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Original Research Article

Outcome of Facial Nerve Decompression Surgery in Cases of Facial Palsy Patients

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Abstract:

Introduction: Facial nerve paralysis or paresis is a debilitating condition that impairs facial expression, mechanisms that protect the eye, ability to eat or drink, and communication. Erosion of the bony fallopian canal can occur in active mucosal COM but probably more commonly in squamosal COM in up to19% case [1] .Idiopathic facial palsy, accounts for 75% of acute facial paralysis. Decompression of the facial nerve can aid the restoration of facial nerve function for appropriately selected patients.

Methods: In the present study, we have assessed improvement in facial paralysis, in patients undergone facial nerve decompression from July 2023 to July 2024 at Narendra Modi Medical College. Demographics, duration between onset of symptoms and surgical decompression, grade of facial nerve dysfunction pre- and post-operatively was assessed using clinical scale the House-Brackmann (HB) scale and follow up was recorded.

Results: In the present study, we have operated 10 patients having facial nerve paralysis with less than 4 months duration of onset. Facial physiotherapy was given to all post-operative patients. Most of patients required oral steroids and/or anti-viral treatment after surgery. Out of 10 patients, 5(50%) patients improved up to grade1 HB scale, 4(40%) patients improved up to grade 2 HB scale while slow recovery was noted in only 1(10%) patient.

Conclusion: Chronic condition of ear pathology like squamosal chronic otitis media and/or traumatic causes of facial palsy refractory to oral steroids and anti-viral treatment requires facial nerve decompression surgery with or without medical support for better outcome.

Keywords: Facial Nerve Paralysis, Cholesteatoma, Facial Nerve Decompression, House Brackmann Classification.

Introduction

Facial nerve paralysis or paresis is a debilitating condition that impairs facial expression, mechanisms that protect the eye, the ability to eat or drink, and communication.[2] Cholesteatoma induced bone destruction seems to be a multifactorial process, involving biomechanical (i.e. pressure), biochemical (i.e. osteolytic enzymes), and cellular (i.e., osteoclasts) factors (13Y16). The accumulation of keratin debris increases pressure on adjacent bone, resulting in cortical devascularization and resorption. Keratin can also act as a foreign body, inducing macrophage activity. A variety of endotoxins and enzymes are released by the bacteria that colonize the cholesteatoma. Finally, subepithelial (fibroblast-like) mesenchymal cells proliferate in this environment, again releasing collagenase and other enzymes capable of dissolving bone which can cause dehiscence in the facial nerve canal. Decompression of the facial nerve can aid the restoration of facial nerve function for appropriately selected patients [3]. Most patients with facial palsy recover facial nerve function with conservative treatment (steroids and/or antivirals). However, a subset of patients, who can be identified using electrophysiological testing, have a worse prognosis and may benefit from facial nerve decompression. [4] Electromyographic examination provides essential information regarding the severity and prognosis of facial palsy, according to the type of neural involvement observed: axonal or myelinic.[5] An incomplete nerve conduction block with blink reflex impairment indicates the presence of neurapraxia, with a good prognosis. Axonal lesions (axonotmesis or electrophysiological

neurotmesis) have a less favourable prognosis, and are indicated by the presence of in excitability, which develops more rapidly as the intensity of neural damage worsens. [6] According to Fisch et al, detection of more than 95 % non-excitable fibres on the 14th day is associated with a less than 50 % chance of obtaining satisfactory facial function.[6] In the present study, ten patients with unilateral facial paralysis despite conservative medical treatment(oral steroid and/or anti-viral no improvement in facial paralysis so that went for facial nerve decompression ,improvement in post-operative HB grading with compare to pre-operative HB grading. Traumatic temporal bone fracture is another common cause of acute facial palsy. [4]

Aims and Objectives:

- To evaluate pre-operative HB grade in facial paralysis patients not responding to the conservative management and for further decision of facial nerve decompression surgery.
- To evaluate post-operative HB grading scale after facial nerve decompression.
- To study and assess improvement in facial nerve paralysis on the basis of HB grading scale after facial nerve decompression surgery.

Materials and Methods:

In this present case study was carried out in patients presenting in our ENT department from July 2023 to July 2024 with chief complain of facial paralysis. A detailed history was taken to know the mode of onset and sequence of events that caused facial palsy. Complete clinical examination was done by clinical scale the House-Brackmann (HB) scale during pre-operative and post-operative Grade of the facial palsy was identified by HB grading scale. Haematological Investigations were done like CBC, LFT, RFT, PT-INR, APTT, serum electrolyte, blood group, HIV, HBsAg, Audiological investigation were done like Pure tone audiometry, Impedance audiometry and Radiological investigation were done like HRCT temporal bone, MRI. Follow up taken regularly to check post-surgical facial nerve paralysis improvement.

Inclusion Criteria:

1. Patients having facial nerve paralysis.
2. Patients not responding to conservative treatment and requiring facial nerve decompression surgery
3. Patients giving consent for surgery.
4. Patient fit for surgery.

Exclusion Criteria:

1. Patients having Upper motor neuron facial nerve palsy.
2. Patient with facial palsy who were not fit for surgery.
3. Patient not giving consent for surgery

House Brackmann grading 1985 [7]

The HOUSE-BRACKMANN scale is a facial nerve grading system, at one end of the scale there is normal facial nerve function and at the other there is complete paralysis.

Grade	Description	Characteristics
1	Normal	Normal facial function in all areas
2	Mild dysfunction	Gross: slight weakness noticeable on close inspection; slight synkinesis At rest: normal symmetry and tone Motion: forehead-moderate to good function; eye-complete closure with minimum effort; mouth-slight asymmetry
3	Moderate dysfunction	Gross: obvious but not disfiguring difference between two sides; noticeable but not severe synkinesis; contracture and/or hemi-facial spasm At rest: normal symmetry and tone Motion: forehead-slight to moderate movement; eye-complete closure with effort, mouth-slightly weak with maximum effort
4	Moderately severe dysfunction	Gross: obvious weakness and/or disfiguring asymmetry At rest: normal symmetry and tone Motion: forehead-none; eye-incomplete closure; mouth-asymmetric maximum effort
5	Severe dysfunction	Gross: only barely perception motion At rest: asymmetry Motion: forehead-none, eye-incomplete closure; mouth-slight movement
6	Total paralysis	No improvement

Results:

Table 1: Age Distribution

Age	No. of cases (N=10)	%
10-20	1	10
20-30	5	50
30-40	3	30
40-50	1	10

In the present study, majority of the cases undergoing facial nerve decompression were under 20-30 age group (i.e. 5 patients) and only 1 case were reported in children.

Table 2: Pre-operative HB grading

Pre-operative HB Grade	In the Present Study(n=10)
6	6
5	3
4	1
3	0
2	0
1	0

In the present study, out of 10 cases, 6 cases had pre-operative HB grade 6, 3 cases had pre-operative HB grade 5, only 1 case had pre-operative HB grade 4, no cases were seen having HB grade 3 and HB grade 2.

Table 3: Comparison of Pre-operative HB grading

Pre-operative HB grade	In the Present study cases(n=10)	M.Ikeda et al [8] (n=16)	Jin kim et al [9] (n=23)
(Grade 6 OR Grade 5) complete paralysis	9 (90%)	5(31.25%)	13(56.52%)
(Grade 2 or Grade 3 or Grade 4) Incomplete paralysis	1 (10%)	11(68.75%)	10(43.47%)

In the present study, all patients with facial paralysis were assessed by HOUSE BRACKMANN grading. Out of 10 patients, 9 patients (90%) presented with complete paralysis (Grade 6 or Grade 5). In M.Ikeda et al study [8], 5 cases out of 16 had pre-operative grade 6 or 5 paralysis. In Jin kim et al study [9], 13 cases out of 23 had pre-operative grade 6 or 5 paralysis (complete paralysis).

Table 4: Evaluation of House Brackman Grading

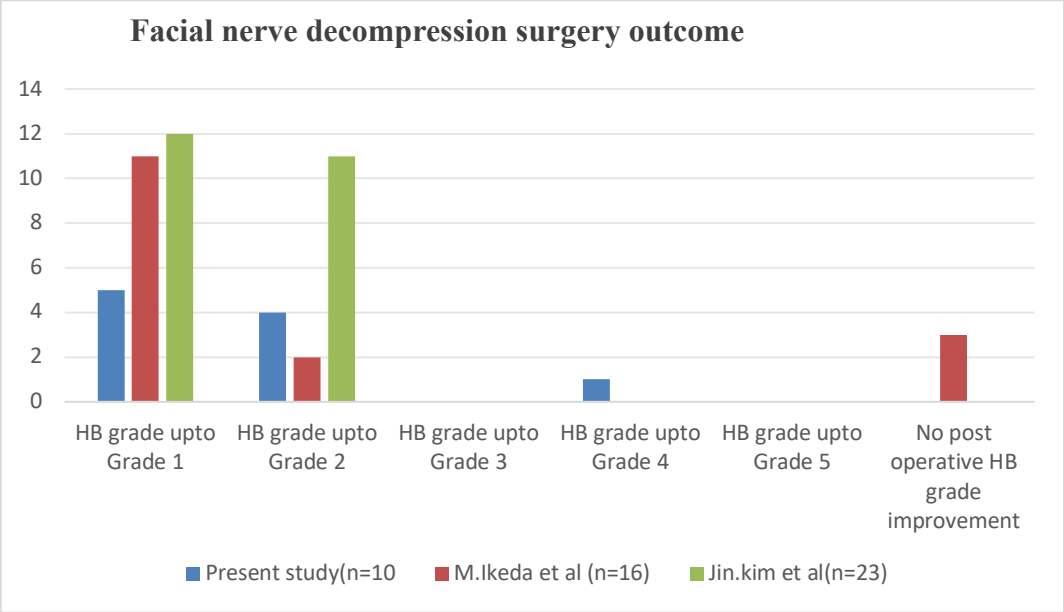
Ear	Duration of ear discharge	Laterality of facial palsy	Duration of Facial palsy (days/months)	Pre op HB grading	Post op HB grading after 1 month follow up	Post op HB grading after 6 month follow up
Right	3-4 years	Right	1 day	5	3	1
Both	10 years	Left	7 days	6	4	1
Right	5 years	Right	12 days	6	4	2
Left	1 year	Left	3 days	5	2	1
Right	6 months	Right	6 days	6	3	1
Left	4 years	Left	10 days	6	3	2
Left	5 months	Left	8 days	5	4	2
Right	1 year	Right	10 days	4	2	1
Right	9 months	Right	4 days	6	3	2
Left	3 years	Left	10 days	6	5	4

In the present study, shows that all 10 patients have undergone facial nerve decompression. Out of 10 patients, 9 patients had pre-operative HB scale 6 or 5 and only 1 patient presented with grade 4. Oral steroids and/or Anti-viral treatment given to all post-operative patients. Facial nerve decompression surgery was performed in the patients not responding to the conservative treatment. On 1 month post-operative follow-up, up to grade 2 improvement was seen in 2 patients(20%) , up to grade 3 in 4 patients(40%), up to grade 4 in 3 patients (30%), up to grade 5 in 1 patient(10%). On 6 months post-operative follow-up, improvement up to grade 1 was seen in 5 patients (50%), up to grade 2 in 4 patients (40%), up to grade 4 in 1 patient (10%). From the above table, we have operated patients with facial paralysis within 14 days for facial nerve decompression.

Table 5: Comparison of Post-operative HB score

Post-operative HB grade	No of patients/cases		
	Present study(n=10)	M. Ikeda et al[8] (n=16)	Jin. kim et al [9] (n=23)
From HB grade 6,5,4,3,2 to grade 1	5(50%)	11(68.75%)	12(52.17%)
From HB grade 6,5,4,3 to grade 2	4(40%)	2(12.5%)	11(47.82%)
From HB grade 6,5,4 to grade 3	0	0	0
From HB grade 6,5 to grade 4	1(10%)	0	0
From HB grade 6 to grade 5	0	0	0
No improvement i.e. no changes of HB grade	0	3(18.75%)	0

In the present study, post-operative HB grade improvement up to grade 1 was seen in 5 patients out of 10 cases. In M.Ikeda et al study [8], post-operative grade 1 improvement was seen in 11 patients. In Jin Kim Et Al study [9], post-operative HB grade 1 improvement was seen in 12 patients. In the present study, post-operative HB grade improvement up to grade 2 was seen 4 cases. In M. Ikeda et al study [8], post-operative HB grade 2 was seen in 2 patients. In Jin kim et al study [9], post-operative HB grade 2 improvements was seen in 11 patients.



Graph 1: Facial nerve decompression surgery outcome

Discussion

In cholesteatoma surgery, dissection of the cholesteatomatous matrix from soft tissues, such as the Dura, sigmoid sinus, jugular bulb, internal carotid artery including the facial nerve, was conducted carefully with wide bony removal. If complete removal was not possible, resection of the injured segment by cholesteatoma was thought to be the only sure alternative for complete removal of the pathology. Facial nerve paralysis due to COM may be either abrupt or gradual in onset. Abrupt onset results from an acute infectious exacerbation superimposed on the COM, while gradual onset typically results from compression from a cholesteatoma or granulation tissue. However, severe dysfunction can also be caused by interruption or fibrosis of the facial nerve. Direct anastomosis or nerve grafts for those with short durations of facial paralysis provide the best chance for recovery of nerve function. [9]

Surgical facial nerve decompression: Anatomical perspectives, the diameter of the meatal segment of the facial nerve is small (approximately 0.68 mm) at the point where it enters the fallopian canal and is susceptible to inflammation and edema. Thus, the edematous swelling of the fallopian canal which underlies Bell's palsy decreases the room for expansion in a rigid bony canal potentially leading to severe nerve damage and even necrosis and fibrosis. More than 90% nerve degeneration within 14 days after the onset of facial palsy is correlated with poor prognosis, indicating the need for Facial nerve decompression.

Opening the bony canal and subsequently releasing the pressure on the nerve sheath causes decompression of the nerve fibers, this can improve the circulation and minimize damage to distal nerve

fibers [10]. Thus, Facial nerve decompression prevents continuous nerve degeneration and restores facial nerve function. Accurate assessment of facial nerve status was obtained intra-operatively.

Four different conditions of the facial nerves were observed among the patients, including a compressed but normal segment, a reddish edematous segment, a fibrosed segment and an interrupted nerve. Edematous and compressed nerves were managed by decompression and removal of the overlying cholesteatoma matrix or infected granulation tissue.

If the facial nerve was found to be interrupted or fibrosed during surgery, the segments involved and adequate margins were cut away. Continuity of the facial nerve was restored by rerouting direct anastomosis, only if the available length of the remaining nerve was sufficient to achieve a tension-free anastomosis or by a graft, if it was impossible. [9]

Surgical timing: Patients who had facial paralysis due to COM cause were operated on as early as possible in order to remove the pathologic tissue. The severity of facial function, the presence of cholesteatoma, type of onset, age, any previous otologic surgical history and duration from onset had no effect on deciding surgical timing.

However, the therapeutic role of Facial nerve decompression in complete facial palsy remains unclear. [9]

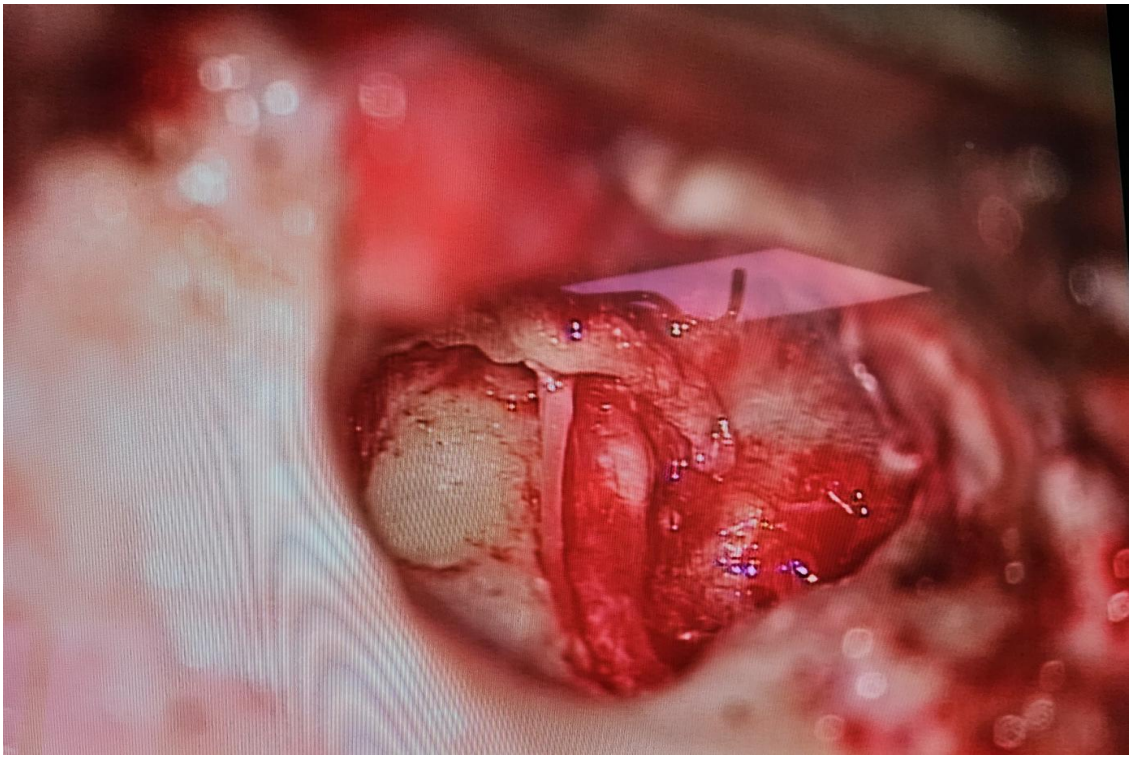


Figure 1: Facial nerve decompression (Intra-operative image of the horizontal part of facial nerve canal decompressed)

Figure 2: 25 year old male patient pre-operative and 1 month post-operative facial palsy recovery

Figure 3: 10 year old girl pre-operative and 1 month after post-operative facial palsy recovery

Figure 4: 35 year old female pre-operative and 1 month post-operative with facial palsy recovery

Figure 5: 28 year old male patient pre-operative and post-operative 1 month follow up

Conclusion:

Facial nerve decompression can be an effective treatment option in patients with facial palsy presenting as a complication of chronic otitis media refractory to medical treatment. Early intervention with facial nerve decompression within 14 days from onset facial palsy seems to increase the therapeutic efficacy, but the optimal time window of surgical intervention for decompression of facial nerve is unclear. Our results may be useful for decision making and outcome prediction in patients with facial palsy.

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