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Late postoperative complications and dysfunction of the stomatognathic system (SS) in patients after orthognathic surgery

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Abstract

Introduction: Patients with maxillofacial and intraoral defects require orthognathic surgery to improve the appearance of the face and correct the occlusion. The number of orthognathic surgeries has been increasing in recent years. The motivation to undergo these surgeries is the possibility for patients to improve stomatognathic system functions i.e. chewing, swallowing and pronunciation, as well as aesthetic and psychosocial factors.

Aim: The aim of the paper was to assess the occurrence of late postoperative complications and dysfunction of the stomatognathic system in patients after orthognathic surgeries such as Maxillary Lefort 1 Osteotomy and Bilateral Sagittal Split Osteotomy (BIMAX). Additionally, the paper emphasizes the necessity of quick activation of the stomatognathic system structures in patients after orthognathic surgeries in order to reduce the incidence of complications.

Material and methods: The research was conducted with the help of the users of internet groups: "Progenia, mandibular prognathism, photos BEFORE and AFTER the operation :)" (in Polish: „Progenia, wysunięta szczęka, zdjęcia PRZED i PO operacji :)") and "Suffering from progenia" („Progenicy") as well as users of the Jawsurgeryforums.com online forum who have given their informed consent to participate in the survey. The analysis was carried out on a group of 92 people who underwent orthognathic surgery of Maxillary Lefort 1 Osteotomy and Bilateral Sagittal Split Osteotomy (BIMAX) type in the years 2004-2019. To assess the opinions of patients, a diagnostic questionnaire method was used, based on a proprietary electronic questionnaire, which consisted of three parts. The first part is metric, i.e.: age, gender and questions concerning the number of orthognathic surgeries performed, time of wearing intermaxillary traction wiring or splints, postoperative rehabilitation. The second part of the questionnaire consisted of 15 close-ended questions assessing the occurrence of symptoms of SS system disorders and functioning. The third part of the questionnaire consists of 20 questions concerning postoperative complications after 3 and 6 months from surgery and functioning of the dental system after surgery. The fourth part of the questionnaire consists of 5 close-ended questions concerning the evaluation of the overall impression after surgery and the most important effects of it. The test results were statistically analyzed using the correlation coefficient and Pearson's chi-squared test ($p \leq 0.05$).

Results: 92 people, of which 86 women (93.5%) and 6 men (6.5%), participated in the study. The most common ailments before the surgery — affecting more than half of the patients — were chewing impairment, speech defect, breathing problems and headaches. 3 months after the operation, facial neurosensory disturbances and facial swelling were the most frequent of the ailments reported by the patients (more than 70% of the respondents), limited jaw mobility, joint pains and chewing impairment were also frequent (more than 40%). 6 months after the surgery, the most frequent persisting ailments were facial neurosensory disturbances (> 60%), facial swelling and acoustic problems (> 30%), as well as pains of masticatory and mandibular muscles, headaches and limited joint mobility (> 20%). More than half of the patients (n=48) were satisfied with the surgery, the second largest group were patients delighted with the result (n=25). 4 people were dissatisfied and 3 very dissatisfied. 12 patients had difficulties in determining their satisfaction with the results of the surgery. 19 people (20.7%) did not report disturbances of somatosensory system in any of the facial areas, and among the patients experiencing ailments, 40 people (43.5%) reported problems in two areas, 27 people (29.3%) in one, 5 people (5.4%) in four and 1 person (1.1%) in three areas. In the 3rd month after the surgery it was observed that people who did not use physiotherapeutic treatment were 11.5% more likely to suffer from bone inflammation [$X2(1)=4.359$; $p=0.037$]. Two statistical tendencies were observed, suggesting that people using physiotherapy slightly less often showed limitations in mandibular mobility [by 17.6%; $X2(1)=3.599$; $p=0.065$] and by 4.7% less often experienced bone inflammation [$X2(1)=1.238$; $p=0.076$].

Conclusions: The most common postoperative complication is somatosensory system disturbance of the lower facial muscles. Orthognathic surgery contributes to the reduction of stomatognathic system ailments. Persons using physiotherapy suffer less frequently from bone inflammation and enjoy greater mobility of the temporomandibular joint.

Key words: postoperative complications, orthognathic surgery, temporomandibular joints, stomatognathic system

Introduction

The correlation between the facial aesthetics and the sagittal plane view has been the subject of research since the time of Angle, who noticed that malocclusion in the sagittal plane position causes various imbalances of the contours of the face [1]. In 1899, Angle described three malocclusion classes: I, II and III. Angle's classification is based mainly on the anterolateral position of the mandibular first molar in relation to the permanent first molar in the maxillary arch, and-additionally-on the posterior position of the incisors [2]. Class I corresponds to the normal situation; the lower teeth are displaced behind the teeth of the upper part of the nodule (i.e., the mandible and maxilla match perfectly). In Class II, Class II malocclusion is characterized by the disto-buccal cusp of the upper first permanent molar occludes in the mesio-buccal groove of the lower first permanent molar. The malocclusion of class II is divided into: 1) subdivision, where upper anteriors areproclined and 2) subdivision with the upper central incisors retroclined and overlapped by the lateral incisors (Figure 1) [2]. The skeletal classification explains the position of the jaw, always in relation to the saggital plane and, at the same time, involves using cephalometric analysis. Class I is the norm. Class II (mandibular retrusion) corresponds to the posterior position of the mandible relative to the jaw. Class III (progeny) means the mesiobuccal cusp of the maxillary first molar occluding posterior to the buccal groove of the mandibular first molar [2, 3]. In terms of permanent teeth, the overall distribution was 74.7% for class I, 19.56% for class II and 5.93% for class III [4].

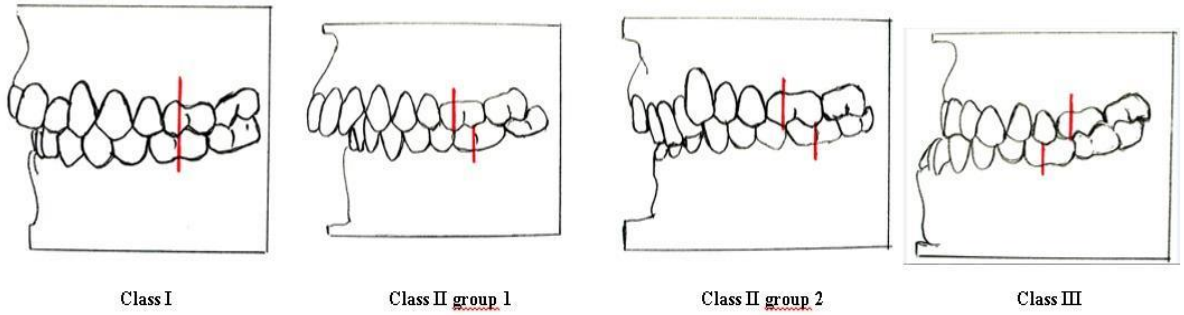

Figure 1. *Angle's classification*
Source: https://pl.wikipedia.org/wiki/Klasyfikacja_Angle'a 18.06.2020r. accessed at 21:42

The causes of stomatognathic system (SS) abnormalities can be divided into general ones, among which we distinguish genetic and environmental factors (e.g. temporomandibular joint dysfunction, breastfeeding) and topical (e.g. caries, injuries, oral parafunctions (such as bruxism) [5, 6, 7]. The aetiology of malocclusion is primarily genetic [8, 9,10]. Possible etiologies include genetic and environmental factors or a combination of both [11].
Orthognathic surgery is a process in which dentofacial deformities are corrected using the orthodontic treatments and facial surgery, sometimes in combination with various treatments of soft tissues [12, 13]. Orthognathic surgery is based on surgical repositioning of the skeletal components of the face to restore their normal anatomical and functional orientation in patients with dentofacial deformities [14].

Currently, the methods of malocclusion treatment include: Maxillary Lefort 1 Osteotomy, Bilateral Sagittal Split Osteotomy, surgeries involving the two aforementioned osteotomies, genioplasty and surgical maxillary expansion by opening of the midpalatal suture [15, 16]. Maxillary Lefort 1 Osteotomy is used in combination with Bilateral Sagittal Split Osteotomy (Bimaxillary Osteotomy) to correct sagittal discrepancies observed in asymmetric mandibular deformations. Maxillary Lefort 1 Osteotomy is a surgical procedure aimed at correcting dentofacial deformities involving the maxilla [17]. The Sagittal Split Osteotomy is a surgery used to correct facial deformations of the lower third of the face [18].

The main motives to undergo orthognathic surgery are the improvement of mandibular functions (including malocclusion, mastication, speech, respiratory function, sleep apnea) [19]. However, at each stage of dentofacial deformity treatment: 1) orthodontic surgery phase 2) surgical treatment phase 3) orthodontic correction phase, complications may occur [20]. Among the complications occurring during the orthodontic treatment phase, the most common are: gum recession, dental resorption and alveolar bone (Periodontal) changes [21, 22]. Surgical complications, such as incorrect realignment of the jaw line or damage to the inferior alveolar nerve may cause posterior complications and postoperative disorders [20]. Changes of temporomandibular joint position may affect the overall result of the surgery and well-being of patients [23]. The late complications and disorders after orthognathic surgeries include: hyposensitivity in the lower part of the face (inferior alveolar nerves, which supply sensation to the lower teeth), local inflammatory complications, gum recession, acoustic problems caused by the temporomandibular joint (TMJ) and deflection of the mandible. Occasionally, the upper respiratory tract may narrow [20, 24].

Aim

The aim of the paper was to assess the occurrence of late postoperative complications and dysfunction of the stomatognathic system in patients after orthognathic surgeries such as Maxillary Lefort 1 Osteotomy and Bilateral Sagittal Split Osteotomy (BIMAX). Additionally, the paper emphasizes the necessity of quick activation of the SS structures in patients after orthognathic surgeries in order to reduce the incidence of complications.

Material and methods

The research was conducted with the help of the users of internet groups: "Progenia, mandibular prognathism, photos BEFORE and AFTER the operation :)" and "Suffering from progenia" as well as users of the *Jawsurgeryforums.com* online forum who have given their informed consent to participate in the survey. The analysis was carried out on a group of 92 people who underwent orthognathic surgery of Maxillary Lefort 1 Osteotomy and Bilateral Sagittal Split Osteotomy (BIMAX) type in the years 2004 - 2019. To assess the opinions of patients, a diagnostic questionnaire method was used, based on a proprietary electronic questionnaire, which consisted of three parts. The first one is metric, i.e.: age, gender and questions concerning the number of orthognathic surgeries performed, time of using intermaxillary traction and postoperative rehabilitation. The second part of the questionnaire consisted of 15 close-ended questions assessing the occurrence of symptoms of SS disorders and functioning. The third part of the questionnaire consists of 20 questions concerning postoperative complications after 3 and 6 months from surgery and functioning of the dental

system after surgery. The fourth part of the questionnaire consists of 5 close-ended questions concerning the evaluation of the overall impression after surgery and the most important effects of it. Such a structure of the questionnaire made it possible to answer the hypothesis and solve research problems. The results collected in the empirical study were analyzed statistically using IBM SPSS Statistics v.25. Different statistical description techniques were used to describe the group and occurrence of complications at 3 time intervals. Pearson's chi-squared test was used to verify the assumptions about the differences in the frequency of the examined ailments. The statistical significance index was set at $p<0.05$.

Results

The study involved 92 people, of whom 86 women and 6 men. The percentage distribution by gender is shown in Figure 2.

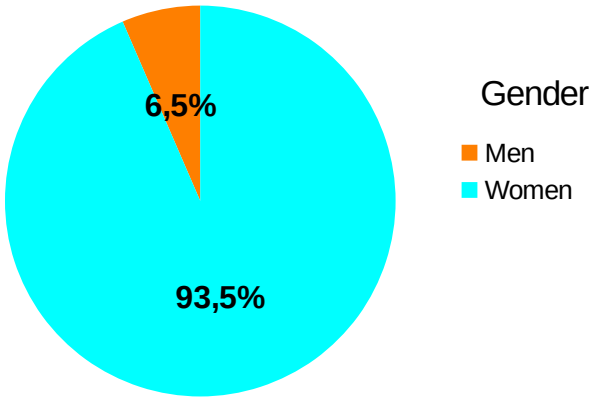

Figure 2. Gender ratio of the surveyed group.
Source: Own research.

The study participants were between 19 and 44 years old, the average age in the group was M = 28.54 years with standard deviation equal to SD = 5.53. Figure 3 shows the age distribution in the study group. It was quite similar to the normal distribution, typical for the general population-most people were of similar age to the average age of the group, and the youngest and the oldest groups of people were the smallest.

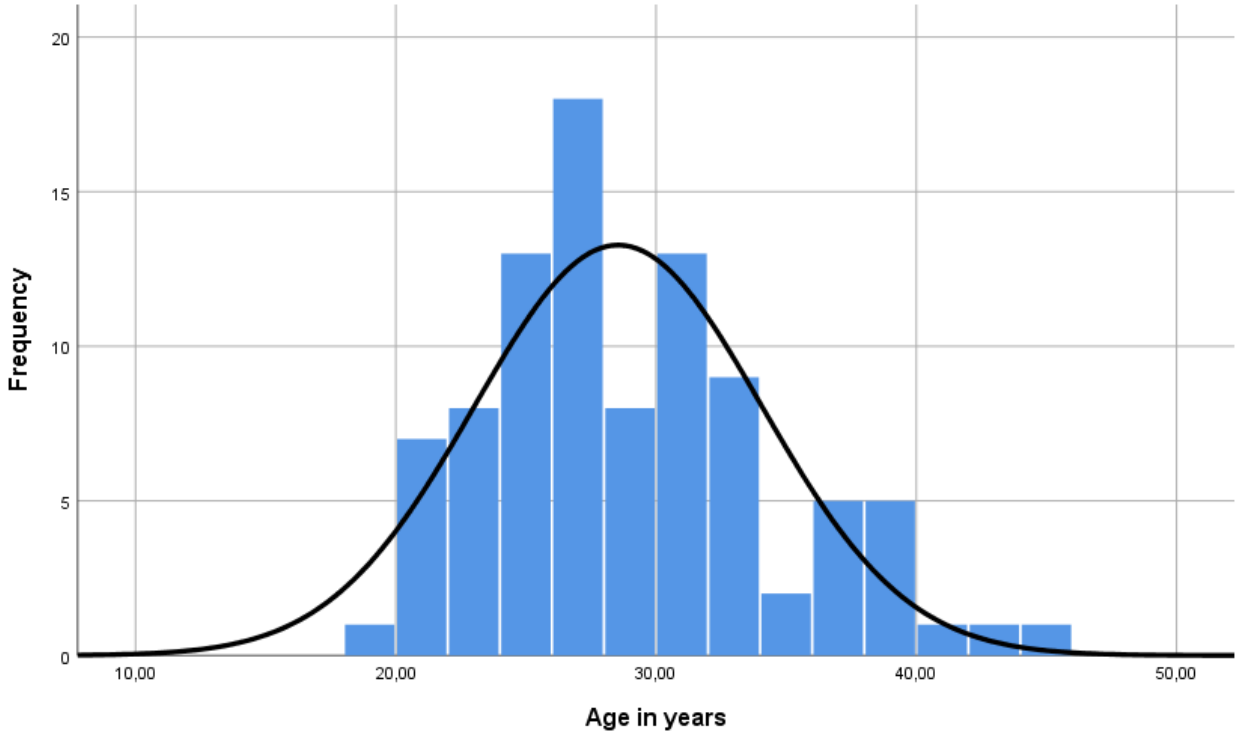

Figure 3. Age distribution of the surveyed group.
Source: Own research.

For more than ¾ of the examined group (n=70) it was the first surgery, for 19 people the second and for 3-the third. The percentage share of people undergoing surgery for the first and subsequent times is shown in Figure 4.

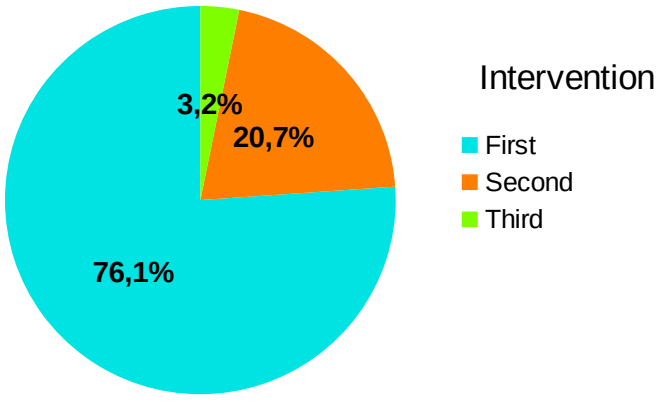

Figure 4. The number of treatments performed in the study group of the studied group
Source: Own research.

The intermaxillary traction wiring or splints were worn from 0 to 65 weeks after the surgery, on average 11.1 weeks (SD = 11.09). The distribution of the time of using intermaxillary traction in the study group is shown in Figure 5. 27.8% of the subjects (n=25) used intermaxillary traction for 6 weeks, 14.4% (n=13) for 4 weeks and 15.6% (n=14) for 8 weeks.

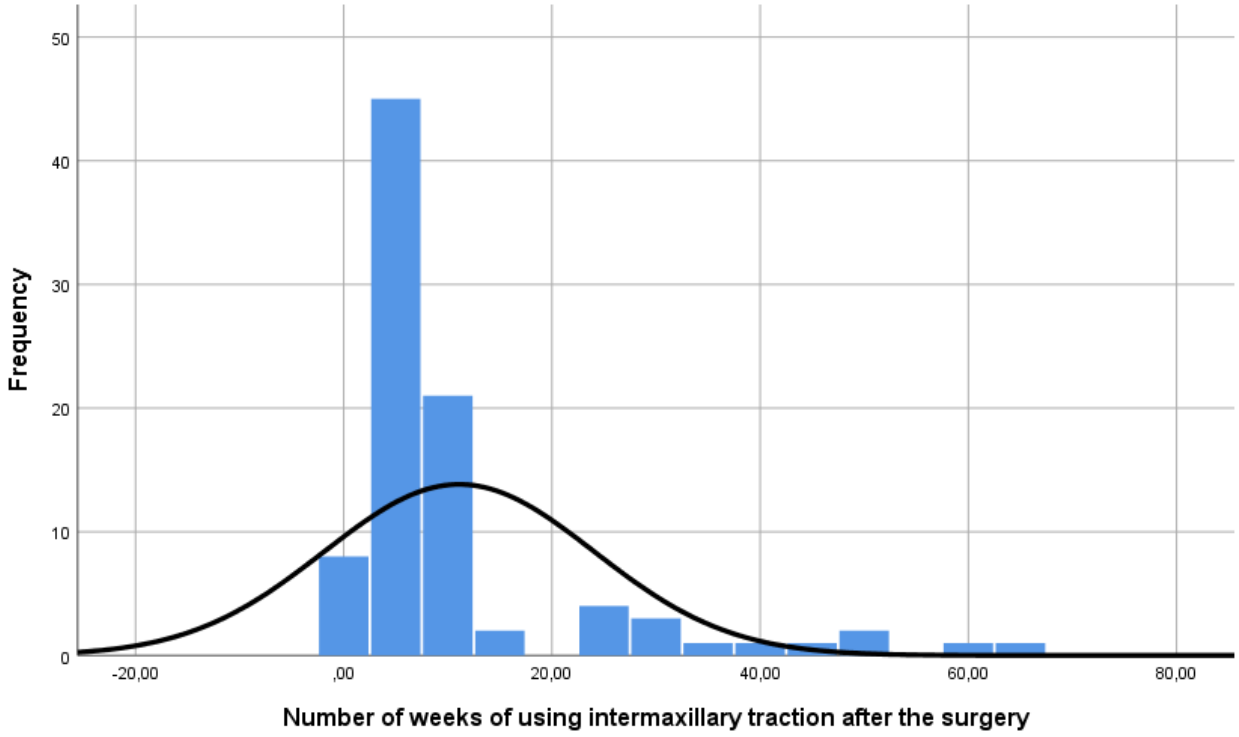

Figure 5. Distribution of the time of using intermaxillary traction after surgery in the studied group.
Source: Own research.

As can be seen in Figure 6, slightly more patients 52,2% (n=48) used physiotherapy after the surgery than did not 47,8% (n=44).

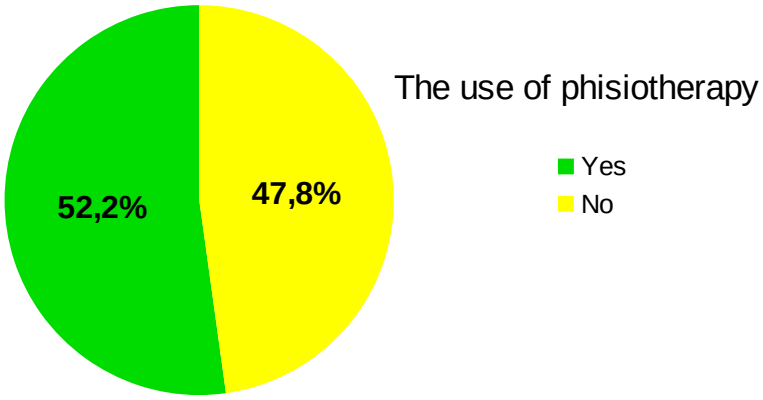

Figure 6. Characteristics of the examined group in terms of the use of physiotherapy after surgery.
Source: Own research.

Figure 7 contains information about the percentage of patients experiencing particular complications before and after surgery. Before the surgery the most frequent ailments-affecting more than half of the patients-were chewing impairments, speech defects, breathing problems and headaches.

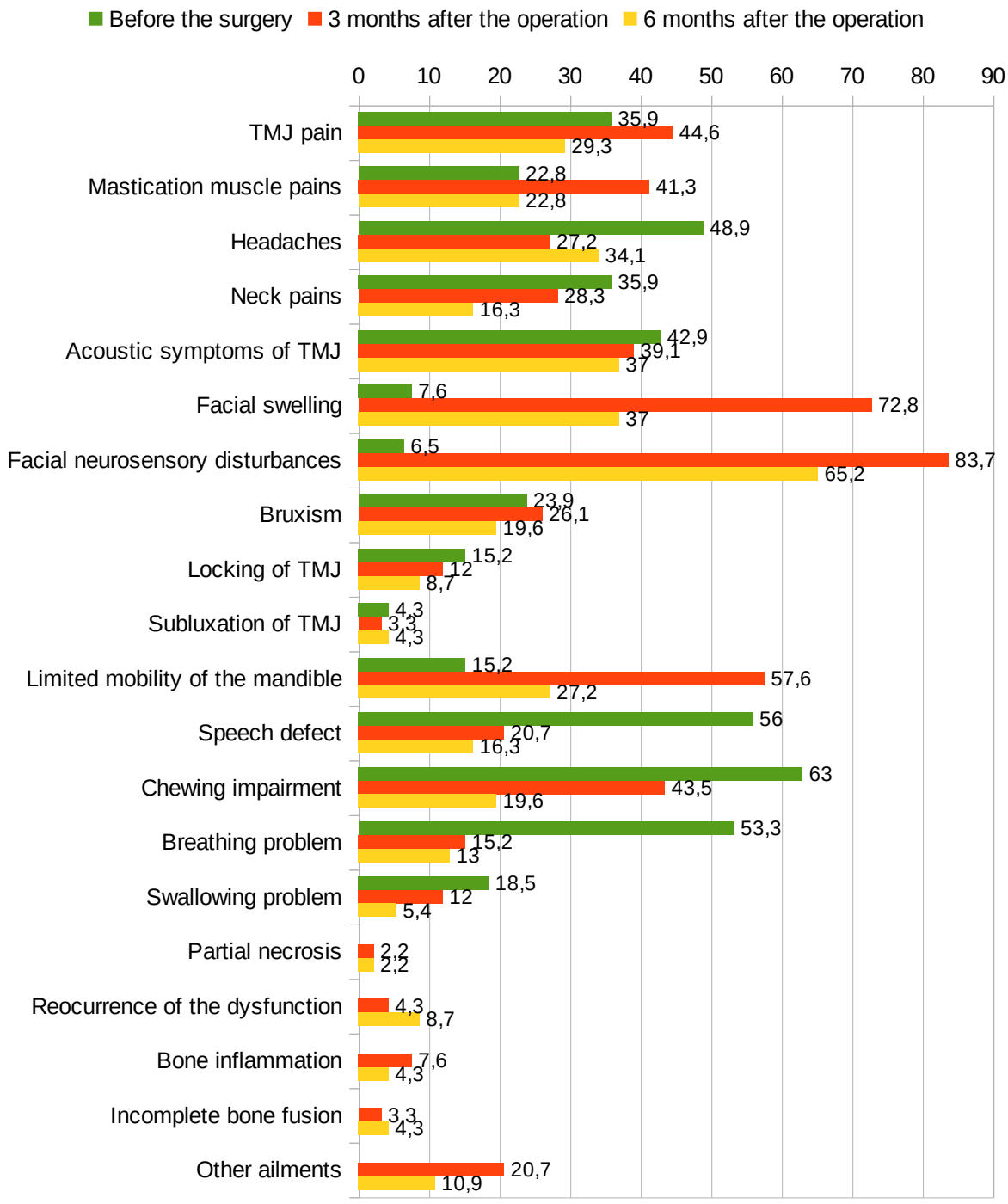

Figure 7. Percentage of people experiencing different complications before and after surgery.
Source: Own research.

3 months after the operation, facial neurosensory disturbances and facial swelling were the most frequent of the ailments reported by the patients (more than 70% of the respondents), limited jaw mobility, joint pains and chewing impairments were also frequent (more than 40%). 6 months after the surgery, the most frequent persisting ailments were facial sensation disorders (> 60%), facial swelling and acoustic traumas (> 30%), as well as pains of masticatory and mandibular muscles, headaches and limited joint mobility (> 20%).

Table 1 contains precise data on the number of people reporting particular complications and the results of comparison of their frequency in all 3 measurements. Almost in all cases the differences were statistically significant ($p<0.05$), no significant differences in the frequency of individual complications were observed only in relation to acoustic symptoms, the occurrence of bruxism, locking and subluxation of temporomandibular joints, as well as all complications occurring only after surgery ($p>0.05$).

Some of the ailments appeared more often 3 months after the surgery than right after it-the second measurement showed an increase in the frequency of patients complaining about joint pain, headache, facial swelling, facial neurosensory disturbances and temporomandibular joint mobility impairment, while the frequency of head and neck pain, acoustic symptoms, speech defects, chewing impairments and breathing problems decreased after the surgery.

On the other hand, comparing the measurement done 3 months with the measurement done 6 months after the surgery, a decrease in the frequency of all complications significantly differentiated by the time of measurement was observed. Compared to the situation before the surgery, only the observed frequency of facial swelling, facial neurosensory disturbances and temporomandibular joint mobility impairments increased 6 months after the surgery.

The analysis of Table 1 will provide more detailed data on the differences in the frequency of individual complications observed before, 3 months after, and 6 months after the surgery.

Table 1. Frequency of postoperative complications observed in three subsequent measurements.

Complication	**Complication frequency**; N (%)			chi-squared test		
	Before the surgery	3 months after the surgery	6 months after the surgery	X2	df	p
Pain in the temporomandibular joints	33 (35,9%)	41 (44,6%)	27 (29,3%)	4,622	2	0,069
Mastication muscle pains	21 (22,8%)	38 (41,3%)	21 (22,8%)	10,174	2	<0,001
Headaches	45 (48,9%)	25 (27,2%)	24 (26,1%)	13,584	2	0,001
Neck pains	33 (35,9%)	26 (28,3%)	15 (16,3%)	9,121	2	0,010
Acoustic symptoms of the temporomandibular joints	39 (42,9%)	36 (39,1%)	34 (37,0%)	0,681	2	0,712
Facial swelling	7 (7,6%)	67 (72,8%)	34 (37,0%)	82,417	2	<0,001
Facial neurosensory disturbances	6 (6,5%)	77 (83,7%)	60 (65,2%)	119,664	2	<0,001
Bruxism	22 (23,9%)	24 (26,1%)	18 (19,6%)	1,139	2	0,566
Locking of the temporomandibular joints	14 (15,2%)	11 (12,%)	8 (8,7%)	1,859	2	0,395
Subluxation of temporomandibular joints	4 (4,3%)	3 (3,3%)	4 (4,3%)	0,189	2	0,910
Limited mobility of the mandible	14 (15,2%)	53 (57,6%)	25 (27,2%)	39,554	2	<0,001
Speech defect	51 (55,4%)	19 (20,7%)	15 (16,3%)	40,642	2	<0,001
Chewing impairment	58 (63,0%)	40 (43,5%)	18 (19,6%)	35,809	2	<0,001
Breathing problem	49 (53,3%)	14 (15,2%)	12 (13,0%)	47,565	2	<0,001
Swallowing problem	17 (18,5%)	11 (12,0%)	5 (5,4%)	7,434	2	0,024
Partial necrosis	-	2 (2,2%)	2 (2,2%)	0,000	1	1,000
Reocurrence of the dysfunction	-	4 (4,3%)	8 (8,7%)	1,426	1	0,371
Bone inflammation	-	7 (7,6%)	4 (4,3%)	0,870	1	0,536
Incomplete bone fusion	-	3 (3,3%)	4 (4,3%)	0,149	1	0,700
Other ailments	-	19 (20,7%)	10 (10,9%)	3,316	1	0,052

Source: own research.

More than half of the patients (n=48) were satisfied with the surgery, and the second largest group were patients delighted with the result (n=25). 4 people were dissatisfied and 3 very dissatisfied. 12 patients had difficulties in determining their satisfaction with the results of the surgery. The percentage distribution of the respondents' satisfaction is shown in Figure 8.

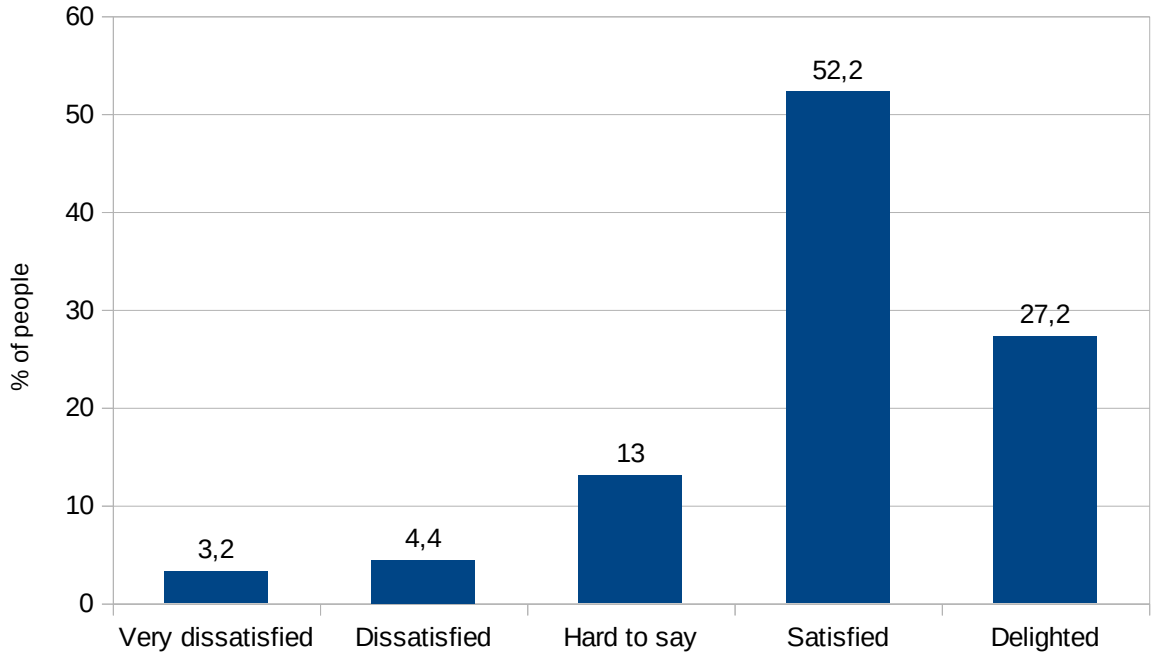

Figure 8. Percentage distribution of patients' satisfaction with the effects of the surgery.
Source: Own research.

A total of 79.4% of patients described themselves as either satisfied or very satisfied with the overall results of the surgery. Table 2 contains information about the satisfaction or lack of satisfaction with 3 selected aspects of the surgery. More than 82% of the patients were satisfied with the aesthetic and functional aspects of the surgery, while the satisfaction with the tooth positioning was expressed by just over 77% of the group.

Table 2. Satisfaction with various aspects of the surgery.

Assessment of the effects of the surgery	**Surgery satisfaction assessment**			
	YES		**NO**	
	N	%	N	%
Aesthetic aspect	76	82,6%	16	17,4%
Tooth placement	71	77,2%	21	22,8%
Functional aspect	76	82,6%	16	17,4%

Source: Own research.

19 people (20.7%) did not report neurosensory disturbances in any of the areas, and among patients experiencing neurosensory disturbances, 40 people (43.5%) reported problems in two, 27 people (29.3%) in one, 5 people (5.4%) in four and 1 person (1.1%) in three areas. Table 3 provides information on the incidence of neurosensory disturbances in specific areas. Figure 9 shows the location of the sensory disturbances. The highest number of patients indicated the lower level of the face, i.e. F (60.9%) and G (56.5%) as the area where neurosensory disturbances most frequently occur.

Table 3. Characteristics of the examined patients in terms of the incidence of sensory disturbances and their location.

Area of the neurosensory disturbance	n	% of the total of the group (N=92)	% of patients experiencing the disturbances (N=73)
none	19	20,7	-
B	6	6,5	8,2
C	4	4,4	5,5
D	1	1,1	1,4
E	6	6,5	8,2
F	56	60,9	76,7
G	52	56,5	71,2
H	4	4,4	5,5

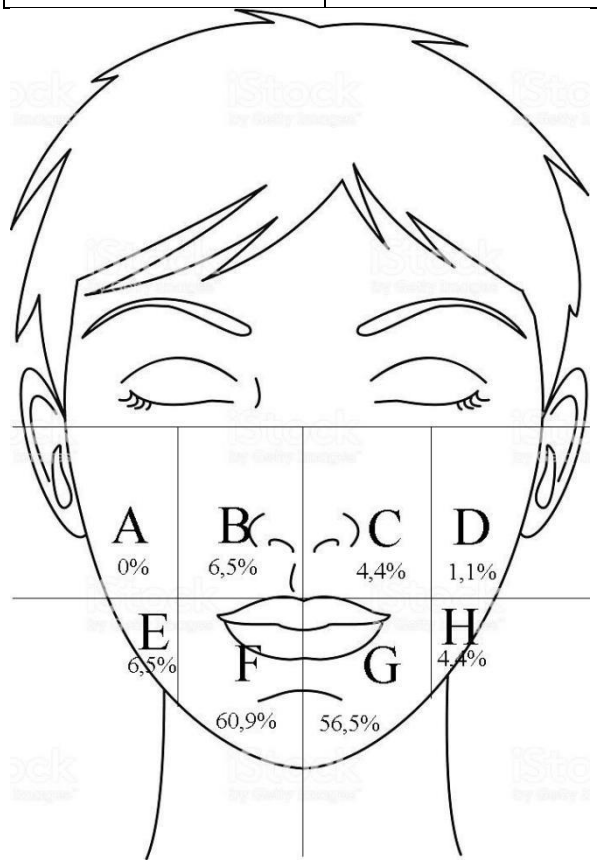

Figure 9. The occurrence of neurosensory disturbances in certain areas of the face
Source: Own research.

Table 4 presents information about the frequency of individual complications 3 months after surgery depending on the fact of using physiotherapist's help. Only in one case of comparison, the significance index reached the value below the threshold ($p<0.05$), which means that, 3 months after the surgery, the fact of using or not using physiotherapy mattered for only one complication. Patients not using physiotherapy were 11.5% more likely to suffer from bone inflammation [$X2(1)=4.359$; $p=0.037$].

Table 4. Comparison of the incidence of complications 3 months after surgery in relation to the fact of using physiotherapist's help.

Complications observed 3 months after the surgery	**Physiotherapist's help** N(%)		chi-squared test		
	YES, n=54	**NO**, n=48	X2	df	p
Pain in the TMJ	20 (41,7%)	21 (47,7%)	0,341	1	0,354
Mastication muscle pains	20 (41,7%)	18 (40,9%)	0,005	1	0,555
Headaches	16 (33,3%)	9 (20,5%)	1,924	1	0,241
Neck pains	16 (33,3%)	10 (22,7%)	1,274	1	0,354
Acoustic symptoms of TMJ	20 (41,7%)	16 (36,4%)	0,271	1	0,672
Facial swelling	32 (66,7%)	35 (79,5%)	1,924	1	0,241
Facial neurosensory disturbances	40 (83,3%)	37 (84,1%)	0,010	1	0,922
Bruxism	11 (22,9%)	13 (29,5%)	0,523	1	0,487
Locking of the TMJ	5 (10,4%)	6 (13,6%)	0,226	1	0,752
Subluxation of TMJ	2 (4,2%)	1 (2,3%)	0,261	1	0,609
Limited mobility of the mandible	25 (52,1%)	28 (63,6%)	1,255	1	0,296
Speech defect	7 (14,6%)	12 (27,3%)	2,256	1	0,197
Chewing impairment	19 (39,6%)	21 (47,7%)	0,620	1	0,529
Breathing problem	9 (18,8%)	5 (11,4%)	0,971	1	0,392
Swallowing problem	5 (10,4%)	6 (13,6%)	0,226	1	0,752
Partial necrosis	1 (2,1%)	1 (2,3%)	0,004	1	0,950
Reocurrence of the dysfunction	3 (6,3%)	1 (2,3%)	0,873	1	0,618
Bone inflammation	1 (2,1%)	6 (13,6%)	**4,359**	**1**	**0,037**
Incomplete bone fusion	2 (4,2%)	1 (2,3%)	0,261	1	0,609
Other ailments	9 (18,8%)	10 (22,7%)	0,222	1	0,638

Source: own research.

In the same way the frequency of complications occurred 6 months after the surgery was compared (third of the measures). As shown in Table 5, it turns out that none of the differences were statistically significant, however, two statistical tendencies were observed suggesting that people using physiotherapy were slightly less likely to experience reduced mandibular mobility [by 17.6%; X2(1)=3.599; p=0.065] and 4.7% less likely to experience bone inflammation [X2(1)=1.238; p=0.076].

Table 5. Comparison of the incidence of complications 6 months after the surgery depending on the fact of using physiotherapist's help.

Complications observed 6 months after the surgery	**Physiotherapist's help** N(%)		chi-squared test		
	YES, n=54	**NO**, n=48	X2	df	p
Pain in the TMJ	14 (29,2%)	13 (29,5%)	0,002	1	0,968
Mastication muscle pains	10 (20,8%)	11 (25,0%)	0,226	1	0,804
Headaches	15 (31,3%)	9 (20,5%)	1,388	1	0,342
Neck pains	9 (18,8%)	6 (13,6%)	0,440	1	0,580
Acoustic symptoms of TMJ	17 (35,4%)	17 (38,6%)	0,102	1	0,830
Facial swelling	15 (31,3%)	19 (43,2%)	1,403	1	0,283
Facial neurosensory disturbances	31 (64,6%)	29 (65,9%)	0,018	1	0,535
Bruxism	9 (18,8%)	9 (20,5%)	0,042	1	0,522
Locking of the TMJ	4 (8,3%)	4 (9,1%)	0,017	1	0,898
Subluxation of TMJ	2 (4,2%)	2 (4,5%)	0,008	1	0,658
Limited mobility of the mandible	9 (18,8%)	16 (36,4%)	**3,599**	**1**	**0,065**
Speech defect	5 (10,4%)	10 (22,7%)	2,550	1	0,158
Chewing impairment	8 (16,7%)	10 (22,7%)	0,536	1	0,600
Breathing problem	7 (14,6%)	5 (11,4%)	0,210	1	0,761
Swallowing problem	1 (2,1%)	4 (9,1%)	2,193	1	0,189
Partial necrosis	0 (0,0%)	2 (4,5%)	2,230	1	0,226
Reocurrence of the dysfunction	4 (8,3%)	4 (9,1%)	0,017	1	0,593
Bone inflammation	1 (2,1%)	3 (6,8%)	**1,238**	**1**	**0,076**
Incomplete bone fusion	2 (3,7%)	2 (4,2%)	0,014	1	0,904
Other ailments	11 (20,4%)	10 (20,8%)	0,003	1	0,954

Source: own research.

Discussion

There is little information in the relevant literature on the influence of orthognathic surgery on the functioning of the SS including temporomandibular joints. It is noteworthy that the relationship between orthognathic surgery and temporomandibular joints problems, as it is described by researchers, remains controversial. Several authors claim that as a result of such surgeries, the dysfunction of the masticatory organ may be alleviated whereas others argue that they may have an adverse effect on the temporomandibular joints [25, 26]. A study by Westmark et al. [27], in which 1516 patients participated, found the beneficial effects of orthognathic surgery on temporomandibular joints problems such as joint pain, joint noises, chewing impairments, or headaches. Prior to surgery, 43% of patients complained about temporomandibular joints problems, while after surgery, only 28% of patients indicated complications. Moreover, it was observed that the improvement in the temporomandibular joints condition was greater in patients who had undergone mandibular retraction surgery [27]. Orthognathic surgery may contribute to pain relief and functional improvement of temporomandibular joints [28]. In orthognathic surgeries, the most common complications in patients include: damage or disturbances of neural transmission (mainly lower alveolar, chin, facial), temporomandibular joint disorders, haemorrhage, incomplete bone fusion, partial necrosis, recurrence of dysfunctions and tooth damage [29]. During the mandibular sagittal osteotomy, it is particularly important to consider the incision of the lower branch of the trigeminal nerve. The damage to this nerve is responsible for hyposensitivity in the lower part of the face, which is considered the most troublesome ailment in patients after orthognathic surgeries. The remission of this loss of sensitivity takes over 6 months in younger patients and an even longer period in older patients [30]. Patients with dentofacial deformities often suffer from a feeling of inferiority due to their appearance, the position of their teeth, or functional problems, such as problems with chewing food. Therefore, it is necessary to take care of both functional and aesthetic improvement to ensure patient satisfaction and mental balance. Lee et al. studied the level of satisfaction after orthognathic surgery using questionnaires and Visual Analog Scale (VAS) designed by the author. The study included 46 patients with a total satisfaction level of 76%. There was a statistically significant difference between subjective evaluation of the aesthetic aspects of the face before and after the surgery ($p < 0.05$). In this study, the influence of the relationship between the surgeon and the patient was shown to help reduce the patient's anxiety and concerns related to surgery. The study also emphasized factors that increase subjective patient satisfaction with surgery results [31].

Conclusions

1. The most common after-surgical complication somatosensory system disturbances in the lower part of the face.
2. Orthognathic surgery contributes to the reduction of the stomatognathic system ailments.
3. People using physiotherapy less often suffer from bone inflammation and enjoy greater mobility of the temporomandibular joint.

Literature

1. Angle H.: Classification of malocclusion. Dent Cosmos 1899, 41, 248-264.
2. Karłowska I.: Klasyfikacja stosunków zębowo-zgryzowo-szkieletowych. W: Karłowska I.: Zarys współczesnej ortodoncji. Podręcznik dla studentów i lekarzy dentystów. Wydanie IV. Warszawa. Wydawnictwo Lekarskie PZWL, 2016 s. 159-162
3. Gilon Y., Raskin S.: A propos de chirurgie orthognathique : ce que tout bon dentiste doit savoir. Le point, 2001, 154, 27-30.
4. Alhammadi M.S., Halboub E., Fayed M.S., Labib A., El-Saaidi C.:Global distribution of malocclusion traits: A systematic review. Dental Press J Orthod. 2018 Nov-Dec;23(6):40
5. Wędrychowska-Szulc B.: Etiologia wad zgryzu. W: Karłowska I.: Zarys współczesnej ortodoncji. Podręcznik dla studentów i lekarzy dentystów. Wydanie IV. Warszawa. Wydawnictwo Lekarskie PZWL, 2016 s. 41-52.
6. Perrotta S., Bucci R., Simeon V., Martina S., Michelotti A., Valletta R.: Prevalence of malocclusion, oral parafunctions and temporomandibular disorder-pain in Italian schoolchildren: An epidemiological study. J Oral Rehabil. 2019 Jul;46(7):611-616.
7. Peres K.G., Cascaes A.M., Peres M.A., Demarco F.F., Santos I.S., Matijasevich A., et al.: Exclusive Breastfeeding and Risk of Dental Malocclusion. Pediatrics. 2015 Jul;136(1):e60-7.
8. Zebrick B., Teeramongkolgul T., Nicot R., Horton M.J., Raoul G., Ferri J., et al.: ACTN3 R577X genotypes associated with Class II and deep bite malocclusions. Am J Orthod Dentofacial Orthop. 2014 Nov;146(5):603-11.
9. Huh A., Horton M.J., Cuenco K.T., Raoul G., Rowlerson A.M., Ferri J., et al.: Epigenetic influence of KAT6B and HDAC4 in the development of skeletal malocclusion. Am J Orthod Dentofacial Orthop. 2013 Oct;144(4):568-76.
10. Doraczynska-Kowalik A., Nelke K.H., Pawlak W., Sąsiadek M.M., Gerber H.: Genetic Factors Involved in Mandibular Prognathism. J Craniofac Surg. 2017 Jul;28(5):e422-e431.
11. Genno P.G., Nemer G.M., Zein Eddine S.B., Macari A.T., Ghafari J.G.: Three novel genes tied to mandibular prognathism in eastern Mediterranean families. Am J Orthod Dentofacial Orthop. 2019 Jul;156(1):104-112.
12. Doniec-Zawidzka I.: Współpraca z chirurgiem szczękowym. W: Karłowska I.: Zarys współczesnej ortodoncji. Podręcznik dla studentów i lekarzy dentystów. Wyd. IV. Warszawa. Wydawnictwo Lekarskie PZWL, 2016 s. 334.
13. Zapała J., Wyszyńska-Pawelec G., Szyper-Szczurowska J., Szczurowski P.: Skojarzone leczenie ortodontyczno-chirurgiczne na podstawie wybranych przypadków. W.: Gedrange T., Zapała J., Dominiak M.: Chirurgia ortognatyczna. Wyd. 1. Wrocław. Edra Urban & Partner Wydawnictwo, 2018 s. 308-314.
14. Patel P.K., Novia M.V.: The surgical tools: the LeFort I, bilateral sagittal split osteotomy of the mandible, and the osseous genioplasty. Clin Plast Surg. 2007 Jul;34(3):447-75.
15. Naran S., Steinbacher D.M., Taylor J.A.: Current Concepts in Orthognathic Surgery. Plast Reconstr Surg. 2018 Jun;141(6):925e-936e.
16. Eslamipour F., Borzabadi-Farahani A., Le B.T., Shahmoradi M.: A Retrospective Analysis of Dentofacial Deformities and Orthognathic Surgeries. Ann Maxillofac Surg. 2017 Jan-Jun;7(1):73-77.
17. Buchanan E.P., Hyman C.H.: LeFort I Osteotomy Semin Plast Surg. 2013 Aug; 27(3): 149–154.
18. Mont'Alverne A.L.F., Xavier F.G., Meneses A.M., Santos E.S., Franco J.M.P.L.: Is Bilateral Sagittal Split Osteotomy of the Mandible With no Step Possible? A Modification in the Technique. J Craniofac Surg. 2019 Oct;30(7):2275-2276.

19. Te Veldhuis E.C., Te Veldhuis A.H., Bramer W.M., Wolvius E.B., Koudstaal M.J.: The effect of orthognathic surgery on the temporomandibular joint and oral function: a systematic review. Int J Oral Maxillofac Surg. 2017 May;46(5).
20. Gedrange T.: Powikłania i zagrożenia w leczeniu ortodontycznym. W.: Gedrange T., Zapała J., Dominiak M.: Chirurgia ortognatyczna. Wyd. 1. Wrocław. Edra Urban & Partner Wydawnictwo, 2018 s.274-280.
21. Lee Y.J., Lee T.Y.: External root resorption during orthodontic treatment in root-filled teeth and contralateral teeth with vital pulp: A clinical study of contributing factors. Am J Orthod Dentofacial Orthop. 2016 Jan;149(1):84-91.
22. Straub B., Bouletreau P., Breton P.: Periodontal management in orthognathic surgery: early screening of periodontal risk and its current management for the optimization of orthodontic and surgical treatments. Rev Stomatol Chir Maxillofac Chir Orale. 2014 Sep;115(4):208-18.
23. Holzinger D., Willinger K., Millesi G., Schicho K., Breuss E., Wagner F. et al.: Changes of temporomandibular joint position after surgery first orthognathic treatment concept. Sci Rep. 2019 Feb 18;9(1):2206.
24. Nicot R., Vieira A.R., Raoul G., Delmotte C., Duhamel A., Ferri J.et al.: ENPP1 and ESR1 genotypes influence temporomandibular disorders development and surgical treatment response in dentofacial deformities. J Craniomaxillofac Surg. 2016 Sep;44(9):1226-37.
25. Dujoncquoy J.P., Ferri J., Raoul G., Kleinheinz J.: Temporomandibular joint dysfunction and orthognathic surgery: a retrospective study. Head Face Med 2010, 6:27., 38.
26. Bays R.A., Bouloux G.F.: Complications of orthognathic surgery. Oral Maxillofac Surg Clin North Am 2003, 15:229-42.
27. Westermark A., Shayeghi F., Thor A.: Temporomandibular Dysfunction in 1,516 Patients Before and After Orthognathic Surgery. Int J Adult Orthodon Orthognath Surg. 2001;16(2):145-51.
28. Panula K., Somppi M., Finne K., Oikarinen K.: Effects of Orthognathic Surgery on Temporomandibular Joint Dysfunction. A Controlled Prospective 4-year Follow-Up Study. Int J Oral Maxillofac Surg. 2000 Jun;29(3):183-7.
29. Kim YK.: Complications associated with orthognathic surgery. J Korean Assoc Oral Maxilofac Surg, 2017,43;3-15.
30. Semper-Hogg W., Fuessinger M.A., Dirlewanger T.W., Cornelius C.P., Metzger M.C.: The influence of dexamethasone on postoperative swelling and somatosensory system disturbances after orthognathic surgery: a randomized controlled clinical trial. Head Face Med. 2017 Nov 7;13(1):19.
31. Lee J.Y., Kim Y.K., Yun P.Y.: Evaluation of the patients' subjective satisfaction about the orthognathic surgery. J Korean Assoc Oral Maxillofac Surg. 2009;35:94–100.