

A Clinical Study and Psychological Impact of Lower Motor Neuron Type of Facial Nerve Palsy

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Abstract

Background: To study the clinical and psychological impact of lower motor neuron type of facial nerve palsy. **Subjects and Methods:** The Prospective longitudinal observational study was conducted in the department of otorhinology TMMC & RC Hospital, Moradabad. All the patients of LMN type of facial nerve palsy who presented to this department who fulfilled the inclusion criteria. Topodiagnostic assessment of palsy refers to the testing (functional) an individual branch of facial nerve to anatomically locate the level of injury or dysfunction. The tests included: Schirmer's test, Stapedial reflex test and sensation of taste on anterior 2/3rd of the tongue. House Brackmann classification is used to clinically assess the Degree of palsy. **Results:** LTBF was the leading cause of facial palsy. Suprastapedial lesion was found to be the commonest site of affection. Grade 2 and 4 facial palsy was the commonest grade. According to HAD-Scale the common were 9-A and 10-D, 11-D, 15-D, 18-D. **Conclusion:** The quality of life can be negatively impacted in a variety of ways by facial palsy. It has the potential to impact a wide range of functions, including the inability to make facial expressions, speak, see, drink, or eat properly. It is also possible for this to result in psychological symptoms and physical pain. Patients who are afflicted with facial nerve paralysis have a diminished quality of life as a result of functional and cosmetic problems.

Keywords: Facial Palsy, Lower Motor Neuron, Quality of life.

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Introduction

The important functions carried out by the facial nerve include lacrimation, salivation, taste and facial expression. It is the peripheral nerve which is mostly disabled and the most important complication that surgeons tend to avoid. It is made of motor, sensory and parasympathetic axons. Nervus intermedius is its sensory root which carries visceral motor and gustatory fibres.^[1]

'Gabriel Falloppius' (1523-1562) described the anatomical course of the facial nerve within bone (Temporal).^[2] 'Sir Charles Bell' (1774- 1842) described the motor innervation to the 7th nerve.^[3] Facial nerve consists of 3 nuclei (Main motor nucleus, nucleus tractus solitarius and nucleus salivatorius superioris, The facial nerve passes through an Intracranial, Intratemporal (longestcourse), Extratemporal course1 and The facial nerve derives most of its blood supply from branches of External Carotid Artery system.^[4,5]

There are 2 types of facial palsy: UMN and LMN. The palsy may be central or peripheral in cause. Peripheral lesion i.e. (Intracranial, Intratemporal and Extratemporal) are more common and about 2/3rd of them are of idiopathic variety. Bell's Palsy (60%-75%) is the commonest cause of LMN palsy.^[1]

Other important causes of CN 7th palsy are: birth trauma,

temporal bone injury, COM with cholesteatoma, herpes zoster, 7th nerve tumor, post- surgical tumor, malignant otitis externa. The clinical features of 7th nerve palsy are - ipsilateral facial muscle loss, inability to raise the eyebrow, inability to close eyelid and drooping of the mouth corner.^[6] The lesion level in intratemporal course of 7th CN can be found out by topodiagnostic tests: Schirmer's test (nerve to be tested is greater superficial petrosal nerve and lesion is suprageniculate), Stapedial reflex test (nerve to be tested is nerve to stapedius and lesion is suprapetrous), Taste test (nerve to be tested is chorda tympani nerve and lesion is suprachordal) and Submandibular salivary flow (nerve to be tested is chorda tympani nerve and lesion is suprachordal).^[7]

Earliest manifestation of facial palsy is delay in blinking and grading the severity of weakness at presentation but it has a limited value. For more clear view House-Brackmann grading is the common one.^[8] There are total six grades varying from 1st Grade (intact), 2nd Grade (dysfunction is mild), 3rd Grade (dysfunction is moderate), 4th Grade (moderately-severe dysfunction), 5th Grade (dysfunction is severe) to 6th Grade (complete paralysis).

Patient who suffered from facial paralysis experience not only the functional problems like eating and drinking but also the psychological problems (anxiety, depression, social isolation), physical functioning and overall well-being

which result in embarrassment. Psychological distress was measured by HADS (The Hospital Anxiety and Depression Scale) which consist of 14 items. The overall score of each scale is between 0 and 21.^[9]

The current study was done to observe the severity & etiology of facial palsy according to House Brackmann grading and study the level of psychological distress according to HADS.

Subjects and Methods

The Prospective longitudinal observational study was conducted in the department of otorhinolaryngology TMMC & RC Hospital, Moradabad. All the patients of LMN type of facial nerve palsy who presented to this department who fulfilled the inclusion criteria from time of approval of study were included in this study.

Study population

The study included Patients who presented with LMN type of facial palsy of both sexes, Patients of either sex, above 14 years of age and Patients above 14 years of age with psychiatric illness diagnosis or receiving treatment currently due to facial palsy.

The study excluded Patients who presented with Lower motor neuron facial palsy associated with congenital syndromes, Lower motor neuron facial palsy less than 14 years of age, UMN type of facial palsy, Unconscious patients, unco-operative patients, Patients who could not come to follow up and Patients less than 14 years of age with a psychiatric illness diagnosis or receiving treatment currently.

Method of collection of data

The assessment of every patient was done by taking a detailed history which included onset time of symptoms, duration, progression rapidity and paralysis completeness. Questions were also asked regarding previous episodes, associated auditory/vestibular/neurological symptoms, family history, chronic illness like Diabetes Mellitus, Hypertension, Tuberculosis, Autoimmune diseases or Malignancy, trauma history & previous surgeries.

Facial nerve function assessment was done by evaluating degree of movements (voluntary) of facial musculature which includes closure of eyelids, forehead wrinkling, whistling, cheeks blowing, corneal & conjunctival reflexes,

presence of nasolabial folds, angle of mouth deviation, facial symmetry status at rest & motion & Bell's phenomenon.

Topodiagnostic assessment of palsy refers to the testing (functional) an individual branch of facial nerve to anatomically locate the level of injury or dysfunction.^[10]

The tests included: Schirmer's test, Stapedial reflex test and sensation of taste on anterior 2/3rd of the tongue.^[11] House Brackmann classification is used to clinically assess the Degree of palsy.^[11]

A complete ENT with head & neck examination was done for every case. Laboratory studies done routinely, PTA & Impedance Audiometry were also included in the clinical assessment. HRCT scan temporal bone was indicated in cholesteatoma & acoustic neuroma & MRI was done only in cases with neoplastic, traumatic or inflammatory etiology. Psychological distress was measured using HADS (Hospital Anxiety & Depression Scale). Each subscale's total score ranges from 0 to 21. A score of less than 7 is a non-case, 8 to 10 is a probable case & more than 11 as a definite case.^[9]

Statistical analysis

SPSS version 25.0 analyzed the Excel data when it was loaded. Quantitative (numerical variables) data was given as mean and standard deviation, whereas qualitative (categorical variables) data was provided as frequency and percentage. The student t-test was used to compare the two groups' mean values, while the chi-square test analyzed their frequency differences. If p0.05, it was statistically significant.

Results

Socio-demographic and clinical factors

As shown in [Table 2], more males were admitted than females with the proportion of 67.4% and 32.6% respectively. The most frequent age group admitted to ICU with the diagnosis of COVID 19 was >63 years old (60.7%), of them 69.9% were died. The median duration of illness before admission was 8 days (interquartile range 1-8days). Cough (93.2%), loss of appetite (88.3%), easily fatigability (88%), shortness of breath (87%) and fever (61.7%) were the most frequent symptoms respectively.

Table 1: Shows the basic information about the study population

		Patients	Percent
Age	10-20 years	6	13.3%
	21-30 years	12	26.7%
	31-40 years	6	13.3%
	41-50 years	9	20.0%
	≥ 51 years	12	26.7%
Gender	Male (M)	25	55.6%
	Female (F)	20	44.4%
Facial Palsy side	Left	23	51.1%
	Right	22	48.9%
Cause	Bell's Palsy	3	6.7%
	CSOM	10	22.2%
	Iatrogenic-MRM	3	6.7%
	Iatrogenic-superficial Parotidectomy	2	4.4%

	Idiopathic	3	6.7%
	LTBF	14	31.1%
	TTBF	4	8.9%
	Ramsay Hunt Syndrome	4	8.9%
	Tumor (VS)	2	4.4%
Level of Lesion	Supragenicular	17	37.8%
	Suprastapedial	20	44.4%
	Suprachordal	6	13.3%
	Peripheral	2	4.4%

Most of the subjects belonged to 21-30 years and >51 years (26.67% each). There were 55.6% males and 44.4% females. Left side was affected among 51.1% and right side among 48.9% subjects. The cause was LTBF among most (31.1%) followed by CSOM (22.2%), Ramsay Hunt and TTBF (8.9%). The Level of lesion was Supragenicular among 37.8%, Suprastapedial among 44.4%, Suprachordal among 13.3% and Peripheral among 4.4% subjects.

Table 2: Shows House Brackman Grading, Topodiagnostic test-Schirmer test, Stapedial reflex and Taste test among the study population

		No. of patients	Percent
House Brackman Grading	Grade 1	2	4.4%
	Grade 2	12	26.7%
	Grade 3	10	22.2%
	Grade 4	12	26.7%
	Grade 5	7	15.6%
	Grade 6	2	4.4%
Topodiagnostic test-Schirmer test	Normal	28	62.2%
	Reduced	17	37.8%
Stapedial reflex	Absent	37	82.2%
	Present	8	17.8%
Taste test	Absent	43	95.6%
	Present	2	4.4%

As per House Brackman Grading, Grade 1 was found among 4.4%, Grade 2 among 26.7%, Grade 3 among 22.2%, Grade 4 among 26.7%, Grade 5 among 15.6% and Grade 6 among 4.44% subjects. Topodiagnostic test-Schirmer test showed reduced among 37.8% subjects. Stapedial reflex showed absence among 17.8% subjects. Taste test showed absence among 4.4% subjects.

Table 3: Shows the relation of Level of lesion with grading

Level of lesion	1st Grade	2nd Grade	3rd Grade	4th Grade	5th Grade	6th Grade
Supragenicular		5	3	5	2	2
Suprastapedial	2	5	5	5	3	
Suprachordal			2	2	2	
Peripheral		2				
Total	3	12	10	12	7	2
p-value	0.001*					

Supragenicular and Suprastapedial lesions were more among grade 2, 3, 4 and 5.

Table 4: Shows High Resolution Ct Temporal Bone Finding, Contrast Enhanced Magnetic Resonance Imaging Brain and Total HAD-S score among study population

		No. of patients	Percent
High Resolution Ct Temporal Bone Finding	Normal	3	6.7%
	Fracture of Temporal Bone – Longitudinal	14	31.1%
		4	8.9%
	COM (chronic otitis media)	10	22.2%
	Others	3	6.7%
Contrast Enhanced Magnetic Resonance Imaging Brain	No	43	95.6%
	S/O vestibular schwannoma	2	4.4%
Total HAD-S score	5-A	2	4.4%
	6-A	4	8.9%
	7-A	3	6.7%
	8-A	4	8.9%
	8-D	1	2.2%
	9-A	5	11.1%
	9-D	2	4.4%
	10-A	1	2.2%

10-D	3	6.7%
11-A	2	4.4%
11-D	3	6.7%
12-A	1	2.2%
12-D	2	4.4%
13-A	1	2.2%
13-D	1	2.2%
15-D	3	6.7%
18-D	3	6.7%
19-D	1	2.2%
19-A	1	2.2%
21-D	2	4.4%

High Resolution CT Temporal Bone Findings showed 22.2% Cases had COM (chronic otitis media), Longitudinal Fracture of Temporal Bone among 31.1% and Transverse Fracture of Temporal Bone among 8.9% cases. Contrast Enhanced Magnetic Resonance Imaging Brain showed S/O vestibular schwannoma was present among 4.4% subjects. As per Total HAD-S score, most of the subjects had 9-A (11.1%). 5 cases of 9-A (11.1%) with Anxiety is affected most and 12 cases of 10-D, 11-D, 15-D and 18-D (6.7%) with Depression is affected most.

Discussion

Idiopathic facial nerve palsy, also known as Bell's palsy, is the most frequent cause of these damages. Male adults are more likely to develop Bell's palsy and traumatic facial palsy than females. Another frequent reason is trauma. An accurate clinical history, clinical examination, and radiological investigations are typically sufficient to make the diagnosis of facial nerve diseases. In determining prognosis and the best course of action for surgery, electrophysiological studies are crucial.^[12]

In our study, most of the subjects belonged to 21-30 years and >51 years (26.67% each). Konnur and Ingale^[12] reported that out of 50 patients, LMN facial palsy affected more adults between the ages of 20-40 years and 20-40 years age group was more likely to have Bell's palsy. Mustafa and Suleiman.^[13] reported that around 38% of them were in the group 21-40 years. Chang et al.^[14] stated that prevalence rate increased with age. Hohman et al.^[15] stated that 44.5±18.6 years were mean age group.

Moala et al.^[8] reported that high incidence is seen in 31-40 years (22.8%) and mean 35.7 years of age.

Rodrigues et al.^[16] also found that facial paralysis was more common in 40 to 49 years of age. Asma et al.^[17] found the average 47.14 years of age. Sudhakaran et al.^[18] found that the average 45.88 years in BP patients, 27.1 years of age in traumatic palsy.

Current research, there were 55.6% males and 44.4% females. Konnur and Ingale.^[12] reported that LMN facial palsy affected more men than women in the ratio of 1.5:1. Mustafa & Suleiman.^[13] reported 55.0% were females and 45% were male. Chang et al.^[14] stated that FP was more prevalent among women.

Hohman et al.^[15] stated that 61% were female. Moala et al.^[8] stated that 61.4% were males and 38.6% were females. In the study by Asma et al.^[17] 47.1% of the patients were

women.

In present study, left side was affected among 51.1% and right side among 48.9% subjects. Mustafa and Suleiman.^[13] reported that right side affected in 51% of patients. Daniel et al.^[19] found that right eye affected in 50.5% cases and left eye 45.3% cases and bilateral 4.2% cases. Moala et al.^[8] found that left side affected in 60.2% cases and right side in 39.8% cases.

In current study, the cause was LTBF among most 31.1% followed by CSOM 22.2%, Ramsay Hunt and TTBF 8.9%. Moala et al.^[8] stated that commonest cause were Bell's palsy 33.3% followed by trauma 24.1% & CSOM 18.1%). Eight patients (9.6%) of diabetic patients had malignant otitis externa. Ramsey Hunt syndrome affected seven individuals in this research group (8.4%). The parotid tumor, local anesthetic, and Carotid body tumor were determined to have the lowest incidences (3.6%, 1.2%, and 1.2%, respectively).

Hohman et al.^[15] stated that most common were Bell's palsy seen in 38%. Daniel et al.^[19] found it has been reported that Blood pressure was the etiology between 46.4% and 69.2% in some of the research.^[20-22] with iatrogenic cases ranging from 14.4-17.4%, traumatic cases ranging from 8.9-10.5%. Nearly 90 percent of all non-traumatic and iatrogenic occurrences were due to BP.^[15]

In current study, as per H-B Grading, Grade 1 was found among 4.4%, Grade 2 among 26.7%, Grade 3 among 22.2%, Grade 4 among 26.7%, Grade 5 among 15.6% and Grade 6 among 4.44% subjects. Chang et al.^[14] reported that 0.12% subjects of age less than 1 had grade 3 or more palsy. Mustafa and Suleiman.^[13] found grade 2 in 37.5%, grade 4 in 31.3% and grade 3 in 14.6%.

Using his grading system, Pietersen.^[22] stated that 12% had grade 2 at time of presentation, 13% in grade 3 and 4% in grade 4 & 5 paralysis. Sudhakaran et al.^[18] found that 47.1% in grade 4, 32.4% in grade 3. Based on the H-B scale, 47.1% of the 121 patients in the study by Zohrevandi et al.^[23] had nerve damage of grade 4 or grade 5.

We found that Topodiagnostic test-Schirmer test showed reduced among 37.8% subjects. Stapedial reflex showed absence among 17.8% subjects. Taste test showed absence among 4.4% subjects. Bharathi et al.^[24] reported that Electrodiagnostic test—electroneuromyography (ENMG) was abnormal among 67.1% individuals.

In our investigation, loss of taste was almost similar to the findings by Konnur et al.^[12] Mustafa and Suleiman.^[13] discovered that 13% of the patients had taste alterations as a

result of the incident. However it was much lesser than that reported by Pietersen.^[22] observed 83% patients had incomplete decreased or eliminated taste & eighty percent of them were able to restore normal taste function. El-Ebiary.^[25] discovered that 14% of the patients in his research complained of taste abnormalities.

In present study, Level of lesion was Suprageniculate among 37.8%, Suprastapedial among 44.4%, Suprachordal among 13.3% and Peripheral among 4.4% subjects. Suprageniculate and Suprastapedial lesions were more among grade 2, 3, 4 and 5.

Bharathi et al.^[24] reported that in 67.3% bells palsy cases had geniculate / Suprageniculate area involved, 20.8% Suprastapedial & 11.9% Suprachordal.

Sudhakaran et al.^[18] found that topodiagnostic tests showed that most of the lesions were in the suprageniculate/geniculate area, which made up 55.9% of the total number of lesions (19 cases). Yanagihara et al.^[26] looked at 53 Bell's palsy patients who had lost nerve function, which was shown by electrodiagnostic tests. In 60% of these cases, the nerve degeneration was caused by the suprastapedial lesion, and in the other 40%, it was caused by the infrastapedial segment. In our study, the infrastapedial was found to be the most common place. Asma et al.^[17] stated that 10 patients had iatrogenic facial paralysis immediately after mastoid surgery sixty percent injuries were to second genu, which was the most common place to get hurt.

In current study, as per Degree of hearing impairment, majority had mild impairment (37.78% and 28.89% for right and left ear respectively) followed by Moderate (13.33% for both ears), Moderately-Severe (8.89% and 15.56% for right and left ear respectively) and Severe (4.44% for both ears) conductive loss. Mustafa and Suleiman.^[13] observed that 10.4% patients had decreased hearing which was much lower than our study.

In our study HRCT Findings showed COM among 22.2%, Longitudinal Fracture of Temporal Bone among 31.1% and Transverse Fracture of Temporal Bone among 8.9% cases. It was found in our study that Contrast Enhanced Magnetic Resonance Imaging Brain showed S/O vestibular schwannoma was present among 4.4% subjects.

We found that as per Total HAD-S score, most of the subjects had 9-A (11.1%), and 10-D, 11-D, 15-D, 18-D (6.7%) each. Out of 45 cases: 5 cases of 9-A (11.1%) with Anxiety is affected most and 12 cases of 10-D, 11-D, 15-D, 18-D (6.7%) with Depression is affected most.

Engstrom et al.^[27] came to the conclusion that a patient's prognosis is worse if they have a lot of nerve damage at both the first exam and the first follow-up. Gordana and Stojanka.^[28] stated that partial palsy in the beginning leads to full recovery till the end whereas a complete palsy at the starting lead to a permanent palsy at the end.

Sudhakaran et al.^[18] reported that at 1-year follow-up, 41.2% had fully recovered, 35.3% had only partially recovered, 6.6% showed no signs of recovery, and 2.9% had died. Pietersen.^[22] found that in 85% cases, function of 7th nerve came to be normal in three weeks and in 15% it came back between 3 and 5 months later.

Conclusion

The quality of life can be negatively impacted in a variety of ways by facial palsy. It has the potential to impact a wide range of functions, including the inability to make facial expressions, speak, see, drink, or eat properly. It is also possible for this to result in psychological symptoms and physical pain. Patients who are afflicted with facial nerve paralysis have a diminished quality of life as a result of functional and cosmetic problems. The more difficult task of managing the social stigma associated with facial palsy can be accomplished by the use of medication, surgery, face exercises, and appropriate counseling with patients and their family members.

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