrospective study based on a single surgeon (P.H.) experience in breast reconstruction with the traditional and innovative approach to DIEP flap dissection. The various methods of muscle sparing technique are summarized in Figure 5 and Table 1.

From January 2007 to March 2012, a total of 84 women underwent breast reconstruction after mastectomy. Of these women, 49 patients were treated with traditional DIEP

Muscle Sparing Technique	Definition (rectus abdominis)
MS-0	Full width Partial Lenght
MS-1L	Preservation of lateral segment
MS-1M	Preservation of medial segment
MS-2	Preservation of lateral and medial segment
AUTHORS' VARIANT	Preservation of entire muscle except for a small cuff (≈3 mm) around the perforator
MS-3 (DIEP)	Preservation of entire muscle

Table 1. The different muscle sparing techniques are summarized. We enlarge the previous concepts adding the author's variant as a new method of dissection

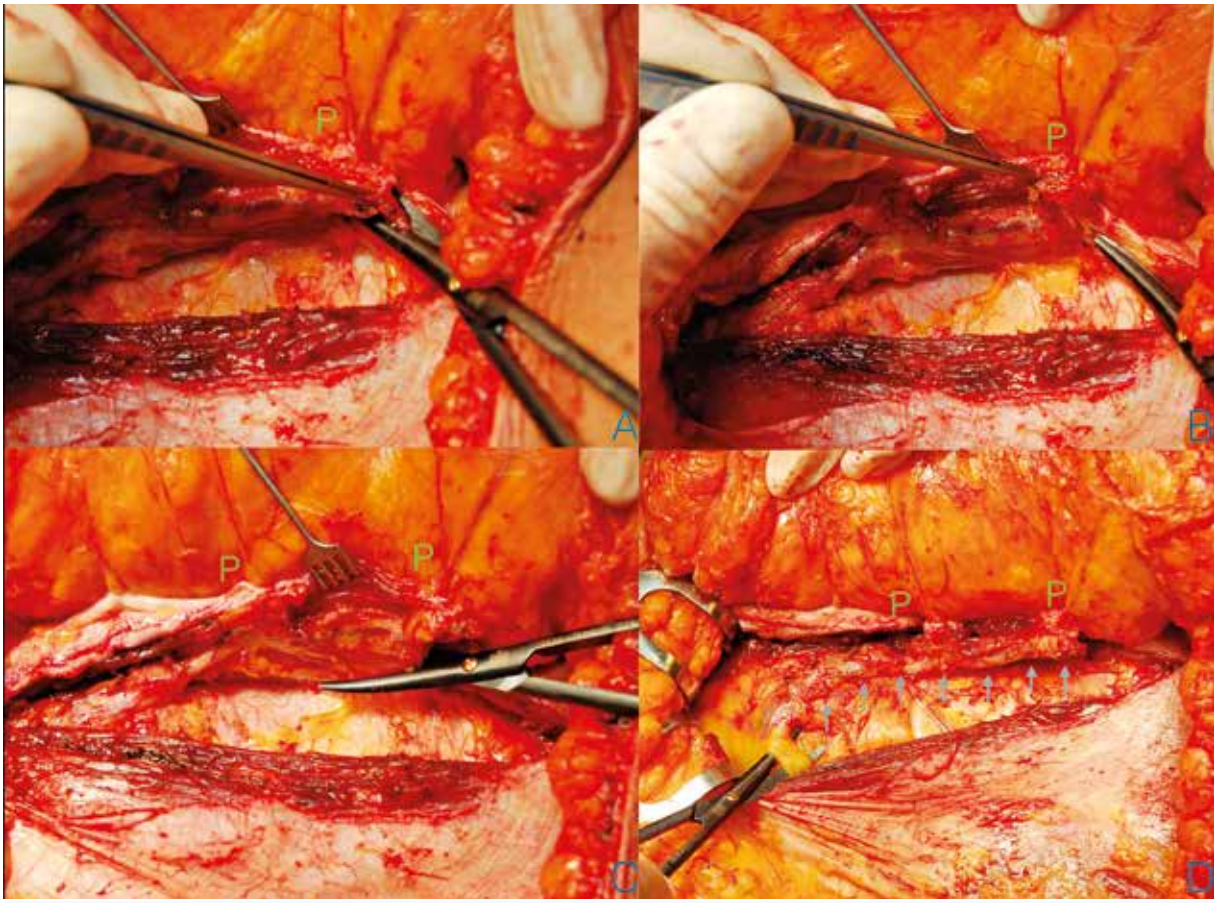

Fig. 2. A small patch of fascia around the perforator (P in green) is resected (A).
We cut a small strip of muscle parallel to the main vessel. The main vessel is always visible from one side of the view (B–C). The pedicle (grey arrows) is completely dissected (D)

flap of which 21 had unilateral procedures and 28 had bilateral procedures (77 flaps). The new method of dissection was performed in 35 women, with unilateral approach in 14 cases and a bilateral approach in 21 cases (51 flaps). The total number of flaps was 133.

Analysis of outcomes related to flap loss, venous congestion, arterial thrombosis, fat necrosis, abdominal bulge, hematoma and infection was performed. We used the Fisher's exact test to evaluate statistical differences between the two groups of complications.

The mean operative time for each procedure was also assessed. We used the Mann–Whitney–Wilcoxon (MWW) test to evaluate if there is any statistical difference between the two groups in terms of operative time.

	TRADITIONAL DIEP	AUTHORS' VARIANT	p*
Flaps	N=77	N=56	
Arterial Thrombosis	3 (3.89%)	3 (5.35%)	0.696
Venous Congestion	1 (1.29%)	3 (5.35%)	0.310
Flap Loss	2 (2.59%)	1 (1.78%)	0.999
Fat Necrosis	1 (1.29%)	1 (1.78%)	0.999
Hematoma	4 (5.18%)	2 (3.57%)	0.999
Infection	3 (3.89%)	1 (1.78%)	0.638
Abdominal Hernia	0 (0.00%)	0 (0.00%)	-

Table 2. Free flap complications of the author's variant versus traditional DIEP flaps
** p-value of Fisher's exact test*

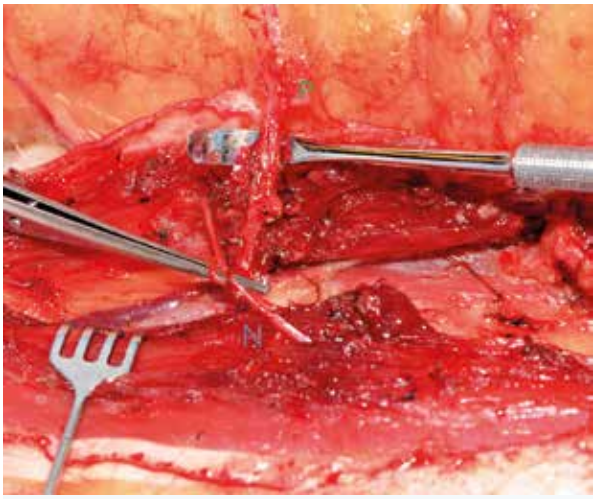

Fig. 3. Dissection of a DIEA perforator vessel using the author's approach (Perforator in green). The dissection does not preclude the sparing of the nerve (Nerve in Blue) during the harvesting of the flap. There is visible a small strip of muscle around the perforator, peculiarity of the author's variant

Fig. 4. The flap is raised. There is visible a small strip of muscle resected with the vessel. No fascia is resected compared to MS-2 TRAM, so a primary tension-free suture is always possible

RESULTS

The results are provided in Table 2 and they refer to the total number of flaps.

For all the flaps dissected with the new approach (n=56), outcomes included fat necrosis in one case (1.78%), venous congestion in three cases (5.35%), arterial thrombosis in three cases (5.35%), hematoma in two cases (3.57%), infection in one case (1.78%) and total flap necrosis in one case (1.78 %).

For all traditionally dissected DIEP flaps (n=77), outcomes included fat necrosis in one case (1.29%), venous congestion in one case (1.29%), arterial thrombosis in three cases (3.89%), hematoma in four cases (5.18%), infection in three cases (3.89%) and total flap necrosis in two cases (2.59%).

In both groups there is no onset of abdominal bulges.

The statistical differences are not significant in the two groups of complications ($p > 0.1$) (see Table 2).

The new approach mean operative time was 3 hours and 10 minutes per flap.

The traditional DIEP mean operative time was 3 hours and 41 minutes per flap.

The operative time for the author's method is significantly shorter than DIEP flap ($p < 0.01$) (Figure 6).

DISCUSSION

A recent paper showed that women who underwent autologous breast reconstruction were more satisfied with their breasts than women who underwent implant breast reconstruction[8]. Besides autologous tissue reconstructive techniques, both pedicled and free, are cost-effective options over prosthetic-based reconstruction[9].

The autologous reconstruction is worthwhile, especially in those with longer life expectancy, when both costs and quality of life are factored together[3].

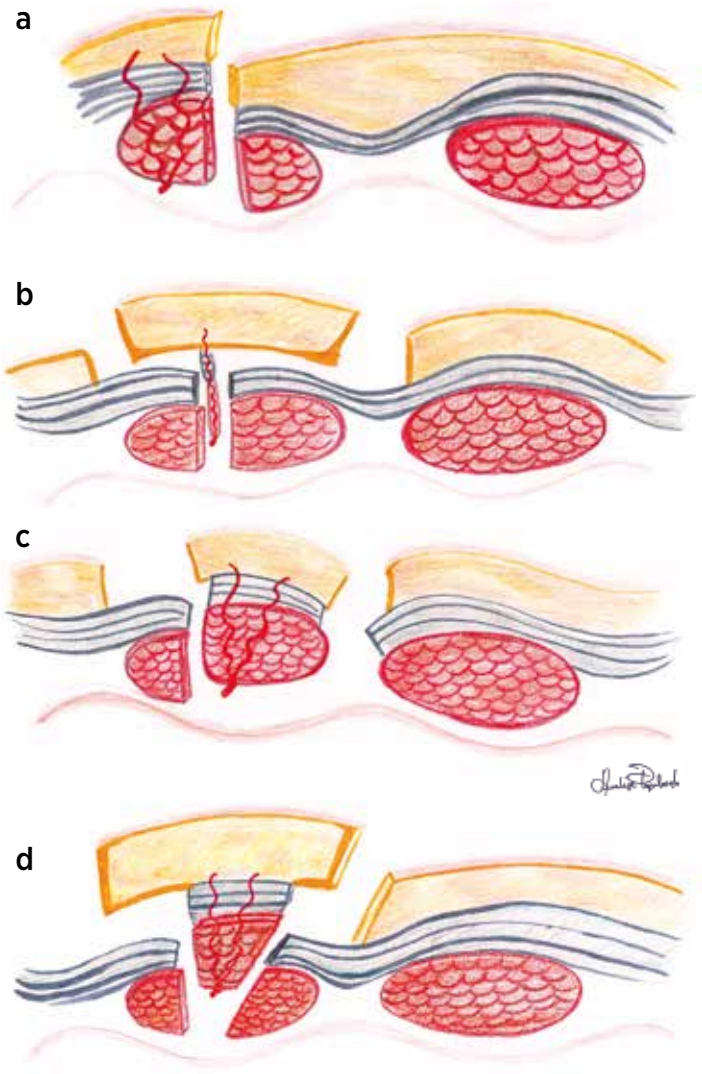

Fig. 5. A schematic representation of the various muscle sparing techniques. MS-1L (a), MS-1M (b), MS-2 (c), Author's Variant (d)

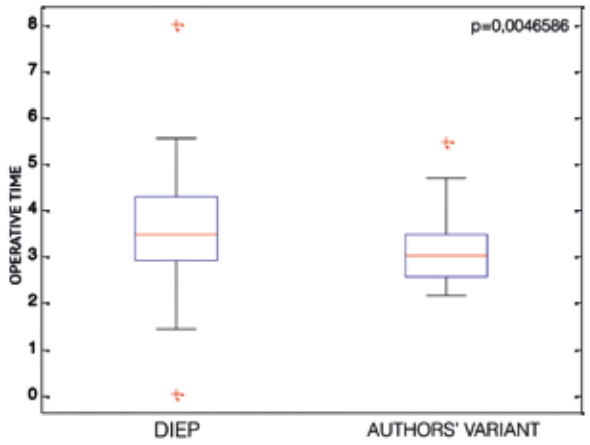

Fig. 6. The operative time of the author's variant is significantly shorter than a traditional DIEP flap ($p < 0.01$)

The muscle-sparing two-transverse *rectus abdominis myocutaneous* (MS2-TRAM) and the deep inferior epigastric perforator (DIEP) free flap are well-established techniques for autologous breast reconstruction. Debate continues regarding the merits of the muscle-preserving techniques to minimize abdominal wall morbidity and to maintain flap reliability[4].

There are many studies that compare the surgical outcomes of DIEP flap to MS-TRAM flap; many authors report that there are no significant differences in donor-site morbidity, survey-based functional outcome, or patient satisfaction between bilateral TRAM and DIEP flap breast reconstruction[10–12]. Despite this, two recent prospective studies comparing the functional impact of DIEP and Muscle-Sparing Free TRAM flaps on the abdominal wall in unilateral and bilateral reconstruction, demonstrate that the muscle-sparing free TRAM flap causes a greater functional decline and the strength is unlikely recovered completely, compared to the DIEP flap[13–14].

Furthermore a recent meta-analysis suggests that the DIEP flap reduces abdominal morbidity but increases flap-related complications compared with the free MS-TRAM flap in breast reconstruction; it is clear from this study that, as a general rule, the DIEP flap is less reliable than the free MS-TRAM flap but that the latter suffers a higher rate of donor-site morbidity[16]. The risk for abdominal hernia in those treated with a DIEP flap was approximately one-half that is seen in patients who have undergone a MS-2 TRAM flap procedure[15–16].

There is an on-going debate regarding the choice of a DIEP or a MS-TRAM flap. It is an *equilibrium* between reliability and morbidity.

The DIEP flap is certainly less reliable than MS2-TRAM flap, especially for two reasons. The first one is the lack of a robust vascularity and of definitive evidence regarding the relationship between the number and dimension of the perforator vessel and the prediction of flap survival.

The second one is the variability of the anatomy of the DIEP and we are far to have an evidence-based approach to perforator selection and intramuscular dissection[5].

The new approach to dissection proposed by the authors is more reliable than a traditional DIEP flap especially for the easier dissection.

The most important aspect of this method is cuffing of the perforator with about 3 mm strip of the muscle. The vessel is kept clearly visible from one side of the view and leaving a strip of muscle allows us to be sure that:

1. We do not injure the perforator.
2. The perforator is protected during dissection by a small cuff of muscle.
3. The risk of kinking is minor.
4. If a branch is accidentally cut, there is still enough space to put a liga-clip with no risk of damaging the vessel.
5. We do not touch directly the vessel, reducing the risk of a spasm and accidental injury[17].

Based on our preliminary results, in spite of a greater reliability in dissection, the morbidity of this new approach is comparable to that of the DIEP flap. In fact the analysis of the flap-related morbidity in our case series that included fat necrosis, venous congestion, and total flap necrosis, demonstrated no significant difference ($p = > 0.1$) between the author's variant and the traditional DIEP flap. Regarding the late surgical complications, the contour abnormalities, such as hernia, found in our cases are comparable in the two groups (MS-3 TRAM / DIEP) ($p => 0.1$).

This may be due to the operative technique of the MS-2 TRAM; in fact after the MS-2 free TRAM, there is usually a 2–4 cm segment of anterior rectus sheath that is excised with the rectus abdominis muscle[6]. Contrariwise with the author's variant the approach is identical to the DIEP flap, completely preserving the anterior rectus sheath (Table 3).

The ease to harvest, using the author's variant, makes the dissection optimal for the less experienced surgeons that are starting to perform the autologous abdominal based breast reconstruction. Especially in those cases in which the vessel has a long intramuscular course (9–26%)[5], the "pure" deroofing of the perforator, as described in DIEP dissection refinements[18], is a very fine dissection. The intramuscular dissection of a perforator is a microsurgical procedure and leaving a small cuff of muscle around the vessel allows avoiding direct handling of the perforator with a minor risk of injury.

Another important aspect is the operative time of the author's method that is definitely shorter than a traditional DIEP flap with a reduction of 14% ($p < 0.01$).

This value is more important in bilateral breast reconstruction in which the operative time could be too long, especially if a complication occurs.

The cost of a DIEP flap is another important factor that a surgical team must evaluate. In a recent study performed in the UK, the breakdown of costs for microsurgery shows that 83% of the cost originates in the theatre[19].

As a result, the reduction of the dissection time is crucial to decrease the total cost of the operation.

	MS-2	AUTHORS' VARIANT	MS-3(DIEP)
MUSCLE RESECTION	++	+	/
FASCIA RESECTION	++	/	/
VASCULARITY	+++	+	+

Table 3. Comparison of the three most important aspects in the debate between reliability/morbidity. The differences in fascia resection – muscle resection – vascularity are evaluated in MS-2, author's variant and DIEP flaps

The problem of the vascularity is not exceeded with the author's variant. This new approach does not increase the perforasome[20], because it is based, as well as the DIEP flap, on a single row of perforators[21-22] (see Table 3). As a result, when the perforators encountered during the dissection by the surgeon are particularly small (< 1.5 mm), it is possible to resort to the empirical algorithms proposed[4,23], converting the flap in MS-2 TRAM, this way including both rows of perforators (medial and lateral).

Further investigations will focus on the evaluation of the abdomen strength comparing the dissimilarities between the two groups.

CONCLUSION

The author's variant to DIEP flap dissection is a new concept in autologous breast reconstruction. This type of dissection is more reliable than the traditional DIEP flap harvest for the ease of the dissection and for the presence of a small protective cuff of muscle around the vessel with a lower risk of perforator injury.

It is a reproducible option of dissection, useful also in less experienced hands and it is a time reducing technique compared with the traditional DIEP flap dissection.

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Corresponding author:

Lombardo Giuseppe A.G.
Cannizzaro Hospital
Via Messina 829 Catania IT 95129
Italy
E-mail: giuseppelombardouni@gmail.com

LIPOMODELLING – ADVANCED TECHNIQUE FOR THE CORRECTION OF CONGENITAL HYPOPLASTIC BREAST MALFORMATIONS AND DEFORMITIES

Streit L.[1, 2], Dražan L.[1], Novák P.[1], Schneiderová M.[3], Dvořák Z.[1], Teplá K.[2], Veselý J.[1]

[1]Department of Plastic and Aesthetic Surgery, St. Anne's University Hospital Brno, Brno, Czech Republic
[2]Department of Plastic and Aesthetic Surgery, Faculty of Medicine, Masaryk University, Brno, Czech Republic
[3]Department of Radiology, Masaryk Memorial Cancer Institute, Brno, Czech Republic

ACTA CHIRURGIAE PLASTICAE, 58, 2, 70-76.

SUMMARY

A variety of surgical techniques has been used to correct hypoplastic breast malformations and deformities, including tissue expanders, breast implants, custom chest wall implants, mammary gland remodelling, as well as locoregional or free flap. Case series of successful breast reconstruction using lipomodelling technique in one patient with severe Poland's syndrome and two patients with tuberous breasts are reported together with literature review. No surgical complications were observed and ultrasound examination did not reveal any pathology in breast tissue other than oil pseudocysts postoperatively. In both malformations, submammary fold was moved downwards. Moreover, the lower part of the breast and areolar herniation was corrected in tuberous breast, and in Poland's syndrome, the areolar complex was significantly shifted downwards and laterally. In comparison with other reconstructive techniques, lipomodelling allows for the breast correction to begin in early adolescence. Further growth of the unaffected breast may be effectively corrected by subsequent lipomodelling session. This technique appears to change the overall approach to the management of hypoplastic breast and chest wall malformations.

KEYWORDS

Congenital, malformation, breast, Poland's syndrome, tuberous, constricted, fat grafting, lipomodelling

INTRODUCTION

Congenital hypoplastic breast anomalies usually manifest during puberty and may have a negative impact on personal and social life of the young women. These patients can suffer from feelings of inferiority, peer rejection, low self-esteem and psychosocial dysfunctions. They may avoid to participate in school and sport activities which results as a negative impact on their psychosocial development [1].

Poland's syndrome is a chest wall deformity characterized by complete or partial absence of the pectoral major muscle, often associated with ipsilateral upper limb malformation. Alfred Poland described this condition in 1841 [2]. The incidence is globally estimated to 1 in 30.000 newborns. Males are more frequently affected with severe forms then females, but less expressed form are more commonly observed in female patients [3]. Upper limb malformation may be highly variable, although the most common are soft syndactyly and hypoplasia of the middle phalanges of the hand. Fourcas demonstrated that hand malformation was present in only 12% in Poland's syndrome, and thus he proposed classification of Poland's syndrome based on the degree of pectoral muscle hypoplasia, costal malformation and breast hypoplasia [3]:

Grade 1: Minor malformation with pectoral muscle hypoplasia and with breast hypoplasia in female patients which is expressed as discrete breast asymmetry

Grade 2: Moderate malformation with significant aplasia of the pectoral major muscle, significant breast hypoplasia or aplasia causing considerable breast asymmetry in female, and potentially with moderate costal malformation

Grade 3: Severe malformation with complete pectoral muscle aplasia associated aplasia of other muscle, breast aplasia in female patients, thoracic deformity with major costal malformation or sternal deformity. A major asymmetry of the thorax is evident.

Mestak estimated that Poland's syndrome represented 14% of hypoplastic breast anomalies [4].

Session	Breast volume before surgery [ml]	Volume of transferred fat [ml]	Breast volume after surgery [ml]	Breast volume resorption
I	Chest wall depression (missing pectoral muscle)	187	Chest wall depression corrected	impossible to determine exactly
II	0	200	200	impossible to determine exactly
III	200	210	350	29%
IV	350	245	500	39%
V	500	240	850	None (contrarily, there was even breast volume increase due to total weight gain)
Total		**1082**	**850**	**21%**

Table 1. Breast volume measurement by dipping the breast in a container filled with water. The overall fat resorption was 21%

Tuberous breast is a breast shape deformity which was described under various names such as tuberous breast [5], tubular breast [6], herniated areolar complex [7] or narrow-based breast [8]. Deformity is caused by insufficient development of the breast base when the preserved mammary gland is enveloped by fibrous connective tissue called a constricting ring. Residual central part of the gland is expanding during puberty and thus typical tubular herniationof areolar complex may occur. We use Grolleau's classification that defines individual types depending on which quadrants of the breast are undeveloped [9]:

Type I: Only the lower medial quadrant is deficient – lateral part of the breast appears oversized in comparison.

Type II: Both lower quadrants are deficient and subareolar cutaneous segment is short.

Type III: All four quadrants are deficient and breast base is constricted both horizontally and vertically. In typical forms, breast is shaped like a tubercle.

Correction of hypoplastic breast malformations is still challenging. And variety of surgical approaches has been described. The aim of this paper is to demonstrate benefits of lipomodelling technique based on our case series and literature review.

PATIENTS AND METHODS

From January 2013 to January 2016, three patients with hypoplastic congenital breast anomalies were operated exclusively by lipomodelling in our department.

Preoperative care

Patients and their parents were informed of the advantages and drawbacks of lipomodelling procedures, its complications, and potential risks. They also consented for postoperative ultrasonography examination. On the contrary, ultrasound was an integral part of the preoperative examination prior to the second or other following session of lipomodelling procedures. A precondition for the next session of lipomodelling was benign finding on ultrasound examination after a previous session of lipomodelling (BI-RADS 1 or 2) with no significant fat necrosis. The main inclusion criteria were sufficient adipose tissue deposits and stable weight preoperatively. Contraindication for the surgery was positive family history of breast cancer, ovarian cancer in first degree relative or patients with a confirmed mutation in BRCA 1,2 gene. Preoperative photographs were taken.

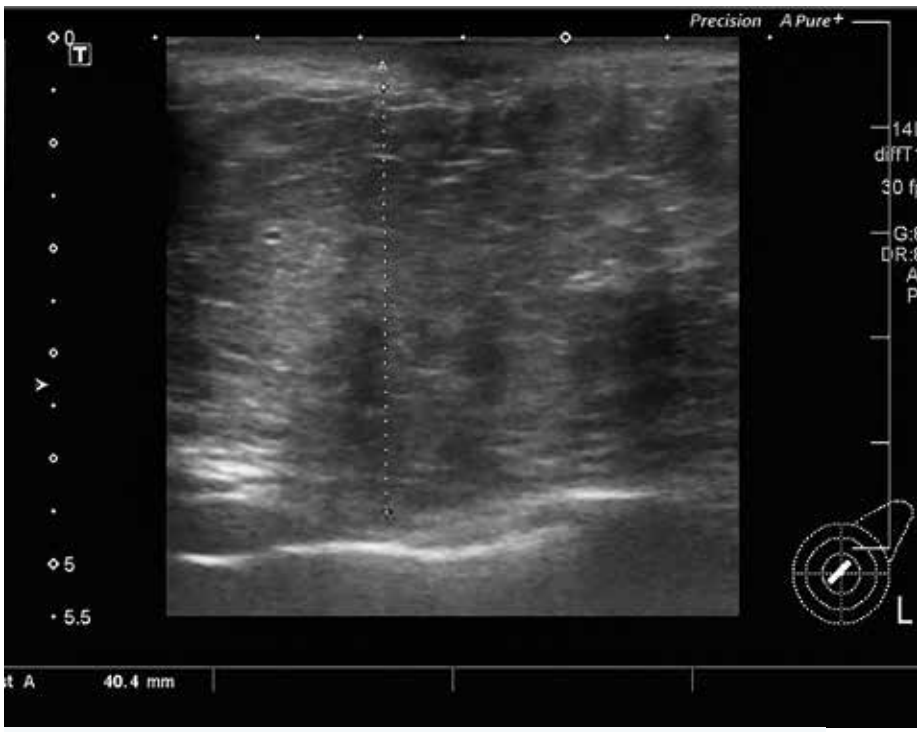

Fig. 1. Six months follow-up echography after the final lipomodelling session in the patient with Poland's syndrome showed a benign finding of homogenous tissue. Maximum thickness of the soft tissue (measured from the ribs) was 40.4 mm

Fig. 2. A 14 years old female patient with Poland's syndrome grade II on the left with complete aplasia of the pectoral major muscle and significant breast hypoplasia

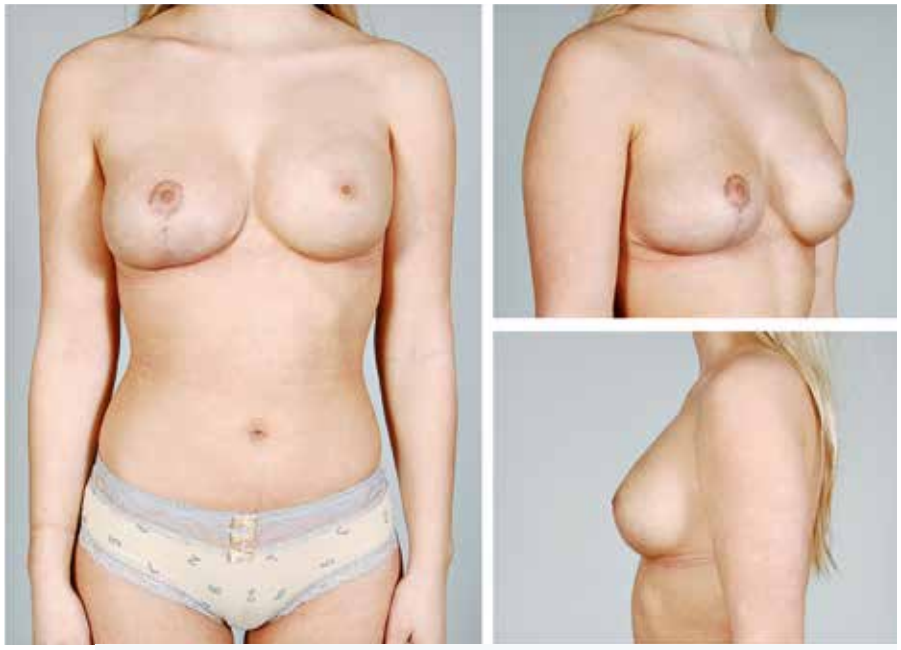

Fig. 3. The patient with Poland's syndrome – 13 months follow-up (after the last session of lipomodelling) and 2 weeks after secondary mammoplasty

Surgical technique

All the procedures were performed under general anaesthesia by a single surgeon (main author) and the result was achieved in the following sessions. Respecting patient's wishes and adipose tissue distribution, donor area included the hips, lower abdomen, trochanter area, inner thighs, inner knees, and also the lumbar region. Low-volume tumescent liposuction was applied (500–750 ml of normal saline with 1:500 000 of epinephrine) according to the protocol of adipose tissue harvesting for lipofilling [10]. We used manual liposuction applying negative pressure by gradually withdrawing the plunger of a 30-ml Luer-lock syringe. We used harvesting cannulas of 3.5 mm in diameter and 17 cm in length (model PLA187, Pouret Medical, France). Lipoaspirate was processed by centrifugation at 1200g for 3 minutes at room temperature directly in 30-ml syringes. Upper oil layer and bottom aqueous layer were removed and complete adipose layer was used for fat transfer.

Processed fat is applied to the thoracic recipient area through several incisions that were made with the sharp bevel of a 17-gauge trocar. 2-3 of them are usually placed in the submammary fold and 2 in areola. Purified fat is transferred directly to the breast region using 10ml syringes with special 2mm transfer cannulas (PLA188, PLA189, Pouret Medical, France). Fat is injected in small quantities while pulling the cannula out in many directions. Transfer is done from deep to a superficial layer. Each microtunnel must be designed to be surrounded by a well-vascularized tissue to avoid creating areas of fatty pools, which could result in fat necrosis. It is essential to overcorrect volume of injected fat, if it is allowed by recipient tissues. Absorption of around 30–40% of the transferred volume can be expected. On the contrary, when the recipient tissues are saturated, further fat injections can cause development of fat necrosis. It is better to schedule an additional session rather than disregard saturation of the tissues.

Multiple fasciotomies with 17-gauge needle are the advanced modeling elements that allows to release subcutaneous fibrous septa percutaneously and thus enables to move the submammary fold downwards, sculpture the lower part of the breast, correct areolar herniation in tuberous breast and finally to shift areolar complex downwards in Poland's syndrome.

Follow-up

All the patients were examined 1) clinically 2 weeks postoperatively after each session of lipomodelling, 2) clinically and by ultrasound shortly before next session of lipomodelling, and finally 3) clinically and by ultrasound

at least 6 months after final session of lipomodelling. Photographs were taken during each follow-up visit. We evaluated a number of lipomodelling sessions, volumes of transferred fat and degree of fat resorption. The size, and the number of fat necrosis were evaluated on sonography by a single radiologist.

RESULTS

From January 2013 to January 2016, three patients with hypoplastic congenital breast anomalies were operated exclusively by lipomodelling in our department (1 patient with Poland's syndrome, 2 patients with tuberous breast). Average of 2 sessions of lipomodelling were needed for achieving desired size of the breast in a correction of tuberous breast deformity and 5 sessions for the breast reconstruction in Poland's syndrome. The minimum time interval between individual surgeries was 3 months. Mean follow-up was 15 months (6–26 months). We achieved breast with a natural appearance and consistency with a bra cup size B–D. We observed no surgical complications; there was not any palpable masses in the breast after lipomodelling.

Before the second and every subsequent session, preoperative ultrasonography examinations have showed homogeneous tissue of the operated breast with several small zones of cystoids (oil liponecrotic pseudosysts) or fat necrosis up to 12 mm in diameter, which did not correlate with the clinical examination. The thickness of soft tissue of the breast was gradually increasing between individual sessions. Postoperative echography at least 6 months after the final session of lipomodelling showed the same benign findings of homogenous tissue with several isolated zones of liponecrosis BI-RADS 1–2 as it is described above (Fig. 1).

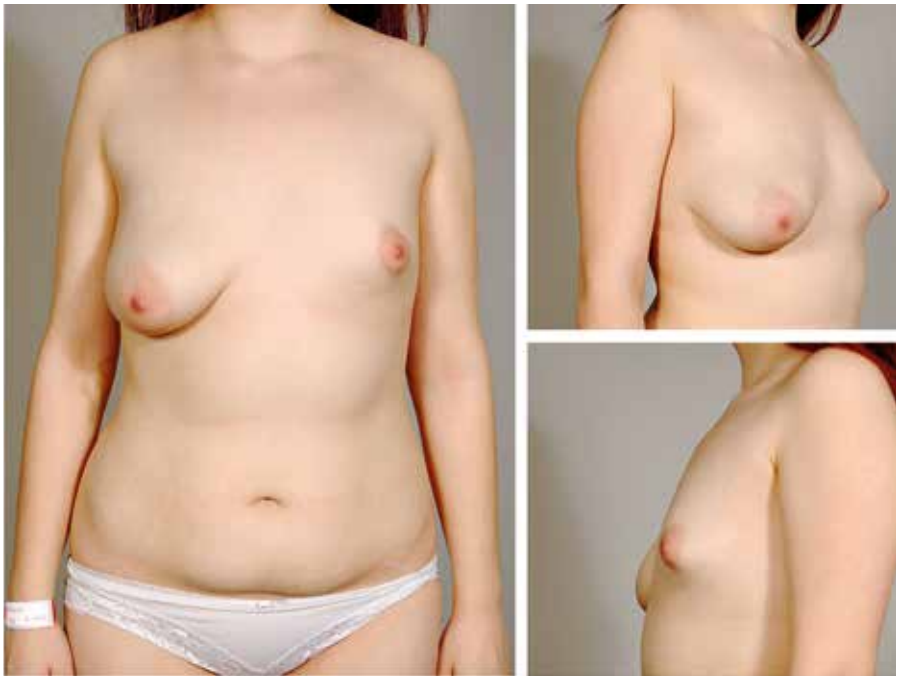

Fig. 4. A 17-year-old patient with tuberous breast malformation on the left and with a ptotic right breast

Fig. 5. The patient with tuberous breast malformation on the left after 2 sessions of lipomodelling and contralateral vertical mastopexy with augmentation by fat grafting in décolleté area – 6 months follow-up

CASE SERIES

Case 1: 14-year-old patient with Poland's syndrome

A 14-year-old female patient with Poland's syndrome grade II on the left side with complete aplasia of the pectoral major muscle and significant breast hypoplasia was treated at our department. Degree of breast asymmetry was enhanced by breast hypertrophy on the right side (Fig. 2). Breast reconstruction was performed with lipomodelling technique only. The aim of the first session was to correct chest wall depression caused by the pectoral muscle aplasia. The breast was reconstructed in a total of 5 lipomodelling sessions. The average volume of transferred fat at one session was 216 ml. Last lipomodelling session was performed in the age of 15 years together with central

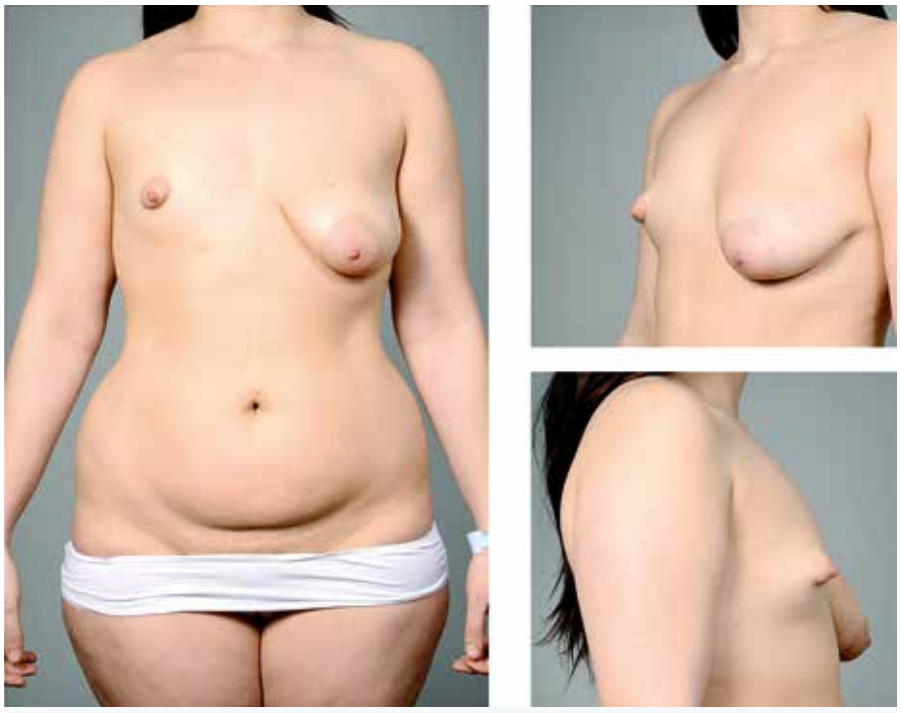

Fig. 6. A 19-year-old patient with bilateral tuberous breast deformity

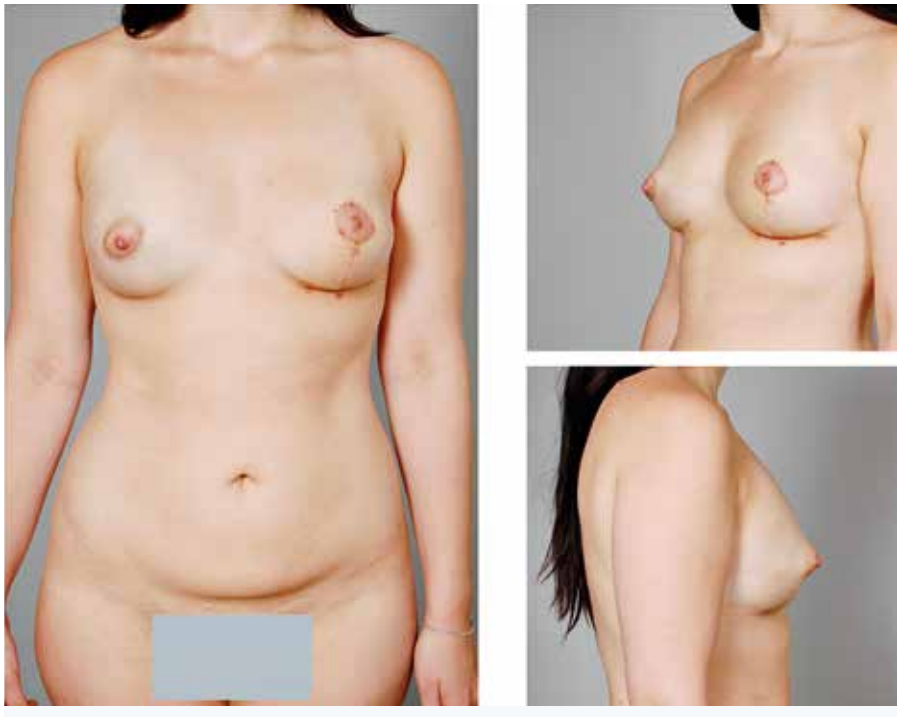

Fig. 7. The patient with bilateral tuberous breast deformity after 2 sessions of lipomodelling and contralateral vertical mastopexy – 3 months follow-up

pedicle mammoplasty of the right breast with reduction of 200g. We evaluated reconstructed breast volume after a second lipomodelling session - the patient was asked to measure breast volume by dipping the breast in a container filled with water. Overall fat resorption was 21% (Table 1). The submammary fold and areolar complex were shifted downwards successfully using fasciotomies. Moderate asymmetry 1 year after the surgery (given by a further growth of the right breast) was corrected by secondary mammoplasty of the right breast (Fig. 3).

Case 2: 17-year-old patient with unilateral tuberous breast

A 17-year-old patient with tuberous breast malformation Type II on the left side and with a ptotic right breast (grade 2) underwent surgery at our department (Fig. 4). Correction of tuberous breast deformity was performed in two lipomodelling sessions (240 and 220 ml of fat) at 3-month interval. Superior pedicle vertical mastopexy with augmentation by fat grafting (70 ml) in décolleté area was performed on the right ptotic breast together with the second lipomodelling session. Overall fat resorption as estimated by the patients was about 30%. Satisfactory breast shape and degree of breast symmetry with minimum scars was achieved and the patients were very satisfied with the result (Fig. 5).

Case 3: 19-year-old patient with bilateral tuberous breast deformity

A 19-year-old patient with severe breast asymmetry caused by bilateral tuberous breast deformity underwent surgical correction in our department. There was Type III tuberous breast malformation on the right and Type II deformity with the hypertrophy of the residual mammary gland on the left (Fig. 6). Correction of tuberous breast on the right was performed in two lipomodelling sessions (440 and 230 ml of fat) at 3-month interval. On the left, tuberous breast deformity was corrected by superior pedicle vertical mastopexy. Satisfactory breast shape and degree of breast symmetry was achieved 3 months postoperatively (Fig. 7). The patient got pregnant soon after. She was not able to breastfeed but there was hypertrophy of the left breast six months after childbirth. Patient presents finally with moderate asymmetry 26 months postoperatively caused by a persistent hypertrophy of the left breast (Fig. 8). Patient is satisfied with the result and she does not wish any other correction in this moment.

DISCUSSION

Fig. 8. A 19-year-old patient with bilateral tuberous breast deformity

Coleman codified and made the technique of autologous fat injection popular [11,12], which is now widely employed in plastic and aesthetic surgery. Delay popularized the technique in plastic, reconstructive and aesthetic surgery of the breast and considerably expanded the indications for lipomodelling technique [13–16]. The technique is now well established and the complication rate is very low [10,17–19].

A variety of surgical techniques has been used to correct chest wall and breast deformity in Poland's syndrome, including tissue expanders, breast implants, custom chest wall implants as well as locoregional or free flap, which may be combined if necessary. Complete breast reconstruction by lipomodelling in Poland's syndrome was first performed in 12-year-old patient with severe chest wall deformity by Delay in 2001. 5 sessions of lipomodelling were required to obtain satisfactory result [20,21]. Due to very good results obtained, Delay proposed this reconstructive option to other 10 patients with Poland's syndrome until 2011 [22]. The average age of the patients was 16 years (12–24 years), number of lipomodelling sessions was 2.9 (1–5) with average 255 ml of injected fat. No surgical complication was observed. Until 2013, total breast reconstruction using lipomodelling technique was performed in 23 patients by the same surgeon [10]. Pinsolle and colleagues presented case series of 7 patients in which fat grafting was used more as a complementary technique to other reconstructive techniques [23]. Derder and colleagues documented 2 cases of total breast reconstruction using lipomodelling technique in 17- and 19-year-old patients with satisfactory results [1].

A range of surgical techniques has been used to correct breast shape and volume in tuberous breast, including a combination of skin plasty and mammary gland remodeling, as well as prostheses and locoregional flaps. Among them, lipomodelling has been shown as advanced minimally invasive technique popularized by Delay and Coleman [10,12,14,17]. Delay demonstrated in series of 31 patients that lipomodelling is reliable and safe technique of tuberous breast correction with excellent long lasting natural results. A single session was required in 45% of the patients with mean transfer volume of 158 ml (50–253 ml), the second session was needed in 55% of the patients with mean transfer volume of 226 ml (100–316 ml). No complications were observed postoperatively and 6 months later ultrasound examination did not reveal any anomalies other then oil cysts [16]. Satisfactory results of tuberous breast correction were documented also by Derder (series of 3 patients) [1] and by Klit (in series of 8 patients) [24].

We believe that fundamental principle of lipomodelling technique, which prevents the formation of fat necrosis, is to respect the capacity of recipient tissue for fat graft. Fat graft must be surrounded by vascularized tissue. Therefore, we consider the initial volume of recipient soft tissues to be essential criteria determining the capacity of recipient tissues. In hypoplastic breast anomalies, we proposed to transfer lower volumes during initial lipomodelling session, especially in correction of Poland's syndrome deformities with hypoplasia or aplasia of the pectoral muscle. Nevertheless, the mean transfer volumes in our case series was 216 ml (187–245 ml) for the correction of Poland's syndrome and 283 ml (220–440 ml) for the correction of tuberous breast, which were much higher in comparison with Delay`s studies [16,22]. No surgical complication was observed postoperatively and ultrasound examination 6 months later did not reveal any abnormalities other then oil cysts in our case series.

The key to achieve the desirable results is to use advanced modeling elements, the most important of which are multiple fasciotomies [25] that is well documented in our case series. In both malformations, the submammary fold was moved at least 2–3 cm downwards (see Figures 2–8). Moreover, the lower part of the breast was sculptured and the areolar herniation was significantly improved in the patients with tuberous breast (see Figures 4–8) and on the other hand in Poland's syndrome, the areolar complex was moved 3–4 cm downwards and laterally successfully (see Figures 2 and 3).

Main advantages of lipomodelling technique are accentuated in young patients with hypoplastic breast malformation: 1) minimal invasiveness with aesthetic benefit in donor site, 2) minimal extent of the scars on the breast, 3) short recovery time, 4) implant free procedure with no associated risk of infection, extrusion, rupture, capsular contracture and recently suggested association with anaplastic large-cell lymphoma, and no needs of implant exchanging in the future.

We believe that lipomodelling allows for the breast correction to begin in early adolescence because further growth and development of the unaffected breast may be effectively corrected by subsequent session of lipomodelling – autologous and minimally invasive procedure. Furthermore, these young patients can considerably appreciate even partial improvement of their asymmetry after the first session(s) of lipomodelling. More difficult is the timing of possible mastopexy or breast reduction of the contralateral breast if it is required. If accepted by the patient, we recommend performing this surgery from the age of 18 years, when the breast volume is more stable. On the other hand, secondary mammoplasty is not associated with additional anesthesia, if the primary mammoplasty is performed in one session with the final session of lipomodelling.

CONCLUSION

Lipomodelling is advanced and minimally invasive technique for the correction of congenital hypoplastic breast malformation without need of a silicone implant. In our case series, we confirmed safety of this therapeutic approach. No surgical complications were observed and ultrasound examination within 6 months postoperative did not reveal any abnormalities other then oil cysts in our case series. Submammary fold was moved downwards, the lower part of the breast and areolar herniation were corrected in tuberous breast and finally areolar complex was effectively shifted downwards and laterally in Poland's syndrome. Lipomodelling allows breast correction to begin in early adolescence because further growth of the unaffected breast may be effectively corrected by subsequent session of lipomodelling. This technique appears to change the overall approach to the management of hypoplastic breast and chest wall malformations.

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Corresponding author:

Libor Streit, M.D.

Department of Plastic and Aesthetic Surgery
St. Anne's University Hospital
Berkova 34, 612 00 Brno, Czech Republic
E-mail: liborstreit@gmail.com

RECONSTRUCTION OF LARGE FACIAL AND ORBITAL DEFECTS BY COMBINING FREE FLAP TRANSFER WITH CRANIOFACIAL PROSTHESIS

Streit L.[1, 2], Dražan L.[1], Hýža P.[1], Stupka I.,[1] Paciorek M.[3], Rosický J.[4], Veselý J. [1, 2]

[1]Department of Plastic and Aesthetic Surgery, St. Anne's University Hospital, Brno, Czech Republic
[2]Department of Plastic and Aesthetic Surgery, Faculty of Medicine, Masaryk University, Brno, Czech Republic
[3]Centre for Plastic Surgery and Hand Surgery, University Hospital Ostrava, Ostrava, Czech Republic
[4]Ortopedická protetika Frýdek-Místek s.r.o., Frýdek-Místek, Czech Republic

ACTA CHIRURGIAE PLASTICAE, 58, 2, 77-81

SUMMARY

The reconstruction of complex craniofacial and orbital defects should satisfactorily restore functional and aesthetic integrity. Autologous reconstruction of nasal, periorbital and auricular facial subunits as a whole using a locoregional or a free flap is very challenging and the results are not sometimes ideal. With advanced technologies that are currently available it is possible to plan and produce authentic facial prosthesis that can satisfactory substitute these facial subunits. We demonstrate an alternative reconstructive concept for complex craniofacial defects based on a free flap combined with a facial prosthesis for the replacement of periorbital or auricular facial subunits. This approach was used in two patients with very satisfactory results. Combination of a free flap with a facial prosthesis may become a preferable approach for the reconstruction of complex craniofacial defects. Clinical outcomes of the reconstructions may be enhanced respecting the principle of aesthetic facial subunits.

KEYWORDS

Free flap, craniofacial, epithesis, combination, reconstruction, orbital, auricular

INTRODUCTION

Free tissue transfer became a standard procedure in facial reconstruction of complex craniofacial defects in the 1980s [1,2]. However, detailed autologous reconstruction of nasal, periorbital and auricular facial subunits as a whole is very challenging and the aesthetic outcome is not always pleasing [3]. The stigma caused by visible disfigurement resulting in psychosocial disability is often poorly accepted by the patients.

Particularly after eye and eyelid enucleation, amputation of the ear or nose, better aesthetic results can be achieved by replacing missing tissues by modern craniofacial prosthesis [4]. There are two options for fixation of the prosthesis; a standard method of adhesive retention and advanced technique using osseointegrated implants and magnets. In a large complex defect involving two or more adjacent facial subunits, decision between prosthetic based reconstruction and the use of a free flap can be difficult [5].

The aim of this paper is to demonstrate a new reconstructive concept for complex craniofacial defects using a combination of facial prosthesis for the replacement of periorbital and auricular facial subunits with the use of a free flap for the reconstruction of the adjacent facial subunit. This reconstructive approach was used in two patients with complex craniofacial defects presented as case reports.

DESCRIPTION OF THE CASES

Case 1

A 63-year-old female patient was referred to our department for recurrence of a skin tumour of the temple and lateral periorbital region, histologically verified as trichoepithelioma (Fig. 1). With regards to the benign character of the tumour, orbit preserving tumour resection with immediate microsurgical reconstruction was indicated in January 2013. Serratus anterior muscle free flap with superficial temporal artery and vein as recipient vessels with meshed split-thickness skin graft was used for the reconstruction of the temple and lateral part of the eyelids. Unfortunately, the definitive histological examination demonstrated tumour duplicity with infiltrative basalioma affecting the eyelids with positive surgical margins. Since further tumour resection would have made functional eyelid reconstruction impossible, orbital exenteration was subsequently performed. The orbit was left to heal secondary for 2 weeks and then a split-thickness skin graft was placed over the early granulation tissue.

Fig. 1. A 63-years-old female patient with histologically verified trichoepithelioma of the temple and lateral periorbital region

Fig. 2. Result after radical tumour resection of the temple and after enucleation of the left eye reconstructed by combination of serratus anterior free flap for the temple with orbital prosthesis for the periorbital region. Result at 3-month follow-up without orbital prosthesis

Fig. 3. Result at 6-month follow-up with orbital prosthesis

Three months postoperatively, the patient was trained how to apply and use a silicone orbital prosthesis which was custom made for her. Thus, the prosthesis was used to replace periorbital aesthetic subunit only while temporal aesthetic subunit was reconstructed by serratus anterior free flap (Fig. 2). There was a need to refurbish prosthesis after 2 years. There is no recurrence at 2.5 years postoperatively. Aesthetic result is very authentic and encouraging (Fig. 3). The patient is very satisfied with the result and she tolerates the placement of the prosthesis well.

Case 2

A 66-years-old male patient with recurrent basal cell carcinoma of frontotemporoparietal region on the left was treated at our department. The first basalioma in temporal region was treated surgically in 1966 at age of 40 years, and then repeatedly using locoregional random skin flaps or skin grafts until 2007 when a relatively large defect after sanative resection of a basalioma recurrence in frontoparietal region and lateral eyelids was reconstructed by free radial forearm flap (Fig. 4). Subsequently, several skin excisions were performed for a new focus of basalioma or its recurrence in the eyelids and frontoparietal region. In 2013, the patient was hospitalized for a histologically verified recurrence of superficial basalioma in temporal region and in lateral thirds of the eyelids and for a new focus of skin neoplasm in concha of the left auricle. The patient initially refused enucleation despite persistent ectropion with excessive tearing and chronic conjunctivitis (Fig. 5). Controlled radical skin resection was performed temporally together with excisional biopsy in the concha. The resection was sanative in the eyelids and also temporally and the defect with the early granulation tissue was covered by split-thickness skin graft in 12 days. Histological examination detected superficial basalioma in concha with positive surgical margins and subsequent contrast-enhanced CT scan showed a localized area of dense

contrast collection in the external auditory meatus affecting the cartilage. Furthermore, impaired vision, related vertigo and a continuing deterioration of ectropion related chronic conjunctivitis were the reasons why the patient decided to undergo enucleation of the left eye. The enucleation was performed together with radical resection of the left auricle and external auditory meatus by an otolaryngologist. We performed immediate reconstruction of auricular region by free lateral arm flap with facial artery as the recipient vessel. The orbit was left to heal by secondary intention for 2 weeks and then a split-thickness skin graft was placed over the early granulation tissue.

Three months postoperatively, the patient was trained how to apply and use silicone orbital and auricular prostheses which were custom-made for him. Orbital prosthesis was bonded to the orbit and the auricular prosthesis directly on lateral arm flap. Thus, prostheses were used to replace periorbital or auricular aesthetic subunit only while the surrounding subunits were reconstructed by radial forearm and lateral arm free flaps. There was no recurrence at 2 years postoperatively. Aesthetic result is very satisfactory (Fig. 6, 7) and it is well accepted by the patient who participates in normal social life.

DISCUSSION

Microsurgical free flap transfer became a standard technique for the reconstruction of large complex craniofacial defects offering significant creativity to the surgeon. However, aesthetic results following free flap reconstruction after orbital exenteration, significant auricular or nasal resection may be insufficient if the goals of the reconstruction include also social functioning and patient's wellbeing. Furthermore, autologous reconstruction of an eye is impossible until now. On the contrary, current prostheses can restore aesthetic integrity of these problematic areas more authentically. Therefore, the surgeon should consider the use of a craniofacial prosthesis to increase the level of the result over the threshold of social acceptability [5]. Combining free flap transfer with prosthetic technique may significantly enhance aesthetic results in selected patients [4,5].

In our case series, we did not primarily plan combining free flap with a prosthesis. The orbital exenteration was indicated when the reconstruction of the surrounding aesthetic subunits using free flap had already been performed. The reason was positive surgical margins and tumour duplicity with infiltrative basalioma in the patients with histologically verified trichoepithelioma or continuing deterioration of ectropion related chronic conjunctivitis, respectively. After enucleation, the orbit was left to heal by secondary intention and then covered by a split-thickness skin graft. Nevertheless, in our opinion, aesthetic results were superior to a reconstruction of the entire defect with a free flap only in one session.

We believe that this reconstructive approach for the reconstruction of large craniofacial defects (affecting two or more facial subunits) combining free flap with craniofacial prosthesis should even enhance aesthetic results if it is planned preoperatively respecting the aesthetic facial subunits [6]. From this point of view, free flaps seem to be more suitable for the reconstruction of rather flat aesthetic facial subunits including the forehead, temple, cheeks, chin and possibly lips. On the contrary, a prosthetic technique seems to be more suitable for the reconstruction of complex-shaped subunits including the nose, auricle and periorbital region. Furthermore, by planning prostheses and respecting the principle of facial subunits, the total size of the defect may be reduced enough that local flap can eventually be used instead of the free flap [7].

Fig. 4. Patient at the age of 61 years, 1 year postoperatively after sanative resection of superficial basal cell carcinoma in the forehead, temple and lateral orbital region primarily reconstructed with radial forearm free flap

The site of implantation needs careful preparation. When planning the use of an orbital prosthesis, attention should be paid to preserve sufficient concavity to allow subsequent rehabilitation [4,5]. If no adjuvant radiotherapy is planned, open granulation of the denudated orbital wall optionally with covering using a split thickness skin graft appears to be a good solution [8].

There are two options for fixing a prosthesis; a standard method of adhesive retention and advanced technique of using osseointegrated implants and magnets. Prostheses are not usually used at night, the patient typically puts on the prosthesis in the mornings and removes it in the evening. Bonding by using silicone glue is a reliable method of prosthesis retention that does not require additional surgery. It can be advantageous in oncological patients with a significant probability of a relapse, or in patients with first prostheses. Bonding is more demanding for the patient than comfortable fixation with magnets in case of osseointetrated implants. On the other hand, also older patients are able to manage the bonding well. Application time is about 5 minutes. Fixation with magnets requires implementation of osseointegrated implants and subsequent attachment of the pins. Custom-made silicone prostheses are fitted with integrated magnets fixing the prosthesis to the pins. The position of the implant

Fig. 5. The same patient at the age of 66 years with histologically verified recurrence of superficial basal cell carcinoma in the temple

Fig. 6. Result after radical tumour resection of the temple and after enucleation of the left eye reconstructed: 1) by radial forearm free flap in the forehead, 2) by splint skin graft in the temple and in the orbit and 3) by lateral arm flap in auricular region. Result at 3-month follow-up without orbital and auricular prostheses

Fig. 7. Result at 7-month follow-up with orbital and auricular prostheses

is determined precisely using a virtual 3D planning based on CT scans respecting the bone quality and optimal position of prosthesis. The disadvantage is the need for surgery. The advantage is the ease to use - several seconds for the fixation. For these advantages, retention with osseointegrated implants is currently a generally preferred method [4,7,9,10]. Our demonstrated patients preferred fixation with adhesives.

CONCLUSION

Our preliminary results indicate that a combination of a free flap with craniofacial prosthesis represents a promising reconstructive option for complex craniofacial defects. Respecting the principle of aesthetic facial subunits in preoperative planning, this reconstructive option can become preferable approach for the reconstruction of complex craniofacial defects.

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Corresponding author:

Libor Streit, M.D., Ph.D.
Department of Plastic and Aesthetic Surgery
St. Anne's University Hospital
Berkova 34, 612 00, Brno, Czech Republic
E-mail: liborstreit@gmail.cz

UPPER EYELID INJURY WITH PARTIAL LOSS. CASE REPORT

Němec I.

Trauma Center, Military University Hospital Prague, Czech Republic

ACTA CHIRURGIAE PLASTICAE, 58, 2, 00-00.

SUMMARY

In case of an upper eyelid injury with loss of tissue, it is very important to perform reconstruction to restore protection of the cornea and bulbus. Depending on the size and location of the defect the most suitable reconstructive technique is chosen. This case report presents a patient with a partial loss of the upper eyelid. The defect was reconstructed with a transposition skin flap to cover the ear cartilage graft. The missing conjunctiva was partially reconstructed by its mobilization from the fornix, and a part of the defect was left to heal by spontaneous epithelisation. This procedure provides an alternative solution for defects in the lateral part of the upper eyelid.

KEYWORDS

Upper eyelid reconstruction, eyelid injuries, conchal cartilage graft

INTRODUCTION

Upper eyelid injuries with loss of tissues can be treated in various ways depending on the scope and location of the defect. Some form of flaps and grafts can be used for reconstruction [1–9]. Use of a transposition skin flap with tarsal and conjunctival reconstruction is one of the options of reconstructing partial loss of the upper eyelid[1]. A similar procedure was used also in our patient with partial loss of her upper eyelid.

CASE REPORT

A 31-year-old patient sustained an injury with 40% loss of the lateral part of her upper eyelid on the left side after a fall. A full-thickness defect of the eyelid affected the lateral canthal tendon in the direction medially towards the residual part of the eyelid. Supraorbitally, there was a margin of the levator aponeurosis (Fig. 1). Medical history without any complaints. In preoperative history there was no ocular or eyelid pathology.

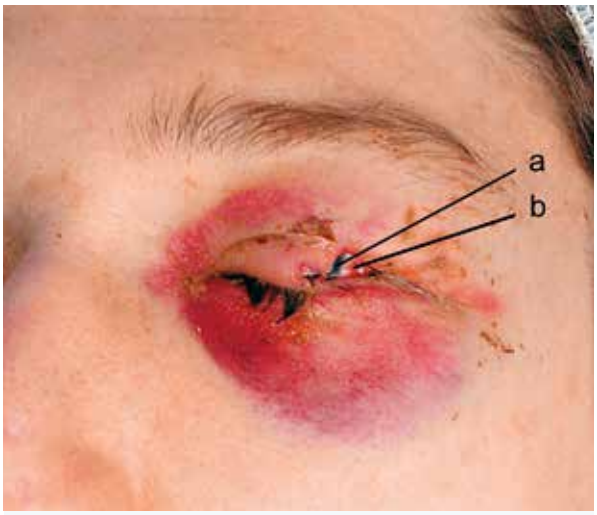

Fig. 1. Injury with partial loss of the lateral part of the upper eyelid on the left side (a – iris behind a transparent cornea, b – conjunctiva)

The missing part of the tarsus was reconstructed using a cartilage graft harvested from the dorsal access, from the concha of the left auricle. The cartilage was thinned and sutured into the defect. We fixed the cartilage graft in place to the medial part of the upper eyelid tarsus, in the lateral part to the lateral canthal tendon and supraorbitally to the levator aponeurosis.

The conjunctival defect was reconstructed in the extent of 80% by mobilization of conjunctiva from the fornix. The remaining part of the defect was left to heal spontaneously by epithelization. The cutaneous part of the eyelid was reconstructed using a transposition flap with the base in the lateral part. The flap was mobilized above the defect, under the eyebrows. The secondary defect was covered with a full-thickness skin graft from the postauricular area (Fig. 2). Ocular irritation during the healing period was controlled using steroid drops and ointment. The course of healing was free of complications (Fig. 3 a, b). The skin graft was excised three months after the reconstruction. At the same time we reduced the skin excess of the flap. Both the appearance and function of the eyelid are satisfactory two years after the surgery (Fig. 4).

DISCUSSION

In case of an upper eyelid injury with loss of tissue, it is very important to perform reconstruction to restore protection of the cornea and bulbus. When treating an eyelid defect, functional and aesthetic requirements must be taken into account. The method of closure of the upper eyelid defect depends on its extent and location.

Direct suture with possible lateral cantholysis can be performed in some cases [1–4]. In larger defects, various types of flaps and grafts can be used including their combinations. For example, the sliding tarsoconjunctival flap[2–4], semi-

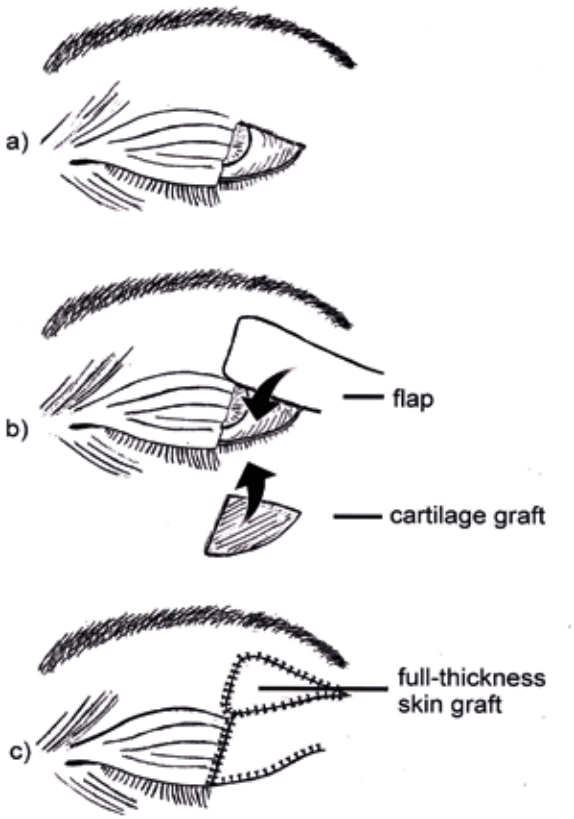

Fig. 2. Reconstruction scheme: a) Partial full-thickness defect of the upper eyelid. b) Arrows indicate the placement of the cartilage graft and its coverage with the transposition skin flap with laterally positioned base. The conjunctiva was partially reconstructed by its mobilization from the surrounding area, and part of the defect was left to heal by spontaneous epithelization. c) The defect resulting from transposition of the flap is covered with a full-thickness skin graft from the dorsal side of left auricle

circular flap (Tenzel)[5], bridge flap (Cutler-Beard)[6], Mustardé lid switch flap[7], or temporal forehead flap (Fricke)[2,3] can be used for the reconstruction.

As regards the free grafts, mucosa of the mouth can be used for conjunctival replacement[2–4], the tarsus and conjunctiva can be replaced using a tarsoconjunctival graft from the contralateral upper eyelid [2–4,8] or nasal chondromucosa [1,4]. For example, a skin graft from the postauricular area [1,4,8,9] or from the contralateral upper eyelid [1,2,4,9] can be used to replace the skin cover.

Carraway described the use of a composite septal mucosal graft and a local pedicle flap. A pedicle flap is mobilized from the remaining upper eyelid skin and brought in place over the graft[1].

Scuderi et al. used a nasal chondromucosal flap for the reconstruction of total and subtotal upper eyelid defects. A skin graft is applied for skin coverage [9].

Patrinely et al. used a tarsoconjunctival graft from the contralateral upper eyelid to reconstruct the upper eyelid. A bipedicle myocutaneous advancement flap is then fashioned from the remaining superior eyelid tissue, and sutured to the anterior surface of the graft. Bipedicle donor site is then closed with a full-thickness skin graft [8].

Fig. 3 a, b. Condition 1 month after the surgery

Fig. 4. Condition 2 years after the surgery

Ear cartilage should not be in direct contact with the cornea because of the risk of corneal damage [2,4]. Some authors suggest that this can by overcome, for example, by moving the conjunctiva from the upper fornix to cover the inner surface [4].

Ear cartilage can be used, for example, together with the Cutler-Beard flap to complete the upper eyelid tarsus [2,3].

In our case, we decided to reconstruct the upper eyelid tarsus using an ear cartilage which could be largely covered with mobilized conjunctiva. The skin cover was reconstructed with a transposition flap. This procedure preserves the lower eyelid intact. The method offers an alternative solution for a defect in the lateral part of the upper eyelid.

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Corresponding author:

Ivo Němec, M.D.

Trauma Center, Military University Hospital Prague
U Vojenské nemocnice 1200, Prague 6, 169 02,
Czech Republic
E-mail: Ivo.Nemec@uvn.cz

ISAPS VISITING PROFESSOR PROGRAM

Hluboká nad Vltavou, Czech Republic

ACTA CHIRURGIAE PLASTICAE, 58, 2, 85

Prof. Fabio Nahas (center), Vladimír Mařík, M.D., (to his left) and other members of the surgical team of Plastic Surgery Centre at Hluboká nad Vltavou

On August 15–16, Visiting Professor Program event took place in Hluboká nad Vltavou. It was the first ever VPP in the Czech Republic. ISAPS National Secretary for the Czech Republic, Vladimír Mařík M.D., invited Prof. Fabio Nahas M.D., PhD., FACS, MBA. Expectations were high; audience was full of residents as well as some of the leading Czech plastic surgeons. Capacity was completely full. Nearly one third of all Czech plastic surgeons found time to attend.

The first day of the course was devoted to live operations conducted by prof. Nahas. Two main procedures were presented – abdominoplasty and mastopexy. Prof. Nahas pointed out important news and techniques during each operation. Only small group of surgeons was at the operating theatre, therefore video was captured and edited for the others. Lectures started early in the morning of the second day. Program was opened by Vladimír Mařík M.D., who introduced prof. Fabio Nahas and ISAPS Visiting Professor Program to the audience. Then, Prof. Nahas took over the conference for nearly the whole day. He presented excellent lectures on the following topics: Treatment of excess skin and fat of the abdomen, Treatment of myoaponeurotic layer of the abdomen – recent trends, Abdominoplasty versus lipoabdominoplasty – what is the best technique?, Secondary abdominoplasty and atypical cases, Limits of liposuction, The internal bra technique for breast reduction, Breast augmentation – some technical considerations. Rich discussion followed after every lecture, many ideas were shared, including lots of different opinions. Level of discussion was very high and atmosphere respectful. Some important conclusions were made. Next part of the program was video presentation from the previous operation day – this was commented live by Prof. Nahas. Once again with many questions from the audience. Each participant received a copy of video on CD-ROM. At the end of the day, Vladimír Mařík M.D. took over the conference once again. This time together with his colleague, Pavel Kurial M.D. They presented difficult cases from their practice with results and Prof. Nahas commented with interest in their approach.

Despite the exhaustive course of the program, organizers found some time for social events. Prof. Nahas had the opportunity to experience the uniqueness of revolving auditorium in the city theatre of Český Krumlov. Physical health was also taken into account – cycling trip through Czech landscape was an icing on the cake.

Response to VPP event was huge; all participants went back home satisfied and full of new ideas. Thanks go to organizers and prof. Nahas for this wonderful and enriching course. Hopefully, this has been the beginning of a new tradition. Everyone looks forward to the next Visiting Professor Program event in the Czech Republic.

ČESKÉ SOUHRNY

ACTA CHIRURGIAE PLASTICAE, 58, 2, pp. 86-87

3D DOPPLEROVSKÉ VYŠETŘENÍ: SPOLEHLIVÁ, NEINVAZIVNÍ A CENOVĚ EFEKTIVNÍ METODA PRO PŘEDOPERAČNÍ HODNOCENÍ PERFORÁTORŮ U DIEP LALOKU

Dražan L., Lombardo G.A.G

Východiska: Předoperační mapování perforátorů je důležitý krok při autologní rekonstrukci prsu, který umožňuje bezpečnější, předvídatelnou a časově kratší preparaci laloku. I když se Dopplerovské vyšetření ukázalo být méně přesné při lokalizaci perforátorů ve srovnání s barevným duplexním ultrazvukovým vyšetřením a CTA, bude mít pravděpodobně i nadále svůj význam pro klinickou praxi. Cílem této práce je podělit se o některá doporučení jak provádět předoperační Dopplerovské vyšetření před operací DIEAp laloku, které zvyšuje spolehlivost při lokalizaci perforátorů.

Metody: Studie se prováděla předoperačně na 26 pacientkách. Pro zhodnocení shody mezi označením dle Dopplera a operačním nálezem byla použita kartézská soustava souřadnic.

Výsledky: Označili jsme předoperačně 145 perforátorů u 26 pacientek pro celkem 52 polovin břich. U jedné pacientky bylo označeno průměrně 5,6 cév. Z nich bylo 80 (55,17 %) nalezeno 0–1 cm od značky, 36 (24,82 %) 1–2 cm od značky a 5 (3,4 %) více než 2 cm od značky. Měli jsme 24 (16,55 %) falešně pozitivních nálezů u nichž nebyla žádná shoda mezi signálem a peroperačním nálezem.

Závěr: I když Dopplerovské vyšetření nemusí poskytovat stejné anatomické detaily jako jiné a novější modality (CTA a MRA), HHD zůstává velmi užitečným a důležitým nástrojem pro autologní rekonstrukci. Doporučujeme provedení tohoto vyšetření v rámci našeho standardizovaného a reprodukovatelného postupu za účelem zlepšení spolehlivosti.

NAŠE PRVNÍ ZKUŠENOSTI S NOVOU METODOU PREPARACE DIEAP LALOKU

Hýža P., Veselý J., Streit L., Schwarz D., Kubek T., Catalano F., Lombardo G. A. G.

Východiska: Břišní tkáň je ideální zdroj pro autologní rekonstrukci prsu. V této práci navrhujeme nový přístup pro intramuskulární disekci DIEP laloku.

Metody: Celkem 84 žen podstoupilo rekonstrukci prsu po mastektomii. Z této skupiny bylo 48 pacientek léčeno tradičním DIEP lalokem, z nichž 21 podstoupilo jednostranný výkon a 28 oboustranný výkon. Tento nový typ preparace byl proveden u 35 žen, s unilaterálním přístupem ve 14 případech a bilaterálním přístupem v 21 případech.

Výsledky: Statistické rozdíly nejsou v obou skupinách významné z hlediska komplikací ($p > 0,1$). Průměrný operační čas při tomto novém přístupu byl 3 hodiny a 10 minut na lalok. Průměrný operační čas při tradiční preparaci DIEP laloku byl 3 hodiny a 41 minut na jeden lalok. Operační čas nového přístupu je významně kratší než preparace tradičního DIEP laloku ($p < 0,01$).

Závěr: Přístup pro preparaci DIEP laloku navržený autory je nový koncept v autologní rekonstrukci prsu. V tomto typu preparace se neresekuje žádná fascie a je spolehlivější než tradiční DIEP lalok pro snazší preparaci a pro přítomnost malé ochranné manžety svalu kolem cév s nižším rizikem poranění perforátoru.

Jde o reprodukovatelnou možnost preparace, užitečnou také pro méně zkušené operatéry, a jde o techniku zkracující dobu operace ve srovnání s tradičním DIEP lalokem.

LIPOMODELACE – ÚČINNÁ TECHNIKA KOREKCE VROZENÝCH VÝVOJOVÝCH VAD PRSU

Streit L., Dražan L., Novák P., Schneiderová M., Dvořák Z., Teplá K., Veselý J.

Mezi standardně používané techniky při korekci vrozených vývojových vad prsu spojených s hypoplazií nebo aplazií mléčné žlázy patří použití tkáňových expandérů, silikonových prsních implantátů, místních nebo volných laloků a techniky vnitřní modelace mléčné žlázy. Autoři představují sérii úspěšných rekonstrukcí prsu technikou lipomodelace u jedné pacientky s Polandovým syndromem a u dvou pacientek s tuberózním prsem. Při léčení nebyly zaznamenány žádné chirurgické komplikace a kontrolní vyšetření prsu ultrazvukem nepotvrdilo žádná podezřelá ložiska, pozorovány byly pouze drobné olejové pseudocysty. Autoři dosáhli posunu submamární rýhy kaudálně, u tuberózního prsu byl korigován tvar dolních kvadrantů a vyklenutí areoly, a u Polandova syndromu se podařilo posunout bradavku kaudálně a laterálně. Hlavní výhodou techniky lipomodelace je skutečnost, že lze začít s rekonstrukcí prsu dříve v adolescenci, protože na další růst a vývoj nepostiženého prsu lze dobře reagovat během následující etapy lipomodelace. Lze očekávat, že technika lipomodelace změní celkový přístup k léčbě vrozených vývojových vad prsu a hrudníku.

REKONSTRUKCE ROZSÁHLÝCH TVÁŘOVÝCH A ORBITÁLNÍCH DEFEKTŮ KOMBINACÍ PŘENOSU VOLNÉHO LALOKU A KRANIOFACIÁLNÍ EPITÉZY

Streit L., Dražan L., Hýža P., Stupka I., Paciorek M., Rosický J., Veselý J.

Cílem rekonstrukce rozsáhlých obličejových defektů je uspokojivé obnovení funkční a estetické integrity obličeje. Autologní rekonstrukce složitých obličejových podjednotek (nos, ucho a očnice) jako celku je velmi náročná a výsledky těchto rekonstrukcí bývají někdy neuspokojivé. Pomocí současných moderních technologií lze naplánovat a vyrobit obličejovou epitézu natolik věrohodně, že je možné tyto tvářové podjednotky autenticky nahradit. Představujeme

alternativní přístup k rekonstrukci rozsáhlých obličejových defektů založený na přenosu volného laloku v kombinaci s použitím silikonové epitézy pro nahrazení periorbitální tvářové podjednotky nebo ucha. Tento rekonstrukční postup byl využit u dvou pacientů s velmi uspokojivými výsledky. Kombinace volného laloku a obličejové epitézy je účinnou metodou rekonstrukce rozsáhlých obličejových defektů. Kvalitu rekonstrukce lze zvýšit respektováním principu estetických tvářových podjednotek.

PORANĚNÍ OČNÍHO VÍČKA S ČÁSTEČNOU ZTRÁTOU. KAZUISTIKA

Němec I.

Při ztrátovém poranění horního víčka má jeho rekonstrukce zásadní význam pro ochranu rohovky a bulbu. V závislosti na velikosti a lokalizaci defektu můžeme zvolit nejvhodnější postup. Prezentujeme pacientku s částečnou ztrátou horního víčka. Defekt jsme rekonstruovali transpozičním kožním lalokem, kterým jsme kryli chrupavčitý štěp z boltce. Chybějící spojivku jsme částečně rekonstruovali její mobilizací z fornixu, část defektu jsme nechali ke spontánní epitelizaci. Uvedený postup představuje alternativní řešení defektu laterální části horního víčka.

INSTRUCTIONS TO THE AUTHORS

ACTA CHIRURGIAE PLASTICAE, 58, 2, pp. 88-91

The journal *Acta Chirurgiae Plasticae* is an international journal of plastic surgery. It is published in English with Czech/Slovak structured abstracts four times a year. There are articles dealing with problems of plastic, reconstructive and aesthetic surgery, craniofacial surgery, hand surgery, microsurgery, burns and allied and cooperating fields of medicine. The journal accepts the following types of articles for publication: original scientific papers including experimental studies, case reports, review articles, discussions, reviews of domestic and foreign publications, news (invitations to specialized meetings, reports from congresses and meetings, letters to the editors, etc.) and other important information from the specialty. All articles are subject to a peer review procedure, whereas bilateral anonymity is maintained. The editorial board accepts articles in English, or possibly after a previous agreement also in Czech and Slovak languages. Only articles that have not been previously published elsewhere can be accepted.

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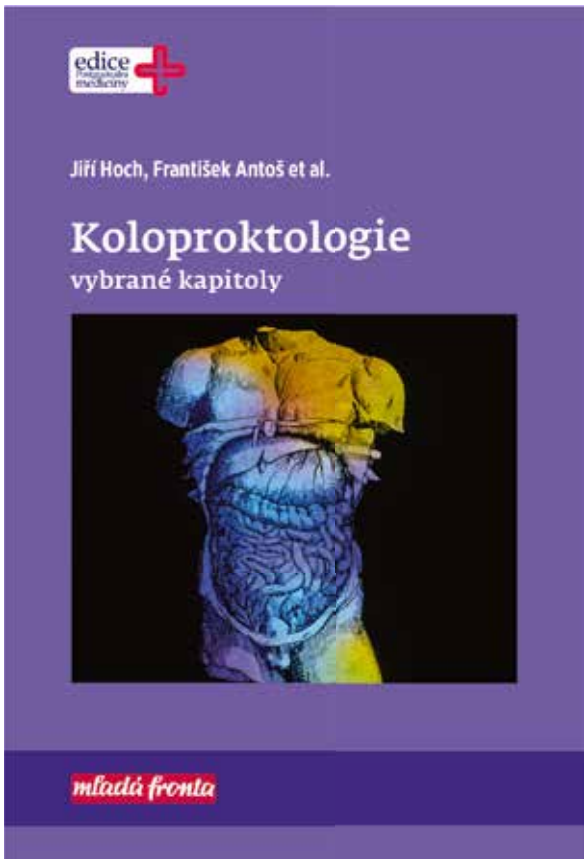
vybrané kapitoly



Koloproktologie je významná chirurgická specializace, které se právem dostává stále větší pozornosti zdravotnické i laické veřejnosti. Náplní oboru je diagnostika a operační i neoperační léčba onemocnění tlustého střeva, konečníku a také řiti. Důvodem pozornosti je, že incidence střevních onemocnění stále vzrůstá, ale rychle se mění i léčebné výsledky, a to díky narůstajícím znalostem průběhu koloproktologických afekcí a pokroku technických možností diagnostiky a léčby.

Připravovaná publikace je nejaktuálnější revue prací, která rozebírá závažná témata diagnostiky a léčby břišních katastrof střevního původu, krvácení do dolní části zažívacího traktu, komplikací stomií, anastomózy, tzn. spojení střeva – nejrizikovější části kolorektálních operací. Novinky se týkají nových staplerů, zatím nejdokonalejší metody kontroly bezpečnosti anastomózy a nové alternativy řešení anorektálních píštělí a defektů. Významná část publikace je věnována kontrole kvality nejen v kolorektální chirurgii.

Autory jsou bez výjimky respektovaní specialisté v oboru, včetně zahraničních.

Autoři: Jiří Hoch, František Antoš et al.

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ČESKÁ LÉKAŘSKÁ
SPOLEČNOST
J. E. PURKYNĚ

ACTA CHIRURGIAE PLASTICAE