

Clinical Paper
Orthognathic Surgery

Patient expectations and satisfaction following orthognathic surgery

**N. Al-Hadi¹, S. Chegini¹,
M. E. Klontzas^{1,2}, J. McKenny¹,
M. Heliotis^{1,2}**

¹Regional North West London Maxillofacial Unit, London North West University Healthcare NHS Trust, Northwick Park Hospital, Harrow, London, UK; ²Imperial College London, London, UK

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Abstract. Orthognathic surgery aims to correct dentoskeletal and facial discrepancies. Treatment usually requires a minimum of 18 months, necessitating that patients are adequately satisfied with the treatment provided. This study aimed to assess the determinants of patient satisfaction following treatment. One hundred and eighteen patients who had undergone orthognathic surgery were included prospectively. All participants completed a questionnaire regarding their reasons for undergoing treatment, treatment logistics, treatment outcomes, and satisfaction throughout their journey. Most patients were ‘very satisfied’ (71.2%) or ‘satisfied’ (19.5%) with the overall treatment. The majority wished to improve their smile (78.0%); post-treatment, 89.0% of patients reported an improved smile. Almost half of the patients (46.6%) stayed in hospital for only one night, and 41.5% took over 4 weeks off work or school post-surgery. People with postoperative breathing difficulties spent more days in hospital ($P = 0.021$), but importantly, the duration of hospital stay did not differ between maxillary advancement, bilateral sagittal split osteotomy, and bimaxillary surgery ($P = 0.78$). In conclusion, patient satisfaction was high following orthognathic treatment. The results highlight areas for improvement, such as information delivery to the patient throughout the treatment journey, and show that the presence of ongoing problems is an important predictor of patient satisfaction.

Key words: orthognathic surgery; patient satisfaction; osteotomy; maxillary; mandibular; sagittal split.

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Orthognathic surgery involves a wide range of different procedures designed to correct dental, skeletal, and facial discrepancies. Such procedures can improve musculoskeletal function whilst also improving quality of life and psychosocial well-being^{1,2}. The treatment requires a multidisciplinary approach involving

orthodontists and maxillofacial surgeons, as well as nurses, dieticians, and in some cases psychiatrists. Most commonly, orthognathic surgery is performed in combination with orthodontic fixed appliances to rectify malocclusion and address facial harmony and aesthetics. Between April 1997 and March 2006, 8941 mandibular

orthognathic operations were performed in England³.

Orthognathic surgery has an important psychological impact on the patient. Indeed, whilst patients are highly motivated, they unanimously find the immediate, early, and later phases of recovery confusing, frightening, and disorientating. As a

result, they can find difficulty in psychologically adapting to their new image and require a robust social support system to maintain their psychological well-being⁴. It is thus highly important that patients are counselled and fully informed throughout the course of their treatment. The time-scale from initial consideration of treatment to having the actual surgery can often be 18 months or more, with fixed orthodontic appliances being worn prior to the surgery. Post orthognathic surgery patients typically undergo several additional months of orthodontic fixed appliance therapy to fine tune their dental alignment. In the authors' unit, patients are then followed up in joint clinics involving both the orthodontists and the maxillofacial team for between 3 and 5 years post completion of treatment. It is thus clear that patients who embark on this journey must be very committed and their satisfaction would be an essential goal of treatment.

The aim of this study was to assess patient satisfaction following orthognathic surgery in a multitude of areas covering their entire treatment journey. It was also sought to understand why patients choose to undergo orthognathic surgery, assess satisfaction after treatment (provided that expectations were met), and enhance the information given to patients prior to surgery.

Patients and methods

A sample of 118 patients who had undergone orthognathic surgery at the university-affiliated Northwick Park Hospital within the last 5 years was collected prospectively. All forms were confidential. All patients questioned had undergone maxillary advancement, bilateral sagittal split osteotomy (BSSO), or bimaxillary surgery in the same centre under one oral and maxillofacial surgeon. The orthodontic treatment was conducted in the orthodontic units of three hospitals within North

West London and patients were monitored by their respective orthognathic multidisciplinary team (MDT), which included the orthodontic consultants serving these hospitals and the operating maxillofacial surgeon. This study was conducted in accordance with the Declaration of Helsinki; patient consent was not required.

Starting in July 2016, patient satisfaction questionnaires were handed out in person to consecutive patients attending the joint oral and maxillofacial surgery (OMFS)-orthodontic MDT clinics who were at least 6 months post-surgery (mean 23.84 ± 15.7 months). This removed the need for randomization, as all patients who fulfilled these criteria were asked to be involved. Forms were handed out and completed between July 2016 and July 2017. All questionnaires were completed and returned to the OMFS-orthodontic MDT clinic staff.

The patient satisfaction questionnaire included 91 questions compiled into eight sections, collecting both quantitative and qualitative responses (**Supplementary Material**, File 1). This in-house questionnaire asked about the four sections of the patient's journey: initial consultation, orthodontic treatment, surgery, and post treatment outcomes and experiences. There were also questions linked to post-operative complications, length of hospital stay, and re-admittance for a second operation. In cases of questionnaires with incomplete sections, the respective patient was not included in the total count of patient analyses for these specific questions.

Statistical analyses were performed using IBM SPSS Statistics version 24.0 (IBM Corp., Armonk, NY, USA). For statistical purposes, satisfaction scores were dichotomized into 'satisfied' (score of 1 on a scale of 1–5) and 'not satisfied' (score of 2–5 on the satisfaction scale). Fisher's exact test and the non-parametric Mann-Whitney *U*-test and Kruskal-Wallis with Dunn's post-hoc tests were

utilized to assess the significance of quantitative variable relationships. Significance levels were set at a *P*-value of <0.05 .

Results

The data from the 118 completed forms were subdivided into the following sections for analysis: logistics, reasons for undergoing treatment, information provided to the patients, post-surgical complications, and satisfaction. The results are outlined below.

Logistics

Of the 118 study patients, 65 (55.1%) had undergone bimaxillary osteotomies, 28 (23.7%) had undergone BSSO of the mandible, and 18 (15.3%) had undergone maxillary advancement. No patient had received surgery solely to their chin; however, when asked, six patients (5.1%) stated having both their jaw and chin moved.

Most patients were initially made aware of orthognathic treatment by their dentist (62.7%) and/or their orthodontist (61.0%). Only 3.4% of patients said their doctor had informed them of this option, and 9.3% said they knew someone who had had this treatment. Most referrals to the hospital were made by the patient's dentist (64.4%), followed by their orthodontist (39.0%) and their doctor (4.2%).

Table 1 shows answers relating to days spent in hospital and days taken off work/school. The majority of patients (53.4%) were told they would stay for one night and 46.6% of them did. Forty-nine patients (41.5%) took over 29 days off work and 25 (21.2%) took between 8 and 14 days off. The majority of patient's partners/parents did not take time off work (62.7%); however of those that did, most took between 1 and 7 days off (21.2%). No significance difference in average hospital stay was found between the patients undergoing maxillary advancements (mean 2.06 days,

Table 1. Answers related to days spent in hospital and taken off work/school^a.

	0	1	2	3	4+	Blank
How many days were you told to stay in hospital?	0	53.4%	29.7%	7.6%	6.8%	2.5%
How many days did you actually stay in hospital?	0	1	2	3	4+	Blank
	0	46.6%	28.8%	11.9%	8.5%	4.2%
How many days were you advised to take off work/school?	0–7	8–14	15–21	22–28	29+	Blank
	5.1%	29.7%	11.0%	9.3%	37.3%	7.6%
How many days did you actually take off?	0–7	8–14	15–21	22–28	29+	Blank
	7.6%	21.2%	13.6%	6.8%	41.5%	9.3%
Did your parents/partner take time off?	Yes	No	Blank			
	36.4%	62.7%	0.8%			
If 'yes', how many days off?	1–7	8–14	15–21	22+	Blank	
	21.2%	8.5%	2.5%	1.7%	66.1%	

^a Data are expressed as the percentage (%) of patients selecting an answer.

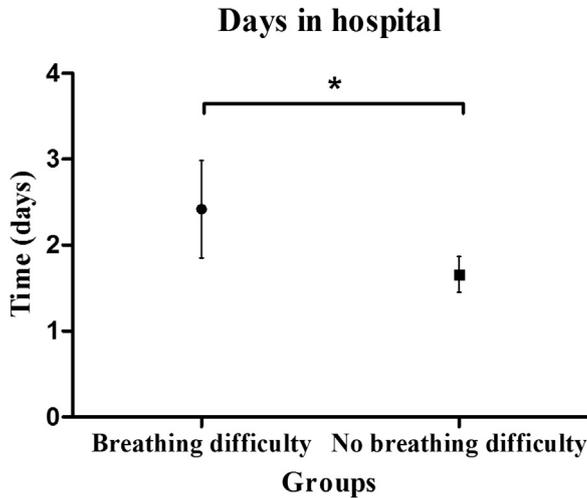


Fig. 1. Days in hospital for patients reporting breathing difficulties. Values represent the mean and the 95% confidence interval; * $P < 0.05$.

95% confidence interval (CI) 1.2–2.9 days), bimaxillary osteotomies (mean 1.93 days, 95% CI 1.6–2.3 days), and mandibular BSSO (mean 1.78 days, 95% CI 1.5–2.1 days) ($P = 0.78$). However, patients reporting breathing difficulties in the immediate postoperative period spent a significantly longer time in the hospital (mean 2.41 days, 95% CI 1.85–2.99 days) than those without any breathing difficulty (mean 1.66 days, 95% CI 1.45–1.86 days) ($P = 0.021$) (Fig. 1). In terms of rescheduling operations, 24.6% of patients reported their operation date being rescheduled. Out of these rescheduled operations, 69.0% were rescheduled by the hospital, with the reason stated

including junior doctor strikes or lack of beds; 31.0% were rescheduled by the patient, with the reason stated including feeling unwell, being nervous on the day, or falling pregnant.

Reasons for undergoing treatment

Close to two-thirds (64.4%) of the patients reported that their parents/partners were involved in their decision-making process prior to embarking on treatment. Sixty-seven patients (56.8%) reported difficulty eating prior to the operation. Of the total 118 patients, 49 (41.5%) stated that apples were difficult to eat, 38 (32.2%) that crusty bread was difficult, 35 (29.7%) that meat

was difficult, and 33 (28.0%) that sandwiches were difficult. Qualitative patient comments regarding the reasons for treatment included worries regarding personal appearance (Fig. 2a).

Information provided to the patients

Patients reported being given information relating to wearing braces (96.6%), the duration of treatment (83.1%), wearing retainers (79.7%), the complications of treatment (92.4%), and the surgery (94.1%). On a scale of 1 to 5 (1 being very informed) with regards to the outcome of their treatment, 63.6% of patients gave a response of ‘1’ indicating that they felt very informed and 22.9% gave a response of ‘2’ or ‘3’ indicating that they felt informed. All but four patients (3.4%) said they were given information leaflets, and 79.8% (91/114) of these patients found the leaflets to be helpful.

Post-surgical complications

In terms of pain, 66.9% of patients experienced as much pain or less than they had expected and all but seven patients (5.9%) continued to feel pain after they had left the hospital. For almost half of the patients (49.2%) the pain lasted as long as they expected; 30.5% reported that the pain lasted longer than they expected. Detailed information on the responses to the pain-related questions can be found in Table 2.

Of the 118 study patients, 79 (66.9%) reported having no difficulty breathing

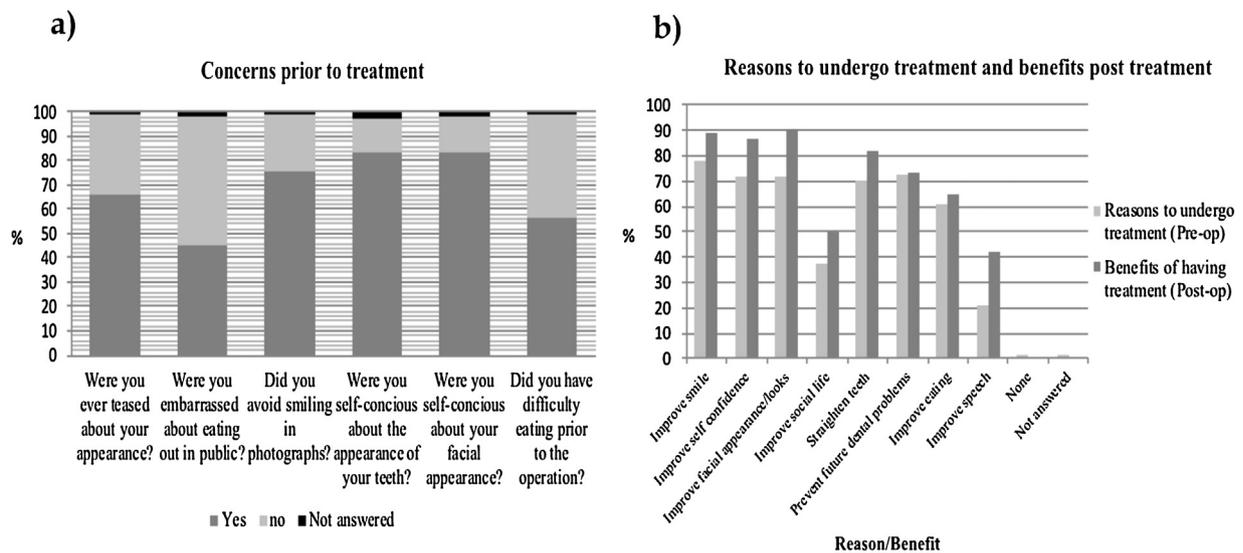


Fig. 2. Patient concerns and expectations prior to and after treatment. (a) Patient concerns prior to treatment. (b) Reasons for undergoing treatment and benefits post treatment.

Table 2. Questions related to pain^a.

How much pain did you have immediately after the surgery?	(None) 1	2	3	4	(Worst) 5	Blank
	7.6%	20.3%	28.0%	27.1%	14.4%	2.5%
What was the pain in comparison to your expectation?	Worse	As	Less	Blank		
	24.6%	36.4%	30.5%	8.5%		
How effective were the painkillers given in hospital?	(Very) 1	2	3	4	(Not) 5	Blank
	31.4%	36.4%	13.6%	11.9%	0.8%	5.9%
What form were the painkillers given during your hospital stay?	Tablet	Liquid	Drip	Injection	Blank	
	62.7%	51.7%	21.2%	25.4%	3.4%	
Did you have pain at home after surgery?	(None) 1	2	3	4	(Worst) 5	Blank
	5.9%	16.1%	33.1%	28.0%	16.9%	0
How long did the pain last compared to your expectation?	Less	As	Longer	Blank		
	16.9%	49.2%	30.5%	3.4%		
Were the painkillers given to take home strong enough?	Yes	No	Blank			
	83.1%	14.4%	2.5%			
What form of painkillers were you given to take home?	Tablet	Liquid	Both T + L	Blank		
	59.3%	17.8%	13.6%	9.3%		

^aData are expressed as the percentage (%) of patients selecting an answer.

after the operation. Of the 39 patients (33.1%) that did, 23 (59.0%) stated that it was worse than they had expected and 16 (41.0%) felt it was just as they had expected.

With regard to speech, 75.4% of patients had difficulty talking immediately after the surgery. Speech was reported to be just as they had expected by 42.4%, to be worse than expected by 29.6%, and to be better than expected by 13.6%.

Bruising after the surgery was reported by 74.6% of the patients ($n = 88$), with 35.6% stating that this was just as expected, 19.5% as better than expected, and 19.5% as worse than expected. Swelling after the surgery was reported by 98.3% of patients ($n = 116$), with 41.5% rating it worse than expected, 41.5% just as expected, and 6.8% less than expected.

The facial areas that were most commonly numb following treatment were the lip (64.4%) and chin (58.5%). However at the time of completing the form, 58.5% of patients did not have any residual numbness (Table 3).

Satisfaction

The time it took to recover post-surgery was reported to be shorter than expected

by 16.1%, as expected by 44.1%, and longer than expected by 39.0% of the patients sampled. Other questions measuring satisfaction on a 5-point scale included whether the patient felt that the specialists had listened to their opinions: 63.6% scored 1 (strongly agree) and 20.3% scored 2 (agree). Furthermore, 72.0% said they strongly agreed that the treatment was explained with clarity. Three quarters of the patients (75.4%) were highly satisfied with their braces and surgery (**Supplementary Material**, File 2). Overall, 71.2% were highly satisfied with the outcome of the entire treatment (score 1) and 19.5% were satisfied (score 2). Patient satisfaction with their surgeon was not related to any possible cancellations ($P = 1$). The majority of patients (90.7%) were highly satisfied with the surgeon (score 1 or 2) (Table 4). However, the presence of an ongoing problem at the time of sampling was significantly associated with overall satisfaction, with people without any ongoing problem being significantly more satisfied ($P = 0.049$).

Furthermore, 50.0% found that the food offered on the ward was appropriate 'most of the time', 16.1% 'sometimes', and 9.3% 'none of the time'. This shows that the majority of the patients were also satisfied

with fine details of their treatment journey such as the food provided. Importantly, 78.0% of patients stated that they wanted to improve their smile as a reason for undergoing treatment and 89.0% found that they had an improved smile following treatment (Fig. 2b). For all qualitative and quantitative responses, please see the **Supplementary Material** (File 2 and Table S1).

Discussion

In light of the rising pressures on the National Health Service (NHS) in the UK and in order to address the Five Year Forward View, it is clear that patient-reported outcome measures (PROMs) and patient-reported experience measures (PREMs) will represent a fundamental part of service delivery going forward^{5,6}. By conducting this project, areas that need to be improved in the orthognathic surgery treatment pathway can be appreciated. The findings can be used to develop specific outcome and experience measures that will enhance treatment provision, guide future care, enhance informed consent, and allow adjustments to current practice.

Table 3. Questions related to numbness^a.

Any numbness on your face after surgery?	Yes	No	Blank		
	88.1%	8.5%	3.4%		
Which areas (shade on diagram)?	Chin	Lip	Cheek	Nose	Blank
	58.5%	64.4%	33.1%	9.3%	14.4%
How did this compare to your expectation of numbness?	Worse	As	Less	Blank	
	26.3%	48.3%	11.9%	13.6%	
Did you expect your face to be numb?	Yes	No	Blank		
	88.1%	11.0%	0.8%		
Did you expect your lip to be numb?	Yes	No	Blank		
	81.4%	17.8%	0.8%		
Any residual numbness in these areas at the time of completing the form?	Lip	Chin	Cheek	Nose	Blank
	32.2%	20.3%	4.2%	1.7%	58.5%

^aData are expressed as the percentage (%) of patients selecting an answer.

Table 4. Answers to questions regarding satisfaction with hospital staff^a.

Satisfaction with:	Satisfaction level					Blank
	1 (Very)	2	3	4	5 (None)	
Joint clinics	61.9%	19.5%	7.6%	3.4%	7.6%	0
Pre-assessment clinics	61.9%	19.5%	6.8%	3.4%	8.5%	0
Surgeon	80.5%	10.2%	3.4%	4.2%	0.8%	0.8%
Orthodontist	82.2%	12.7%	2.5%	0.8%	0.8%	0.8%
Junior doctors	69.5%	16.1%	11.0%	1.7%	0	1.7%
Clerical and admin staff	63.6%	22.0%	9.3%	4.2%	0	0.8%
Nurses on HDU	66.9%	18.6%	5.9%	4.2%	1.7%	2.5%
Nurses on the ward	59.3%	22.9%	9.3%	4.2%	3.4%	0.8%
Anaesthetist	77.1%	16.9%	3.4%	0.8%	0.8%	0.8%
Dietician	62.7%	17.8%	9.3%	1.7%	2.5%	5.9%
Overall satisfaction of partner/parent	69.5%	18.6%	6.8%	0.8%	1.7%	2.5%

HDU, high dependency unit.

^aData are the percentage of patients.

PROMs have been developed for varicose vein, hernia repair, and hip and knee replacement surgery. These are elective procedures with constant threat from NHS funding bodies. PROMS were assessed by the London School of Tropical Medicine and it was found that these operations should continue to be provided within the NHS due to the great impact they have on patient quality of life⁷. Whilst multiple quality of life and patient satisfaction surveys have been developed, there are few specific to orthognathic surgery. The Orthognathic Quality of Life Questionnaire (OQOL) is a validated instrument. However, in contrast to the questionnaire used in the present study, it only examines the patient's perception of facial aesthetics and oral function. It does not ask other procedure-specific questions such as on numbness, pain, and swelling, or the patient's reported experience with their treatment pathway⁸.

The results presented in this article could have many useful implications for future clinical care. The current literature does not appear to include such a comprehensive analysis of patient thoughts throughout the entire journey of orthognathic surgery. The data presented here therefore give a clearer insight into many different aspects of the patient's experience before, during, and after their surgery. This can be generalized to other units and could prompt the adoption of a similar comprehensive survey to be used in other regions.

One of the benefits of collecting this information is that the data will be made readily available on the hospital's website for patients and staff who are interested in identifying certain areas that they may be concerned with. Patients in particular can be directed to this website to learn further information directly from other patients,

which in turn could aid in shared decision-making. Most importantly, these publicly available data can be provided to patients as part of the consent process before surgery. Apart from disclosing complications, informed consent in orthognathic surgery should also include information regarding treatment satisfaction and should ideally be provided both verbally and in writing. Therefore, the information provided in this study could be shared with patients to enhance information delivery prior to surgery⁹. Finally, the results could be used to guide direct hospital improvements with regard to preoperative, perioperative, operative, and postoperative care.

An improvement that can be made going forward is the development of an 'orthognathic treatment pack' to include information on all relevant areas of the treatment, based on yearly contemporaneous updates of the information booklets handed out to patients based on these audited data (<http://www.lnwh.nhs.uk/services/a-z-services/m/maxillofacial-and-oral-surgery/>). The results found that only 79.7% of patients felt they were given information on retainers and only 83.1% on the duration of the treatment. Thus having a specifically designed pack that includes all of this information as well as a link to access the findings from this project could be beneficial for patients embarking on this treatment in the future. Importantly, patient answers to the questionnaire may be strongly affected by the quality of the information provided throughout the process, highlighting the need for such a treatment pack.

An interesting area of data collection was that related to the duration of hospital stay following surgery: 46.6% of patients had a one-night stay, 28.8% two nights, 11.9% three nights, and 8.5% over four

nights. The mean length of hospital stay for the 118 study participants sampled was 1.7 days. Huamán et al. reported that the overall mean duration of stay for orthognathic procedures was 1.7 days based on data collected over a 12-year period (January 1994 to July 2006)¹⁰. This is the exact same mean as reported herein. It is worth noting that Cunningham and Moles reported the mean duration of inpatient stay over a 9-year period for mandibular orthognathic surgery in the NHS to be 3.2 days¹¹. It must be remembered, however, that the present study findings are not for one type of surgery, as 55.1% of patients had bimaxillary osteotomies, whilst the other patients had either a single jaw moved or an operation on the jaws and chin. However, as shown by the study data, there was no difference in terms of duration of hospital stay between the different orthognathic procedures. This highlights the fact that performing a single-jaw or a more complicated double-jaw procedure does not change the duration of hospital stay and subsequently the cost of the stay.

Other studies looking into the benefits of combined orthodontic-orthognathic treatment have been conducted in the past. Ponduri et al. assessed whether treatment would improve the occlusal relationship in 40 patients who had orthodontic procedures and 40 patients who had orthognathic procedures. They found that all participants reported improvements in aesthetics or function, or both¹². This is in keeping with the present study results, with 90.7% reporting improved aesthetics following treatment. Function was also improved, with 64.4% of patients reporting improved eating and 42.4% reporting improved speech. Other studies have also found that orthognathic procedures not only improve musculoskeletal functions but also significantly enhance the psychosocial well-being of the affected individual and improve their quality of life^{11,12}. This emphasizes the benefits that this treatment may have for the patient, from both a physical and mental health point of view.

However, postoperative complications were also prevalent. Je?drzejewski et al. reviewed complications following orthognathic surgery and found the rate of nerve injury to be the highest at 50%, followed by temporomandibular disorders (TMD; 14%), haemorrhage (9%), and infections (7%)¹³. In agreement with these results, the present study showed that 61.0% of patients reported no ongoing problems at the time of completing the form. Out of the 43 patients (36.4%) who reported ongoing

problems, most reported numbness ($n = 32$, 27.1%) and 'other' ($n = 13$, 11.0%), with jaw pain, jaw clicking, and tense jaws as the most common issues.

As stated in one of the qualitative comments (**Supplementary Material**, File 2), some patients felt that they would have benefitted from psychological advice prior to embarking on treatment. Cadogan and Bennun stressed the importance of screening patients for unrealistic expectations and for providing psychosocial support while decisions are being made about treatment⁴. This highlights the benefit of a mental health professional in the team to help counsel patients who may require additional psychological support.

This work has specific strengths and limitations. First of all, the results presented herein are based on a highly comprehensive patient outcome questionnaire tailored to orthognathic surgery. The questionnaire was applied prospectively to a significant number of anonymized patients treated by a single surgeon over a long period, enabling an unbiased analysis. However, the lack of a standardized questionnaire in the literature and the fact that the responses were collected at various postoperative months may also be confounding factors in the analysis. In addition, future digitizing of the questionnaire could help avoid missing answers in some of the questionnaires. Finally, it is worth mentioning that the overall patient satisfaction was significantly associated with the presence of an ongoing problem. This reflects the fact that improved aesthetics and function are not the only predictors of patient satisfaction. Thus comprehensive assessment of patient management throughout the treatment journey is at least as important as assessing the post-treatment aesthetic and functional outcomes.

Patients are managed by a team of professionals including receptionists, nurses, dieticians, orthodontists, and surgeons, and the involvement of all team members is important, since they can promptly detect and deal with any ongoing problems that affect patient satisfaction. Management in multidisciplinary clinics may also play an important role in increasing patient satisfaction, since patients get to know and trust all of the professionals involved in their long treatment journey. Such teams keep track of the patient's progress and can successfully manage and address any patient concerns about ongoing problems or potential complications, which appears to be important in determining overall patient satisfaction. Therefore, a prospective clinical study is needed to assess the independent predictors of orthognathic surgery

results, taking into account patient satisfaction as a major outcome.

In conclusion, the data herein provide a valuable insight into the thoughts of patients who have completed orthognathic treatment, including the reasons why they decided to undergo treatment. Furthermore, the data show high satisfaction with all aspects of treatment. The results also highlight many areas for improvement, such as enhanced delivery of information to patients and better service provision by all members of staff involved in the treatment process.

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Competing interests. No competing interest; no conflict of interest to declare.

Ethical approval. This project was exempted from the need for formal ethical approval (a statement of exemption was provided by the Trust's Research & Development Office).

Patient consent. Not required.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.ijom.2018.07.013>.

References

- Kim SJ, Kim MR, Shin SW, Chun YS, Kim EJ. Evaluation on the psychosocial status of orthognathic surgery patients. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2009;**108**:828–32.
- Murphy C, Kearns G, Sleeman D, Cronin M, Allen PF. The clinical relevance of orthognathic surgery on quality of life. *Int J Oral Maxillofac Surg* 2011;**40**:926–30.
- Cunningham SJ, Moles DR. A national review of mandibular orthognathic surgery activity in the National Health Service in England over a nine year period. Part 2. Patient factors. *Br J Oral Maxillofac Surg* 2009;**47**:274–8.
- Cadogan J, Bennun I. Face value: an exploration of the psychological impact of orthognathic surgery. *Br J Oral Maxillofac Surg* 2011;**49**:376–80.
- NHS England. National patient reported outcome measures (PROMS) programme guidance. NHS, 2017. <https://www.england.nhs.uk/wp-content/uploads/2017/09/proms-programme-guidance.pdf> [Accessibility verified November 25, 2017].
- NHS England. Five year forward view. NHS, 2014 <https://www.england.nhs.uk/wp-content/uploads/2014/10/5yfv-web.pdf> [Accessibility verified November 25, 2017].
- Calkin S. PROMS show no evidence of inappropriate surgery. *Health Service Journal* 2013. <https://www.hsj.co.uk/news/commissioning/proms-show-no-evidence-of-inappropriate-surgery/5066155.article> [Accessibility verified November 25, 2017].
- Cunningham SJ, Hunt NP. Quality of life and its importance in orthodontics. *J Orthod* 2001;**28**:152–8.
- Boffano P, Gallesio C, Garzaro M, Pecorari G. Informed consent in orthognathic surgery. *Cranio Maxillofac Trauma Reconstr* 2014;**7**:108–11.
- Huamán ET, Juvet LM, Natri A, Denman WT, Kaban LB, Dodson TB. Changing patterns of hospital length of stay after orthognathic surgery. *J Oral Maxillofac Surg* 2008;**66**:492–7.
- Cunningham SJ, Moles DR. A national review of mandibular orthognathic surgery activity in the National Health Service in England over a nine year period. Part 1. Service factors. *Br J Oral Maxillofac Surg* 2009;**47**:268–73.
- Ponduri S, Pringle A, Illing H, Brennan PA. Peer Assessment Rating (PAR) index outcomes for orthodontic and orthognathic surgery patients. *Br J Oral Maxillofac Surg* 2011;**49**:217–20.
- Je?drzejewski M, Smektaa T, Sporniak-Tutak K, Olszewski R. Preoperative, intraoperative, and postoperative complications in orthognathic surgery: a systematic review. *Clin Oral Investig* 2015;**19**:969–77.

Address:
Manolis Heliotis
London North West University Healthcare
NHS Trust
Northwick Park Hospital
Watford Road
Harrow
HA1 3UJ
UK
Tel: +44 (0)7947 571997
E-mail: manolis.heliotis@nhs.net