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Metoda limfatyczna plastrowania dynamicznego w walce z obrzękiem twarzy po operacjach na szkielecie części twarzowej czaszki – doniesienie wstępne

Lymphatic kinesiology taping technique as the method of treatment against the swelling of a face after surgeries in the craniofacial area – preliminary report

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Streszczenie:

Współczesna chirurgia szczękowo-twarzowa za cel nie stawia sobie wyłącznie przywracania funkcji układu stomatognatycznego i twarzy, ale również przywracanie ich harmonii i poprawę estetyki. Stale narastające tempo życia oraz chęć pacjentów do jak najszybszego powrotu do pełnej sprawności wymusza na członkach zespołu terapeutycznego szukanie nowych możliwości skrócenia czasu rehabilitacji, a w tym sposobów na redukcję obrzęków. Istnieje szereg metod walki z zastojem chłonki, ale często nie dość, że nie są wystarczająco skuteczne, to obarczone są ryzykiem szeregu poważnych działań ubocznych. W związku z tym nieustannie poszukuje się nowych metod redukowania obrzęku, jedną z nich jest metoda limfatyczna plastrowania dynamicznego.

Cele. Ocena wpływu metody limfatycznej plastrowania dynamicznego na dynamikę obrzęku twarzy u pacjentów operowanych z powodu urazów i wad części twarzowej czaszki.

Materiał i metoda. Do badania włączeni zostali pacjenci Kliniki Chirurgii Szczękowo-Twarzowej Uniwersyteckiego Szpitala Klinicznego im. WAM-CSW w Łodzi leczeni z powodu urazów oraz wad gnatycznych w okresie od 31.08.2013 do 30.06.2014. Na podstawie randomizacji utworzono 22 osobową grupę badawczą i 19 osobowoą grupę kontrolną. W grupie badanej stosowano aplikację metodą limfatyczną plastrowania dynamicznego, a następnie w obu grupach dokonywano pomiarów obrzęku twarzy w 1,2,5 oraz 10 dobie po zabiegu. Wyniki poddano analizie statystycznej.

Wyniki. W grupie chorych przeważali mężczyźni (68%) w średnim wieku 34,2 lata. Wykazano znaczący wpływ plastrowania dynamicznego na dynamikę powstawania obrzęku pooperacyjnego. Powodowało ono jego stopniową redukcję do uzyskania 75% poprawy w 10 dobie po zabiegu, podczas, gdy w grupie kontrolnej początkowo obserwowano narastanie obrzęku i znacznie mniejszą jego redukcje w końcowej fazie badania.

Wnioski. Metoda limfatyczna plastrowania dynamicznego wykazuje pozytywny wpływ na redukcję obrzęku pooperacyjnego twarzy i wskazane jest dalsze badanie wpływu tej metody na rehabilitacje pacjentów operowanych w obrębie części twarzowej czaszki.

Słowa kluczowe:
obrzęk, chirurgia szczękowo-twarzowa, kinesiology taping, złamanie, chirurgia ortognatyczna

Abstract

The contemporary maxillofacial surgery aims not only to restore the functions of the stomatognathic system and the face, but also to restore their harmony and to improve aesthetics. Constantly increasing pace of life and the desire of patients to regain the full fitness as quickly as possible, make the therapeutic teams to always look for the new ways to reduce the time of rehabilitation, and this includes the ways to reduce the swelling. There are a number of methods to fight the lymphedema, but often not only they are not efficient enough, but also they raise the risk of several serious side effects. Therefore, the new methods for reducing the swelling are being searched for constantly, and one of them is the lymphatic kinesiology taping technique.

Objective. Evaluation of the impact of the lymphatic kinesiology taping technique on the dynamics of the facial swelling, in patients after surgeries due to injuries and defects of the craniofacial area.

Materials and Methods. In the study participated the patients of the Maxillofacial Surgery Clinic of the University Clinical Hospital of WAM-CSW in Łódź, who had been treated due to injuries and gnathic defects, during the period from 31.08.2013 to 30.06.2014. Based on randomization, there had been formed the test group of 22 persons and the control group of 19 persons. In the test group the lymphatic kinesiology taping technique had been applied, and then in both groups the facial swelling measurements were taken – on the 1st, 2nd, 5th and the 10th day after the surgery. The statistical analysis of the results had been made.

Results. The group of patients was predominantly male (68%), with the mean age of 34.2 years. A significant impact of the kinesiotaping on the dynamics of the postoperative edema formation had been demonstrated. The kinesiotaping resulted in the gradual reduction of the swelling, up to the 75% of improvement on the 10th day after the surgery, while in the control group the swelling initially escalated and its reduction was much less pronounced in the final phase of the research.

Conclusions. Lymphatic kinesiology taping technique has a positive impact on the reduction of the postoperative edema of the face, and it seems advisable to further study the effects of this treatment method on the rehabilitation of the patients, who have undergone a surgery in the craniofacial area.

Key words:
swelling, maxillofacial surgery, kinesiology taping, fracture, orthognathic surgery

Introduction

Any surgical intervention results in the mechanical damage of the lymphatic structures (mainly the lymph vessels), and this in turn causes the postoperative swelling. Moddaber and his colleagues have demonstrated, that in the case of the craniofacial surgery, the facial swelling gradually escalates to reach its maximum between 48 and 72 hours after the operation (the face increases its volume by about 60%) [1, 2]. The swelling decreases by about 80% within the first month after the surgical intervention, but up to 3 months after the procedure, the volume of tissue remains enlarged by approximately 11% [2]. In addition to being an aesthetic problem, the swelling is also associated with a number of the undesirable side effects, like: disorders of breathing, swallowing and speech, emergence of the new foci of inflammation, which in turn leads to the further development of dysfunctions of the lymphatic system. The edema escalation also leads to the body temperature increase and the intensified pain sensation [3]. In view of the above, fighting the edema seems to be very important aspect of the postoperative care. To do so, there are a number of methods, such as: pharmacotherapy (mainly glucocorticosteroids), which causes several side effects, cold compresses application, pneumatic compression therapy and manual lymphatic drainage [4, 5, 6, 7, 8, 9, 10, 11, 12]. Another method worth considering, as the procedure for reduction of the postoperative swelling, is the lymphatic kinesiology taping technique, laid out by Kenzo Kase in the seventies of the twentieth century. The mechanism of this method is based on the taking the load off of the fascia system, by the use of the glued to the skin flexible tape, which causes the reduction of the mutual pressure of the tissues, reinforces their mutual moveability and increases the flow of fluids [8, 9, 10, 13, 14, 15, 16]. Although this method is fairly well defined, there are only a few reports referring to its application in the maxillofacial surgery [8, 9, 10].

Objective:

The aim of this study has been the preliminary assessment of the efficacy of the lymphatic kinesiology taping technique application, as the method to reduce the postoperative swelling of the face, and the analysis of the correlation between the formation of the edema and the point in time when the kinesiology taping has been applied.

Materials and Methods

The study encompassed 41 patients, treated between 31.08.2013 and 30.06.2014 in the Maxillofacial Surgery Clinic of the University Clinical Hospital of WAM in Łódź. Inclusion criteria were: age (18-55 years old) and the surgical treatment within the craniofacial area, due to the fractures or the correction of gnathic defects. The patients have been randomized into two groups. In the first group, which consisted of 19 patients, the traditional methods of fighting the edema had been applied – such as cold compresses, in the other group (22 patients) there had been additionally

introduced the lymphatic kinesiology taping technique. For the study, the presented below tapes of the NITTO CROWN brand were used, and applied according to the scheme shown in Figure 1

In patients of both groups the measurements were taken immediately after the surgery, as well as on the 2nd, 5th and the 10th day after the procedure. The measurements were made in the 5 sections (Fig. 2) on both sides of the face.

The statistical analysis of the results has been done with the Microsoft Excel 2010 and the Statistica Software, version 6.

Fig. 1. Lymphatic kinesiology taping technique

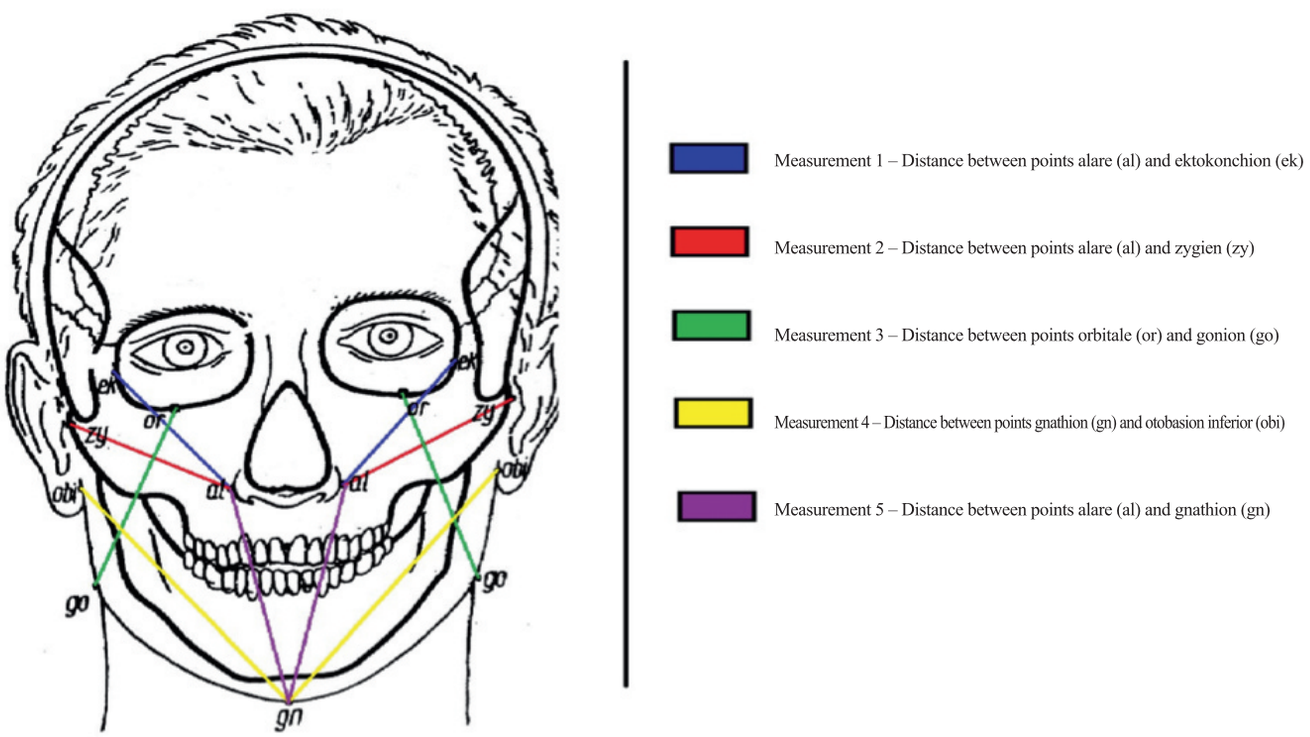

Fig. 2. Measurement points

Results

The study encompassed a total of 28 men (68%) and 13 women (32%) with the mean age of, respectively, 34.2 years – men, and 32.2 years – women. In the test group the majority were men (57%), while in the control group women (54%) (Fig.3). For the purpose of the study, the treatments were divided into 3 groups: mandibular fracture fixation, orbital fracture fixation along with the reconstruction of the orbit walls with the implant, orthognathic procedures. The patients participation in the particular groups is shown in Table 1 and Chart 2 (Table 1, Fig.4).

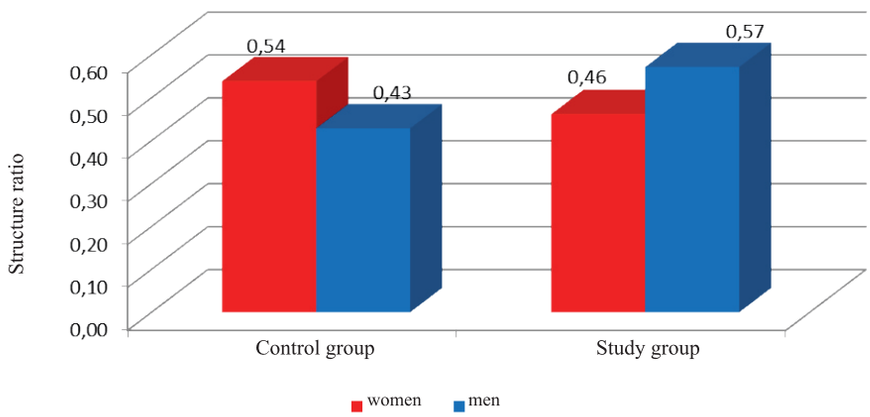

Fig. 3. The structure of the test and the control group according to gender

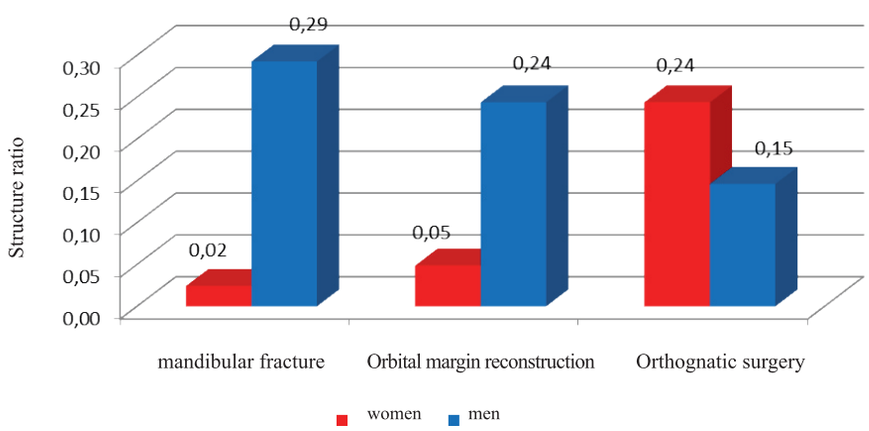

Fig. 4. The structure of the test and the control group according to the type of procedure

Table 1. Participation of the particular genders in the groups assigned to the types of the surgical procedures

Type of surgery	Number of women	Number of men
Mandibular fracture	1	12
Orbital fixation	2	10
Orthognatic procedures	10	6

Analyzing the change in length of the measured sections in the test group and the control group, one notices a significant difference in the dynamics of the facial swelling in both groups. Since there has not been observed a statistically significant difference between the left and the right side (Fig. 5 and 6) the authors have decided to present the dynamics on the basis of the measurements of just one side. In the case of the first measurement, clearly recognizable were two distinct types of the edema development – in the test group, the edema declined in almost linear way, while in the control group the edema had initially escalated and, in some simplification, could have been described with the quadratic function. It is worth to emphasize, that the application of the lymphatic kinesiology taping technique had resulted, in the test group, in reduction of the swelling by an average of about 13 mm (Fig. 7). Similar results were noted in the case of the 2nd measurement, both the dynamics of the changes and the reduction of the edema had been similar (13 mm for the test group and 4mm less for the control group) (Fig. 8). The greatest reduction of the edema in the test group was noted in the third measurement (18mm) (Fig. 9). Similarly look the charts showing the edema dynamics for the fourth and fifth measurements (Fig. 10 and 11). Also the summary of the median percentage values for both groups shows the better result in the test group than in the control group (Table 2)

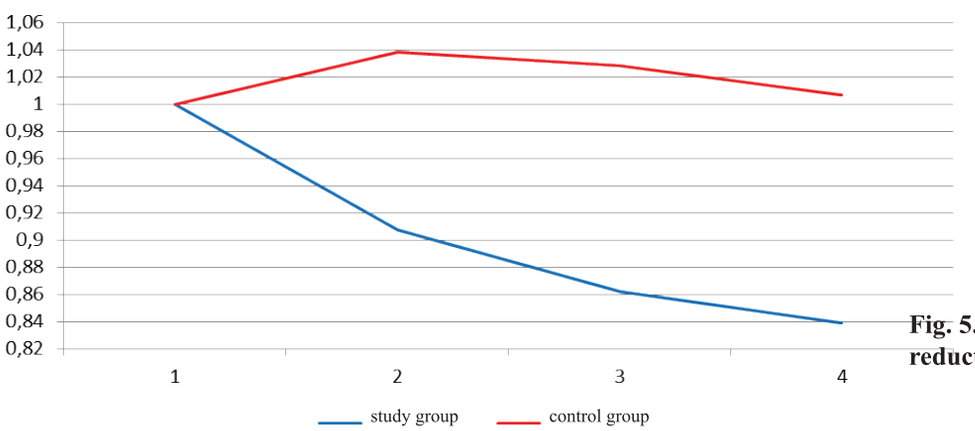

Fig. 5. Dynamics of the swelling reduction on the right side of the face

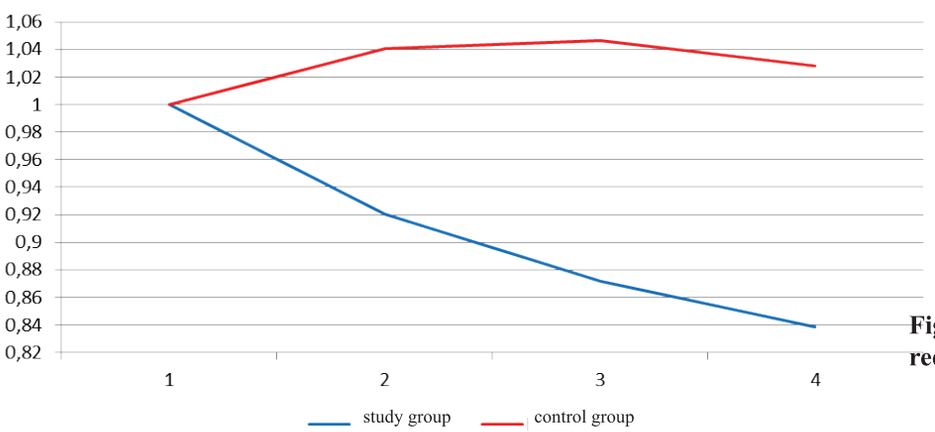

Fig. 6. Dynamics of the swelling reduction on the left side of the face

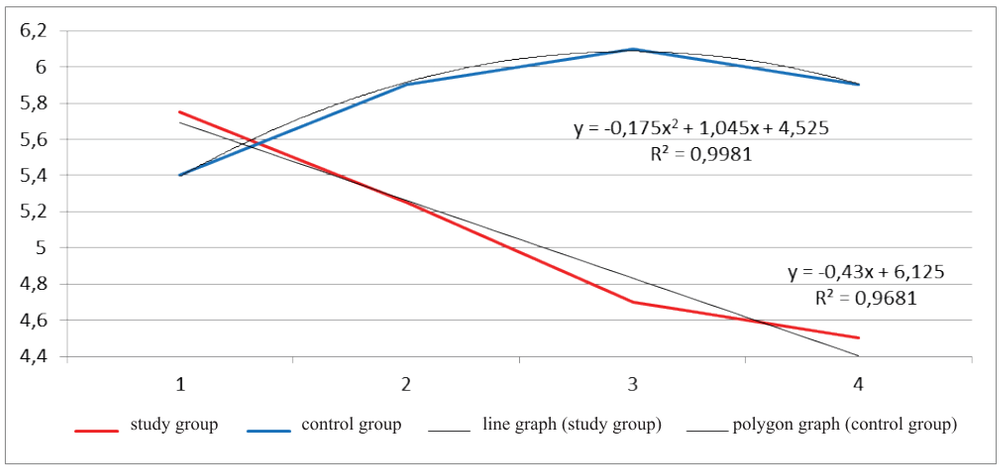

Fig. 7. Dynamics of the swelling reduction on the left side of the face

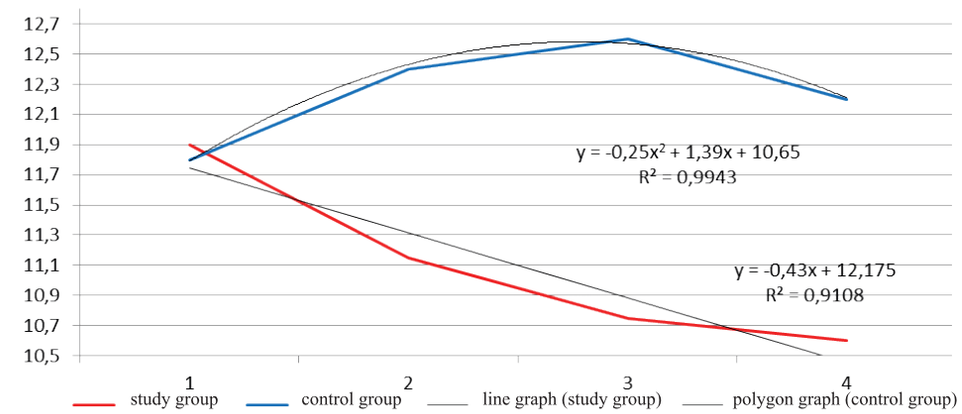

Fig. 8. Changes in the facial swelling during the second measurement for the right side

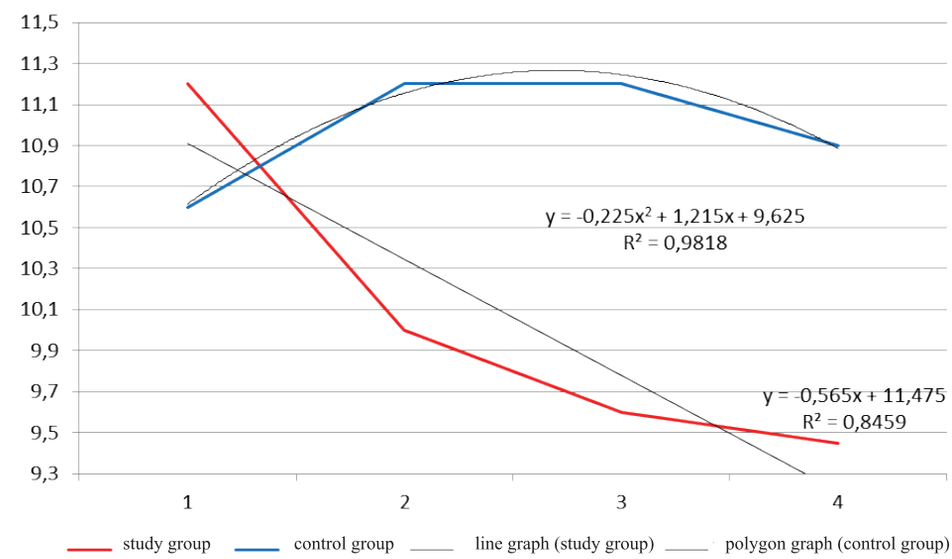

Fig. 9. Changes in the facial swelling during the third measurement for the right side

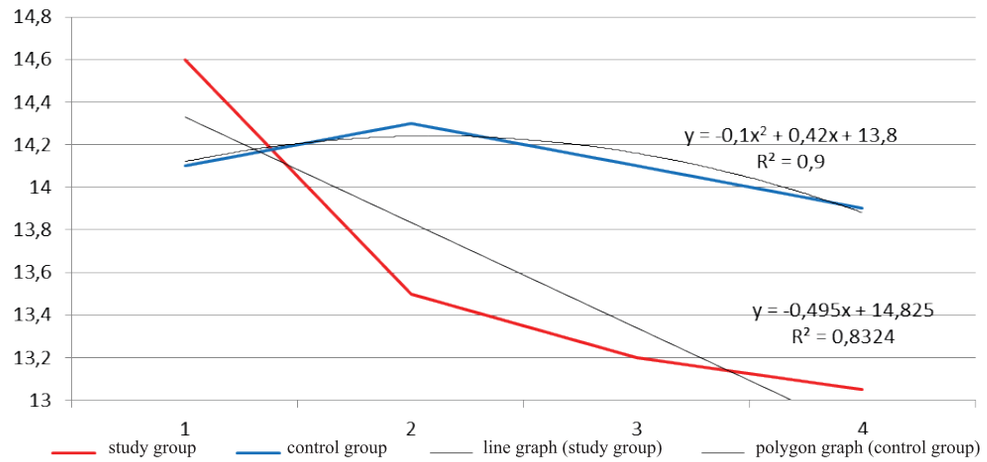

Fig. 10. Changes in the facial swelling during the fourth measurement for the right side

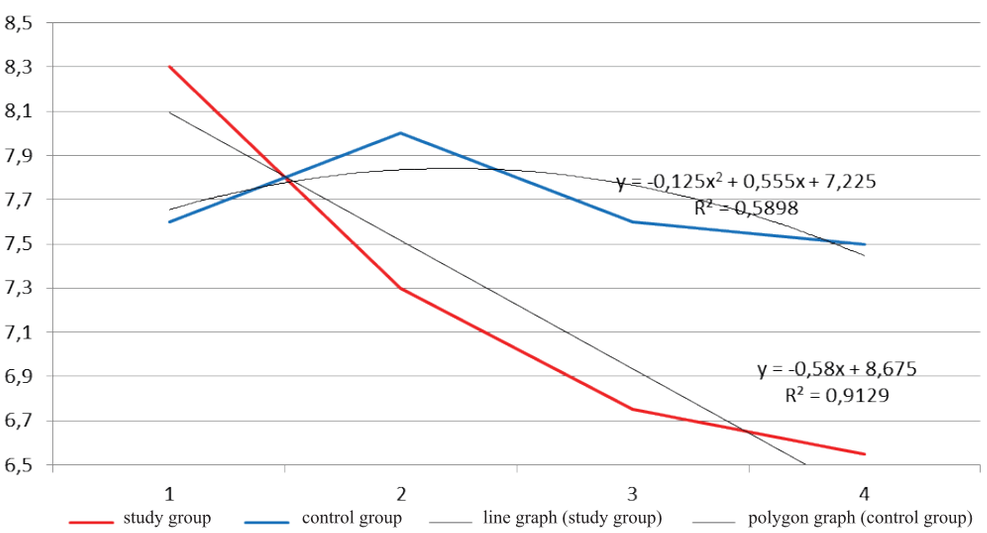

Fig. 11. Changes in the facial swelling during the fifth measurement for the right side

Table 2. Table of the test and the control group median cross-correlation

	Measurement number				
	1	2	3	4	5
The ratio of median values for the right side [%]	20%	14%	13%	6%	12%
The ratio of median values for the left side [%]	24%	12%	15%	8%	12%

Analyzed were also the dynamics of the edema changes in both groups, depending on the surgery type performed. In the case of the mandibular fracture fixation (Table 3), in the control group the swelling initially escalated (the structure ratio was 1.04, which meant the edema increased by 4%). In the test group, there were noted decreases of a structure ratio to the levels of 0.84 and 0.85, depending on the side if the face, which meant the reduction of the edema, respectively by 16% and 15%. Similar results were obtained in the group of patients operated in the area of orbits (Table 4) and due to the maxillofacial defects (Table 5).

Table 3. Table showing the dynamics of changes in swelling in the mandibular fractures

Meeting number (day)	Left side of face		Right side of face	
	control group	study group	control group	study group
1 (1 day)	1	1	1	1
2 (2 day)	1.04	0.93	1.04	0.92
3 (5 day)	1.05	0.87	1.03	0.88
4 (10 day)	1.03	0.84	1.01	0.85

Table 4. Table showing the dynamics of changes in swelling in the orbital margin reconstructions

Meeting number (day)	Left side of face		Right side of face	
	control group	study group	control group	study group
1 (1 day)	1	1	1	1
2 (2 day)	1.04	0.92	1.03	0.91
3 (5 day)	1.05	0.87	1.01	0.87
4 (10 day)	1.01	0.84	0.98	0.85

Table 5. Table showing the dynamics of changes in swelling in the orthognathic surgery.

Meeting number (day)	Left side of face		Right side of face	
	control group	study group	control group	study group
1 (1 day)	1	1	1	1
2 (2 day)	1.04	0.92	1.03	0.90
3 (5 day)	1.05	0.87	1.03	0.86
4 (10 day)	1.02	0.84	1	0.84

Discussion

Postoperative swelling is an important issue in the recovery of patients after the maxillofacial surgeries. In the professional literature, there are a number of reports on the use of pharmacological and non-pharmacological methods in the prevention and reduction of the postoperative swelling [1, 4, 5, 7, 8, 9, 10, 11, 12 15, 16]. Moddaber, Rana and Ghassemi, together with their colleagues, have shown in their studies the beneficial effects of the hilotherapy as the method to fight the edema. This is a method based on the application on the patient's face, immediately after the surgery, of the mask made of the thermoplastic polyurethane, the temperature of which, near the patient's skin, is 15oC. The mask was being applied for 3 consecutive days, 12 hours per day. To evaluate the swelling, the researchers had used an optical scanner on the 2nd, 3rd, 7th, 28th and 90th day after the surgery. Because of the different methodology for assessing the edema, it is difficult to compare the Moddaber's results to ours. Still, what draws attention is the fact, that in their study the residual swelling persisted even in about one month after the surgery, whereas in our material, in some of the patients we have achieved 100% reduction of swelling on the 10th day after the surgery [1]. Another aspect of the use of low temperatures for the reduction of edema discuss in their work Belli, Rendine and Mazzone [15]. They paid attention to the impact of the compress temperature on the dynamics of the swelling. They have proved the safety of the hilotherapy in the temperature of 15oC, and in this temperature they have also observed the positive impact of the cold on the pain sensation. Compresses in temperature of 0oC (bags with ice) caused the metabolism slow down and the lymphatic drainage reduction. Therefore such therapy may be bringing the result opposite to the expected – the longer persistence of the swelling [15]. For obvious reasons, the use of the method we have researched does not carry this kind of risk.

Another, described in the literature, way of prevention and reduction of swelling is pharmacotherapy. Benetello et al., in their study, examined the effectiveness of the nonsteroidal anti-inflammatory drugs – NSAIDs (valdecoxib and piroxicam) – in fighting the edema. The drugs have proved to be quite an effective tool in this area, and in addition they have had anti-inflammatory and painkiller effects. Unfortunately, the presence of numerous complications (mainly gastrointestinal bleeding and cardiovascular incidents), with the incomplete reduction of the facial swelling, call for the special care in administering these medications, especially to elderly patients and those with the systemic diseases [4]. If compared to the NSAIDs, the lymphatic kinesiology taping technique seems to be much more effective and, above all, completely safe. Another group of medicines assessed for their effectiveness in the reduction of the postoperative edema were the glucocorticosteroids. Chegini and Dhariwal, in their meta-analysis regarding the application of this group of medicines in the maxillofacial surgery treatments, based on the computer tomography examinations, have positively evaluated the effectiveness of the drugs for the reduction of the edema after the orthognathic procedures (the evaluation was done on the 1st and the 3rd day after the surgery) [4]. The authors point out, quite like in the case of the NSAID medicines, the numerous side effects, such as: hypertension, inflammation of mucous and gastric ulcers, mental disorders, insomnia or retention of fluids in the body. In view of the above, again the application of the lymphatic kinesiology taping technique presents the significant advantage over the pharmacotherapy.

In their research Shetty et al. have demonstrated the effectiveness of the enzymatic treatment (serine and cysteine proteases, trypsin, rutine) in the reduction of the postoperative swelling. The patients operated due to the gnathic defects were being assessed with the USG immediately after the surgery and 1, 5 and 15 days later. With the systematic administering of the enzymes, the highest edema reduction had been noted between the 5th and the 15th day after the surgical treatment [11]. Again in comparison with the above method, the lymphatic kinesiology taping technique is more effective in modifying the dynamics of the swelling and in its reduction already during the 1st day after the surgery. Analyzed has also been the impact of the manual lymphatic drainage on the forming of the postoperative swelling, in the maxillofacial surgery procedures. Szolnoky, Szendi-Horvath, Seres et al. have demonstrated, that the early application of this therapeutic method stimulates the lymph circulation, which results in the reduction of the swelling. In their research, the patients had the lymphatic drainage performed with the Vodder method, on one side of the neck (immediately after the surgery), and the other side of the face had been used for comparison. The measurements were taken with a measuring tape, and the distances were measured between 6 measurement points. The authors have achieved reduction of the edema by 14mm (approximately 38%). They have also pointed out, that the early application of the drainage prevents the increased formation of the swelling [12]. It should be noted, however, that the manual lymphatic drainage requires a considerable experience and skill of the therapist, so the novice physiotherapist may not be able to perform it effectively. Unlike the lymphatic kinesiology taping technique, which is a simple enough, and easily applied therapy method.

So far, there have been only a few publications evaluating the the lymphatic kinesiology taping technique in the maxillofacial surgery. In the research by Ristowet al., it has been shown that the lymphatic technique contributes to the 60% reduction of the edema within the first 48 hours after the surgery. Evaluated were patients treated due to the mandible, zygomatic bone fractures and the surgical removal of the retained third molars. It has also been noted that the presented method has contributed to the reduction of such ailments as: pain, sensory disorders or a lockjaw [8, 9, 10].

In conclusion, it should be emphasized that the method we have examined differs from the other physiotherapy methods in the time it takes to start working. The kinesiology taping is being referred as the 24 hours a day treatment, which ensures the continuity at all times, and not only during the therapy sessions. Further advantages of this method are: the fact that it does not have any side effects, is relatively simple to apply and does not preclude the application of other forms of physiotherapy; it does not interfere with them, and on the contrary – often brings about the synergy effect. For all the discussed above reasons, it does seem advisable to commonly implement the lymphatic kinesiology taping technique in order to reduce the time, and to soften the adverse effects of the recovery, after the maxillofacial surgery treatments.

Conclusions

The application of the lymphatic kinesiology taping technique seems to be an effective method in reduction of the postoperative swelling of the face, and the application of this method, as soon as possible after the occurrence of the edema, prevents it from the initial increase and helps, as well, to gradually reduce it.

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