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Original Research

Quality of life and functional assessment of facial palsy patients: A questionnaire study

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ABSTRACT

Background: Facial palsy leads to functional and aesthetic deficits, which impair the quality of life of affected patients. General health-related and disease-specific questionnaires are available for quality of life assessment. In this study, observer-based analysis of facial function (Sunnybrook Facial Grading Scale) was compared patient-based to facial palsy-specific gradings (Facial Clinimetric Evaluation Scale and Facial Disability Index), and general health-related quality of life questionnaires (SF-36). We hypothesized that only facial palsy-specific instruments capture functional and social impairments of affected patients.

Methods: Thirty facial palsy patients treated at a tertiary referral centre were included in this study. Inclusion criteria were unilateral facial palsy with stable facial function, age over 18 years and fluency in German. Facial function was assessed with general and disease-specific patient-reported outcome measures and subsequently evaluated by the treating facial plastic surgeon. Statistical analysis included descriptive statistics for all assessed measurements. Correlations were calculated to compare general and facial palsy-specific instruments, as well as observer-based grading.

Results: Observer-based evaluation of facial function correlated well to the patients-based assessment of physical function, however social subscores did not correlate demonstrating the limited correlation of patient distress and facial nerve impairment. Physical function scores of disease-specific instruments did not correlate with general health assessment scores, while social function scores showed moderate to good correlations.

Conclusion: Validated disease-specific instruments are essential for the assessment of facial palsy patients. Patient-reported outcome measures like the FaCE Scale and the Facial Disability Index should be applied in addition to standardized observer-based ratings to capture the patients' perspective on functional and social impairments associated with facial palsy to fully assess the burden of disease.

1. Introduction

Facial palsy is a devastating condition leading to functional and aesthetic deficits [1]. Deficits resulting from facial muscle weakness such as lagophthalmus and impaired oral function lead to psychological distress and impair interpersonal communication [2,3]. The mostly sudden onset of symptoms increases the psychological distress of affected patients [3–5]. High rates of depression and reduction of social contact were described in facial palsy patients [4,6].

1.1. Assessment of facial function

Facial function can be assessed by subjective or objective measures, both are essential for patient assessment [7]. Objective facial motion analysis with 3D-video analysis is widely seen as the gold standard measurement of facial function in facial palsy patients [8]. A survey of the Sir Charles Bell Society found that only 18% of specialists are currently using three-dimensional imaging of facial movements and that the widely used photographic documentations of facial function greatly lack standardization [9]. Standards for photographic and videographic documentation of facial movements in facial palsy patients

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Abbreviations

FaCE Scale	Facial Clinimetric Evaluation Scale
FDI	Facial Disability Index
FGS	Facial Grading Scale
PROM	Patient-reported outcome measure
QOL	Quality of life
SD	Standard deviation
SF-36	Short Form 36 Health Survey Questionnaire

were only recently proposed [10].

These methods, however, only capture objective measurements, such as range of motion or resting symmetry.

1.2. Patient-based outcome measures in facial palsy

Subjective patient-based evaluation relies on patient-reported outcome measures (PROM), which are used in 58% of Facial Nerve Centers [9]. PROM are questionnaires that quantifiably measure the quality of life (QOL) and other metrics from the patients' perspective [4,11,12]. Patient satisfaction after surgical and non-surgical treatment in facial palsy patients is highly influenced by patient self-perception [3]. Therefore, it is important to address the patients' social disability and psychological factors to optimize the quality of care. Subjective assessment of facial function is either observer-based (e.g. House-Brackmann Scale [13], Sunnybrook Facial Grading Scale (FGS) [14], eFACE [15,16]), or patient-based, using PROM like the Facial Clinimetric Evaluation Scale (FaCE Scale) [17] and the Facial Disability Index (FDI) [18]. It was reported that 31% of facial nerve specialists routinely use the FaCE Scale, 12% use the FDI and 11% combine the FaCE Scale and the FDI [9]. Out of a multitude of *ad-hoc* questionnaires published in the facial palsy literature, the FaCE Scale and the FDI are the only established PROM that meet the criteria required for development and validation of psychosocial assessments [3].

1.3. General health-related quality of life assessment

Health-related QOL assessments measure the impact of health-related issues on the general well-being [11]. QOL can be evaluated by either using generic instruments, which measure QOL in different patient populations, or by using disease-specific instruments that focus on impairments caused by specific medical conditions [11,19]. The Short Form 36 Health Survey Questionnaire (SF-36) is a widely used, validated generic instrument that measures health-related QOL in diverse patient populations [20].

1.4. Study aims

In this study, we first aimed to compare general and disease-specific QOL assessments in facial palsy patients of facial function and health-related QOL to the most established PROM: the SF-36 for general health-related QOL assessment and the FaCE Scale and FDI for facial palsy-specific analysis. Secondly, patient-based and observer-based assessments were compared.

2. Methods and materials

2.1. Patient characteristics

Thirty consecutive facial palsy patients treated at the facial nerve outpatient clinic from September 2014 until October 2015 were included in this study. Inclusion criteria were unilateral facial palsy, age over 18 years and fluency in German. Patients with advanced stage malignancies and other serious illnesses that would preclude the patient from being a candidate for complex facial reanimation surgery and negatively influence quality of life were excluded from the study. Patients who underwent facial surgery within the last 3 months before presenting to the facial nerve clinic were also excluded. The local ethics committee approved this study (protocol number 1379/2014). Informed consent was obtained from all individual participants included in the study.

Eighteen (60%) female and 12 (40%) male patients were included in the study. The mean age was 48.8 years (SD 15.6; range 20–75 years) and the mean duration of facial palsy 10.7 years (SD 13.5). Twelve patients presented with iatrogenic facial palsy (40%), 6 patients with idiopathic and 6 with traumatic facial palsy. Five cases were due to infectious causes and one was developmental. The right facial nerve was affected in 56.6% of patients, the left side in 43.3%. The facial nerve deficit was complete in 10 cases (33.3%) and incomplete in 20 cases (66.7%). In 70% of patients all facial nerve branches were affected (total facial palsy).

Twenty-one patients were treated with facial reanimation procedures, 7 patients received conservative treatment (botulinum toxin injections and physical therapy) prior to the inclusion in the study. Facial function was stable at the time of assessment, patients who underwent procedures within 3 months prior to the study were excluded. Previous surgical procedures included interposition nerve grafts (n = 2), masseteric nerve transfer to the buccal branch of the facial nerve (n = 1), gracilis muscle transplants innervated by cross-face nerve grafts (n = 10) and the masseteric nerve (n = 1), as well as temporal muscle transfer to the eye (n = 7) and to the mouth (n = 1). Two patients were treated with myectomy of spastic depressor muscles and 14 patients underwent static procedures such as brow lifts, blepharoplasties, periorbital tendon-suspensions and face-lifts.

2.2. Observer-based assessment of facial function

Facial function was assessed with the Sunnybrook FGS by experienced facial nerve surgeons [14]. The Sunnybrook FGS analyzes the function of different regions of the face and scores the resting symmetry, voluntary movement and synkinesia. A composite score is calculated ranging from 0 (complete facial paralysis) to 100 (normal facial function) [14]. A clinical example of a patient who presented with a facial palsy on the right side of the face and was received a Sunnybrook FGS composite score of 9 is shown in Fig. 1.

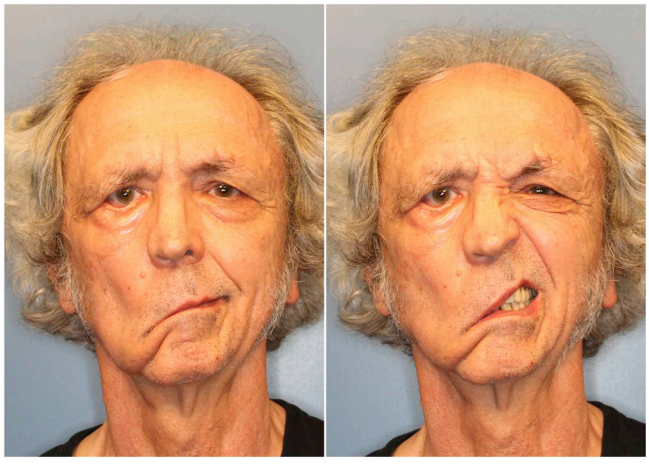

Fig. 1. *Patient example.* A 75 year-old patient presenting with right-sided facial palsy after acoustic neuroma resection. The images show facial function at rest (left) and during smile movement (right). The surgeon-based grading revealed a Sunnybrook Facial Grading Scale composite score of 9, the total score of the FaCE Scale was 35 and the physical and social functioning scores of the Facial Disability Index were 45 and 48, respectively.

2.3. Patient-reported outcome measures for facial palsy-specific quality of life assessment

The FaCE Scale and FDI were used as PROM to assess facial function and facial palsy-related quality of life. The FaCE Scale is a facial palsy-specific 15-item instrument (5-point Likert scale and visual analogue scale), which assesses 6 thematic domains: facial movement, facial comfort, oral function, eye comfort, lacrimal control and social function [3,17]. The scores are calculated on a scale from 0 (worst) to 100 (best) to assess facial function. The FDI contains 10 Likert-type questions, which evaluate 2 domains: physical and social function. Physical function scores range from −25 (worst) to 100 (best) and social function scores from 0 (worst) to 100 (best) [17]. The German versions of both the FaCE Scale and the FDI were used in this study [21].

2.4. General health-related quality of life assessment

The SF-36 was used for general health-related QOL assessment. The SF-36 is an established, validated, generic instrument that measures health-related QOL in diverse patient populations [20]. It is based on a 36-item questionnaire with eight subscales and two component summaries of physical and mental health-related QOL. The physical health assesses general health, mobility, and activities like lifting. The German version of the SF-36 was used in this study [22].

2.5. Statistical analysis

Descriptive statistics were reported as mean value, standard deviation and range. The correlations (Spearman rho coefficient) of facial palsy-specific QOL instruments (FaCE Scale and FDI) and general health-related QOL assessment (SF-36), as well as the correlations of observer-based assessment of facial function (Sunnybrook FGS) and PROM (FaCE Scale, FDI and SF-36) were analyzed. Correlations were categorized as described by Marsk and colleagues [23]. Correlations were graded as fair ranging from 0.25 to 0.5, moderate to good from 0.51 to 0.75 and as very good to excellent from > 0.75. Two-sided *p*-values of < 0.05 determined statistical significance.

3. Results

3.1. Facial palsy-specific quality of life assessment

Facial palsy-specific QOL was assessed in 30 patients using 2 established PROM, the FDI [14] and the FaCE Scale [17]. The mean value of the physical function score of the FDI was 63.8 (SD 22.4, range 17.5–100; Table 1). The mean social/well-being score was 63.3 (SD 19.9, range 12–92; Table 3). The mean total score of the FaCE Scale was 47.1 (SD 20.2, range 4.7–86.5; Table 3); subcategories of the FaCE Scale are described in Table 1.

3.2. General health-related quality of life assessment

The SF-36 [22] was used to assess general health-related QOL in eight specific domains. The mean physical function score was 83.3 (SD 21.1, range 25–100), the mean bodily pain score was 70.9 (SD 28.1, range 12–100) and the mean social role functioning score was 68.8 (SD 29.9, range 12–100). The remaining SF-36 domains are shown in Table 1.

3.3. Observer-based analysis of facial function

Facial function of all included facial palsy patients was rated using the Sunnybrook FGS [14]. The mean composite score was 38.9 (SD 27.9, range 3–95), which was calculated from the resting symmetry score (mean 10.5, SD 6.1, range 0–20), the voluntary movement symmetry (mean 55.1, SD 24.5, range 24–100) and the synkinesis score (mean 5.8, SD 2.3, range 3–17).

3.4. Correlation of general health-related and facial palsy-specific quality of life

Spearman's rank correlation coefficient were calculated to determine the correlations of SF-36 domains and facial palsy-specific scores of the FDI and the FaCE Scale (Table 2). The correlations of the social/well-being function of the FDI and the SF-36 social role functioning and mental health domains were moderate to good at 0.698 and 0.591, respectively (Table 2). Physical function assessed by the FDI and physical domains of the SF-36 showed no correlation.

The FaCE Scale social function score and the SF-36 domains social role functioning (r = 0.572), emotional health (r = 0.512) and mental health (r = 0.67) correlated well. Physical function subscales of the FaCE Scale and the SF-36 did not correlate (Table 2).

3.5. Correlation of observer-based assessment of facial function and patient-reported outcome measures

To correlate the surgeons' and the patients' perspective of facial function, Spearman's rank correlation coefficients were calculated for the Sunnybrook FGS and both the FDI and FaCE Scale. The physical function subscore of the FDI correlated well with the composite score of the Sunnybrook FGS (r = 0.536, Table 3). There was no correlation of the Sunnybrook FGS and the FDI social/well-being function score (Table 3). The FaCE Scale facial comfort subscore correlated well with the Sunnybrook FGS composite score, while the facial movement, oral function, eye comfort and lacrimal control subscores only reached fair correlations (Table 3).

Facial function assessed with the Sunnybrook FGS composite score did not correlate with any subcategories of the SF-36 (physical function score: r = 0.248; physical role functioning: r = 0.197; bodily pain: r = 0.088; general health perceptions: r = −0.026; vitality: r = −0.223; social role functioning: r = −0.295; emotional role

Table 1
Facial palsy-specific and general health-related quality of life assessment.

Instrument	Subscales/domains	Mean	Median	Standard deviation	Range
FDI	Physical function	63.8	60	22.4	17.5–100
	Social/well-being function	63.6	70	19.9	12–92
FACE SCALE	Facial movement	15.8	12.5	18.1	0–58
	Facial comfort	55.6	60.4	26.8	0–100
	Oral function	57.9	56.3	32.6	0–100
	Eye comfort	44.6	37.5	32.8	0–100
	Lacrimal control	41.7	25	45.2	0–100
	Social function	51.4	56.3	25.1	0–100
	Total	47.1	45.6	20.2	4.7–86.5
SF-36	Physical function	83.3	92.5	21.1	25–100
	Physical role functioning	58.3	50	39.6	0–100
	Bodily pain	70.9	73	28.1	12–100
	General health perceptions	61.4	61	18	20–32
	Vitality	49.3	40	25	0–95
	Social role functioning	68.8	68.8	29.9	12–100
	Emotional role functioning	42.2	33.3	42.8	0–100
	Mental health	62.9	66	21.9	8–92

Facial function and quality of life was assessed with facial palsy-specific instruments (Facial Disability Index and FaCE Scale) and the general QOL instrument SF-36. The Facial Disability Index assesses two subscores: physical and social function. The FaCE Scale calculates a total score from six subcategories. The SF-36 evaluates eight different domains of physical function, social function and mental health.

Table 2
Correlation of general health-related and facial palsy-specific patient-reported outcome measurements.

Facial palsy-specific assessment	SF-36 Domains							
	Physical function	Physical role function	Bodily pain	General health	Vitality	Social function	Emotional health	Mental health
FDI								
Physical function	0.127	0.113	0.182	0.09	−0.023	0.049	−0.113	0.005
Social/well-being function	−0.082	0.39	0.472	0.268	0.355	**0.689***	0.377	**0.591***
Face scale								
Facial movement	0.001	0.07	0.349	−0.089	0.115	−0.035	0.051	0.118
Facial comfort	0.027	0.428	0.199	0.169	−0.194	0.244	0.053	−0.078
Oral function	0.101	0.303	0.429	0.201	0.137	0.33	0.172	0.407
Eye comfort	0.111	0.162	0.431	0.043	0.175	0.157	0.188	0.233
Lacrimal control	0.227	0.229	0.302	0.164	−0.243	−0.044	−0.176	−0.243
Social function	0.022	0.457	0.239	0.162	0.357	**0.572***	**0.512***	**0.67***
Total	0.148	0.435	0.436	0.23	0.054	0.242	0.168	0.218

General health-related quality of life assessed with the SF-36 was correlated to the facial palsy-specific Facial Disability Index and FaCE Scale. Moderate to good correlations (Spearman rho coefficients 0.51–0.75) were highlighted in bold and marked with an asterix (*).

Table 3
Correlation of patient-based and observer-based assessments of facial function.

Facial palsy-specific Prom	Sunnybrook Facial grading scale Composite score
FDI	
Physical function	**0.536***
Social/well-being function	0.001
Face scale	
Facial movement	0.438
Facial comfort	**0.573***
Oral function	0.299
Eye comfort	0.312
Lacrimal control	0.505
Social function	−0.06
Total	0.495

The results of facial palsy-specific patient-reported outcome measurements (Facial Disability Index and FaCE Scale) were correlated with the Sunnybrook Facial Grading Scale composite score. The physical function scores showed moderate to good correlation of facial function graded from the surgeons and the patients' perspective.
Please note: The Sunnybrook Facial Grading Scale only assesses resting symmetry, voluntary motion and synkinesis. Social function and quality of life are not included in this observer-based instrument. Moderate to good correlations (Spearman rho coefficients 0.51–0.75) are highlighted in bold and marked with an asterix (*).

functioning: r = −0.07; mental health: r = −0.201).

4. Discussion

In this study, facial function and health-related QOL were evaluated with facial palsy-specific and general instruments. The results were subsequently compared to surgeon-based assessments using the Sunnybrook FGS [17]. It was demonstrated that facial palsy-specific impairments of facial function are only captured by disease-specific instruments and that patient- and surgeon-based functional assessments correlated well. The FaCE Scale [17] and FDI [14] were used as facial palsy-specific instruments. These PROM were established for the general facial palsy population and are the clinically most widely used validated questionnaires, as recently reported [9]. General health-related QOL was assessed with the SF-36, which was developed for diverse patient populations [20].

4.1. Characteristics of facial palsy patients and treatment concepts

In our study, 40% of patients presented with postoperative facial palsy due to planned oncological resections and other iatrogenic causes. Idiopathic and traumatic causes were the second most common aetiologies. Compared to similar studies, our patient population suffered from longstanding facial nerve impairment, as the mean duration of facial palsy was 128.3 months. Gonzales and colleagues adapted a Spanish version of the FDI and included 79 patients who underwent superficial parotidectomy with preservation of the facial nerve [24]. QOL assessment using the FDI was performed 3 months after the operation. In 34 patients, general QOL was assessed with the SF-36 and results were correlated to the FDI. Similar to our results, the authors did not find a correlation of the physical subscales of the FDI and the SF-36 [24]. Recently, a Swedish version of the FaCE Scale and FDI was validated in 93 facial palsy patients with longstanding facial palsy (mean duration 51.9 months) [23]. Nearly 80% of patients included in this study suffered from Bell's palsy, compared to 20% in our patient population.

4.2. Patient- and surgeon-based assessment of facial function

4.2.1. Functional impairments graded similarly by patients and surgeons

In this study facial function was evaluated by the treating facial plastic surgeon using the established Sunnybrook FGS [17]. The composite score of the Sunnybrook FGS was subsequently compared to patient-based evaluations. In a recent Swedish study Marsk and colleagues assessed facial function with the Sunnybrook FGS and the broader House-Brackmann Scale [23]. In both the Swedish patient group and the current study, the physical subscore of the FDI and the composite score of the Sunnybrook FGS correlated well, indicating corresponding assessments of facial function by the patients and treating surgeons. Interestingly, the facial movement subscore of the FaCE Scale correlated only fairly with results of the Sunnybrook FGS in our study, which was significantly lower than values described by Marsk and colleagues, who found high correlations. Facial comfort assessed by the FaCE Scale and the composite score of the Sunnybrook FGS correlated well in both studies. In the original work by Kahn and colleagues, who introduced the FaCE Scale in 2001, 86 patients with facial palsy (43% Bell's palsy) were included and results of the FaCE Scale were correlated with the Sunnybrook FGS [17]. The composite score of the Sunnybrook FGS and the subscore facial movement of the FaCE Scale also correlated well in this study [17].

4.2.2. Patient-based assessment of social function did not correlate with degree of facial nerve impairment

Social function assessed with both the FDI and the FaCE Scale did not correlate with the composite score of the Sunnybrook FGS in the present study. Previous studies found fair correlations of the social/well-being function of the FDI and good correlations of the social function subscore of the FaCE Scale and the Sunnybrook FGS [17,23].

Poor correlation of social function and graded impairment of facial function was previously described by Cross and colleagues, who studied QOL in patients suffering from iatrogenic or postoperative facial palsy after acoustic neuroma surgery, using different PROM [25]. The authors showed that psychological distress did not correlate with the severity of facial palsy [25]. Similarly, no correlation of severity of facial palsy and social function score of the FaCE Scale was found in patients with facial nerve impairment one year after vestibular schwannoma surgery [26]. The main differences in studies where social function scores and facial nerve impairment correlated well are the shorter mean duration of facial palsy and a majority of idiopathic or Bell's palsy cases [17,23]. There is still limited data available on social function of patients suffering from longstanding, postoperative facial palsy or patients who underwent facial reanimation procedures. The current study underlines the importance of QOL assessment in all facial palsy patients, as the severity of facial nerve impairment alone does not indicate patient distress and effects on social function [23,26].

4.3. General and disease-specific patient-reported outcome measures

Our results comparing facial palsy-specific and general health-related QOL assessments confirmed earlier reports that, even though the SF-36 is a reliable instrument, it is not sensitive enough to measure facial nerve-related changes in QOL [3,11,27]. It assesses only activities that involve mobility and lifting, tasks that do not primarily involve facial function [18]. In the current study, the social function of the FDI and FaCE Scale correlated well with the social function, emotional health and mental health domains of the SF-36. Physical function subscores of both facial-palsy specific instruments did not show any correlation with SF-36 scores. These findings concur with results described by Marsk and colleagues [23]. We also demonstrated that there is no correlation of observer-based assessment of facial function with the Sunnybrook FGS and the SF-36. Most previous studies that compared facial palsy-specific instruments and/or general health-related QOL assessments with observer-based grading did not include patients who were treated with facial reanimation procedures [17,23,24].

4.4. Quality of life after facial reanimation surgery

In this study, 76.7% of patients underwent surgical procedures to restore facial function. Henstrom and colleagues previously used the FaCE Scale to assess the pre- and postoperative QOL of 37 facial palsy patients, who were treated with static periocular procedures [28]. They found improvement of general QOL and positive alterations in eye-specific questions assessing the need for eye drops or lubricants and the time the eye felt dry or irritated [28]. Lindsay and colleagues described improvement of QOL assessments in 148 patients with facial palsy who received free gracilis muscle transplants for smile reanimation, innervated by either cross-face nerve grafts or a trigeminal donor nerve [29]. After successful free gracilis muscle transplantation, the facial palsy-specific QOL assessed by the FaCE Scale was significantly improved [29]. Interestingly, there was no statistically significantly difference in QOL results between the cross-face nerve graft and the trigeminal donor nerve groups [29].

4.5. Limitations of the study

Limitations of this study include that postoperative changes after facial reanimation surgery were not assessed. While the effect of facial reanimation on facial function-related QOL is certainly crucial for any facial nerve surgeon, it was not within the scope of the present preliminary investigation, which compared disease-specific and general QOL instruments. This question will be the focus of future research and ought to be assessed prospectively. For the current study, the patient group assessed represented a cross-section of facial palsy patients treated at the facial nerve centre, including patients managed both surgically and conservatively. Given the wide possible range of impairment of facial function and the varying complexity of applicable treatment concepts, our research interest included the diverse group of patients presenting to our clinic.

5. Conclusion

Our results demonstrate the importance of facial palsy-specific QOL assessment compared to general health-related instruments. Disease-specific QOL instruments are crucial as general health-related QOL assessments fail to capture face-specific impairments. Patient-based assessment of QOL with validated and established instruments like the Face Scale and the Facial Disability Index should be part of the evaluation of all facial palsy patients in addition to observer-based ratings and facial motion analysis to assess the patients' perspective on facial function and impairments.

Ethical approval

The ethics committee of Medical University of Vienna approved this study (protocol number 1379/2014).

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Author contribution

Eva Györi: Study design, data collection, data analysis, manuscript.
Christopher Przestrzelski: Data collection, data analysis.
Michael Hagmann: Study design, statistical planning, data analysis.
Igor Pona: Facial nerve outpatient clinic, data collection.
Thomas Rath: Division of Plastic and Reconstructive Surgery, manuscript editing.
Christine Radtke: Division of Plastic and Reconstructive Surgery, manuscript editing.
Chieh-Han John Tzou: Facial nerve outpatient clinic, data collection, manuscript editing.

Conflicts of interest

The authors have no commercial associations or financial disclosures to declare.

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Guarantor

Eva Györi and Chieh-Han John Tzou.

Previous presentations

Preliminary data of this study were presented at the Annual Meeting of the Austrian Society of Plastic and Reconstructive Surgery in Innsbruck, Austria on October 8, 2016.

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