TO FIND OUT & COMPARE THE EFFECT OF FACIAL NERVE MANIPULATION AT STYLOMASTOID FORAMEN AND CONVENTIONAL TREATMENT IN BELL'S PALSY PATIENTS

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ABSTRACT

Background: Bell's palsy is a disorder of the facial nerve, which may begin with symptoms of pain in the mastoid region and produce full or partial paralysis of movement of one side of the face. The incidence of Bell palsy is 20 to 30 per 100,000 persons. There are peaks of incidence in the 30 to 50 age groups. Bell palsy is seen with almost equal frequency (ratio 46:54) in men & women. To date the effectiveness of facial nerve manipulation at stylomastoid foramen in Bell's palsy patients has not been compared in a randomized experimental clinical trial.

Study design: A randomized experimental clinical trial.

Objective: To find out & compare the effect of facial nerve manipulation at stylomastoid foramen and conventional treatment in Bell's palsy patients.

Methods: 30 consecutive patients were randomly allocated into two groups with mean age (25-50) year, chief complaint of Bell's palsy. 10 male & 5 female patients were taken in each group.

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Patients were treated 3 days a week for 3 weeks duration. All patients were referred to physical therapy by neurosurgeons of reputated hospitals. This study was done to measure pre and post effect of facial nerve manipulation at stylomastoid foramen in Bell's palsy patients**.**

Data Analysis: Sample size calculations were performed on software package SPSS 17.00 version for windows. Mann Whitney U test & t-test with equal variance was applied to analyze the inter-group differences in HBGS, FDI-Physical function, FDI- Social-well being before and after performance of Facial Nerve Manipulation, Electrical Stimulation and Conventional Exercises. Data was analyzed at significant level of 95% (P<=0.05).

Results: After 3 weeks of treatment there was significant improvement in individual rate of recovery group A then group B on HBGS, FDI- Physical function and FDI- Social-well being index.

Conclusion: Facial Nerve Manipulation technique at stylomastoid foramen is more effective than conventional treatment methods in improving HBGS, FDI- Physical function, FDI Social-Well being for Management of Bell's palsy.

KEYWORDS: House Brackmann's Grading Scale (HBGS); Facial Disability Index (FDI) ; Physical Function (PF) , Social-Well Being (SWB) .

Introduction:

Bell's palsy is a disorder of the facial nerve, which may begin with symptoms of pain in the mastoid region & produce full or partial paralysis of movement of one side of the face [1, 2.] The incidence of Bell palsy is 20 to 30 per 100,000 persons [3,4 .] There are peaks of incidence in the 30 to 50 age groups [5,6] ratio 46:54 in men & women [7]. Onset of facial paralysis almost equally occurs on both sides of the face & approximately 5% of adult patients (Prescott 1988). Pregnancy, pre-eclampsia, diabetes, and hypertension have all been associated with an increased incidence of Bell palsy [8] (Shmorgun

2002). The etiology of Bell's palsy includes cold exposure (e.g. chill wind, cold air conditioning) or driving with car window down were considered the triggers to Bell's palsy. Increasing evidence suggests that the main cause of Bell's palsy is reactivation of latent Herpes simplex virus type 1 in the cranial nerve ganglia [9, 10 , 11.] Bell's palsy has different path-stages; it includes acute stage (1-7 days onset of disease), resting stage (8-20 days onset of disease) &

restoration stage (21-90 days onset of disease) [12,13,14,15]. There is differentiation between an upper & lower motor neuron lesion of the facial nerve. A lower motor neurone lesion occurs with Bell's palsy, where as an upper motor neurone lesion is associated with a cerebro-vascular accident or lesion. A lower motor neurone lesion causes weakness of all the muscles of facial expression. Weakness of frontalis occurs, eye closure is weak and the angle of the mouth falls. With an upper motor neurone lesion frontalis is spared, normal furrowing of the brow is preserved, and eye closure and blinking are not affected. If the lesion is at stylomastoid foramen, it may result in facial paralysis only [5]. Bell's palsy first noticed facial weakness in the morning, suggesting that actual development of facial palsy occurred during sleep [16](nocturnal onset). Clinical features of Bell palsy include in inability to frown and wrinkle the forehead (nasociliary and frontal head of occipitofrontalis), difficultly in eye closure and Bell's phenomena (orbicularis oculi), inability to whistle and puff out the cheeks with expiration (orbicularis oris & buccinator), flattening of nasolabial fold & drooping of angle of mouth on affected side due to paralysis of muscles of facial expression.[5]. Diagnosis of Bell's palsy is diffuse facial nerve involvement manifested by paralysis of the facial muscles, with or without loss of taste on the anterior two-thirds of the tongue or altered secretion of the lacrimal & salivary glands. The House-Brackmann Facial Nerve Grading Scale was used to assess the severity and monitor the changes of a patient's motor recovery, abnormal movement, tone, and symmetry (House and Brackmann, 1985). It was chosen in this study because it was officially adopted as a recognised facial nerve grading system by the Dysfunction is then graded as I (normal), II (slight abnormality), III (moderate abnormality), IV (moderately severe abnormality), V (severe abnormality), & VI (total–no function), through the use of specific criteria as detailed by House and Brackmann (1985). Demands for validation, reliability, and reproducibility assessments of the H-B FGS and its "golden standard" status have been made (Browning 2007) [4].There are various other assessment scales also available like Sunnybrook facial grading system, Peitersen grading system, Yanagihara grading system, Nottingham grading system for Bell's palsy. Treatments for Bell's palsy are aimed at returning facial power to normal for cosmesis, competence of lip seal and protection of the cornea from drying and abrasion due to impaired lid closure and tear production. For protection of the cornea lubricating drops are recommended during the day and a simple eye ointment at night [19, 11, 1]. There is significant benefit from treating Bell's palsy with corticosteroids [12]. Physical therapy, in the context of Bell's palsy, mainly increase muscle and

nerve function either through thermal methods, electrotherapy, massage, facial exercises and biofeedback [14.] Exercise therapy has been used more than other interventions [12, 15, 16, 17]. Manual therapy is an application of an accurately determined and specifically directed manual force to the body, in order to improve mobility in areas that are restricted, in connective tissues, joints or in skeletal muscles (Korr, 1978). Nerves are actually composed of 50–80% fascia. They can develop adhesions to their surrounding tissues or even within their internal structures. Since nerves supply all the information that the brain uses to control your body, the brain protects this information at all costs. This causes underuse or spasms in surrounding muscles as well as pain. Gentle manipulations can free the nerves, allowing them to stretch again and restoring this important information source to the brain [18]. It also applies to the treatment of nerves, follows the standard principles of mobility and function. For optimal function nerves must be able to move freely within its surroundings. Neural Manipulation (manual therapy for cranial nerves introduces the new diagnosis and therapy concept from Jean-Pierre Barrel and, Alain Croibier) are also a form of manual therapy in which localized manipulation of the facial nerve at the stylomastoid foramen is preformed. Neural Manipulation examines mechanical relationships between the cranium/spine hard frame to the dura and neural elements. It provides assessment and treatment approaches to address restrictions of the dural and neural components not commonly focused on with musculoskeletal symptoms. Neural Manipulaton identifies and releases local nerve restrictions while at the same time examines the effect these local fixations have on the rest of the body, and by accessing this relationship, resolves the more comprehensive (global) dysfunctional patterns [18,20,21]. Neural Manipulation facilitates nerve conductivity and intraneural blood supply for local & systemic responsiveness.

MATERIALS AND METHODS

Present study was Pre test-Post test Experimental Study design. The samples were selected from a leading neuro & orthopedic hospital in Sonipat & Hisar, India. 30 consecutive patients were randomly allocated into two groups with mean age (25-50) years. Bell's palsy onset duration between (1 Week to 7 Weeks). 15 subjects in Group-A (Experimental Group) 15 subjects in Group- B (Control Group). This study was done to measure pre & post effect of facial nerve manipulation at stylomastoid foramen In Bell's Palsy on House Brackmann Scale & Facial Disability Index.

The inclusion criteria for the study were Age of patients between 25 to 50 years. Both male and female included in the study. Duration of Bell's palsy is between 1 week to 7 weeks. Pre diagnosed case of unilateral facial paralysis.

Exclusion criteria

Pre diagnose case of Multiple radiculitis, tumor which offend temporal bone, cerebral trauma. Stroke & cardiovascular disorder. Hunt's syndrome.

Dependent variables

Facial Nerve Manipulation

Electrical stimulation

Independent variables

House Brackmann Scale &Facial Disability Index

Outcome measures

Readings of House Brackmann Scale & Facial Disability Index which includes Physical functions Eating, Drinking, Tearing of the eye, Speaking, and Oral hygiene Social well-being Peacefulness, Irritability , Withdrawal, Sleeping ,Social activity

The following instruments were used wooden

Couch, Muscle stimulator, House Brackmann Scale &Facial Disability Index

Procedure

30 subjects with Bell's palsy made equally divided into 2 groups would be considered for the study. As subjects those who fulfilled inclusion criterion & diagnosed then all filled an informed consent and dually signed from all the patients. Patients having symptoms present or greater than 1 week or less than 7 weeks & a rating by House Brackmann Scale and Facial Disability Index . Subjects were randomly assigned into a Group A (Experimental) and Group B (Control) as per Randomization. House Brackmann Scale & Facial Disability Index would be filled before 1st session of treatment and after 9th session of treatment to note the level of functional disability. In

Group A all 15-subjects received facial nerve manipulation, electrical stimulation & home exercise program. In Group B (control group) all 15-subjects received electrical stimulation, home exercise program

The total treatment session was 3 days a week for 3 weeks duration.

Protocol:

Facial nerve manipulation at stylomastoid foramen.

Position of the Patient: The patient supine lying, the head turned slightly to the side of the stylomastoid foramen to be treated.

Position of the Therapist: Step I: Place one finger to be placed in the anterior part of the external acoustic opening. To make contact with the stylomastoid foramen, pass arm under the skull and with left index finger push the external acoustic opening anterior and medially.

Step-II: Position the middle and index fingers of right hand against the anterior edge of the mastoid tip to draw it towards the back and medially. Working within the elasticity of the osseous tissue of the temporal bone has an effect on the terminal part of the facial canal. This technique would be applied for 5-7 oscillation in single session/day, 3 days a week for 3 weeks duration.

Electrical stimulation (PHYSIOSTIM-DT, IEMP: 3031, Frequency- 50Hz). Partial denervation (focal demyelination or neurapraxia) facial stimulation or electrical stimulation using 0.1-1ms duration pulses delivered at a frequency of 1-2 pulses/s given for 50- 200 contractions/session, 3 session/week for 3 weeks. Completely denervated interrupted galvanic stimulation (IGS) of 100ms, rectangular pulses may be given at a rate of 1 pulse/s for 30-100 contraction/session usually given 3 session/week for 3 weeks.91

Home Exercise Program: 8–10 repetitions of four exercises with two to three daily sessions suggesting that quality of exercise more important than quantity (Diels 2000). Bring eyebrows together and downward as in frowning, Raise eyebrows as in being surprised, Close your eyes gently and then tightly, Flare nostrils by blowing out with nose, compress nostrils in a sniffing attempt, Smile closed mouth and then open mouthed , Attempt to whistle by puckering lips and compressing cheek, Tighten chin and neck to eventually pull lower lip down to expose lower teeth.

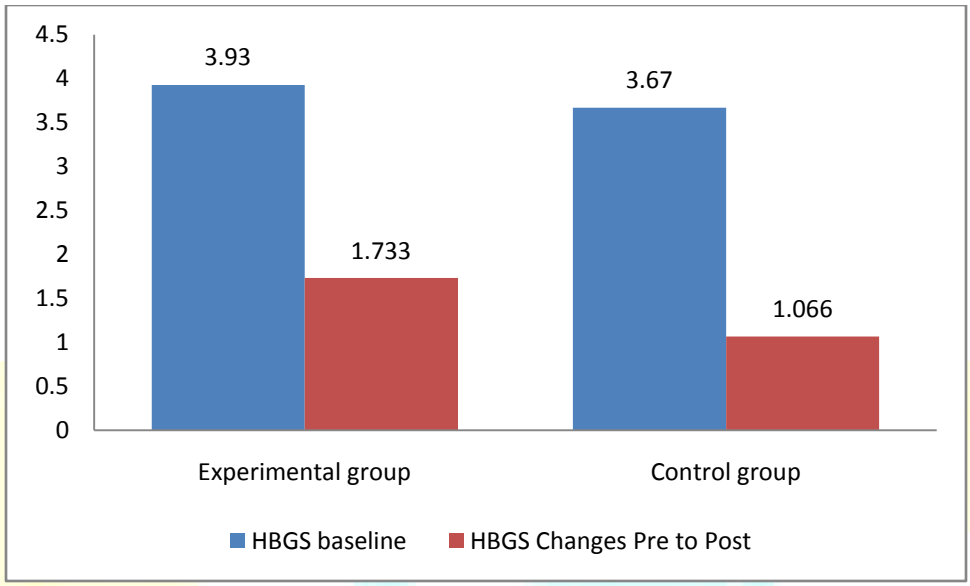
RESULT & DATA ANALYSIS

Data analysis was performed using software package SPSS 17.00 version for windows. Mann Whitney U test & Unpaired sample t-test with equal variance was applied to analyze the inter-group differences in HBGS, FDI-Physical function, FDI- Social-well being before & after performance of Facial Nerve Manipulation, Electrical Stimulation & Conventional Exercises. Data was analyzed at significant level of 95% (P<=0.05). 30 patients who met the selection criteria were enrolled for study, 15 subjects grouped for experimental group & 15 subjects grouped for control group. A total of 17 male subjects and 13 female subjects were included in the study. Efforts were made in this study to examine the effect of Facial Nerve Manipulation in improving House Brackmann's Grading Scale & Facial Disability Index (Physical function and Social-well being) in Bell's palsy Patients. No adverse event was reported during the whole study. All the values of experimental group and control group are expressed in terms of Mean ± S.D. for HBGS, FDI- Physical function and FDI- Social-well being. By applying "Wilcoxon signed rank test" and "Paired Sample t-test" for HBGS, FDI- Physical function and FDI- Social-well being used to find out significant differences within-group for experimental group & control group respectively. A significant difference was observed within-groups in experimental group & control group for HBGS, FDI- Physical function and FDI- Social-well being. By applying "Mann-Whitney's U-test" and "Independent Sample t-test " for HBGS, FDI- Physical function and FDI- Social-well being used to find out significant differences between-groups for Experimental group and Control group respectively. A non-significant difference was observed between-groups experimental group and control group for HBGS, FDI- Physical function and FDI- Social-well being. The data for both groups calculated at 5% level of significance.

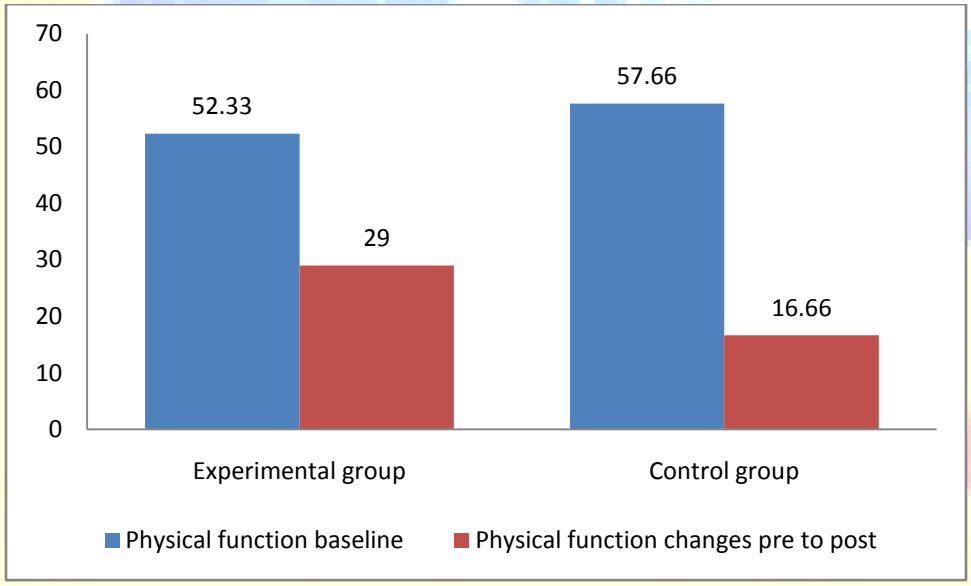
Table 1: Comparison of HBGS between Experimental Group and Control Group

Variable	Experimental group Mean ± S.D.	Control group Mean ± S.D.	Mean difference	Standard Error Difference	t-value	P-value
HBGS baseline	3.93±.799	3.67±1.047	.267	.340	.784	.439
HBGS Changes Pre to post	1.733±.4577	1.066±.4577	.6667	.118	3.989	.001
Physical function baseline	52.33±13.07	57.66±14.49	-5.33333	5.04110	-1.058	.299
Physical function change Pre to post	29.00±9.1025	16.667±6.172	12.333	2.839	4.343	.001
Social well-being function baseline	48.26±11.25	54.93±11.25	-6.66667	4.11146	-1.621	.116
social well-being function change Pre to post	28.00±7.250	15.733±4.131	12.266	2.154	5.693	.001

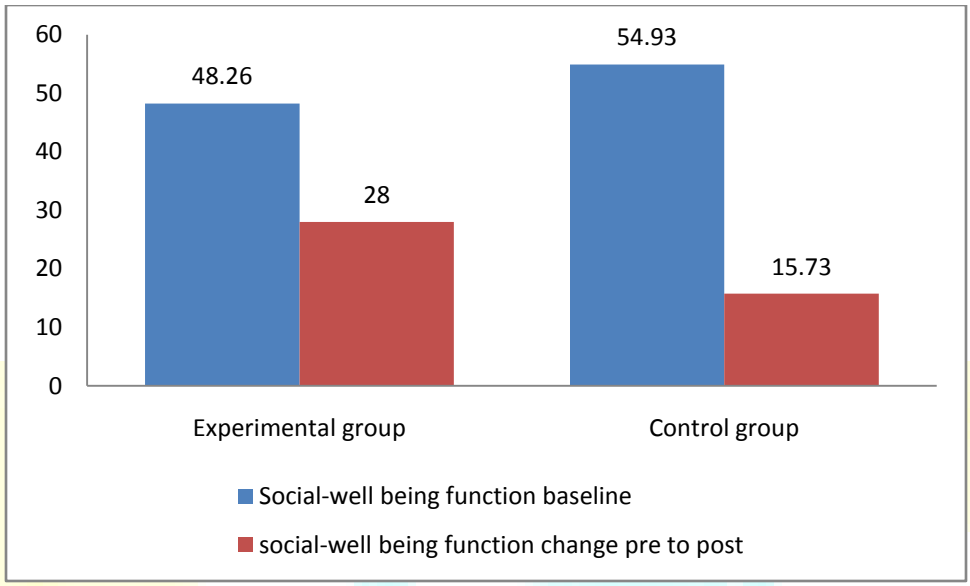
P<.05 shows a significant HBGS difference Between Experimental Group and Control Group



Graph 1: Graphical presentation of Group comparison in HBGS between Experimental Group & Control Group



Graph 2: Graphical presentation of improvement in FDI- Physical function within Experimental group



Graph 3: Graphical presentation of improvement in FDI- Social-well being within Experimental group

DISCUSSION

This study was based on sample of Bell's palsy patients to determine the effect of Facial Nerve Manipulation on HBGS, FDI-Physical function and FDI- Social-well being. The above findings of the study stated that more improvement in individual rate of recovery in Experimental group HBGS, FDI- Physical function and FDI- Social-well being may be due to increase in myelin to a certain point as during remyelination, myelin sheath is thin, internodal conduction and capacitance increases. This internodal distance is great enough to maximize the jump of action potential and reduce the loss of current at the node of Ranvier, as with a continuous compression there is a depletion of axon plasma which becomes noticeable along the entire distal neuron section. During Facial Nerve Manipulation the fibrosis near the nerve is released by applying pressure in form of glide. Electrical stimulation can improve contractile capability and restore muscle function in long-term denervated and degenerated muscles. The low excitability of the muscle cells at the initial stage of training and surrounding connective tissue acting as electrical shunt, require special stimulation parameters48. Exercises focused on controlling the abnormal or synkinetic movement, such as raising the brow while keeping the eye open and controlling the ocular synkinesis. Movement control facial exercises emphasize moving only as much as the

patient can without triggering the abnormal facial movement. The range of the movement is increased as long as the abnormal movement is controlled.[15] Facial paralysis can mean the loss of ability to convey any or all of at least six universal human facial expressions14. The inability to express anger, surprise, distress, disgust, fear and happiness may severely impair a person's ability to be understood, or more importantly to not be misunderstood. Thus, important aspects of a patient's daily function such as emotional well-being, behavioral competence, sleep and rest, energy and vitality, and general life satisfaction53 can be altered by impairments associated with facial nerve disorders. To provide important benefits through therapeutic intervention means providing benefits that the patient values33. The primary desired outcome of interventions for facial nerve disorder is the recovery of facial expression. Because facial expressions are directly linked to emotions16, 101 and often the external representation of mood and self-concept, the potential for recovery of expressions in a patient with predominantly negative emotions or a depressed mood may well be limited or prolonged. A greater understanding and consideration of psychological factors related to patients with facial nerve disorders appear necessary to achieve the most efficacious outcome of intervention.[10] The findings of the study suggest that Facial Nerve Manipulation technique is more effective than conventional treatment methods in improving FDI- Physical function in Bell's palsy patients. The study of David G. Lancaster, Crow WT and Shrode stated that manipulative treatment is effective in Bell's palsy patients [20], However data seems to confirm that Facial Nerve Manipulation was safe and enhance recovery[18.] Neural Manipulation involves mechanical relationships between the cranium/spine hard frame to the dura and neural elements. Neural Manipulation locates and releases local nerve restrictions and at the same time examines the effect these local fixations have on the rest of the body. The nerve would move more smoothly through its sheath without restriction and the neural pathway would have proper signaling to the compromised structure that it innervates 56. When a nerve is fixed, it typically loses its ability to glide and/or stretch in length. The intra- or peri-neural pressure dramatically increases, at the same time there are changes in consistency. The nerve pathway shows functional interferences (blood supply or electric and/or electromagnetic conductivity). With fixation smaller nerve sections can harden. They feel like buds and are very sensitive or painful to the touch. Such "Nerve Buds" are an indication of an intraneural interference, an overload of physiological pressure points or a local fibrosis . Nerves are actually composed of 50–80% fascia. They can develop adhesions to their surrounding tissues or even

within their internal structures. Since nerves supply all the information that the brain uses to control your body, the brain protects this information at all costs. This causes underuse or spasms in surrounding muscles as well as pain. Although the myelin sheaths are primarily affected by nerve compressions, the axons can also be severly damaged. Wallerian degeneration begins above the lesion site. The proximal part of the axon is discernibly enlarged by an accumulation of cell organelles and enzymes. As a result of the disturbed (centripetal) axon transports, there are also extensions in the distal part. If the compression pressure is higher than the upper threshold of tolerance with which the axon membranes can withstand a stretch or strain, the distal fibers rupture. Manual neural manipulation changes intra- and extraneural pressure, improves sympathetic function to blood vessels due to the auto-innervation of the sympathetic gangli and sympathetic innervation of peri-neural connective tissues both of which are affected with treatment of fixations in the nerve sheaths. Treatment to nerves is through precise applied pressure. Gentle manipulations can free the nerves, allowing them to stretch again and restoring this important information source to the brain. The tension of the perineurium and all other neural connective tissues is transmitted down to the root sheaths, so the distal contact has a central effect mechanically and reflexogenically. In physical Therapy Facial Nerve Manipulation is less frequently used than other conventional treatment in Bell's palsy patients. This study of effect of Facial Nerve Manipulation is important to understand and manage the Bell's palsy. Therefore, Facial Nerve manipulation may have been important in improving the Facial function in Bell's palsy patients.

Relevence of The Study

This study produced a statistically significant improvement in HBGS and FDI- Physical function & FDI- Social-well being in both groups but the result of Facial Nerve Manipulation Technique was found to be more effective than Conventional Therapy. This research also provide evidence that facial nerve manipulation may proved to be a safe, valuable and useful tool in clinical practice and is consistent with the current use by clinical Physiotherapist in the treatment of Bell's Palsy.

Future Research

1. Study can be done with large sample size & longer treatment period.

2. Study can be done on subjects in different age group.

Acknowledgement

Authors expressing their sincere gratitude & heartly thanx to Dr. Ashok Arora MS Orthopedics, Dr. Vasudha Elawadi , Dr. Anuj Kumar PT, Dr.Rajkumar PT for their assistance, guidance & full support during research procedure,.

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