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META ANALYSIS

Masseteric Nerve Transfer for Facial Reanimation: Meta-analysis Study

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Abstract

Background: **Loss of facial nerve function, always follows facial nerve damage is called facial palsy. This complicated condition hinders social connections since communicating emotions or intentions becomes difficult. Thus, facial nerve repair requires customized meticulous techniques.**

Objective: **Meta-analysis study to evaluate masseteric nerve transmission role in reanimation of the face.**

Methodology: **This is a meta-analysis study for literature that was implemented from January 2012 to 28th of Aug 2022, with the aid of these databases: Google Scholar, PubMed, Scopus, and Web of Science (ISI). We searched carefully all the included references of appropriate reviews in addition to the original articles for significant studies. Relevant research was exported to a Microsoft Excel spreadsheet. To identify which articles are relevant for us we screened the abstract, title, and full-text.**

Results: **The included patients' ages ranged from 32.5 to 61.7 on average. The main causes of facial nerve palsy were cerebellopontine angle tumors. There was a statistically significant better mean facial grading among patients treated with master transfer, contrasted with the control group, Between the two groups, there was no statistically significant variation in mean synkinesis score.**

Conclusion: **The paralyzed midface and perioral area can be revived using the Masseteric Nerve Transfer technique. With minimal surgical morbidity, the transfer of the masseteric nerve can produce satisfactory symmetry as well as perception.**

Keywords: Facial reanimation, Masseteric nerve, Paralysis

1. Introduction

Social interaction and quality of life plus face function can all be severely impacted by paralysis of facial muscles. Congenital abnormalities, neoplasms, inflammation, infections, trauma, and accidental injuries are the most common causes of facial paralysis. The facial nerve and its innervated muscles play a crucial role in speech production, emotional expression, proper tearing mechanics, eye closure, smile formation, and facial expression. Restoring these functions of the facial muscles, social relations, facial symmetry, and lifestyle quality are the objectives of facial reanimation. It is very important to settle on the cause of facial paralysis, the date when this happened, amount of damage, existence as well as the condition of the facial nerve, viability of facial muscle, concomitant cranial nerve impairments, and patient's general health while examining a patient for face reanimation.[1]

Treatment is often inadequate and surgical correction is the appropriate solution, especially in well-established long-standing facial muscle paralysis. Although there are many different surgical methods for face reanimation, still there is little empirical research to help doctors decide which procedure is appropriate for each patient's situation. Determining whether to intervene in patients with undamaged facial nerves but nonfunctional, either due to idiopathic causes, or traumatic, is difficult given the likelihood of spontaneous

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recovery. After a nerve injury, there is a crucial window of opportunity for the injured facial nerve to be strengthened by joining up with an additional undamaged nerve. The native face muscles can be rewired in this way, but a different cranial nerve must be sacrificed.[2]

Prior to current attention in the trigeminal nerve's motor division to the masseter, the hypoglossal or else accessory nerve was employed to reanimate the face.[3]

Spira was the first to discuss the masseter nerve's function in face rehabilitation. It was initially investigated for direct coaptation to paralyzed face nerve branches, but more recently it has gained popularity for other neuromuscular transfers, such as free gracilis grafts.[4]

The masseter nerve has shown many advantages such as convenient proximity at the donor site and limited morbidity compared with other cranial nerve transplants for example the 12th cranial nerve (the hypoglossal nerve), plus having rapid functional recovery.[5]

Additionally, using the natural movement of the masseter muscle (clenching the jaw) is considered more natural and discreet than the movement of the tongue.[6]

The masseteric nerve's alleged inability to generate an expressive smile when employed alone was the main disadvantage of its use; nevertheless, recently, many published studies reported the opposite. Furthermore, the complex function of the native facial nerve cannot be replicated by a single cranial nerve transplant.[7,8]

This study's objective was to thoroughly evaluate the existing literature, and evaluate the result of the transfer of masseteric nerve in reanimation of the face in comparison to other nerve transfer and to guide further research.

2. Patients and methodology

Preferred reporting items for systematic review & meta analysis (PRISMA) and Cochrane Collaboration's evaluation standards and suggestions were followed for carrying out this comprehensive review and meta-analysis.[9,10]

Al-Azhar University Faculty of Medicine's Ethics Committee Unit gave the study protocol its blessing and registered it.

Patients with facial nerve paralysis who had transfer of the masseter nerve to facial nerve with the step of muscle flap or another cranial nerve transposition were included in all clinical studies. The patients might be of any age, sex, color, ethnicity, language, publishing year, or location.

We excluded any studies that were not conducted on humans, were not comparable, or did not disclose the results of a master nerve transfer using nerves besides the masseteric nerve. For unextractable data studies, we also omitted recommendations, animal studies, posters, case reports, comments, review articles letters, editorials, and book chapters from this study.

Types of included studies: the investigations comprised prospective and retrospective comparative cohort studies, recent clinical trials, or cluster trials.

Types of participants: only human subject's elective for masseteric nerve transfer for facial reanimation.

We studied researches that was implemented from January 2012 to 28th of Aug 2022, with the aid of these databases: Google Scholar, PubMed website, Scopus journal, and Web of Science (ISI). These keywords were used; ‘Masseteric’, ‘Masseter’, ‘Trigeminal’, ‘Face’, ‘Facial’, ‘Paralysis’, ‘Paresis’, ‘Reanimation’. We looked for any pertinent research in the references of linked reviews and original publications. The relevant and important articles were exported to an Excel file in Microsoft. The relevant papers that satisfied the inclusion criteria were found using the title, abstract, and full text screening procedure.

The following information was taken from the articles that were eventually included; features of the study (study ID, publication year, research type, time, and area), the demographics of the patients (sample size, age, sex, and Co-Morbidities). Facial nerve paralysis related data (causes and grade of paralysis, duration of paralysis, side of paralysis, and time interval before surgery). Masseter nerve transfer related data and outcomes (surgical procedure, recipient nerve, functional outcomes (effort to smile, brow raise, lip purse, synkinesis, time to onset of movement), cosmetic outcomes, and follow-up period).

By the National Institutes of Health quality evaluation method, observational studies' level of quality was evaluated.[11] Based on this evaluation of study quality, studies were categorized as excellent, fair, and terrible when the scores were 65 %, 30−65 %, and greater than 30 %, respectively. The domain was regarded as ‘Yes’ if the parameter was controlled, and vice versa.

Quantitative findings of the movement of facial nerve following nerve transfer, together with oral commissure movement and time to nerve healing, were the study's primary targeted goals.

The continuous variables were analyzed using standardized mean difference or weighted mean difference for the analysis of dichotomous variables, the risk ratio with 95 % confidence interval was utilized. When a fixed population effect size is assumed, the fixed-effect model was utilized; otherwise, the random-effects model was applied. Utilizing the Cochrane Q (χ^2 test) at a value of P 0.10 and the Higgins I2 statistic with a value of greater than 50 %, statistical heterogeneity was recognized. Based on the results of the Egger's regression test (P value 0.10) and presence of an asymmetrical funnel plot, publication bias was postulated. Software for thorough meta-analysis, version 3. At the value of P 0.05, the difference was determined to be significant.

3. Results

Systematic searching of the included databases resulted in 122 articles, 26 of them were eliminated because they were duplicates, leaving 96 articles available for screening. Screening of the retrieved articles resulted in 30 studies eligible for full-text review. Finally, for the meta-analysis and the systematic review, we included eight publications (Fig. 1).

Eight publications encompassing 194 patients with facial nerve palsy were included (Albathi et al.[5]; Altamami et al.[12]; Bianchi et al.[13]; Biglioli et al.[14]; Li et al.[15]; Socolovsky et al.[16]; Vincent et al.[17];

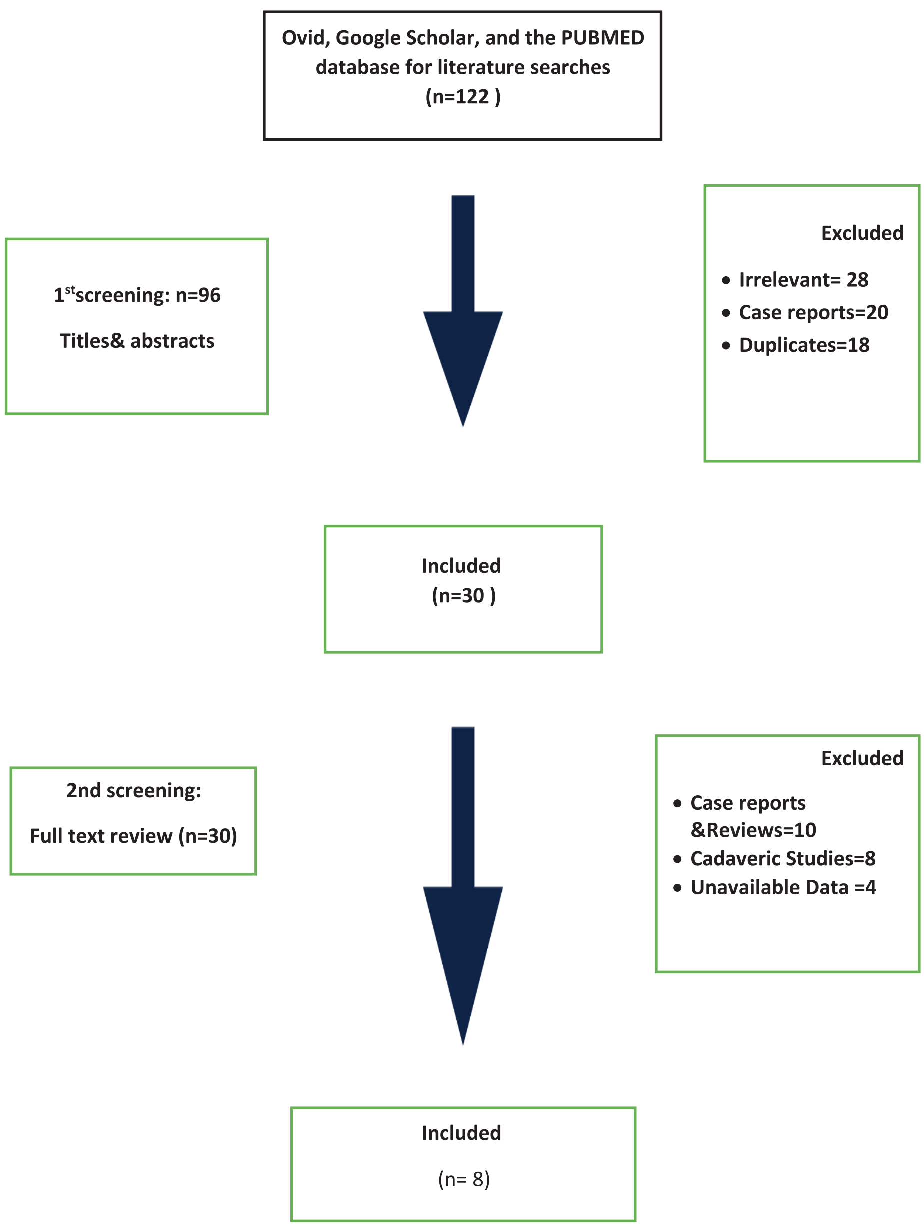

Fig. 1. PRISMA flow diagram for study selection.

Table 1. Characteristics of the included studies.

	Study ID	Study Region	Study Design	Study Period	Sample Size		Age (Years)		Gender: Males		Causes of Facial Palsy: CPA tumors		Bell's Palsy		Trauma	
					Intervention	Control	Intervention	Control	Intervention	Control	Intervention	Control	Intervention	Control	Intervention	Control
					Number	Number	Mean±SD	Mean±SD	Number	Number	Number	Number	Number	Number	Number	Number
1	**Albathi et al., 2015**	USA	Prospective Study	January 1, 2009, to March 31, 2015	14	5	47.6±12.41	44.6±4.22	8	3	14	5	0	0	0	0
2	**Altamami et al., 2019**	France	retrospective study	NR	7	6	49.4 (32–72)	61.7 (36–73)	4	1	7	6	0	0	0	0
3	**Bianchi et al., 2017**	Italy	retrospective study	January 2009 and May 2016	6	6	24				5		1			
4	**Biglioli et al., 2018**	Italy	Prospective Study	January 2011 and March 2017	20		32.45±10.82		9		0	0	0	0	0	0
5	**Li et al., 2022**	China	Prospective Study	June 2018 and August 2020	20		40.5 (18-62)		8		10		5		4	
6	**Socolovsky et al., 2016**	Argentina	retrospective study	January 2005 and July 2013	15	51	11–64	23–72	5	21	7	47	NR	NR	NR	NR
7	**Vincent et al., 2019**	USA	Prospective Study	September 14, 2015, and April 19, 2018	7	7	NR	NR	NR	NR	3		4			
8	**Zotov et al., 2020**	Russia	prospective study	2013-2016	21	9	48.8 (22 to 76)		10		29		0	0	1	

CPA=Cerebellopontine Angle, NR=non-reported, SD=Standard Deviation

Zotov et al.[18]). The range of age of the patients included in this study was from 32.5 to 61.7 ys. The main causes of facial nerve palsy were cerebellopontine angle tumors, 133 patients, succeeded by Bell's palsy, 10 patients, and traumatic causes, 5 patients (Table 1).

Twenty five individuals had facial paresis on the right side and 21 had it on the left. The average time to surgery ranged from 8.7 to 10.42 months in the intervention group of patients, while it was around 11.7−16.8 months in control group. The typical follow-up time was between 11.8 and 24.6 months (Table 2).

Four articles including 105 patients compared the control groups and the masseter transfer group's face grading systems (Bianchi et al.,[13] Albathi et al.,[5] Li et al.,[15] Socolovsky et al.[16]). Pooling the effect sizes in the model of random-effects ($I^2 = 75$ %, $P = 0.01$) showed a significant statistically result better mean facial grading between patients treated with master transfer, in comparison to the control group (standardized mean difference, SMD 2.657; 95 % 0.837, 4.476; $P = 0.004$) (Fig. 2).

Two studies including 41 patients with facial palsy evaluated the mean time to recovery between the master transfer and the control groups (Albathi et al.[5]; Zotov et al.[19]). The mean time to recovery was significantly low among patients treated with masseter nerve transfer (SMD -2.178; 95 % −2.934, −1.422; $P < 0.001$) (Fig. 3).

The difference in mean synkinesis score between the masseter nerve transfer and the group of control patients was described in six articles containing 145 candidates (Albathi et al.[5]; Altamami et al.[12]; Biglioli et al.[14]; Li et al.[15]; Socolovsky et al.[16]; Vincent et al.[17]). There was no significant statistically variation

Table 2. Facial paralysis related data and quality assessment of the included studies.

	Study ID	Side of the Paralysis: Right Side		Left Side		Time to surgery (Moths)		Control Arm	Follow-up Period (Months)	Quality Assessment	
		Intervention	Control	Intervention	Control	Intervention	Control			%	Decision
		Number	Number	Number	Number	Mean±SD	Mean±SD				
1	**Albathi et al., 2015**	NR	NR	NR	NR	10.42±4.01	16.8±3.033	Hypoglossal Nerve Transfer	18	66.66%	Good
2	**Altamami et al., 2019**	NR	NR	NR	NR	8.7 ± 7.6	11.7 ± 7	Hypoglossal to facial nerve anastomosis	NR	75%	Good
3	**Bianchi et al., 2017**	2		4		10.42±4.01	16.8±3.033	pretreatment	NR	66.66%	Good
4	**Biglioli et al., 2018**	14		6		22.8		pretreatment	NR	66.66%	Good
5	**Li et al., 2022**	9		11		NR	NR	pretreatment	11.8 (6.6-24.7)	75%	Good
6	**Socolovsky et al., 2016**	NR	NR	NR	NR	16.5 (2-192)		hemihypoglossal-facial neurorrhaphy	20.9 ± 6.2, 24.6 ± 7.1	66.66%	Good
7	**Vincent et al., 2019**	NR	NR	NR	NR	NR	NR	Pretreatment	NR	66.66%	Good
8	**Zotov et al., 2020**	NR	NR	NR	NR	NR	NR	No treatment	NR	66.66%	Good

NR=non-reported, SD=Standard Deviation

Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
	Statistics for each study						
Altamami et al., 2019	0.035	0.556	0.310	-1.056	1.125	0.062	0.951
Bianchi et al., 2017	10.468	2.213	4.900	6.130	14.807	4.729	0.000
Li et al., 2022	2.944	0.456	0.208	2.050	3.839	6.450	0.000
Socolovsky et al., 2016	1.933	0.339	0.115	1.270	2.597	5.711	0.000
	2.657	0.928	0.862	0.837	4.476	2.862	0.004

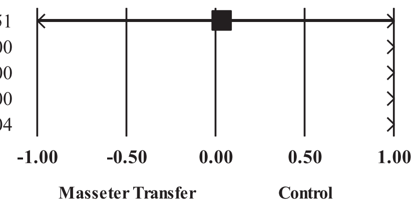

Fig. 2. Between the master transfer and control groups, the mean face grading system scores differed by a standardized mean difference and a 95 % confidence interval. Black squares size reflects the statistical importance of each trial. The pooled point estimate is shown by the grey diamond.

Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
	Statistics for each study						
Albathi et al., 2015	-2.177	0.629	0.396	-3.411	-0.944	-3.459	0.001
Zotov et al., 2020	-2.179	0.488	0.238	-3.134	-1.223	-4.467	0.000
	-2.178	0.386	0.149	-2.934	-1.422	-5.650	0.000

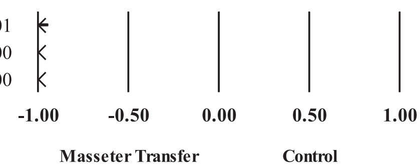

Fig. 3. The difference between the master transfer and control groups' mean times for facial palsy recovery, as well as their 95 % confidence intervals, are shown in a forest pattern. The proportion of each trial's statistical weight to its size was shown in black squares. While grey diamonds display what is called average point estimate.

between the control and the study groups (SMD -0.570; 95 % −1.697, 0.557; $P = 0.321$) in the model of random-effects ($I^2 = 90.32$ %, $P < 0.001$). Based on the symmetrical distribution of the studies along the line of null effect and the Egger's regression test results, regarding the publication bias there were no indication ($r = -5.51$, $P = 0.17$) (Figs. 4 and 5).

4. Discussion

Masseter neurotransmission is a safe procedure, but it has a few negatives and limitations. Comparing to the hypoglossal nerve we found that the masseter nerve appears to have less tension at rest. The nature of masseter muscle function can explain the lack of resting tone, as during activity it has tight contractions and a low resting tone. Because only the descending branch of the masseter muscle is divided, donor site morbidity is minimal, and the medial pterygoid muscle, as well as robust temporalis and contralateral muscles of mastication, stay unaltered through chewing. On the other hand, facial eating movements are common and were observed in a study by van Veen et al. as 12.7 % of patients described this as ‘annoyed’ or ‘very anxious’. In this study, 18.3 % of patients self-reported masseter atrophy. Dysfunctions of temporomandibular joint was not considered a possible complication of masseter nerve transmission.[8]

The purpose of the current study, which compared the functional results and side effects of the transfer procedures of hypoglossal and masseteric nerve,

Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
	Statistics for each study						
Albathi et al., 2015	0.000	0.521	0.271	-1.021	1.021	0.000	1.000
Altamami et al., 2019	-0.289	0.559	0.313	-1.385	0.807	-0.517	0.605
Biglioli et al., 2018	-1.435	0.355	0.126	-2.130	-0.740	-4.048	0.000
Li et al., 2022	1.064	0.338	0.114	0.402	1.727	3.150	0.002
Vincent et al., 2019	-4.862	1.063	1.130	-6.946	-2.779	-4.574	0.000
Socolovsky et al., 2016	0.610	0.298	0.089	0.025	1.195	2.042	0.041
	-0.570	0.575	0.330	-1.697	0.557	-0.992	0.321

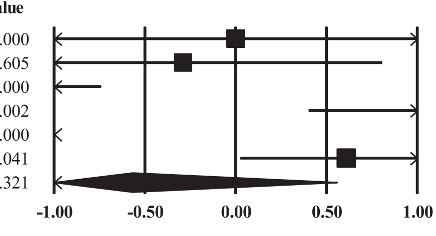

Fig. 4. The mean synkinesis score between the master transfer and the groups of control, together with the standard mean difference and 95 % confidence interval, are shown in a forest pattern. The size of the black squares reflects the statistical importance of each trial. The pooled point estimate is shown by the grey diamond.

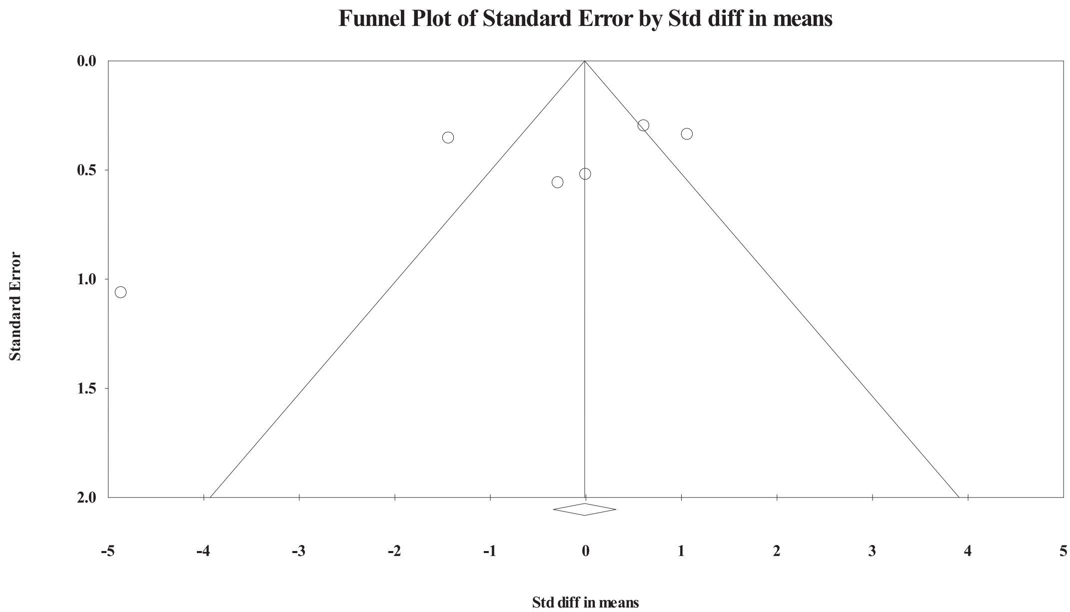

Fig. 5. The studies that are included in the funnel plot compare the master transfer and control groups' mean synkinesis scores.

was corresponding to the systematic review and meta-analysis by Urban et al. meta-analysis included 71 studies: 60 studies of them included 1312 hypoglossal-facial transfers plus 15 studies containing 220 masseteric-facial transfers. The average age of patients underwent masseteric-facial transfers was 42.9 years with 61 % females. Bell's palsy, trauma, and cerebellopontine angle tumors were the most typical causes of facial paralysis.

Murphey et al.[20] carried on a second systematic review and meta-analysis to examine masseteric nerve transfer results meant for facial reanimation. The study included 13 articles with 183 candidates undergoing masseteric nerve transfer (98 females and 85 males) with a mean (SD) age of 43 (12.2) years and mean (SD) follow-up examination past surgery of 22 (7.6) months. Tumors of the cerebellopontine angle, either from a mass effect or after removal, were the primary cause of facial nerve palsy, listed in 107 of 132 (81 %) cases. The study stated that age of the patient and the facial nerve branch were both related to how quickly the nerve recovered. Also, although the overall smile ratings remain the same, Wang et al.[21] investigated the relation between recovery time of the nerve and the age group and discovered that patients older than 40 years had longer recovery times (80.5 vs. 150.4 days), with the oldest patient who was 70 years having the longest recovery (365 days).

As well, age, sex, the underlying cause of facial paralysis, and the preoperative Sunnybrook Facial Grading System grade were found to be associated with the success of the transfer of masseteric-to-facial nerve by Li et al.

However, Socolovsky et al.[16] discovered that cause of facial nerve palsy, sex and age were non significantly associated with the outcome. Also, Bianchi et al.[13] found that there was not any correlation between age and outcome.

Three studies (Bianchi et al.[13]; Biglioli et al.[14]; Li et al.[15]) studied the prevalence of affected side, there were 25 patients with right sided facial paresis and 21 with left side facial paresis. 5 studies (Albathi et al.[5]; Altamami et al.[12]; Bianchi et al.[13]; Li et al.[15]; Socolovsky et al.[16]) have assessed the average time to surgery which was ranged from 8.7 to 10.42 months within the intervention group, while it ranged from 11.7 to 16.8 months among the group of control. 3 studies (Albathi et al.[5]; Li et al.[15]; Socolovsky et al.[16]) assessed the mean follow-up that was 11.8—24.6 months.

Comparable with our results Murphey et al.[20] revealed that 14 months on average (SD) were spent in a state of paralysis before the transfer of the nerve. 22 (7.6) months after surgery, the mean (SD) follow-up examination was conducted. The study also revealed that the majority of patients had complete, unilateral facial nerve paralysis when they underwent surgery.

Also, Urban et al.[18] showed that In the group receiving masseteric-facial transfers, the mean paralysis duration prior to nerve transfer was 14.5 months, and the mean follow-up was 16.1 months. When compared with the Hypoglossal group, the

Masseter group's mean follow-up was significantly shorter and its mean duration of paralysis was significantly longer.

Li et al.[15] reported that The results of the transfer of masseteric-to-facial nerve were associated with facial paralysis duration, according to logistic regression.

Socolovsky et al.[16] found no link between follow-up time and outcome, but they did find a negative impact of delay since injury on the outcomes of the surgery of facial reanimation.

The extended time before surgery (from 1 to 24 months), according to Altamami et al.,[12] did not significantly affect the final composite score. According to that, they anticipate roughly the same postoperative outcomes if the surgery is delayed by up to 24 months.

In the current study Four articles (Altamami et al.[12]; Bianchi et al.[13]; Li et al.[15]; Socolovsky et al.[16]) including 105 patients assessed the difference in facial grading system between the masseter transfer group and the control group. Pooling the effect sizes in the model of random-effects ($I^2 = 75$ %, $P = 0.01$) showed a statistically relevant better mean facial grading between patients treated with master transfer, in comparison to the control group (SMD 2.657; 95 % 0.837, 4.476; $P = 0.004$).

Our results were supported by Urban et al.[18] the meta-analysis by who revealed that there was significant improvement Facial Nerve Grading Scale in both groups, the study also revealed that Masseteric Transfer was better than Hypoglossal Nerve Transfer on the composite Sunnybrook Facial Nerve Grading Scale (47.7–7.4 vs. 33.0–6.4, $P < 0.001$).

In agreement with our results Li et al.[15] revealed that the candidates showed much enhancement regarding voluntary and resting movement domains ($P < 0.001$). Overall, however, only three patients displayed moderate synkinesis with an open-mouth smile or snarl (obvious but not disfiguring). Following the masseteric-to-facial nerve transfer (MFNT), the median total composite score amplified from 18 (12.5) to 49 (13.5), primarily due to voluntary movement and resting symmetry, with only minor score decreases in the domains of the eye, nasolabial fold, and oral resting symmetry. The lip pucker, snarl, and open mouth smile followed by gentle eye closure, showed the best functional recovery according to symmetry in voluntary movement, but brow lift was not improved.

Furthermore, Bianchi et al.[13] showed that the House-Brackman score changed from preoperative VI in all patients to II in two patients and III in four patients. Sunnybrook scores were 0–10 for him before surgery, but he was 62–84 at the last visit. The mean FDI score moved from 24 to 38.5, a highly statistically significant improvement ($P < 0.01$).

As well, Altamami et al.[12] revealed that total Sunnybrook score for both hypoglossofacial and masseter facial nerve anastomosis groups which is approximately symmetric; this indicates that generally speaking, both surgical techniques are nearly equally effective at reviving the paralyzed face. Socolovsky et al.[16] found that the nearly symmetric Sunnybrook score for the hypoglossofacial and masseterofacial nerve anastomosis groups indicates that, generally speaking, both surgical techniques are nearly equally effective at reviving the paralyzed face.

The mean time to recovery between the master transfer and the control groups was compared with both of the studies (Albathi et al.,[5] and Zotov et al.[19]), which included 41 patients with facial palsy. Median time for recovery was notably shorter among patients treated with masseter nerve transfer (SMD -2.178; 95 % −2.934, −1.422; $P < 0.001$).

Our findings were corroborated by Murphey et al.,[20] who reported that the average time needed for the recovery of the nerve was 5 months (around 2–7 months), explaining that this time varied depending on the facial nerve branch that was injured. Time to recovery increased with distal branch coaptation compared with main branch coaptation, 3.76 vs. 5.76 months (95 % CI, 0.33 to 4.32), however the mean difference was not statistically significant. With an interposition graft, nerve recovery took 6.24 months instead of 4.06 months (95 % CI, 0.20 to 4.16). Age of the patient as well as the facial nerve branch were related to how quickly the nerve recovered.

Additionally, Urban et al.[18] found that the masseteric nerve transfer had a significantly shorter time to first movement (in months) than the hypoglossal nerve transfer (4.6–2.6 vs. 6.3–1.3, P 0.001).

Furthermore, Albathi et al.[5] discovered that the masseteric nerve recovers more quickly than hypoglossal nerve transfers (5.6 vs. 10.8 months).

As well, Zotov et al.[19] revealed that function recovery time was less in the short duration of facial palsy group in comparison to the group with longer duration of symptoms (6 vs. 8 months, $P = 0.003$), indicating the correlation between palsy duration and time to recovery.

In the current meta-analysis, the difference in mean synkinesis score between the masseter nerve transfer and the groups of control were mentioned in six articles containing 145 patients (Albathi et al.[5]; Altamami et al.[12]; Biglioli et al.[14]; Li et al.[15]; Socolovsky et al.[16]; Vincent et al.[17]). There was no statistically significant difference between both groups (SMD -0.570; 95 % −1.697, 0.557; $P = 0.321$) in the random-effects model (I2 = 90.32 %, $P < 0.001$). Based on the symmetrical distribution of the studies along the line of the null effect and the results of the Egger's regression test ($r = -5.51$, $P = 0.17$), there was no evidence of publication bias.

In their cohort of both nerve transfers, Albathi et al.[5] found no statistically significant variations in the levels of synkinesis. According to Socolovsky et al.,[16] direct masseteric transfer resulted in better synkinesis outcomes for their hypoglossalfacial cohort than an interposition graft, but there was no difference between their masseter and direct hypoglossal transfer groups. The rates of synkinesis between the two procedures in Altamami et al.[12] cohort were not significantly different overall, but there was significantly more ocular synkinesis with masticating, yawning, and talking in the group treated with the transfer of hypoglossal nerve.

However, Vincent et al.[17] discovered that Patients showed a major improvement in mean (SD) eFACE scores in multiple domains, including dynamic function (preoperative, 62.57 [15.37]; smile (preoperative, 65.00 [8.64]; synkinesis (preoperative, 52.70 [4.96]; postoperative, 76.43 [7.79]; $P = 0.01$), and postoperative, 75.71 [8.48]; $P = 0.03$), and postoperative, 82.00 [6.93]; $P < 0.001$), lower face and neck function (preoperative, 51.14 [16.39]; midface and smile function (preoperative, 60.71 [13.52]; and postoperative, 78.86 [14.70]; $P = 0.02$), and postoperative, 66.43 [20.82]; $P = 0.046$). Preoperative House-Brackmann Facial Nerve Grading System scores ranged from 3 to 4, and postoperative scores ranged from 2 to 3; this change was not significant'.

Also, Li et al.[15] revealed that the patients experienced prominent high score in synkinesis domain ($P < 0.05$).

Additionally, according to Biglioli et al.,[14] seven out of the 11 patients had their synkinesis completely resolve, while three of the 11 still displayed it, albeit with a reduced degree and only in response to stronger stimuli than before surgery. In one of the 11 patients, synkinesis did not get better.

Recent research has shown that by supplying two distinct nerve inputs, the combination strategy reduces synkinesis. Additionally, the use of selective neurectomy and botulinum toxin therapy could be beneficial salvage treatments for synkinesis that is severe or disfiguring (Vincent et al.[17]; Azizzadeh et al.[22]; Cooper et al.[23]).

Interestingly, a delayed surgical method depending on the transfer of the hypoglossal facial nerve was preferred over immediate repair to prevent synkinesis. (Guntinas-Lichius et al.[24]).

Additionally, problems were modest and uncommon, occurring in only 6.5 % (12 of 183) of patients, according to Murphey et al. Additionally, Urban et al.[18] found that both procedures had few (5 %) side effects.

4.1. Conclusion

The paralyzed midface and perioral area can be revived with the Masseteric Nerve Transfer method. With minimal surgical morbidity, the masseteric nerve transfer can produce satisfactory symmetry and perception. It is necessary to corroborate the existing findings with further clinical studies containing larger sample sizes and longer follow-up in order to identify the risk factors for unfavorable outcomes.

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