Journal of Applied Sports Science
December 2019, Volume 9, No. 1
www.jass.alexu.edu.eg

The Value of the Rehabilitation for Cases with Facial Palsy after Removal of Brain Tumor Schwannoma (Case Study)

Mohamed Said Abdel Moneim Hedak[1]

[1] PhD in Physical Education, Specialist in Sports Faculty of Physical Education for Men - Alexandria University, Egypt

Abstract

This study aim to identify the value of the rehabilitation for cases of the connection of the seventh nerve after the removal of a tumor in the brain, the most important results were confirm the value of the rehabilitation in maintaining the muscles of the face from fibrosis until the arrival of nerve signals from the brain to the muscles through the connection of the nerve and the value of rehabilitation in restoring muscle functions after removal of the tumor.

Introduction

The tumor that affects the facial nerve Schwannomas is rare and is a challenge in the diagnosis and how to deal with. (3: 12)

The surgery for the eradication of the tumor is the strategy of the first solution, as the tumor causes a strain on the facial nerve and lead to injury to the axis of the nerve and cause paralysis and convulsion of the facial muscles. (6: 525-536)

Maintaining the function of the facial nerve is the primary goal after the removal of the Schwannomas. (4: 54-60)

The evaluation of expected outcomes after surgical treatment is achieved through improved patient performance during various life activities such as improved facial muscles performance. (1: 544-555)

Rehabilitation has a primary role after the surgical removal of the Schwannomas In maintaining and restoring normal nerve functions. (3: 14)

The researcher studied the role of rehabilitation after the surgical removal of the Schwannomas where the patient suffers from weakness of the facial muscles of the right side as a result of the injury of the right seventh nerve after the eradication of brain tumor and the connected of part of the fifth nerve

Objective of the study

Identify the value of the rehabilitation for cases with facial palsy after removal of brain tumor Schwannoma.

Research hypotheses

Rehabilitation is valid for cases with facial palsy after removal of brain tumor Schwannoma.

Related studies

Study Jenny Kim and others 2003.

Entitled "Clinical Note facial Nerve schwannoma "Case Study The study aims to rely on clinical examination, diagnostic scans, medical report and surgical treatment to study the condition of a young patient with schwanoma, The most important surgical results for the removal of schwanoma tumor affect the face and motor neurons as well as sensory nerve and thus affect the functions of the facial nerve. The study emphasized the importance of surgical intervention of the facial nerve to restore the functions of the facial nerve. (3)

Study Ondrej and Others 2010

Entitled "exercise with visual feedback improves postural stability after vestibular schwannoma surgery "The aim of this study is to evaluate the effect of visual rehabilitation exercises on the patient's control after schwannoma tumor surgery, The most important results: The study reached special exercises with visual feedback to improve the function of the facial nerve and the efficiency of the facial muscles and stability , balance after a tumor schwannoma is removed. (5)

Study Zhooyan wang and others 2013

Entitled "Long-term facial nerve function following facial reanimation after translabyrinthine vestibular schwannoma surgery" The aim of the Study is to compare the results of schwannoma surgery with different surgical procedures, The most important results of the study were that postoperative rehabilitation improves the function of the facial nerve and that the mental results of the functions of the facial nerve can occur after more than three years of surgery. (7)

Study Moniroh Albathi and Others 2016

Entitled "Early Nerve Grafting for Facial Paralysis after Cerebellopontine Angle Tumor Resection with Preserved Facial Nerve Continuity" The aim of the study was to evaluate the use of facial pattern restoration in the first months after surgery to remove the tumor and connect the facial nerve. The most important results were restoring the functions of the facial nerve takes place within the first 6 months after surgery after the tumor is removed. (4)

Study Renato Torres and others 2016

Entitled "Multivariable Analysis of factors influencing facial Nerve out came following micro surgical resection of vestibular schwannoma" The most important results were that the tumor is a risk factor for the nerve of the face where it leads to nerve weakness and is important in improving the function of the facial nerve. (6)

Study Jamie Gompel and others 2018

Entitled "Congress of Neurological Surgeons systematic Review and evidence-Based Guidelines on Emerging Therapies for the Treatment of Patients with Vestibular Schwannomas" The aim of the conference was to identify the role of rehabilitation after surgical intervention of patients with Schwannoma tumor the most important recommendations of the conference: Rehabilitation before and after surgery to remove the tumor has a significant role in improving the strength of facial muscles and stability , balance and not fall during walking. (2)

Study Abdul Rahman Al-Shudifat and others 2018

Entitled "APatient-Assessed Morbidity to Evaluate Outcome in Surgically Treated Vestibular Schwannomas" The aim of the study was to evaluate the performance of a patient who was surgically treated by the Schwannoma tumor in terms of ability to work and degree of restoration of facial nerve function, The most important results: Surgery is useful for patients in young age to improve the recovery of the function of the facial nerve and improve the ability to work and rehabilitation after surgery is important in restoring the function of the nerve and facial muscles. (1)

Take advantage of the Related studies

All studies have agreed that the surgical removal of Schwannoma tumor affects the functions of the facial nerve and postoperative rehabilitation has a role in improving the functions of the facial nerve and facial muscles and that this improvement is over six months after the procedure.

Procedures

First: Medical report of the case

The patient suffers from weakness of the facial muscles of the right side as a result of the injury of the right seventh nerve after the eradication of a brain tumor Schwannoma and the connection of part of the fifth nerve connected to the muscle of the lower branch of the seventh nerve. The muscle layout showed the presence of Small Polyphailc Motor unit After 5 months of connection, evidence of neuromuscular back-up was recorded. Electro-physiological measurements showed an improvement in the lower facial muscles (Nasalis, Risorius, Orbicularis oris), and no improvement in frontal belly muscles and the orbicularis oculi muscles. The value of the rehabilitation program in maintaining the muscles of the face from fibrosis until the arrival of nerve signals from the brain to the muscles through the connection of the nerve as well as in the restoration of muscle functions after removal of the tumor.

Second: Spatial field

Electrophysiological measurements of the case for study were achieved at the Ibrahimi Center for Rheumatology and Physical Medicine. The rehabilitation program was carried out at the Center for Physical Therapy and Rehabilitation of the Foundation of the Peace Association for Development.

Third: Time domain

The previously electrophysiological measurements were performed before the tumor was removed, The post Electrophysiological measurements were performed nine months after the tumor was removed and five months after the nerve connection and achieved the rehabilitation program.

Fourth: The method

The researcher used the experimental method to identify the benefit of the rehabilitation program and its effect on maintaining the facial muscles and restoring the function of the nerve.

Fifth: The measurements

The electrophysiological measurements of the injured right facial muscles and injured right facial nerve were performed and compared with the electrophysiological measurements of the non-injury left muscles and non-injury left facial nerve.

Application of the rehabilitation program

The objective of the rehabilitation program is to maintain the efficiency of facial muscles and prevent the fibrosis of the muscles until arrival nerve signals to muscles through the nerve as well as in the restoration of muscle functions after removal of the tumor.

Foundations of the preparation of the rehabilitation program:

The researcher applied the general scientific bases for qualification and in accordance with the requirements of the case and the researcher prepared the required procedures, tools and devices. The researcher took the following principles into account to ensure the success of the planning of the rehabilitation program:

1. The relevance of the program to the situation under study.

2. Provide the used means, tools and devices.

3. Program flexibility during application.

4. Graduation in the load during application of the program.

5. Determine the rehabilitation exercises used according to the circumstances of the case.

6. Using some of the programs that have been developed in this field before.

Steps to build the preparatory program:

The researcher used the scientific references which dealt with the effect of rehabilitation programs in improving the same cases and reached the following:

1. Determine the program of equipment, tools and rehabilitation exercises.

2. Determine the duration of the rehabilitation program.

3. Determine the number of units in rehabilitation program.

4. Determine the unit time from 35 to 45 minutes .

5. Determine the number of units weekly by 6 units during the first month and the second and 3 units during the next four months.

Rehabilitation Program

Rehabilitation stage: the stage of passive and light exercise movement to the muscles of the face

The first and second months: The goal of the rehabilitation stage to maintain the efficiency of the facial muscles from fibrosis and maintain the absence of inflammation of the nerve as the patient at this stage suffers from pain and inflammation of the nerve.

Parts of rehabilitation Unit	Content	Intensity	Repetition	Rest time	Number of groups	rest between groups
The preparation part	electric stimulation of the muscles of the injured face (Galvanic)	15 minutes	Determined according to patient ability	2 minutes		
The main part	1-Keeping the lips with hands to prevent air out and try blowing the cheeks	5 minutes	10 once	3 seconds	2	2 minutes
	2-Close the eyes with hands and then raise the hands and try to maintain this situation and eye closed	5 minutes	10 once	3 seconds	2	2 minutes
	3-Try to open your mouth as much as possible	5 minutes	10 once	3 seconds	2	2 minutes
The final part	beating massage For facial muscles and eyebrows	2 minutes	once			

Rehabilitation stage: Assistive Exercise Phase during thread and fourth month The goal of the stage: During this stage of rehabilitation begins inflammation that suffers from the patient gradually disappearing and therefore begins to increase the intensity and frequency of the rehabilitation program

Parts of rehabilitation Unit	Content	Intensity	Repetition	Rest time	Number of groups	rest between groups
The preparation part	1-electric stimulation of the muscles of the injured face (Galvanic) 2- infrared	25 minutes 5 minutes	Determined according to patient ability			
The main part	1-Blow the hands with the help of hands with stability during this situation 2-make O letter with the lips with the help of hands 3-open the mouth and work the letter E with the lips with the help of the hands 4-Open mouth as far as possible to pronounce letter A 5-move the eyebrow up and down with the help of hands	15 minutes	10 once 10 once 10 once 10 once 10 once	3 seconds 3 seconds 3 seconds	2 2 2	2 minutes 2 minutes 2 minutes
The final part	beating massage For facial muscles and eyebrows	2 minutes	once			

Rehabilitation stage: (training stage without assistant) during the fifth and sixth months The goal of the rehabilitation phase: The patient begins at this stage to improve as a result of the arrival of nerve signals across the nerve to the muscles, especially for the lower part of the face where the patient begins to improve the shape of the face and control of the muscles during life situations (smile - eating - ....)

Parts of rehabilitation Unit	Content	Intensity	Repetition	Rest time	Number of groups	rest between groups
The preparation part	1-electric stimulation of the muscles of the injured face (Galvanic) 2- infrared	25 minutes 5 minutes	Determined according to patient ability			
The main part	1-Tighten the cheeks back with stability. 2-smile with an attempt to open the mouth and stability. 3-Open the mouth on the largest amount with moving the lower jaw to the right and left. 4-Move the eyebrow up and down.	20 minutes	10 once 10 once 10 once 10 once	3 seconds 3 seconds 3 seconds	2 2 2	2 minutes 2 minutes 2 minutes
The final part	beating massage For facial muscles and eyebrows	2 minutes	once			

Results and discussion

First: previously measurements of the injured right facial nerve before surgery compared to the non-injury left facial nerve

Figure 1

Electrophysiological measurements Blink reflex of the injured right facial nerve compared to the non-injured left side

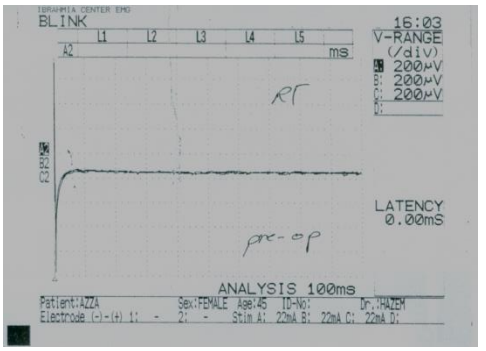


Figure 2

Electrophysiological measurements of the injured right facial nerve compared to the non-injured left side

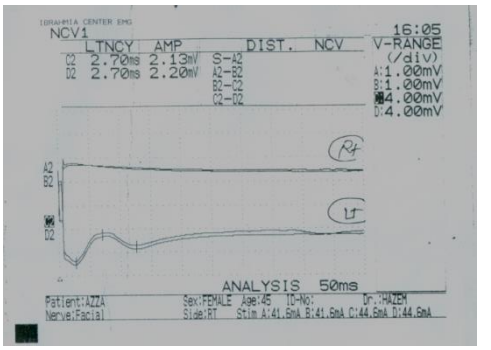


Figure (1), (2) show that there are differences between the injured right facial nerve and the non-injured left facial nerve in favor of the non-injured left facial nerve before the operation, indicating that the right facial nerve affected by the presence of the tumor and this is consistent with what Renato Torres and others 2016 That the tumor is a risk factors for the nerve of the face where it leads to weakness of the nerve and the importance of the removal of the tumor of Schwannoma in improving the function of the facial nerve. (6: 225-235).

Second: The post Electrophysiological measurements of the injured right facial nerve After surgery to remove the tumor (after 9 months) (and after five months) of the nerve connection compared to the right nerve.

Figure 3

Electrophysiological measurements of the injured right facial nerve after the operation to remove the tumor

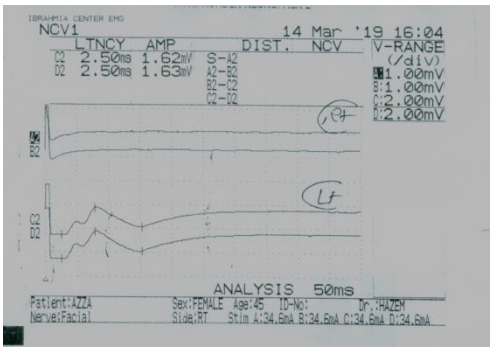
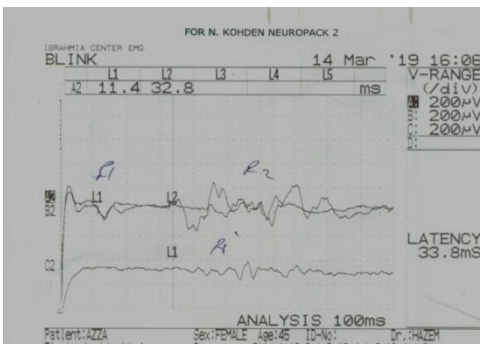


Figure 4

Electrophysiological measurements blink reflex of the injured right facial nerve after the operation to remove the tumor



The Figure (3) and (4) show that there is no improvement in the electrophysiological measurements of the injured right facial nerve, but the obvious improvement in the electrophysiological measurements of the muscles. Kim and others 2003 show that the surgery to remove the Schwannoma tumor has an effect on the face and on motor neurons as well as sensory nerve thus restoring the functions of the facial nerve. (3: 112)

Third: Electrophysiological measurements of facial muscle layout after the completion of five months of nerve conduction and rehabilitation program.

Figure 5

layout of the facial muscles (Orbicularis oris) after the end of five months of nerve conduction and rehabilitation program

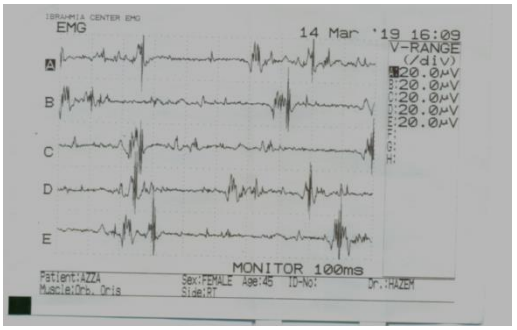


Figure 6

Layout of the facial muscles (Nasalis) after the end of five months of nerve conduction and rehabilitation program

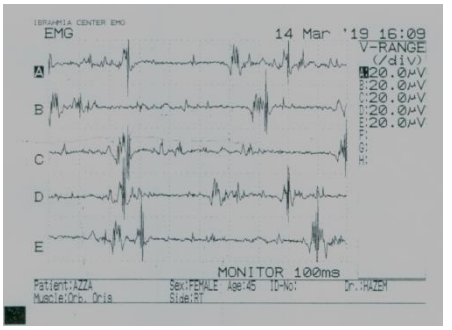


Figure (5) and (6) show an improvement in the electrophysiological measurements of the muscles that move the lower part of the face (the nasalis, the Orbicularis oris, the resorius) This indicates the success of the process of connecting the nerve after removal of the tumor and also confirms the role of rehabilitation after removal of the tumor in the maintenance of muscles from Fibrosis occurs This is in line with Jamie Gompel et al. 2018. Pre-post and postoperative rehabilitation of tumor removal has a major role in improving facial muscles. (2: 52-54) Zhaoyan Wang and others note that rehabilitation after surgery improves the function of the facial nerve. (3: 112)

Figure 7

layout of the facial muscles (Orbicularis oculi) after the end five months of nerve conduction and rehabilitation program

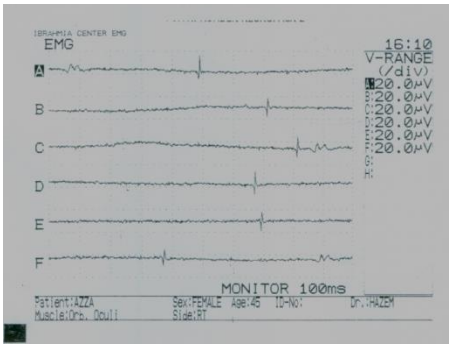


Figure 8

Layout of the facial muscles (Frontal belly) after the end of five months of nerve conduction and rehabilitation program

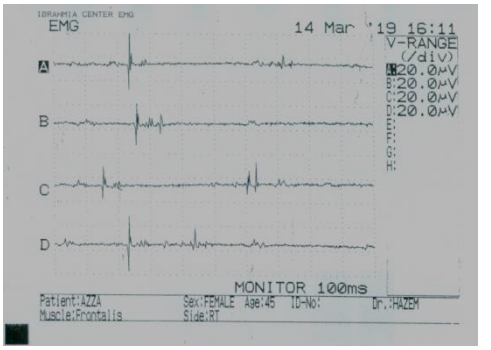


Figure (7), (8) show no significant improvement in the electrophysiological measurements of the muscles that move the upper part of the face and eyebrow such as the frontal belly and the orbitalis oculi This is due to slow arrival nerve signals.

Conclusions

There is an improvement in the restoration of lower facial muscles (Nasalis, Rosorius, Orbicularis oris), and no improvement of the frontal arbicularis ocul muscles following the removal of a brain tumor Schwannoma and the connecting of a portion of the fifth nerve connected to the muscle mass of the lower branch Of the seventh nerve and this confirms the value of the rehabilitation in maintaining the muscles of the face from fibrosis until the arrival of nerve signals from the brain to the muscles through the connection of the nerve and the value of rehabilitation in restoring muscle functions after removal of the tumor.

Recommendations

keeping the continuation of the rehabilitation after the removal of brain tumor Schwannoma as it has a value in maintaining the muscles of the face from the fibrosis until the arrival of nerve signals from the brain to the muscles through the connection of the nerve as well as in the restoration of muscle functions after removal of the tumor

References

1-Abdul Rahman, A.S., Babar, K., Peter, H. Sven, L. (2018). A Patient-Assessed Morbidity to Evaluate Outcome in Surgically Treated Vestibular Schwannomas, world neurosurgery, 94:544.

2- Jamie, G., Siviero, A., Matthew, L. C., Dare A., (2018). Congress of Neurological Surgeons systematic Review and evidence-Based Guidelines on Emerging Therapies for the Treatment of Patients with Vestibular Schwannomas, Neurosurgery, Volume 82, Issue 2, page E52-54.

3-Jenny, KT.,Ronald, GA., (2003). Clinical note Facial nerve Schwannoma , Ann ctol Rhinol laryngl, 112.

4- Monirah, A., Sam, O., Lisa, E.I., (2016). Early Nerve Grafting for Facial Paralysis After Cerebellopontine Angle Tumor Resection With Preserved Facial Nerve Continuity , JAMA Facial Plast Surg.,18(1):54-60.

5- Ondrej,C, Martin, CT., (2010). Exercise with visual feedback improves postural stability after vestibular schwannoma surgery, springer.

6- Renato,T., Yann, N.,Antoine,V.,Daniele, B.,(2016). Multivariable Analysis of factors influencing facial Nerve out came following micro surgical resection of vestibular schwannoma ,SA GE, vl.156(3)525-533.

7- Zhaoyan, W.,Zhihua, Z., Jun, Y.,(2013) : Long-term facial nerve function following facial reanimation after translabyrinthine vestibular schwannoma surgery , doi.org/10.3892/etm.1120 Pages: 101-104.