

# Drooling' and its Management







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## FOREWORD

Most of the persons with mental retardation have associated problem of drooling. These persons suffer from social stigmatization and isolation due to unacceptable condition of drooling. This leads to emotional trauma and segregation from the society of the person with drooling and mental retardation. The intervention strategies will help the persons to control drooling and regain their self confidence and social acceptance.

To give the need based interventions, knowledge on drooling and its control is very crucial for professionals, parents, caregivers and grassroot level workers. The research study on this topic yielded one professional approach that can be practiced by many professionals involved in the services of mentally retarded.

The guidelines in the book will help the professionals in gaining more knowledge on intervention strategies regarding facilitation of oromotor functioning, feeding, swallowing, positioning and desensitization techniques. Appropriate illustrations and diagrams are given for better understanding by the professionals.

I appreciate the work done by the research team which I hope will be found useful to the people in the service of persons with mental retardation.

**Dr. L. Govinda Rao**





## PREFACE

Drooling is the abnormal spillage of saliva from the mouth beyond normal age limit and it is more prominent and prolonged in children with mental retardation. Therefore there is a need to give intervention to control drooling, not only for health and hygienic conditions but also for being socially accepted.

This book is relevant to all the professionals involved in the management of drooling in the field of mental retardation. The professionals involved are physicians, physiotherapists, speech therapists, occupational therapists, psychologists, dentists, child development specialists. These professionals provide management to the persons with drooling. Each therapist has his own set of goals, perspectives and objectives. This book focuses on an integrated approach that can be followed by professionals working in the field of rehabilitation.

This book is divided into three parts: the first part comprises of introduction and anatomy, physiology of oro-motor region. The second part consists of assessment, evaluation tools and appropriate methods for identifying areas of dysfunction. The third part consists of intervention strategies for controlling drooling.

This book discusses the issues on mechanism of drooling, its types, intervention strategies and any necessary modifications in controlling drooling. It is useful for professionals and other team members working in the field of mental retardation.

*R.C. Nitnaware*





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# Chapter-1

## INTRODUCTION

Drooling is the abnormal and unintentional spillage of saliva from the mouth onto the face and clothing. It is a characteristic of persons with neuromuscular impairments (particularly in oromotor area), and mental retardation and the need to manage these individuals has become increasingly recognized because greater number of children are living with the problems beyond early childhood.

It is a serious medical, social and hygienic problem. It is often used interchangeably with sialorrhea. It is an increase in salivary flow that can be chronic or episodic. This condition should be differentiated from drooling. Persons who drool usually produce a normal salivary volume but cannot swallow their saliva effectively. This is most commonly due to a neurological or muscular disorder. This results in accumulation of saliva in the anterior part of mouth, which leads to drooling. Sialorrhea, is often compensated by an increase in their rate of swallowing. However, it is possible that it could lead to drooling if the rate cannot be compensated. In addition, there are some neurological conditions, which, can lead to drooling due to ineffective oral musculature that is also associated with an increase in the salivary flow rate. It occurs in children and adults with cerebral palsy, mental retardation, peripheral or central neurological and neuromuscular disorders (particularly in oromotor area) & facial palsy.

Drooling is a medical condition and not a disease or an illness, but may be a symptom of some underlying illness or condition. It is a loss of control over one's own saliva so that it drips out of the mouth. People may experience drooling due to abnormalities in the structure or function of the jaw, face or mouth. They can also have drooling if they produce too much of saliva, or have difficulty with the normal swallowing of that saliva. Most babies drool, but it is normal however, they should develop control of their saliva by 18 months of age. This is largely due to teething. Occasionally, children of normal health may have episodes of drooling up to four years. Also few persons with normal health may occasionally have episodes of drooling during light sleep, especially if they are sleeping on one side, when the mouth muscles relax and the saliva drips forward out of the corner of the mouth. Others may drool when they are nervous, eat certain foods (Sialagogues) or very excited and may make more than usual amounts of saliva.

For effective and efficient oral secretions, the muscles and structures of the oral areas must constantly make suitable adjustments, twenty-four hours a day. The sensory awareness at the lower cheeks, gums and lip must be enhanced to detect the small change in pressure on these tissues. The range of cheek and lip movement must be closer. It is necessary to maintain the negative infra oral seal during oral therapy for swallowing. Lip muscle power must be adequate to maintain the lips in a closed position during the process of swallowing. The posterior cheek muscles must squeeze in, towards the teeth and gums to shift the saliva to the center of the mouth for swallowing. The jaw must elevate to support the mid body of the tongue as it lifts up to contact the hard palate and propel the saliva into the pharynx. The soft palate must elevate during the swallowing to close the nasal cavity and to maintain negative pressure seal with in the month.



In order to understand the causes and management of drooling, a review of the anatomy and physiology of the salivary glands is important.

## **ANATOMY & PHYSIOLOGY OF ORO-MOTOR REGION**

Saliva is produced by the salivary glands. These glands are controlled by the autonomic nervous system. There are three pairs of major salivary glands: the parotid, submandibular, and sublingual glands. One and one half liters of saliva is produced daily, most of which (70%) comes from the submandibular glands at a resting state. The other one third comes from the parotid glands (25%) and from sublingual (5%) glands. Ingestion of food causes stimulation of the parotid gland to secrete a higher percentage of saliva. All the glands have a dual nerve supply from the sympathetic and parasympathetic systems. Secretary innervations are primarily under parasympathetic control.

Preganglionic parasympathetic fibers to the submandibular and sublingual glands originate in the superior salivatory nucleus in the medulla. These fibers then travel with the nervous intermedius in the facial canal. They travel with the facial nerve at the geniculate ganglion and leave the mastoid segment of the facial nerve as the chorda tympani. The chorda fibers go through the petroympenic fissure and join the lingual nerve to the submandibular ganglion. In this ganglion, they synapse and become postganglionic fibers which go to the submandibular and sublingual glands.

The preganglionic parasympathetic fibers to the parotid gland originate in the inferior salivatory nucleus in the medulla. They leave the brainstem as part of the glossopharyngeal nerve. Jacobson's nerve (the tympanic segment of CranialNerve IX) travels through the middle ear on the promontory and supplies the middle ear mucosa. The fibers then continue as the lesser superficial petrosal nerve, which joins the otic ganglion in the pterygopalatine fossa. The fibers synapse in the otic ganglion and continue as postganglionic parasympathetic fibers, which travel with the auriculotemporal nerve to the parotid gland.

Stimulation of the parasympathetic system causes secretion of saliva from all the salivary glands. Stimulation of the sympathetic system causes production of small amounts of saliva from the submandibular gland but it has no effect on parotid gland secretion. The sympathetic system originates in the cervical ganglion and travels with the arteries that supply the salivary glands.



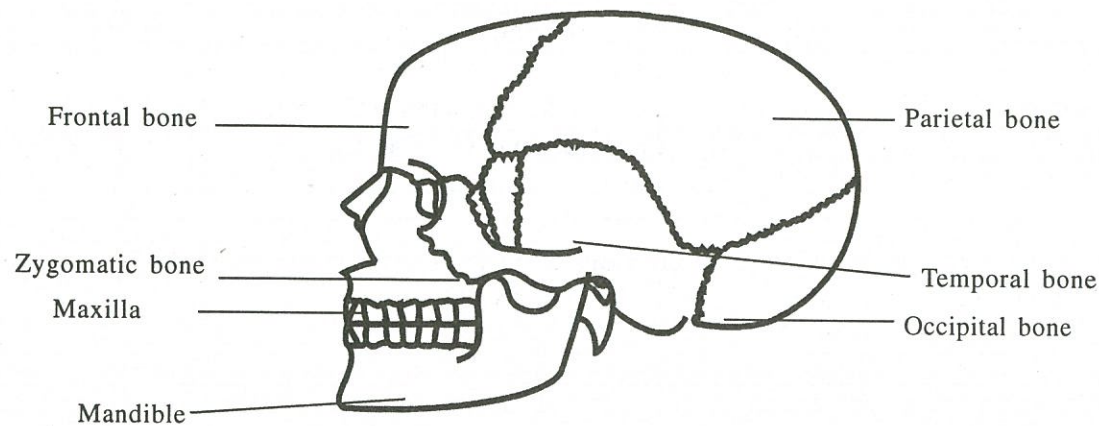


Fig. Bones of skull & face

## How do Glands produce Saliva

The type of nervous system that controls saliva production is the autonomic nervous system, which controls both the volume and type of saliva secreted. The secretion of saliva by each gland is controlled by two different types of nerves; sympathetic and parasympathetic nerves.

The parasympathetic nerve supply, is most active during the day, whilst eating, creates more watery saliva; predominantly produced by the parotid gland, and partly by the submandibular gland.

The parasympathetic system turns up the flow of saliva by releasing a chemical, acetylcholine, which stimulates the glands to make more saliva. If these glands get diseased, damaged, or affected by drugs, they may not produce enough saliva, leading to dry mouth.

The sympathetic nerve supply produces predominantly thicker mucous saliva mainly by the sublingual and partly by the submandibular glands. This may occur in certain situations like fear, stress or anger. This can also happen during strenuous physical exercise.

### *The Parotid Glands*

The parotid glands are the largest glands and lie between the back of the jaw and ear and secrete about 25% of the total saliva at rest. Each gland is surrounded by a hard capsule called the parotid capsule. The parotid mainly produces watery, or serous saliva. Its duct opens in the mouth just opposite the crown of the 2nd upper molar tooth. The gland's productions are predominantly controlled by a nerve called the Glossopharyngeal Nerve (Cranial Nerve IX) which originates in the superior salivatory nucleus of the medulla in the brainstem.

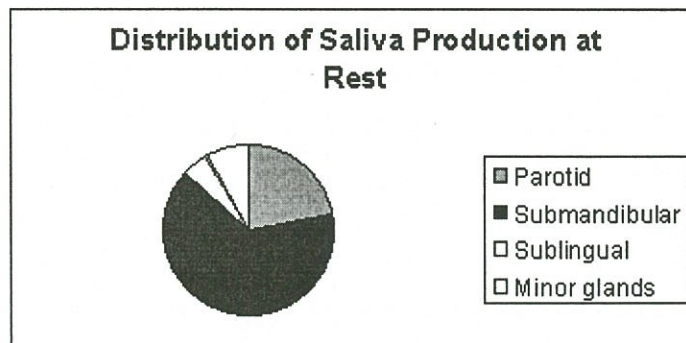
### ***The Submandibular Glands***

The submandibular glands are of intermediate size and lie in the floor of the mouth. A part of the gland curls inwards around the mylohyoid muscle. The submandibular gland produces most of the saliva at rest (about 60%) and its ducts are 5cm long, emptying underneath the tongue at the floor of the mouth. The type of saliva produced is both serous and mucous saliva: the amount of saliva produced by gland is altered depending on the nerves (parasympathetic or sympathetic) controlling it.

The submandibular gland is innervated predominantly by the facial nerve (CNVII). The nerve fibres begin in the superior salivatory nucleus in the pons of the brainstem.

### ***The Sublingual Glands***

The sublinguals are the smallest glands and are located just under the floor of the mouth, above the mylohyoid muscle. You can feel it as a ridge under your tongue. These secrete around 5% of total saliva at rest and produces mainly mucous saliva, although some serous saliva is also produced. The major and minor ducts also empty at the floor of the mouth in a row along with the submandibular duct. The nerve controlling sublingual production, follows the same pathway as the nerve controlling the submandibular gland (Cranial Nerve VII).



Saliva is primarily involved in the beginning of the swallowing process. When food is placed in front of the nose or eyes, the sight the smell of food stimulates the autonomic nervous system which in turn sends messages to the glands instructing them to produce saliva. The saliva produced is secreted into the mouth. It mixes up with the food and is swallowed.

Saliva has many uses, it primarily does the following functions:

- It begins digestion.
- The enzyme amylase in saliva begins the process breaking down of carbohydrates of food in the mouth.
- Lubricates the tongue and lips for smooth and clear articulation of speech.



- Protects the lining of the mouth from damage caused by abrasive foods and objects.
- Assists with acidity levels in the digestive tract. Bicarbonate ions regulates the pH levels in the mouth and esophagus.
- Acts as a solvent so that substances in the mouth can be tasted.
- Maintains a clean and hygienic mouth, Carries anti-bacterial agents (immunoglobulins). They destroy micro-organisms and remove toxic substances.

## Influences on Saliva Production

The general pattern of saliva production is that, it is greater during the day than at night and when upright rather than lying down. However, from person to person, the production of saliva can vary. Following external and internal elements, can influence saliva production:

- *Mood* (eg. Anxiety, depression).
- *Gender*: Evidence has shown that males produce greater amounts of saliva and also rates of flow of saliva than females.
- *Age*: Although there is conflicting evidence in this regard, several studies have found that the prevalence of oral dryness increases with aging and that the resting flow in the rate of saliva decreases with age.
- *The amount of water you drink*. Reducing the body water content, may lead to less saliva flow at rest.
- *Chewing*. It is generally agreed that chewing creates more saliva flow, particularly from the parotid secretions and thus serous saliva. Nerve endings or receptors (periodontal mechanoreceptors) ascertain the force and frequency of chewing and feedback information so that the amount of saliva secreted from the parotid is adapted accordingly.
- *Taste*. The saliva contains specific proteins, that are growth factors that makes taste buds to develop and mature. Without these growth factors, taste buds degenerate. Decreased saliva flow results in a clinically significant oral imbalance that may manifest as altered taste sensation.
- *Sight of Food*. It is commonly thought that saliva is produced by the sight of food.

## Facts and Figures

Most mature salivary glands produce about 600ml of saliva per day. In a resting or unstimulated state whole saliva is produced at a rate of 0.3-0.5ml/minute, if stimulated saliva production is 1.0-3 ml / minute.

## Functions of Saliva

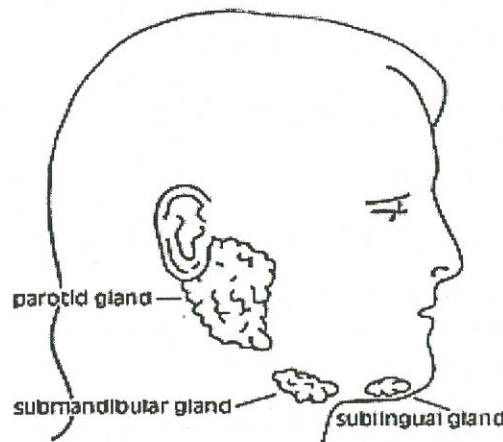
Saliva has many functions. It protects against dental and oral infections by its inherent pH and the immunoglobulin content. It is also important in swallowing by coating the bolus and digestion through the breakdown of carbohydrates

## Drooling and its Management

Domain	- Function
Digestive	- Facilitates chewing - Initial enzymatic breakdown of food - Facilitates swallowing
Protective	- Maintains oral health and - Prevents caries and periodontal disease
Speech	- Facilitates articulation by moistening surface of the tongue, lip and palate.

Saliva is produced by salivary glands that are found in the underlying tissues of our mouth. The basic unit of salivary glands is clusters of cells called acini. These cells secrete a fluid that contains water, electrolytes, mucus and enzymes, all of which flow out into a series of connecting ducts. The main salivary glands are:

- Parotid glands
- Submandibular glands
- Sublingual glands



Each gland is found in symmetrical pairs in the head. Each gland has a tube shaped duct that carries the saliva produced into the mouth. There are also smaller saliva-producing glands that are dotted throughout the mouth and contribute to the overall amount of saliva produced.

## **SALIVA CONTROL**

Control of saliva develops in infancy, with toddlers usually controlling drooling (except during teething, by age of two years). School children and adults with disabilities may continue to have problems with saliva control or drooling.



Consequences of drooling include laceration of skin around the mouth, chin and neck which may lead to secondary bacterial infection. Parents and caretakers must deal with the constant soiling of clothes, books, toys and furniture. Psychosocial stigma and rejection, associated with drooling, has an adverse effect on clients.

Persons who have a clinical problem with drooling usually have an underlying medical condition that disturbs the normal saliva production and swallowing process. Common reasons for drooling include cerebral palsy, infantile hemiplegia, mental retardation, delayed motor development, bell's palsy and epilepsy(seizure disorders), as well as disorders in the shape of the mouth and jaw.

The opposite problem is known as xerostomia or dry mouth(cottonmouth), in this condition person does not have enough saliva. This condition may often be temporary, such as, when a person gets very nervous or has to speak in public. It can also be permanent, which may be due to head and neck radiation for cancer treatment or medical conditions. Saliva is normally in the major salivary glands, such as the submandibular gland or the parotid gland. The secretion of saliva by these glands is controlled by two different sets of nerves, the sympathetic nerves, which tend to decrease the secretion of saliva, and the Parasympathetic Nerves, which follow the Facial Nerve(seventh cranial nerve) and tend to turn the flow up by releasing a chemical, acetylcholine, which stimulates the salivary glands to make more saliva. If these glands get diseased, damaged or affected by drugs, they may not produce enough saliva, leading to dry mouth.

Thus the scope of this problem can be broad and there may be a significant negative effects on the physical, social and psychological well being of these children. Physical problems associated with excessive drooling include facial chapping or bruising and the possibility of transmission of infectious diseases. Parents and caregivers may have to change the child's clothing or bib 10-20 times each day. Infrequent clothing or bib change may result in decreased physical contact or neglected by parents or others caregivers that may lead to social isolation and at times, depression. With the increasing trend of mainstreaming persons with physical disabilities as much as possible, it is important to correct such factors as drooling, which may distract the child from interaction. Furthermore saliva may be dribbled on the desk, computer keyboard and other educational materials, resulting in decreased educational opportunities, particularly for those who are more aware cognitively of their environment and social interactions.

## **Natural Development of Saliva Control**

Drooling is the unintentional loss of saliva from the mouth and it can give the appearance of excessive saliva production, although this is not always the case. Drooling is considered a normal phenomenon in children before they develop adequate oral neuromuscular (nerve and muscle) control, related to positioning, activity, oral muscle functioning, and the integration of these muscle movements. This is achieved at the age of 18-24 months.

Drooling occurs normally when a child is acquiring a new motor skill. Until the skill becomes automatic, drooling may continue. When a child cuts a new tooth, drooling occurs before, during and just after the event.

Since the production of saliva is related to the digestion of food, infants produce only a small amount of saliva before the age of 3 months as their only diet is cow's or breast milk. The minimum amount of saliva is secreted for the purpose of keeping the mouth moist and clean. However, as the child grows, glands enlarge and more saliva is produced. As the texture of food changes from liquid to semi solid, they develop chewing skills. The infant is then required to learn to control the saliva that fill in the mouth whilst they are not eating.

## **Development of Saliva Control Stages**

Development of saliva is a natural process.

### **After 3 months**

Infants begin to produce greater amounts of saliva, if lying flat, face up or reclining; gravity will enable the saliva to follow its due course with the swallowing process. They may drool when:

- A baby initiates head lifting or turning, or when gravity works against the normal path, drooling may occur.

### **6 months**

Infants control their saliva when lying face down, on their backs and in supported sitting positions. They may drool when:

- Teething or using their hands for reaching or using objects.
- Beginning to attempt tasks requiring concentration or finer use of their fingers or hands(due to a reduction in mouth control).
- Before, after or during a meal; they produce more saliva.

### **9 months**

Even during larger movements such as rolling, sitting or belly-crawling; drooling is absent. The child will not generally drool around mealtimes. They may drool when:

- Cutting a tooth or teething.
- Eating certain foods.

### **15 months**

Drooling is no longer present when continuously attempting newly acquired advanced movements such as walking. They may drool when:

- Teething
- Concentrating on advanced fine finger movements like self-feeding, random-play or undressing.

### **24 months**

Children develop the structure and control of their nerves and muscles to engage in the fine finger movements mentioned above, manipulating small objects and forming two-word speech mechanism without drooling.



## Description of Normal Swallowing

Swallowing is a highly complex and integrated neuromuscular function. The initial stage, is the preparation of the bolus, is under voluntary control, but once the bolus is passed into the oral pharynx, the second, or involuntary stage of the act of swallowing begins. It is the contact of the bolus or saliva with the mucosa of the back of the tongue and pharynx which sets up the swallowing reflex. It is during the involuntary stage the food passes through the pharynx to the oesophagus, partly under the influence of gravity with the person in the erect position and partly due to the successive contraction of the constrictor muscles.

Food is taken into the mouth with the lips and is bitten by the front teeth. The tongue moves the food on to the molars and mixes the food with salivary secretions. The cheek, comprising the buccinator muscle, also assists in controlling the food in mouth by pushing the food back on to the molars when the action of chewing tends to push it in sideways.

The tongue selects the food that is sufficiently moistened for swallowing. The anterior part of the tongue is raised and pressed against the hard palate just behind the front teeth. The bolus is formed on the tongue and squeezed backwards towards the posterior oral cavity by movement of the tongue against the hard palate. This movement commences at the tip of the tongue and spreads back rapidly to assist in the formation of bolus. The bolus is passed into the oral pharynx through the palatoglossal arches by elevation of the posterior third of the tongue in a postero-superior direction. In swallowing fluids, the intrinsic muscles of the tongue are used to form a tunnel with the hard palate and to squirt fluid back through the mouth.

In preparation for swallowing, the hyoid bone is brought forward into a position of moderate elevation through the movements of the tongue. The lips and jaw are closed and the soft palate and uvula made tense to seal the nasopharynx. The larynx is pulled upward behind the hyoid bone and towards the back of the tongue. This narrows the lumen of the larynx which helps to protect the respiratory tract. As the bolus reaches the epiglottis, some of it spills sideways descending on one or both sides of the larynx into the oesophagus. The pharynx is also pulled upwards over the bolus, propelling it, a short distance into the oesophagus. Once the bolus enters into the oesophagus, it continues downward by peristaltic movement. Breathing is inhibited momentarily during swallowing .

### ESSENTIAL COMPONENTS

- Jaw closure
- Lip closure
- Elevation of posterior third of tongue to close off posterior oral cavity.
- Elevation of lateral borders of tongue.

## NORMAL DEVELOPMENTAL STAGES OF FEEDING

### Sucking liquid from the bottle or Breast

One month	Suckling or sucking pattern with the bottle or breast. Loses some liquid during sucking.
Six months	Suckling or sucking pattern with the bottle or breast. Does not lose liquid during sucking, although may lose some when initiating or terminating the suck or as the nipple is removed.
Nine months	Uses both the suckling and sucking patterns while drinking from the bottle or breast. No longer loses any liquid during sucking initiation or when the nipple is removed from the mouth.
Twelve months	Takes liquid primarily from the cup. May continue with the bottle or breast at bedtime.

### Sucking Liquids from the Cup

Four to six months	Is introduced to liquids from the cup.
Six to eight months	Suckling pattern, or a mixture of sucking and suckling for cup drinking. Extension-retraction motions of the tongue during drinking or as the cup is offered or removed. Wide jaw excursions are common. Loses liquid.
Twelve months	Sucking pattern. Extension-retraction motions of the tongue is rare. Jaw excursions may be up-down or backward-forward. Tongue may protrude slightly beneath the cup to provide some additional stability. May lose liquid during sucking.
Eighteen months	Sucking pattern. External jaw stabilization is obtained by biting down on the edge of the cup. Upper lip is closed on the edge of the cup, providing a better seal for drinking. Tongue does not protrude from the mouth or rest beneath the cup. Minimal wide jaw excursions up-down or backward-forward if stabilization is not used.
Twenty-four months	Uses an up-down sucking pattern, with the cup held between the lips. Internal jaw stabilization is emerging.
Twenty-four months & above	Uses a sucking pattern and active internal jaw stabilization without biting the edge of the cup. Internal stabilization occurs most of the time during drinking sequences of more than two sucks. Slight up-down jaw motions or holding the edge of the cup with the teeth also may occur.



## Sucking Soft Solid or Pureed Foods from the Spoon

Under three months	Does not take food from a spoon.
Three months	If soft or pureed foods are presented, uses a suckling or sucking patterns as food approaches or touches the lips. Lip does not assist in food removal.
Six or seven months	Visual or tactile recognition of the spoon. The jaw becomes quiet and remains in a stable, open position until the spoon enters the mouth. The tongue rests quietly to accept the spoon.
Eight months	Upper lip moves downward and forward to posture or rest on the spoon and assist in food removal.
Ten months	Lower lip draws inward as the spoon is removed or if food remains on the lower lip. Upper lip actively moves forward, downward, and inward to remove food from the spoon.
Fifteen months	Upper incisors are used to clean the lower lip as it draws inward. Uses a sucking pattern or a mixture of sucking and suckling. Playful biting on the spoon may occur, but the phasic bite reflex has been integrated and is not present.
Twenty-four months & above	Tongue is used in a free, sweeping motion to clean food from the upper or lower lips. Tongue elevation and depression are independent of jaw movement. Skillful tongue tip action may be present. Slight lateral movements of the jaw may occur.

## Lip Movements in Chewing

Under six months	Uses sucking or suckling motions.
Six months	Upper or lower lip draws slightly inward when food is left on it. When food is placed between the lateral biting surfaces of the gums, the cheek and lip on that side tighten asymmetrically to keep it in place for chewing. Does not yet use teeth and gums to clean food from the lips.
Nine months	Lips are active with the jaw during chewing, and make contact at the sides or in the center as the jaw moves up and down. Upper or lower lip draws inward when food is on the lip.
Twelve months	Lips are active during chewing. Uses upper incisors or gums to clean food from the lower lip as it is drawn inward. May lose food or saliva while chewing.

Fifteen months	Upper and lower lips are active during chewing and cleaning. Corner of the lip and the cheek draw inward to assist in controlling food placement and movement. This occurs more frequently, with a wide variety of food transfers in chewing. Diagonal rotary movements are smooth and well coordinated.
Eighteen months	Can chew with the lips closed, and does so intermittently. Lips are closed for chewing primarily when needed to prevent food from falling out. May lose food or saliva while chewing.
Twenty-four months	Adequate lip movement during chewing. The lip movement up-down pattern is more variable and less automatic than the phasic bite-and-release pattern. Diagonal rotary movement of the jaw occurs when the tongue moves to the side to assist with chewing the food placed between the biting surface of the gums. The phasic bite-and-release pattern also may occur.
Twenty-four months & above	Jaw movement in chewing continues to be a mixture of nonstereotypic and diagonal rotary movements. Circular rotary movements occur when transferring food across the midline from one side of the mouth to the other.

### **Tongue Movements in Chewing**

Under six months	Uses sucking or suckling patterns.
Six months	Tongue moves up and down in a munching pattern, with no lateralization when solid foods are placed in the center of the mouth. Some lateralization may occur when food is placed on the side, between the biting surfaces of the gums. Sucking movements may alternate with the munching/chewing patterns.
Seven months	Tongue begins to show more lateralization, with a gross rolling movement or simple horizontal shift when food is placed on the side, between the biting surfaces in the molar area.



Nine months	Lateral tongue movements continue to occur with ease when food is placed on the side of the mouth. Begins to transfer food from the center of the tongue to the side. Intermittent extension-retraction movements may occur occasionally with a difficult food transfer. Tongue tip position. Tongue may move forward with an extension-retraction movement pattern during the swallow. This may alternate with a pattern of simple protrusion between the teeth. Lips may be open while swallowing. May lose liquid.
Twelve months	Swallows liquid from the cup with a tongue tip that is intermittently elevated. This position may alternate with an extension-retraction pattern or simple tongue protrusion. Lips may open while swallowing.
Twenty-four months	Swallows liquid from the cup with easy lip closure. No liquid loss during drinking or when the cup is removed from the lips. Elevated tongue position is used more consistently for swallowing.
Twenty-four months & above	Tongue tip elevation is used consistently for swallowing. Swallowing occurs with no observable extension-retraction pattern and no tongue protrusion. Easy lip closure, with no loss of liquid during drinking or when the cup is removed from the lips.

## Swallowing Liquids

One month	Swallows thin liquid with a suckle-swallow pattern. Tongue may protrude slightly through the lips with an extension-retraction movement.
Six to eight months	Swallows liquid from the cup with no observable elevation.
Twelve months	Can transfer food from the center of the tongue to both sides of the mouth. Intermittent extension-retraction movements may occur with a difficult food transfer.
Twenty-four months	Can transfer food from either side of the mouth to the other side without pausing in the center. Extension-retraction movements may occur occasionally with a difficult food transfer.
Twenty-four months & above	Can transfer food rapidly and skillfully from the center to the side, from the side to the center, and from side to side across midline. Uses precise tongue tip elevation movements. No extension-retraction movements occur, even with difficult food transfers.

### Swallowing-Semi-Solids

Under three months	Does not take semi-solids.
Three months	If soft or pureed foods(semi-solids) are presented, uses a primitive suckle-swallow response to move food into the pharynx. Some food is pushed out of the mouth. Periodic choking, gagging, or vomiting can occur.
Six or seven months	Tongue shows an extension-retraction pattern or simple protrusion between the teeth or gums. Food is not pushed out by the tongue, although minor losses of food occur.
Nine months	Uses an up-down sucking pattern. Simple tongue protrusion between the teeth and gums. Some extension-retraction of the tongue may continue intermittently.
Twelve months	Swallows semi solid food with an intermittently elevated tongue-tip position. This tongue pattern may alternate with a pattern of simple tongue protrusion. Swallows with easy lip closure. No loss of food.
Eighteen months	Uses tongue tip elevation intermittently or consistently for swallowing. Simple tongue protrusion may occur during swallowing. No extension-retraction movements of the tongue.
Twenty -four months & above	Swallows with no loss of food or saliva. Uses tongue tip elevation for swallowing. No tongue protrusion.

### Swallowing Solids

Six to eight months	Swallows some thicker pureed foods and tiny, soft, slightly noticeable lumps. May use simple tongue protrusion or extension-retraction movements.
Twelve months	Swallows ground, mashed, or chopped table foods with noticeable lumps. Uses an intermittently elevated tongue tip, but may have simple tongue protrusion. No extension-retraction movements during swallowing.
Eighteen months	Swallows solid foods with easy lip closure as needed. No loss of food or saliva. Tongue tip elevation used for swallowing. Some simple tongue protrusion may continue during swallowing.
Twenty four months & above	Swallows solid foods, including those with a combination of textures, with easy lip closure as needed. No loss of food or saliva. Skillfully swallows foods that have a combination of textures. Tongue tip elevation used for swallowing. No simple tongue protrusion during swallowing.



## Coordination of Sucking, Swallowing and Breathing

One month	Sequences two or more sucks from the breast or bottle before pausing.
Three months	Sequences twenty or more sucks from the breast or bottle. Swallowing follows sucking with no discernible pauses when hungry. Pauses for breathing are infrequent. Occasional coughing or choking indicates poor coordination of sucking, swallowing, and breathing.
Six months	Uses long sequences of sucking, swallowing, and breathing, with breast or bottle. When taking liquids from a cup, may have continuous sucks followed by uncoordinated swallowing. Much liquid is lost. Larger mouthfuls may result in choking or coughing.
Nine months	Uses long sequences or continuous sucks during cup drinking. Still has difficulty in coordinating sucks with swallowing and breathing. Although longer, coordinated sucks are possible, usually takes up to three sucks before stopping or pulling away from the cup to breathe.
Twelve months	When taking liquids from a cup, swallowing follows sucking with no pause. Sequences of at least three suck-swallows occur when thirsty. Intake during each suck-swallow is less than one ounce. Some coughing and choking may occur if the liquid flows too fast.
Fifteen months	When taking liquids from a cup, swallowing follows sucking with no pause. Pattern is well coordinated, and coughing and choking rarely occur. Sequences at least three suck-swallows while drinking one ounce or more without a major pause.

## Control of Drooling

One month	Rarely drools because of minimal saliva production.
Six months	Rarely drools in supine, prone or sitting. May drool in these positions if babbling or when using hands for reaching, pointing or manipulating objects. Or may drool due to teething. Or drools only or primarily during or immediately after feeding or when given particular foods.
Nine months	No longer drools when attempting newly acquired gross motor skills, such as rolling and belly crawling. Drooling occurs during but not immediately before or after teething.

Fifteen months	No longer drools when attempting newly acquired gross motor skills, such as walking and running. If cutting teeth, some drooling may occur.
Eighteen months	No longer drools when attempting early fine motor tasks, such as self-feeding, undressing, or random play. Drooling may occur if teething.
Twenty-four months	No longer drools when attempting more advanced fine motor tasks, such as drawing, fine finger movements, or two-or three word speech combinations.

### **Jaw Movements in Biting**

Five or Six months	Uses a primitive phasic bite and release pattern on a soft cookie. Biting rhythm is regular, and there is no controlled, sustained bite. May revert to sucking the cookie instead of biting it.
Nine months	Holds a soft cookie between the gums or teeth without biting all the way through. Maintains a quiet jaw and a holding posture as the feeder assists in breaking off a piece. With firmer cookies, may alternate this holding pattern with a phasic bite pattern.
Twelve months	Uses a controlled, sustained bite on a hard cookie. With a hard cookie, may not be able to sustain the bite (because of lack of teeth or weak biting power) and may revert to a phasic bite or sucking.
Eighteen months	Uses a controlled, sustained bite on a hard cookie. May use overflow or associated arm or leg movements during biting. May pull the head backward into slight extension to assist with the bite.
Twenty-one months	Uses a controlled, sustained bite on a hard cookie with no overflow or associated arm or leg movements. No longer extends the head to assist with biting. Opens the mouth wider than necessary to bite foods of various thickness.
Twenty-four months	Uses a controlled, sustained bite while keeping the head in midline when food is presented for biting on both sides of the mouth. Is able to grade the opening of the jaw when biting foods of various thicknesses.



## Jaw Movements in Chewing

Under five months	Uses only suckling and sucking.
Five months	Jaw movement is predominantly the primitive phasic bite-and-release pattern with a regular, stereotypic rhythm. Diagonal rotary movements may occur if food is placed on the side of the mouth for chewing or transfer to the middle of the mouth. Nonstereotypic vertical movements and speed may occur intermittently.
Six months	Jaw movements consist primarily of nonstereotypic vertical movements.

## **Chapter-2**

# **ASSESSMENT OF DROOLING AND ORAL MOTOR FUNCTIONS**

### **INTERDISCIPLINARY EVALUATION OF DROOLING**

This approach refers to coordinated effort among several specialists, each with specific expertise to offer in solving a complex problem both in the evaluation and management plans. It may need to be adjusted based on the input and shared ideas of a group of people which include not only the specialist but also the children, parents and other caregivers. No single approach will be suitable for all children except a multi-disciplinary team consisting of all the medical and para medical professionals.

First, detailed evaluation of the drooling is done to classify its severity and contributing factors. Oro-motor functions, swallowing evaluation should be done by speech language pathologist or by occupational therapist. The dentist performs an assessment of the conditions of gums, teeth and the maxillary, mandibular occlusal relationships which affects production and control of saliva. Finally medical evaluation with particular attention of the oral cavity and structural problems encountered in the upper oro digestive tract is performed. Additional consultant such as a neurologist, physiotherapist, developmental specialist may be called on need.

Physical examination is extremely important in the evaluation of drooling. Attention should be directed to the head and neck posture, sores on the lower one third of the face, dental abnormalities, abnormal tongue size or movements, problems with swallowing, and the patency of the nasal airway. Anterior open bite malocclusion, hypoactive gag reflex, and decreased intraoral sensitivity are common in the, person having drooling.

Speech language pathologists - Assess the quality of the drooling in functional terms, the intellectual, cognitive level and language function, as well as the ability to control the secretions.

Physiotherapists and occupational therapists - Assess the body position, head, mouth positions, tone, strength, coordination of the lips, jaw and tongue.

Developmental specialists - Assess the cognitive level of the child and try to develop certain techniques, which are helpful to the child.

Orthostists - Assess the position of the mouth, jaw, head and design a modified device which is helpful to prevent excessive drooling.

Dentists - Assess the condition of the gums, teeth and any decays which would cause excessive drooling and also correct the position of the teeth and jaws.



Medical practitioners - Assess general health of the child and prevent infectious diseases.

Neurologists - Assess the neurological status of the child.

Otolaryngologists - Assess the medical condition of the person including medications neurological status particularly the structures of the upper oro digestive track and nasal obstructions.

## History

A thorough history is invaluable prior to treatment. Make an assessment of the severity and frequency of drooling, and inquire about the effect of drooling on the quality of life for the person and family. Importantly, identify factors contributing to drooling. Caregivers or parents can assist in assessing the characteristics of drooling, such as peak time of day, changes in volume with specific activities, consistency of saliva (i.e., thick, mucinous, watery), and the frequency of drooling.

Quantitative measurements can be difficult, but classification schemes have been developed to give a general idea of the magnitude of the problem. Multiple classification schemes have been used by different authors to report the severity of drooling.

The severity of drooling can be classified with the following scale:

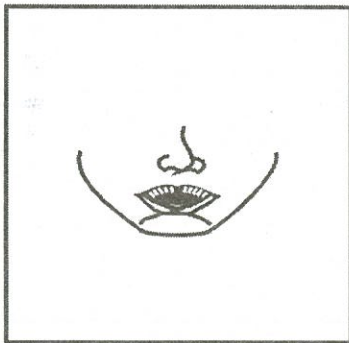


Fig: Drooling on to the lip region

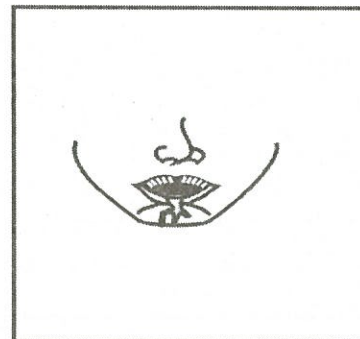


Fig: Drooling on to the lip & chin

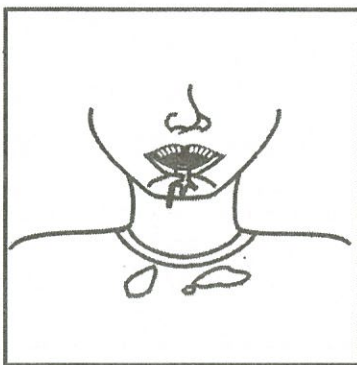


Fig: Drooling on to the lips, chin & clothes

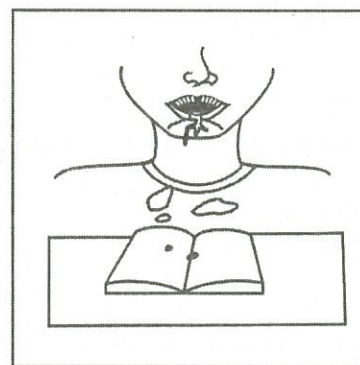


Fig: Drooling on to the hands, table etc

**Table - Functional Classification of Drooling**

<b>Severity</b>	<b>Description</b>	<b>Frequency</b>	<b>Functional Effects</b>
0-Absent	Dry, never drools	Never	None
1-Mild	To lips only	Not every day, occasionally	Minimal except in individuals with high cognitive and social function
2-Moderate	Lip and chin	Every day with some dry periods	Moderate to severe, depending on functional and cognitive level and associated physical problems.
3-Severe	Clothing soiled	Constant	Severely limiting and isolating
4-Profuse	Clothing, hands and table wet	Constant	Severely limiting and isolating

The frequency of drooling can be quantified based on the following scale:

- Never drools
- Occasional drooling - Not every day, constant drooling.

These types of classifications can be helpful for guiding management decisions. They can also be helpful for reporting purposes, to compare results of techniques and management strategy.

Some specific points should be addressed when assessing the magnitude of the problem with caregivers, which include the following:

- Number of bib or clothing changes per day.
- Difficulties in swallowing saliva.
- Severity of perioral skin maceration and infections.

The other classification of drooling:

- Excellent - Normal salivary control.
- Good - Slight loss of saliva (dried on the lips).
- Fair - Improved, but with significant residual saliva loss or with thickened, offensive, brown, gummy froth.
- Poor - Failure to control or too dry.



Problem of drooling spans a continuum of severity. Mild droolers spill saliva onto their lips but not beyond the vermilion border. Moderate drooling reaches the chin and severe drooling is characterized by dripping onto clothing. Those with the greatest problem experience profuse drooling on: books, papers, equipment and every other equipment which is in possession or proximity to the face.

The standard concept of drooling refers to visible anterior or labial spill. The pooling of saliva, at times mixed with food, may be the cause of malodor. The term 'posterior drooling' has been applied to the situation in which oral secretions are not lost externally but rather pool in the hypopharynx where it should normally stimulate a swallow reflex. In the absence of adequate swallowing, they spill over into the pharynx producing congested breathing, coughing, gagging, vomiting and at times aspiration into the trachea. Viewed in this broader context, anterior drooling represents one element on a continuum of oral performance impairments which include speech(articulation) problems, feeding and swallowing difficulty, upper respiratory congestion, and even aspiration. The term sialorrhea implies excessive secretion of saliva, though most assert that saliva is not over-produced in children who drool but inadequate swallowing and lip closure are the problems. Research has provided support for this clinical observation in normal subjects and children with cerebral palsy. They studied drinking tasks and found that children with cerebral palsy who drooled, had more trouble with lip closure and swallowing mechanism rather than unimpaired children or children with cerebral palsy who did not drool.

Other clinical factors that could contribute to spillage of oral contents should be explored while taking the person's history. Nasal obstruction with chronic mouth breathing can exacerbate drooling. The anterior obstruction of the nose due to other causes, such as allergic rhinitis, malocclusion, gingivitis, and dental caries can contribute to drooling and should be addressed by a pediatric dentist at the outset of the evaluation.

## ASSESSMENT PROFORMA FOR DROOLING

Name \_\_\_\_\_ Age \_\_\_\_\_

Sex \_\_\_\_\_ Registration No. \_\_\_\_\_

Presenting complaint

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### SIGNIFICANT HISTORY

Prenatal :

Natal :

Postnatal :

Family History :

### DEVELOPMENTAL HISTORY

Age at which achieved

Neck control :

Sitting :

Walking :

Feeding history :

Extra-esophageal reflux :



## CLINICAL EXAMINATION

General examination :  
Specific examination :  
Lip :  
Mandible :  
Palate :  
Pharynx :  
Tongue :  
Dental health :  
Congenital abnormalities :

## FUNCTIONAL ASSESSMENT

Oral Tactile Sensitivity :  
Sucking and Swallowing efficiency :  
Chewing efficiency :  
Lip movement :  
Mandible movement :  
Tongue movement :  
Upper airway's obstruction :

## ORO MOTOR REFLEXES

Rooting reflex(0- 4 months) :  
Sucking and swallowing reflex(2nd day to 2-5 months) :  
Protective gag reflex :  
Bite reflex(birth - 5 months) :  
Babin reflex :

Table - Functional classification of drooling

Severity	Description	Frequency	Functional Effects
0-Absent	Dry, never drools	Never	None
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3-Severe	Clothing soiled	Constant	Severely limiting and isolating.
4-Profuse	Clothing, hands and table wet	Constant	Severely limiting and isolating.

**Type of Drooling:**

**Oro Motor Tone:**

### **EXAMINATION IN SITTING POSTURE**

Head and neck :

Shoulder girdle :

Trunk :

Medication :

Provisional diagnosis :

Etiological diagnosis :

Associated conditions :

Specific diagnosis :

Degree of drooling :

### **MANAGEMENT**



## Physical Examination

Perform a thorough head and neck examination. Give special consideration to those anatomic factors that could contribute to or exacerbate drooling so that these issues can be addressed prior to surgical intervention. Some key points to be evaluated during the physical examination includes the following:

- Head position and control.
- Sitting posture
- Condition of perioral skin.
- Tongue size and control and the presence of thrusting behaviors.
- Tonsil and adenoid size.
- Occlusion: Malocclusion, particularly an open bite deformity, is a common finding in persons with mental retardation. This can make proper oral hygiene very difficult. Open bite deformities can prohibit closing of the mouth and can mimic nasal obstruction in these persons.
- Dentition: Caries may be noted.
- Gingival tissues.
- Mandible and palatal position.
- Gag reflex and intraoral tactile sensitivity.
- Presence of mouth breathing.
- Nasal obstruction and the appearance of tissues upon anterior rhinoscopy.
- Swallowing efficiency: This is determined by observation or by barium swallowing method. Barium is a radioactive substance which is made to swallow and visualized under x-rays or under a scan to find any obstruction or restriction.

## Lips Movement

*Lips movement:* Inspect the lips first for relative size, symmetry and scars. Can the client smile, pucker his lips and retract them? Can he close his lips tightly for the sounds /p/, /b/ and /m/?

*Jaws:* (Observe for symmetry): Can he open and close his mandible at least once per second? Does his mandible deviate to the right or left on opening? Assess mandibular strength by asking him to attempt to open or move his jaw laterally against resistance.

*Teeth:* Inspect the client's bite during rest. A normal dental bite is characterized by the upper teeth overlapping with the lower teeth by not more than one half of their vertical dimension. Is there an open, under or overbite? Does the client have cavities, jumbled teeth, gaps between teeth, or more than the normal complement of teeth?



*The tongue:* Note the size of the tongue relative to the oral cavity. Observe for symmetry in structure and movement. Is there scarring, atrophy or fasciculations? Can the client protrude and retract his tongue, wiggle it from side to side, and touch the alveolar ridge without random movement or extraordinary effort? Inspect the tip of tongue and the frenulum for any evidence of tongue-tie. Some children, especially those presenting neuromuscular problems, may find it difficult to elevate the tip of their tongue to the alveolar ridge on command. Test for diadochokinesia (alternate supination and pronation of forearm) by having him utter "tuh"; can say one per second? Look for regularity as well as rate in any tongue movement task. See for any tongue thrust?(an open bite might alert for this possibility). When he swallows, does he have an exaggerated lip seal? Does his tongue protrude beyond the incisors? Is there no apparent bunching in the masseter? If the answers to these last three queries are positive, then the client may be a tongue thruster.

*Hard palate:* See the shape(is it flat or high arched?) and width of the hard palate. Are there any scars present? Can the client produce /r/ and /l/?

*Soft palate and pharyngeal closure:* Check the velum for size, scars, and symmetry. Look carefully for any variations in color, such as bluish borders or striations. Does the soft palate move back and up toward the posterior pharyngeal wall? What is the size of the velum relative to the depth of the pharynx? Can you visualize lateral movement of the velum? Can the client whistle or puff up cheeks?

*Others:* Observe the client's breathing during speech and at rest. Is there an obstruction of the nasal passages? Is the client a mouth breather? Observe the facial muscles: Is nasolabial fold flattened; does an eyelid droop(ptosis); to one side of the face, smooth and absence of normal creases? Is there anything unusual about the appearance of the individual's head?

### **Neurological Examination:**

Pay particular attention to cranial nerve examination findings. Check for frequency & consistency of drooling. The diagnosis of drooling is a clinical one, based on the person's history and physical examination. During the history, an assessment of the severity of drooling is made. The quantity of saliva and the peak time of drooling during 24 hour period is important to note. Drooling is difficult to measure. It varies from day to day and influenced by factors including hydration, hunger, emotional state, and the level of alertness. Associated factors can sometimes shed light on the etiology of the persons who drool. For example, a child with nasal obstruction leading to drooling will also have a history of chronic mouth breathing and may demonstrate adenoid facies. If the person has a treatable condition such as rhinitis, sinusitis, or adenoid deficiencies, hypertrophy, this should be treated first.

In case of a child, parental expectations should be evaluated. The parent must understand the goal of treating drooling, is to reduce the excessive salivary flow while maintaining a moist and healthy oral cavity. Avoidance of dry mouth(xerostomia) is very important. The person's full medical history should be obtained, paying close attention to any neurological conditions which may play a role in the etiology of drooling. In addition, other medical conditions may present, a contraindication to a potential management option.



## **ORO MOTOR ASSESSMENT**

To determine the muscle areas involved, a baseline of the components of muscle, movements must be determined. These components include, response to pressure and movement, range of movement, variety of movement, strength of movement, and control of movement. The areas assessed include the lips, cheeks, jaw, tongue and soft palate. Observation of the face at rest and during activities such as eating, drinking, talking, and during change in facial expression are important. The structures of the face and mouth should be inspected visually for alignment and symmetry. In addition to observation, the lips, cheeks, jaw, tongue and soft palate can be manipulated manually, add data regarding the components of movement listed above. This is especially important if the individual is nonverbal, on non-oral intake, or cannot follow commands. Findings from this baseline will yield data critical to the design of an effective intervention program.

The focus of oro-motor intervention will be determined by the baseline assessment. Some examples of interventions might include increasing sensory awareness at the gums and inner lower cheeks, increasing lip strength at the sides and center of the upper and lower lips, increasing internal jaw strength, increasing soft palate activation and increasing the variety of intrinsic tongue muscle movements.

Drooling may still occur intermittently, especially during the occurrence of teething, gum or tooth disease, upper respiratory track infections, sinus infections, allergies, middle ear infections, gastroesophageal reflux, mouth breathing, increased level of concentration, or decreased level of consciousness. The overall occurrence of drooling is reduced due to the increased internal oral motor control, the individual has developed. Function is the focus of the management outcome.

## **EXAMINATION OF ORAL REFLEXES**

### **Rooting Reflex**

- Persists from birth upto 3 to 4 months of age and disappear in infants by 7 months of age.
- Turning head in the direction of tactile stimulation that is applied in a light stroking manner at the corner of the mouth.
- It is the 1st reflex that enables the neonate to pursue tactile input, thus allowing the neonate to make contact with the external environment.

### **Suck Swallow Reflex**

- From 2nd or 3rd day upto 2-5 months of age.
- Usually 3 sucks followed by one swallow, follows a rhythmical pattern.
- Sucking is by elevation of anterior part of tongue against bottle or nipple, the posterior part of the tongue acts as a furrow to transfer liquid into oral cavity.
- Non nutritive sucking is also seen in the absence of food.

### **Protective Gag Reflex**

- It is present from birth but gradually becomes weaker when infant starts chewing but does persist though out life.
- It is said to be hyperactive if it is facilitated in any other area of oral cavity.

### **Bite Reflex**

- Bite, diminishes around 5 to 6 months when rotatory chewing begins.
- Rhythmic opening and closing of mouth is elicited by direct application of tactile input to teeth, gums or tongue.
- Six months, hand to mouth play begins (because of combined flexion - extension pattern) oral exploration is not only important for development of body image but also to decrease threshold of oral cavity to tactile input.
- When finger feeding begins, infant will accept various consistency of food and spoons without facilitating primitive oral reflexes especially gag reflex.

### **Babin Reflex**

- It is opening of infants mouth when pressure is applied to the palm of the hand.

A number of oral reflexes are seen in the first year of life. For example, the bite reflex, which emerges at about four months(stimulation of the gum pads leads to biting and chewing practice). The reflex fore away behaviors by the end of the first year as more mature tongue, lip and jaw movements develop. One reflex, however, remains throughout life, the gag reflex, if the back of the tongue or throat is stimulated suddenly.



**ORAL REFLEXES**

Area evaluated	Age	Function	Stimulus	Response
Face	Birth to life long	Appropriate level of sensitivity allows for touch awareness. Motor component allows for food handling and expression	Pressure to perioral area and temples Functional muscle test	Appropriate toleration of pressure; isolate muscle function coordination evaluation.
Tongue	Birth 4-6 month 10-12 month	Tongue elevation Lateralization Tip elevation; moves and locates food in mouth; directs food back in mouth to be swallowed.	Feeding cortical command; manually palpate with index finger or rubber seizure stick.	Elevation; lateralization, tip elevation, rapid lateralization
Soft palate	Birth to life	Elevation', allows food to escape nasal cavity.	Light touch on lateral portion of soft palate	Soft palate elevation
Rooting	Birth to 3-5 months	Assist in locating food source	Touch on corner of lip or cheek	Rooting reflex can cause possible impedance of normal or motor stimulus, open mouth, and tongue slightly protracted
Bite	Non reflexive after 3-5 months	Allows introduction of food and leads to chewing	Padded tongue blade or rubber seizure stick on person's tongue, gum and tooth surfaces	Sustained reflexive
Sucking and swallowing	Birth to 3-5 months	Initial intake of food; sucking, followed by swallowing	Nipple; straws of various diameters	Sucking with buccinator and orbicularis oris compressing; subsequent swallow.
Swallowing	Birth to life	Food intake of solids and fluids; nutrition	Stretch, digastric and geniiohyoid muscles; depress spoon or tongue blade half way back on tongue, introduce eyedropper full of fluid.	Swallowing
Coughing	Birth to life	Prevents aspiration	Observe for voluntary or spontaneous coughing	Coughing
Gag	Birth to life	Prevents aspiration, triggers swallowing mechanism	Apply pressure on posterior third of tongue	Simultaneous head and jaw extension with rhythmical protrusion of tongue and contraction of pharynx.

## **Sensation**

Difficulties in ability to process and correctly interpret sensory messages or deliver appropriate messages to muscles, can affect eating, drinking, delaying the swallow, poor initiation of chewing and swallowing.

### **Common Problems**

#### *Hypersensitivity*

A stronger than normal reaction to specific sensations, including various textures, touch in specific areas (for initiation of suck, chew or swallow) and tastes.

May lead to rejection of food or signs such as turning away, tightening muscles, gagging, and grimacing.

#### *Hyposensitivity*

Diminished reaction to stimuli than normal would be expected and reduction of sensory awareness, with signs such as not being aware of saliva or food in the mouth or of varying textures.

#### *Sensory Overload*

Inability to filter relevant information during feeding, the child may be distractible and irritable.

#### *Sensory Defensiveness*

The child is excessively defensive to stimulation around the mouth, sounds or movement. Touch may be felt as pain or discomfort. This may be evident when the child pulls away from programme.

## **Motor Abilities During the Oral Examination**

During the oral examination, observe disturbances in the client's gross and fine motor abilities that suggest possible neurological dysfunction. Although the diagnostic appraisal of motor dysfunction is the responsibility of the neurologist, the speech pathologist and clinician should have a basis for making intelligent referrals. This can be accomplished by comparing various facets of the client's motor performance with norms corresponding to his age level.



There are certain pre-requisites, which are necessary for effective swallowing.

- Good posture
- Balanced sitting (independent sitting with out any support) .
- Ability to move head independently of body.
- Normal threshold to sensation.
- Control of breathing in relation to swallowing.
- Normal reflex activity (the gag reflex is the only reflex normally present in the adult).

*Analysis of oro-facial function involves:*

- Observation of sitting position.
- Observation of movements of lips, jaw, cheeks.
- Intra-oral digital examination of tongue and cheeks (to test threshold, to touch and to establish whether the tongue offers the normal resistance to movement).
- Observation of eating and drinking.

## **Dysphagia**

*Lack of control over oro-facial musculature will result in:*

- Open jaw
- Poor lip seal
- Tongue, too forward and asymmetrically placed.
- Drooling
- Immobile hypotonic tongue (tongue may look enlarged).
- Food collection between cheek and gums. Although this is often attributed to lack of muscular activity in the cheek (buccinator), a major factor is undoubtedly the immobility of the tongue.

*Altered threshold to stimulation will result in:*

- Diminished awareness, which will cause difficulty in swallowing and lack of awareness of saliva and food in the mouth,  
Or
- Hypersensitivity, which will be demonstrated by a hyperactive gag reflex, retraction of the tongue and aversion to touch and to the presence of food in the mouth. This occurs as a secondary problem, due to fear of choking in untreated persons and after prolonged use of a nasogastric tube.



Swallowing involves a network of muscles and nerves working simultaneously together. When one or both become impaired, the inability to swallow occurs. Dysphagia is defined as “the loss of or difficulty in chewing / preparing food in the mouth and swallowing”. The meaning of dysphagia has been extended to include “behavioral, mental retardation, cerebral palsy, sensory, visual, and cognitive awareness of upcoming eating situations”. This influences the types of interventions chosen.

### *Assessment procedures*

Thorough and careful assessment of all aspects of a client’s feeding history, neurological and physical state and feeding routines must be undertaken before remediation procedures are investigated. It is also important to remember that, even with older clients, the nervous system may be in a state of change and new behaviours, both normal and abnormal, may result from this change. Regular reassessment is, therefore, essential.

### *Checklists for Feeding*

It covers the assessment of posture, oral-motor skills for drinking, eating, sensitivity, oral reflex behaviour, feeding utensils, routines and preferences, additional oral activities, such as dental hygiene and drooling and additional behaviors such as screaming, vomiting and the time taken for each feed.

Information on the client can be gained through observation of the classroom or day room staff in conjunction with a detailed assessment carried out by the speech therapist. In cases, where additional medical, physical or dietary problems are suspected, help and advice should be sought from the professionals concerned (pediatrician, neurologist, orthodontist, dietician). Any problems with vomiting, constipation, diarrhea, or reflux of food/fluids through the nose must be referred for further investigation by the medical team. In older clients, well-fitting dentures are essential and regular dental checks are crucial for all ages.

Some checklists include the assessment of self-feeding skills. Self-feeding programmes should, however, be introduced with caution for those clients who have little voluntary control over head posture, arm, hand movements and the control of the tongue, lips and jaw. A self-feeding programme being considered in a joint assessment by the speech therapist, physiotherapist and occupational therapist may be beneficial.

Even if he is unable to feed himself does your child eat normal family food?

That is ....can he eat solids, either biting an appropriate sized mouthful or taking the food off the spoon or fork with his lips?

Can he chew the food with lips closed, moving his jaw round as well as up and down?

Can he swallow without food escaping from his mouth and without choking?

Yes

No

If your answer is No check the following.....

Does your child have difficulty sucking or taking food from a spoon because his lips are loose and immobile and do not close round the spoon?

OR

Because the lips curl back in a grimace?

Yes

No

Thus any management plan, that proposes to change the flow of saliva in the oral cavity must take into account all of these functions. Children who are unable to control their saliva have been found to have the greatest difficulty in the oral voluntary control of swallowing. Both inefficiency to swallow as well as reduced swallowing are contributing factors. Thus oral motor therapy, the main aim of management is to concentrate to some extent on strengthening the oral musculature but more precisely on improving coordination and increasing awareness, if possible, of the swallow-red in the affected individuals. Other factors that may influence the severity of drooling include poor body posture, tone, airway obstruction, mouth breathing, decreased oral sensation, emotional state and ability to concentrate.



## Chapter-3

# INTERVENTION

Management options for drooling include pharmacological therapy, speech therapy, physiotherapy, behavioral therapy, radiotherapy, and surgery. The initial approach in most cases is nonsurgical and thus reversible. Pharmacological therapy is usually used for temporary symptomatic relief. Anticholinergic drugs decrease saliva production. The side effects of these drugs are sedation, constipation, urinary retention, blurred vision, xerostomia(drying of mouth), and restlessness that prevents its long-term use. Transdermal scopolomine has been used with the advantage of requiring only one application for three days. Antihistamines have also been used to decrease saliva production but are also not popular for long term use due to troublesome side effects.

There is a hypothetical role for anti reflex medication in the Cerebral Palsy(CP) child with drooling and reflex. Many children with CP suffer from gastro-esophageal reflex due to esophageal dysmotility and decreased lower esophageal sphincter tone.

The goal of speech therapy is to improve jaw stability and closure, increase tongue mobility, strength, and positioning, improve lip closure, and to decrease nasal regurgitation. Best results are achieved when therapy is begun for an infant. Limited results are achieved in the severely retarded person. Oral prosthetic devices, such as a chin cup, may be used to some extent.

Behavioral therapy uses combination of cueing, overcorrecting, and positive and negative reinforcement to help the drooling person. There are three phases in behavioral therapy. The first is cognitive phase, the participant gains an overall idea of the skill to be acquired. In the second phase, the fixation phase, there is reorganization of the motor behavior. In the third or autonomous phase, the performance is automated and control of the behavior is moved from the higher to lower brain centers. Behavioral therapy is not used widely despite reports of its success due to the time intensive nature of the therapy and the requirement of a certain level of intelligence in the person for cooperation. In addition, regression has been shown to occur once the therapy is discontinued.

The lips and intra-oral area are sensitive to temperature change, Ice, which is sometimes used to stimulate oral function, in fact a numbing effect which increases the person's difficulty in moving his tongue around his mouth or to know if his lips are closed or not. Sucking an ice block may also cause him to aspirate, as liquids are more easily aspirated than solids.

The therapist should not persist for too long stimulation as the person will tend to become desensitized and will fail to respond. For example: In training lip closure, the therapist should not use continuous or persistent stimulation but should use her finger briefly to indicate the person where he should concentrate his attention. Intra-oral techniques should be interrupted frequently, the fingers removed and the jaw held close in order to allow the person to swallow. Presence of saliva and closure of the jaw and lips will combine with the improved muscular activity of the tongue to trigger the swallowing process.



## Intervention Techniques

Intervention for persons who drool often include strategies such as postural changes, changes in diet and food consistency, oral stimulation, exercises and swallowing maneuvers. Posture techniques, redirect the flow of food and change in pharyngeal dimensions. Such techniques may include the chin-up position, head rotation, and the head-tilt.

Swallowing can be facilitated by increasing person's awareness of the presence of food in the mouth when oral sensory stimulation is impaired. This can be achieved by several methods including: gentle application of pressure on the tongue by using a spoon, the use of a sour stimulus such as Lemon juice, Tamarind, Amla, Orange, Grapes etc. The presence of food for chewing which often increases the sensation to swallow. Using cold, thermal and tactile stimulation against the facial arch increases one's awareness and facilitates pharyngeal swallowing.

Clinician instructs the person to inhale, holding their breath while pushing down on a hard surface. When finished, the person is instructed to cough. This procedure helps to close the entrance to the airway as well as increase laryngeal elevation and tongue base retraction. The effortful swallow increases posterior tongue motion during swallowing. The person is instructed to squeeze hard with his/her muscles as he/she swallow. The pressure exerted along the tongue increases tongue base movement. The clinician instructs the person to swallow several times. The person is instructed to pay attention to the movement of the "adam's apple". Once the person is aware of the voice box lifting and lowering, they are instructed to hold the swallowed rather for a few seconds. This procedure increases elevation of the larynx, retraction of the tongue base and airway closure. These maneuvers can be performed on persons having good cognition.

Exercises, aid in alleviating dysphagia for some persons. These exercises involve range-of-motion (ROM) and resistance exercises. ROM exercises are used to improve movement of the lips, jaw, oral tongue, tongue base, larynx, and vocal folds. The therapist instructs the person to elevate the tongue towards the front, back and then towards the back as far as possible. This procedure helps to improve speech as well as oropharyngeal swallowing. Pushing the tongue against a tongue blade or popsickle stick helps to improve range of motion and strength. Other exercises used to improve tongue control involve placing the end of rolled gauze or piece of sticky substance like chocklate in the mouth of the person. The therapist maintains control of the other end in order to alleviate the potential for accidental swallowing. This exercise helps the person to improve his ability to control food in the mouth.

The person with dysphagia can use breath control exercises(breathing exercise) while bent over or pushing against a hard surface to increase vocal fold closure, to increase pharyngeal dimensions, and to improve the quality of airway closure. Having the person repeat "ah" using a hard glottal attack with each vowel, strengthens vocal fold adduction as well. The person who engages in exercises which elevate the larynx similar to that of normal swallowing, improves laryngeal functioning and voice quality.



By modifying the person's diet, one can reduce dysphagia. This may include, changing the consistency of the person's meals by providing a semisolid meal. For the dysphagic person, a diet of pureed food or semisolid food becomes necessary. However, pureed food or semisolid food result in liquids easily getting separated during the pureeing process, the clinician can assist in the prevention of aspiration by changing food from semi solid to solid consistency.

## **NORMAL AND ABNORMAL DEVELOPMENT IN FEEDING**

### **COMPONENTS**

1. Sucking
2. Swallowing
3. Biting
4. Chewing
5. Self feeding
6. Acceptance
7. Food texture

- In special children, primitive or abnormal oral patterns resulting from high, low fluctuating tone or lack of balance between flexors & extensors mainly occur.
- Jaw thrust may occur during any phase of feeding process(lower part droops down).
- A child also exhibits lip and cheek retraction so that it forms a tight horizontal line over the mouth. This limits lip closure and feeding.
- Neck hyperextension and pull of gravity may cause tongue retraction by pulling back the tongue into pharyngeal space and close approximation of hard or soft palate makes it difficult.
- Place a nipple or spoon to initiate swallowing response, the airway may also be cut off the tongue.
- Tongue thrust or protrusion of tongue and its intermittent occurrence may interfere with any phase of feeding process.
- There is an abnormal strong jaw closure and such tight involuntary closure often makes opening the jaw difficult, this is related to excessive flexor tone throughout the body or self stimulation of tonic reflex.
- In CerebralPalsy, there is a lack of ability to produce own tactile stimulation, this causes oral hypersensitivity, which results in resisting textured food. This may also lead to jaw thrust, tongue bite, lip and cheek retraction.
- Shoulder blocks, like scapulo humeral rhythm tightness may cause elevated and internally rotated shoulders.

- Shoulder elevation increases neck hyperextension which causes tightness in upper chest, limits respiration and feeding process.
- Scapular adduction does not allow hands to come in midline, this prevents the child from providing own tactile oral desensitization.

Based on abnormal oral characteristics as compensations in development, compensation essential for successful remediation programme produces stability and symmetry.

1. Inner stability - by internal components.
2. External stability - by positioning and jaw control.

### **Sucking**

- To facilitate rhythmical sucking, stroke with finger(pad) on the hard palate.
- Rhythmical stroking with a spoon on the lower lip may increase the strength of sucking.
- Faster transient or slow transient stroking may cause choking.
- Chin tuck method decreases the effect of choking, while hyper extension of neck causes direct flow of liquid into lungs.
- Encourage child's hand into mouth pacifier or textured toy to suck on, then change to bottle or spoon.
- The nipple of the bottle should have a small hole to allow slow transition of milk.
- Repositioning the child in flexion, will facilitate functional suck. Jaw control may be required to upgrade movements.

### **Swallowing**

- Initially child is dependent on suckle or suck to trigger a swallow, gradually swallowing is disassociated, and he swallows whatever food is in mouth.
- Quick light touch on back/front of the child's upper lip and nose may facilitate swallow.
- Gentle bouncing and rocking may provide vestibular stimulation, that helps the child to swallow.
- Gravity may be required to swallow, semi reclined position is given to facilitate swallowing.
- Never feed in supine position it may facilitate regurgitation & will not help in swallowing
- In low tone Quick stretching of cheeks should be done and lay emphasis on lip closure.



- Light quick tapping on lips.
- In lip retraction, place an index finger under the lip with back of the finger to the teeth or the gum, then the finger is rolled out of the mouth stretching the lip forward, allow the child to swallow after stretch.

### **Biting and Chewing**

- It is voluntary aspect of feeding, although reflex movement pattern are triggered by stimulation.
- It is flattening and spreading of the tongue combined with up and down movement of the jaw.

### **Oral Hypersensitivity**

- In this there is increased gag reflex, which impedes feeding process.

## **TO TRAIN JAW CLOSURE**

Tongue must be inside the mouth. Therapist holds jaw closed by stabilizing atlanto-occipital joint in the mid position & facilitates closure.

[**Note:** This technique should be performed throughout therapy sessions whenever necessary, that is, whenever jaw hangs open and the person needs to swallow.]

### **Instructions**

‘Close your mouth.’

‘Keep your teeth gently together.’

### **Check**

Make sure not to push the atlanto-occipital joint into extension.

## **TO TRAIN LIP CLOSURE**

Therapist holds the jaw closed, by using finger to indicate the lip area which is not functioning.

### **Instructions**

‘Keep your lips gently together.’

### **Check**

Do not allow the person to suck on lower lip as this interferes with tongue movement for swallowing. Do not encourage the person to open the jaw always. It must be closed & Make sure nose is clear.

## TO TRAIN TONGUE MOVEMENT

Therapist uses one or two fingers to give horizontal digital vibration to the anterior third of tongue with firm pressure downwards. The amplitude of the vibratory movement should be small and the stimulation should not last for more than 5 seconds. The therapist withdraws her fingers and assists with jaw closure.

### Instructions

'Open your mouth. I'm going to stimulate your tongue to help you to swallow.'

'Now close your mouth.'

### Check

Tell the person when he has to swallow (he may not know).

Make sure atlanto-occipital joint is not extended excessively.

Do not put fingers too far back on tongue.

Do not repeatedly ask the person to swallow - swallowing in the absence of saliva requires effort.

## TO ELEVATE POSTERIOR THIRD OF TONGUE

Therapist uses index finger to give firm pressure on the anterior third of the tongue in a downward direction, to close off posterior oral cavity. Follow immediately with lip and jaw closure in order.

### Instructions

'Open your mouth. I'm going to push down your tongue to help you to swallow.'

'Now close your mouth.'

'Can you feel the back of your throat close off when you swallow?'

## TO ELEVATE LATERAL MARGINS OF TONGUE

Therapist gives vibration to the tongue in various direction inwards, upwards and in a diagonal direction, with middle finger placed under the lateral margin of the tongue. The amplitude of the vibratory movement should be small and the stimulation should not be more than 5 seconds. Follow immediately with lip and jaw closure.

### Instructions

'Open your mouth. I'm going to stimulate your tongue to help you to swallow.'

'Now close your mouth.'

### Check

Place finger under the tongue and at the side of velum.



## **EXERCISES FOR THE TONGUE, LIPS AND JAW**

**NOTE: TRY TO PERFORM THESE EXERCISES IN FRONT OF A MIRROR**

### **TONGUE EXERCISES**

#### **Range of Motion Exercises**

1. TONGUE EXTENSION

- Please protrude tongue between lips.
- Please stick out your tongue as far as you can.
- Can you try & touch the nose with the tongue.
- Hold tongue steady and straight for 3 to 5 seconds.
- Relax and Repeat as many times as possible.

2. TONGUE RETRACTION

- Retract your tongue or touch the back of your tongue to the roof of mouth (as if producing the /k/ ).
- Hold for 1 to 3 seconds.
- Relax and Repeat as many times as possible.

3. TONGUE EXTENSIONS AND RETRACTION

- Combine these two procedures, hold each position for 1 to 3 seconds.
- Relax and Repeat as many times as possible.

4. TONGUE TIP UP

- Can you place tongue on the area behind your upper teeth.
- If you don't have any teeth, move your tongue tip up to your gum and upper teeth.
- Can you open mouth as wide as possible while maintaining tongue contact.
- Hold for 3 to 5 seconds.
- Relax and Repeat as many times as possible.

5. TONGUE ELEVATION ALONG WITH THE PALATE

- Can you move tongue tip upto the area behind your upper teeth.
- Please move tongue from front to back along with the roof of your mouth.
- Relax and Repeat as many times as possible.

6. TONGUE SIDE TO SIDE

- Please move tongue tip to left side of mouth, hold it for 3 to 5 seconds.
- Can you move tongue tip to right side of mouth, hold it for 3 to 5 seconds.
- Relax and Repeat as many times as possible.

7. TONGUE TIP UP AND JAW DOWN

- Can you lower down your jaw as far as you can while keeping tongue tip behind your teeth.
- Hold it for 3 to 5 seconds
- Relax and Repeat as many times as possible.

**Tongue Resistance**

1. PUSH TONGUE IN A FORWARD DIRECTION.

- Can you stick out your tongue as far as you can.
- Put something flat (back of a spoon on or a tongue depressor) against your tongue.
- Push tongue with the flat object.
- Hold it for 1 to 2 seconds times.
- Repeat as many times as possible.

2. TONGUE PUSH UP

- Push down tongue with the flat object.
- Hold it for 1 second.
- Repeat as many times as possible

3. PUSH TONGUE TO THE SIDE

- Can you extend your tongue as far as possible to the corner of mouth while pressing against the tongue.
- Hold it for 1 second.
- Repeat as many times as possible
- (Repeat it for each side of the mouth unless instructed otherwise).

4. PUSH TONGUE INSIDE

- Can you put finger against right cheek to the side of the corner of mouth.
- Can you push inside the tongue against cheek. Push as hard as you can.
- Hold it for 1 to 2 seconds.
- Relax and Repeat as many times as possible on each side of the mouth unless instructed otherwise.



## **JAW EXERCISES**

### **Range of Motion**

#### 1. JAW OPENING

- Can you open your jaw as wide as you can until you feel wide enough, but it should not pain.
- Hold this position for 5 seconds then relax and close mouth.
- Repeat it for 1 to 2 seconds and repeat as many times as possible.

#### 2. SIDE-TO-SIDE MOVEMENT

- Please move your jaw to the right side as far as you can until it pulls but does not hurt.
- Hold it for some time & then relax.
- Can you move your jaw to the left side as far as you can until you feel a stretch but it does not hurt.
- Hold it for 5 seconds then relax.
- Alternate this from right to left side movement Repeat as many times as possible.

#### 3. INCREASING CIRCULAR JAW MOVEMENT

- Can you move your jaw around in a circle making it to move as far as possible in each direction until you feel a stretch but no pain.
- When you have completed a full circle then relax.
- Repeat the circular movement & Repeat as many times as possible

## **LIP EXERCISES**

### **Range of Motion**

#### 1. LIP RETRACTION

- Smile. Hold for 5 seconds.
- Relax and Repeat as many times as possible

#### 2. LIP PROTRUSION

- Can you pucker your lips as if you were going to give someone a kiss.
- Hold it for 5 seconds.
- Relax and Repeat as many times as possible

#### 3. LIP RETRACTION AND PROTRUSION

- Smile, then pucker your lips. Use full movements.
- Relax and Repeat as many times as possible

## Lip Closure

### 1. LIP PRESS

- Press lips tightly together for 5 seconds.
- Relax and Repeat as many times as possible.

### 2. PRESS LIP ON TONGUE DEPRESSOR

- Press lips tightly around tongue depressor, while the clinician tries to remove it.
- Perform it for 3 to 5 seconds.
- Relax and Repeat as many times as possible.

### 3. PUFF CHEEKS

- Fill cheeks with air, move air from one cheek to the other for 5 to 10 times.
- No air should escape from the lips or the nose.
- Relax and Repeat as many times as possible

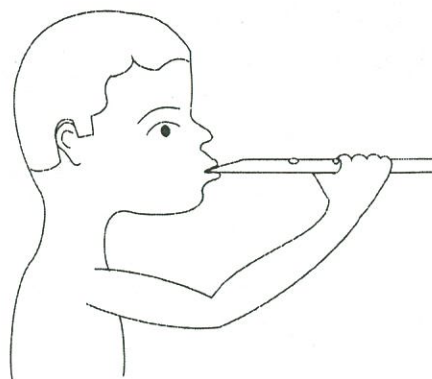
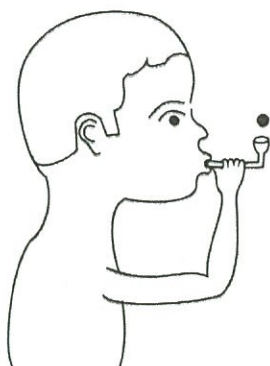
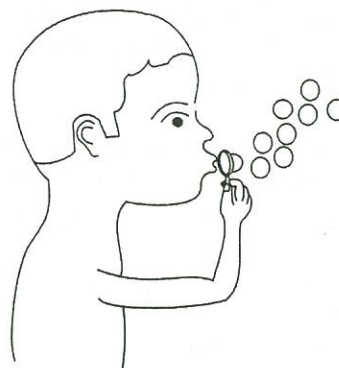


Fig: Graded blowing activities



## **BOLUS CONTROL EXERCISES**

### **1. CHEWING**

- Place one end of candy between the tongue and hard palate.
- Clinician holds the other end.
- Move the candy from midline to left side of oral cavity.
- Repeat as many times as possible.
- Perform same motion on right side if needed.

### **2. FRUIT JUICE ON GAUZE SQUEEZE: (Use only if the person can tolerate small amounts of liquid without aspiration).**

- Take a long piece of gauze, roll it up and soak it in fruit juice.
- Place gauze inside the mouth at midline,
- Ask the person to push upward and backward with tongue.
- This action will squeeze juice from the gauze, aid in bolus propulsion, and allow the person to practice swallowing small amounts of liquid, while manipulating solids.

## **GAG REFLEX**

Stimulation of a hypo-active gag reflex.

The therapist stimulates the gag reflex by touching briefly on soft palate with a cotton bud.

[**Note:** This technique will only rarely be necessary as the stimulating techniques mentioned above will usually result in a more normal threshold.]

### **Check**

Do not elicit if gag reflex is present, as it is most unpleasant for the person once the reflex is established.

### **Hypersensitive Mouth**

Apply firm digital pressure on the least sensitive area and carry work towards the most sensitive area, from lips to gums then to anterior third of tongue.

## MANAGEMENT OF DROOLING IN FACIAL PALSY CHILD

### ENCOURAGE FACIAL MOVEMENTS

Jaw held closed, person tries a little smile while therapist indicates the direction in which movement should occur.

#### Instructions

'Try to smile? Try to use this side of your face, keep the other side relaxed.'

#### Check

Lips should be gently closed.  
Do not allow over activity on the intact side.

[Note: Do not give bilateral facial exercises, as these will increase the tendency of over activity of the intact side. The person needs not only to activate the muscles on the affected side, but also to decrease activity on the intact side.]

### Instructions

'Take a deep breath. Breathe out gently,  
'Now say 'ah', 'm' as you breath out.

Another method of improving breath control enables the person to regain control over tongue and soft palate. It is also useful for helping the person to gain control over outbursts of crying.

Person holds air in his cheeks while breathing in and out through his nose in a relaxed manner.

### Instructions

- Hold some air in cheeks & do not let the air come out.
- Keep lips closed and breathe quietly through nose.
- Encourage all the graded blowing activities
- Massage the affected side of the face.
- Do the activities in front of the mirror.

### Check

Make sure that the person keeps air in cheeks (means he has closed off the posterior oral cavity.)

**NOTE: All these activities are suitable for mild & moderate mental retardation & persons who follow the instructions. For persons with more cognitive impairment the therapist should passively do & encourage the child to perform.**



## **PRACTICE OF ORO-FACIAL FUNCTION**

Liquid is more easily aspirated than food, hence the person will gain some confidence in his ability to swallow without choking if he practices, swallowing solids before he attempts liquids. Food should be palatable, consist of a variety of textures and initially should be of the consistency of mashed potatoes. Pureed food or food which goes sloppy in the mouth will not provide the stimulus needed for regaining normal oral function and may be easily aspirated.

The person should also be given chewable food. If he has difficulty with chewing, he may find it easier if the therapist holds his jaw tightly closed. During all the sections of this programme, the therapist constantly monitors the person's facial posture while he concentrates on various activities. He indicates about his lips and jaws, which is often open and reminds him to keep them closed. He stimulates the cheek to encourage activity and discourages over activity of the intact side. The therapist uses his/her own facial expression in order to encourage the person to respond.

The person you are involved with, may be using a behavioral programme to manage drooling. If this is the case, it is important that, you continue the programme during the time they are with you. The goals of the programme may be to improve head position, to close lips and maintain jaw stability, to remind to swallow, or to learn to wipe their own chin effectively.

### **Programs to Enhance Coordinated Movement of Oral Structures**

#### **Jaw**

Mandibular stability is basic for bolus formation, swallowing and speech motor control. Jaw control assistance may be needed for infants and children who demonstrate either hypertonicity or hypotonicity. Suggestions for treatment related to specific jaw problems follow. Jaw thrust and retraction are more common with hypertonicity. Jaw clenching and instability occur more often with hypotonicity. Tonic bite reflex does not appear directly related to either hypertonicity or hypotonicity.

#### *Problem: Jaw thrust*

Jaw thrust is characterized by sudden forceful jaw opening or by exaggerated up-and-down movements; it is a common abnormality that is usually associated with increased tone. The jaw thrust can be precipitated by poor posture, overstimulating environment, hypersensitivity and in some instances, dislocation of the temporomandibular joint that may cause pain upon jaw opening.

### *Recommendation*

Mouth play with the child's fingers and soft toys, as well as assisted toothbrushing, may aid in reducing jaw thrust. For example, a finger toothbrush-gum massager that slips on a caregiver's finger, has soft bristles and can be used to massage tender gums gently and clean teeth easily and effectively. Sustained jaw closure can be encouraged by having the child hold a cloth or similar soft object between the teeth. However, caution is urged because the maneuver may precipitate jaw clenching.

### *Problem: Jaw retraction*

Jaw retraction may be a part of excessive muscle tension that limits the range of movement, particularly with overall increase in body extension. This type of jaw retraction must be differentiated from the retrognathic mandible that is characteristic of Pierre Robin sequence and other craniofacial anomalies.

### *Recommendation*

Prone position may be helpful for feeding some children because gravity assists the tongue and jaw to move into a more forward position, thus enlarging the pharyngeal airway and reducing the jaw retraction. The hand can be placed under the child's jaw with a slight forward pull to enlarge the airway further and to improve feeding efficiency.

### *Problem: Jaw clenching and teeth grinding*

Jaw clenching and teeth grinding may be compensatory attempts to keep the mouth from sagging open when there is postural instability and low tone in the trunk. Jaw clenching may also be an attempt to prevent invasion of the mouth because of past negative experiences with invasive procedures. Jawclenching obviously restricts oral activity for feeding. Teeth grinding may be one part of both tactile and auditory sensations employed for exploration and play by the child. The sound of the teeth grinding often is irritating to adults.

### *Recommendation*

The best response by an adult usually is to pay no attention to the activity at all because any attention may be perceived by the child as a way to gain control and even more attention. Jaw clenching and teeth grinding can be replaced by pleasurable mouth play. This is encouraged by the clinician or parent who uses fingers to effect a gradual opening of the jaw. Meaningful activities are then facilitated by helping the child get fingers, toys, toothbrush and feeding utensils to the mouth more independently. Food is used functionally at mealtime.

### *Problem: Jaw instability*

Jaw instability is characterized by a shift of the jaw to one side or forward. This instability usually results from a generalized hypotonia in the body and face, which is focused at the temporomandibular joint.



### *Recommendation*

Activities that encourage jaw closure are usually helpful with this problem. Jaw stability may be enhanced by placing the middle finger under the chin and the index finger between the chin and lower lip support can be given from the front or from the side. The degree of pressure is determined by the response of the child, who may indicate displeasure by turning the head, trying to push the hand away, or fussing. Pressure maintained throughout feeding may be more accepted than frequent changes in hand placement. Maintenance of jaw closure can be encouraged by having the child hold a terry cloth or a small soft toy that can be moved back and forth gently by the clinician or caregiver. The goal is to maintain jaw closure with an object in the mouth.

### *Problem: Tonic bite reflex*

A tonic bite reflex can interfere with feeding. This reflex can be caused by or exacerbated in multiple ways from postural tension to oral hypersensitivity to purposeful clenching of teeth in order to keep something out of the mouth. The tonic bite reflex occurs when the jaw moves upward into a clenched position on presentation of a nipple, a spoon, or another object into the mouth when contact is made to the biting surfaces of the side gums or teeth. Once the tonic bite occurs, release is usually quite difficult. Any attempt to pull against a tonic bite reflex typically increases the strength of the bite.

### *Recommendation*

Release of the bite may be achieved with pressure applied at the temporomandibular joint on both sides of the face. An inhibitory sensory environment may reduce the frequency of occurrence. Well-graded oral tactile stimulation may aid in prevention or at least reduction in strength, of the bite reflex. A coated, fairly flat spoon may prevent harm to the teeth in some children.

## **Lips**

Lip closure is necessary for keeping food in the mouth and also assists tongue action for moving a bolus of food posteriorly. Common problems that affect the function include lip retraction and limited upper-lip movement.

### *Problem: Lip retraction*

Lip retraction is commonly observed in children with hypertonicity. In attempting to counter the lip retraction, a child may end up with exaggerated lip pursing.

### *Recommendation*

Finger tapping or vibration to the cheeks may reduce the hypertonicity which in turn reduces the lip retraction. Lip closure can be facilitated by the jaw control procedures described above, that in turn, may encourage an effective spontaneous swallowing process. Stroking or tapping may be repeated several times in a rhythmic way. A functional activity should follow immediately. Examples of functional activities include nonnutritive sucking on a pacifier, nutritive sucking on a nipple, cup drinking, or spoon-feeding. In addition to tapping, firm and sustained pressure can be applied to the face with a

finger, palm of the hand, or a warm cloth in a direction to move the cheeks and lips into a more normal nonretracted position. These actions of “Facial molding” may help the child feel a more normal, less retracted position. Tart flavors and cold temperatures may also facilitate lip closure.

### *Problem: Limited upper lip movement*

Limited upper lip movement may result from either hypertonicity or hypotonicity or from specific cranial nerve damage. Tapping at the cheeks and drawing cheeks forward may reduce hypertonicity in cheeks and lips, which should then result in increased upper lip movement.

### *Recommendation*

Treatment to help reduce hypotonicity and to increase sensory input consists of stimulation with varied food textures and temperatures, as well as tapping and stroking. Similar tapping and stroking activities may be used with both hypertonicity and hypotonicity. Straw drinking may be useful with low tone and limited movement in the cheeks and lips. A straw with a large diameter coupled with a physical assistance can help a child close the lips around the straw.

## **Cheeks**

Children need adequate tone in the cheeks to assist lip closure and to keep food from falling into the lateral sulci. Adequate tone in the cheeks indirectly assists the tongue as it forms a bolus.

### *Problem: Reduced tone*

Common problems include reduced tone in the cheeks and reduced sensory awareness. Reduced tone in the cheeks has a direct effect on reduced movement of lips. The mouth may hang open, and excessive drooling can be seen. Food may fall into the lateral sulci in the buccal cavity so that bolus formation is difficult.

### *Recommendation*

Treatment consists of stroking and tapping the cheeks, especially around the temporomandibular joint, which may aid jaw stability. A functional activity, such as sucking on a nipple, cup-drinking, or spoon-feeding, should follow immediately.

## **Tongue**

Coordinated tongue action is fundamental to functional swallowing and speech production. Incoordinated tongue action does not automatically mean that aspiration will occur with swallowing, however. All problems with tongue strength and coordination have direct implications for the oral phase of swallowing and thus, indirectly for the pharyngeal phase of swallowing. Oral-motor stimulation for facilitation of improved tongue action is often a major focus in therapy with children. The problems most often are characterized by tongue thrust, tongue retraction or hypotonia of the tongue and less frequently by tongue deviation and limited tongue movement.



*Problem: Tongue thrust*

Tongue thrust may be exaggerated in some children so that the tongue moves forward beyond the border of the gums and may even stick out between the lips. This forceful protrusion often makes it difficult to insert a nipple or a spoon into the mouth and may even cause liquid and food to be pushed right back out of the mouth. The tongue thrust may be one aspect of an overall increased extensor tone in the body and may compensate for low tone or movement related to stressful respiratory patterns. A lack of tongue lateralization also can lead to exaggerated tongue protrusion.

*Recommendation*

Postural modifications should be made as needed. Treatment consists of imposing jaw stability with fingers between the lower lip and the chin to assist lip closure, changes in food texture and placement of food on the tongue. When up-down sucking movements are not habitual, thickened liquid can be released from a cup placed on the lower lip. Simultaneously, jaw stability is used to encourage the upper lip to come down on the cup. A sucking motion should get started at the lips as they come together, which in turn helps the tongue to stay behind the lips. In addition, food placed at the side of the gums or posteriorly on the molars can stimulate a munching or chewing action, which in turn, may encourage lateral tongue action, thus reducing the thrusting motions. Lateral tongue action also can be attempted without any food having to be swallowed.

The spoon can be used to create gentle downward pressure at the middle of the tongue. This stimulation can activate a downward movement of the upper lip that helps lips to close around the spoon, and in turn assists with removal of food from the spoon. If immature sucking with in-out tongue actions is predominant, thinner pureed food may help reduce the amount of tongue action needed to move the material posteriorly for swallowing. Feeding should never be done by scraping the food off the spoon at the hard palate or upper gums. This will not facilitate desired tongue movements and lip closure, but instead will reduce the efficiency of moving a bolus posteriorly for swallowing and may precipitate a tonic bite reflex.

*Problem: Tongue retraction*

Tongue retraction may accompany either excessively low or high tone, may be seen with neck hyperextension, and is common with mandibular hypoplasia. An infant or child may press the tongue against the hard palate for stability or to prevent the tongue from moving into the airway.

*Recommendation*

Prone positioning for infants, with the shoulder girdle and head elevated and in good alignment with the trunk, should help to increase the forward movement of the tongue when it is stroked from back to front. With uncoordinated sucking along with the tongue retraction, these infants may also benefit from a rhythmic stroking of the tongue with finger moving from midtongue to front. The prone positioning facilitates oral feeding with some infants. An angled bottle may be helpful for some of these infants in a semi prone position.

When the older child is in an upright position, the chin tucked down toward the chest helps keep the neck elongated, so that tapping upward under the chin at the base of the tongue may provide greater tongue stability, which can assist in forward movement of the tongue. Chin tuck is not advocated for young infants.

*Problem: Tongue hypotonia*

A hypotonic tongue frequently reflects overall hypotonia. It also can be a flaccid tongue that is directly related to cranial nerve XII damage.

*Recommendation*

Treatment consists of vibration to the tongue for those children who do not find that aversive. Oral sensory stimulation by objects with a variety of textures and temperatures to the mouth may result in increased tongue movement. Older children may be able to attempt to imitate movements of the tongue. Whether cold objects, warm objects, or food in the mouth encourage more effective tongue action is as yet unknown. Therapy should include cautious trial and error for individual patients.

*Problem: Tongue deviation*

Tongue deviation to one side of the mouth may be noted as the child attempts to protrude the tongue. It also can be observed as the child attempts to manipulate food in the mouth when both sides of the tongue do not move equally well. Deviation of the tongue may result from ipsilateral cranial nerve damage, or it may be due to the presence of an asymmetric tonic neck reflex in which the tongue pulls to the side towards which the head is turned.

*Recommendation*

Maintaining the head at midline using position or head support may aid significantly with an ATNR. Stimulation of the less active side of the tongue can be done with a finger, a toothbrush, or selected toys.

*Problem: Tongue-Limited movement*

This may occur because of increased tension in the tongue due to hypertonicity, insufficient tension of the tongue due to hypotonicity, or from damage to CN XII.

*Recommendation*

Treatment options include, but are not limited to, increased stimulation by varying textures, temperatures and tastes. Vibration to the tongue may help to increase awareness and discrimination and, in turn, increase movement.



## **POSITIONING**

Management of sensory-based issues addresses the various aspects of the processes involved. The choice of management options depends upon the child and the specific problem.

Facilitation of posture and position aimed at reducing or normalizing muscle tone and abnormal patterns of movement (such as primitive reflexes) to help the child to experience a new sensorimotor pattern.

### *Positioning*

In supine, with the head is at midline and flexed slightly forward, the child can lie on a flat surface or an inclined surface. Pillows or sandbags may be necessary to maintain the head and trunk in midline and the extremities in proper alignment. The maintenance of body symmetry is important if the child tends to have a strong ATNR. If excessive extensor muscle tone is present in supine it will be necessary to flex the head slightly forward and flex the hips and knees. Close contact, as well as controlled tactile stimulation can be easily provided in this position. These positions are never forced against the involuntary resistance of excessive extensor muscle tone. Handling techniques or the side-lying position may be necessary for relaxing the child prior to flexing the hips and knees. After the hips and knees flexed, the child is placed in supine. If the child has insufficient muscle tone, allow the shoulders to droop backward onto the surface on which he or she is supine, the shoulders may need to be supported forward.

### *Use of the position*

Supine position can be used as a position for sleep, passive activities such as watching television, or some play activities. The semireclined position is sometimes used, with great care, for feeding. If the child is watching television or engaged in other activities while in supine, the activity or equipment should be positioned at or below eye level in order to prevent excessive extension of the head. If symmetry is to be maintained, the activity must be placed at midline.

### *Precautions*

Discontinue this position if it triggers excessive extensor muscle tone.

## **CHAIRSITTING**

### *Positioning*

The ideal position in a chair includes the following components: body symmetry; head at midline and flexed slightly forward; trunk well aligned at midline; hips flexed to 90° and abducted; knees flexed to 90°; ankles dorsiflexed to 35°; and weight evenly distributed between both buttocks, thighs and feet. The cut out table surface should be positioned at elbow height for those children who have good head and trunk control. For children with poor trunk control and excessive flexor muscle tone in the trunk and upper extremities, the table height should be raised to midchest.

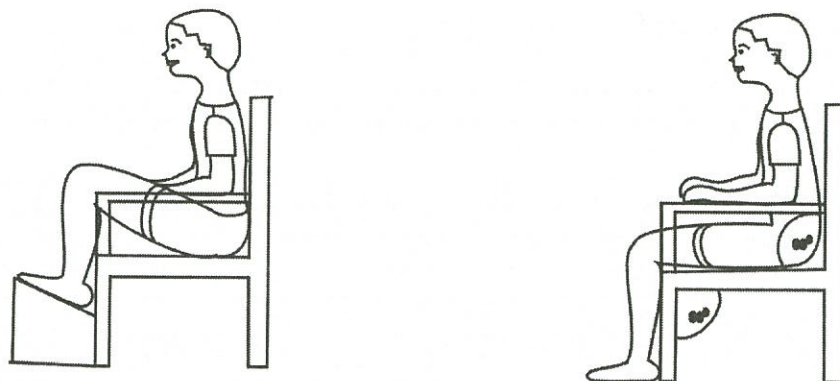


Fig. Positioning in sitting

### *Use of the position*

The seated position is used for play, schoolwork, toileting, eating and transportation. If the child is to be seated for eating, schoolwork, or play, the following suggestions will help to properly align the body parts, normalize muscle tone and prevent further deformity:

1. Position the child as symmetrical as possible with weight evenly distributed on both buttocks, both thighs and both feet.
2. The head should be at midline and flexed slightly forward. If the head is flexed too far toward the chest, flexor hypertonicity may result in the rest of the body. If the head extends too far back, extensor hypertonicity in the rest of the body may occur. Improper head position will also interfere with eye-hand coordination, breathing and swallowing.
3. The hip needs to be flexed if extensor hypertonicity interferes with sitting. This is called the jackknife sitting position, hips and knees are flexed to less than 90°.
4. Both feet must be well supported, with proper alignment of the lower legs, ankles and feet.

To achieve the best sitting position, the therapist or caregiver may have to first use handling techniques that may reduce muscle tone.

### *Precautions*

For some spastic children, excessive chair sitting is contraindicated because it promotes tightness or contractures in hip and knee flexors.

For children who exhibit excessive flexor muscle tone in prone and excessive extensor muscle tone in supine, side-lying is a good neutral position.



## **POSITIONING IN SITTING**

1. Head forward with chin tucked or down
  2. Head in midline
  3. Shoulders forward
  4. Arms internally rotated
  5. Hands in the lap
  6. Trunk straight
  7. Hip and knee flexed to 90°.
- Infant may be cradled in feeder's arms in above position, this encourages eye contact and communication with feeder.
  - Feeders seat, wheelchair or high seat may be adapted to meet the criteria.
  - Mealtime is the time for direct communication, feeding, from front is better than side is necessary for jaw control.
  - A child with excessive flexor tone may be fed in prone, bolster or wedge may be used for proper positioning.
  - To bring head forward a wedge may be placed at the occipit, to elicit chintuck when neck is flexed.
  - Pressure is avoided at neck region to avoid hyper extension of neck.
  - Hips and knees flexed at 90°, but the child sit on buttock and ischial tuberosity and not on sacrum.
  - Child should be straight, but reclined enough to allow for the passage of food.

## **Wheel Chair Adaptations**

1. Making the child sit with trunk straight, hips and knees flexed upto 90° with legs abducted. The ankles are at 90°, and elbows rest comfortably on arm rest or lapboard.
2. Wheel chair
  - Solid seat and back rest to keep the trunk straight and shoulder forward.
  - Padding, at the back to maintain symmetry.
  - A pillow may be placed backward to push shoulders forward.
  - To increase hip flexion, firm wedge shaped seat is used, that is higher in front.
  - To inhibit adduction of the legs a moulded insert is used to fit the child.
  - Low tone child is benefited with moulded seat to provide more adduction.
  - Foot plates are provided.

- 'U' shaped head support to hold head in midline, (center should be at the base of the skull.)
- Lap board is used to provide food, play and work position at elbow joint level, toy bar is hung too.
- High chairs, potty chairs and other devices are adopted on same lines.
- Triangular chair / corner seat.

Table: Guidelines for development of normal eating skills in a sitting position.

Objective	Rationale / Method
Develop total body alignment	<ol style="list-style-type: none"> <li>1. Will provide good head control and proper spinal alignment.</li> <li>2. Prevents abdominal flexion.</li> <li>3. Allows isolated movements of head, neck and arm.</li> </ol>
Encourage symmetrical leg posture	Use of abductor pad between legs for better base support.
Provide head and shoulder support	<ol style="list-style-type: none"> <li>1. Eases tension around mouth area.</li> <li>2. Allow isolated movement of head, neck and arm.</li> </ol>
Increase hip, knee and ankle flexion	<ol style="list-style-type: none"> <li>1. Discourages extensor thrust.</li> <li>2. To provide stable base of support, may need to increase height of knee (1/2"-2").</li> </ol>
Provide secure foot support	<ol style="list-style-type: none"> <li>1. Use of straps across sides of foot and around ankle minimizes plantar flexion.</li> <li>2. Feet must not be left dangling; increases tendency to hyperextend total body.</li> <li>3. Simple adaptation: Several telephone books or catalo taped together, small footstool or wooden platform attached in front of chair legs.</li> </ol>
Increase independent arm and hand movement	<ol style="list-style-type: none"> <li>1. Placing "X" or "H" shaped straps across shoulders, chest and waist will allow for increased arm movements.</li> <li>2. Adapted utensils(built-up handles or straps) decrease feeder assistance.</li> </ol>



## **Massage to the Oro Motor Region**

Massage is one of the treatment technique used in physiotherapy, rhythmic movements with the help of both hands in a particular manner and directions are given on the persons affected part of body, even pressure executed with palmar surface of hands including fingers by using different techniques. A number of strokes given, differ with every individual. It can be stationary or progressive.

### **The various massage techniques which are useful for the oro motor region:**

1. Effleurage or stroking

2. Petrissage

    Kneading

    Wringing up

    Rolling

    Shaking

3. Percussion

    Vibration

    Tapping

4. Shaking

    Friction

### *Effleurage*

In this technique, the hands pass over the soft tissue with even pressure, which exerts soothing effect and will assist fluid to flow through the tissue spaces, lymph vessels and veins, distal to proximal.

### *Stroking*

Stroke the area to be treated with hands and fingers rhythmically, applying even pressure, which produces relaxation.

### *Kneading*

This technique is performed with the pads of the fingers and palmar surface of hands. It is useful to break adhesions around the joints.



### *Wringing*

This technique involves lifting the tissues, squeezing it and then the muscle are twisted up.

### *Rolling*

With fine movements of the thumb and fingers, soft tissues are lifted, squeezed and then rolled over.

### *Vibrations*

These are produced by vigorous shaking of the hands placed over the soft tissues and joints.

### *Frictions*

These are small range of movements applied with the thumb or fingers, superficially over the skin and are applied in transverse and circular fashions. They are used, to mobilize the tight structures or soft tissues.

The effects of massage are given below:

1. Normalizes the tone in the oral muscles.
2. Increases blood circulation in the area.
3. Stretching of tight fascia and restoration of mobility of soft tissue.
4. Pain relief is obtained by releasing acute or chronic tension in muscles by the effect of pressure and touch on nerve endings.
5. Waste products are effectively drained.
6. To promote relaxation.
7. To stimulate sensory and motor nerves.



### **Contra-indications**

1. Acute inflammations
2. Skin conditions Ex. Eczema.
3. Skin disorders which would be irritated either by increase in warmth of the part or the lubricants, which might be used.
4. Early bruising.
5. In the presence of recent unhealed scars.

### **Modification of External Sensory Input**

Alteration of the environment surrounding the child that is aimed at arousing or calming the child during feeding in order to create an optimum mealtime environment which allows the child to focus attention on the food and feeder.

#### *Pre-feeding Stimulation*

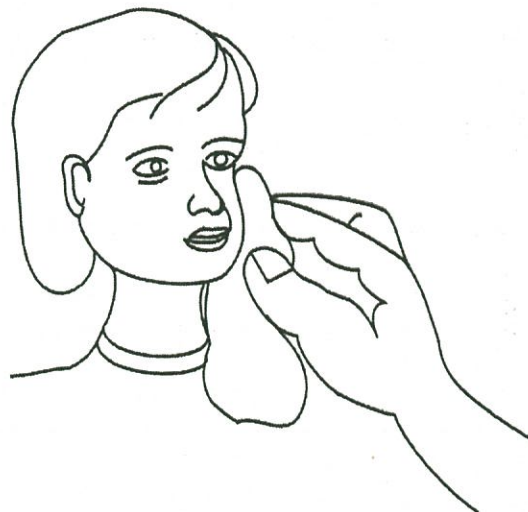
Uses physical and sensory input before the introduction of food/liquid to improve sensory tolerances and neuromotor competency in order to prepare the child for the introduction of feeding stimuli. Includes massage; vibration; stroking; muscle stretch; pressure to muscle, tendons and joints; resisted and assisted movement and touch cues.

#### *Oral-Motor Training*

Aims to improve strength, stability, range of movement and co-ordination in the structures used for chewing through the use of massage, resistance to movement, muscle stretch and touch cues to facilitate the desired modifications in the movement patterns.

#### *Desensitisation Programs*

Assists the infant to accept and tolerate stimuli which may include; varying texture, taste and temperature, facilitating optimal arousal level and food play.



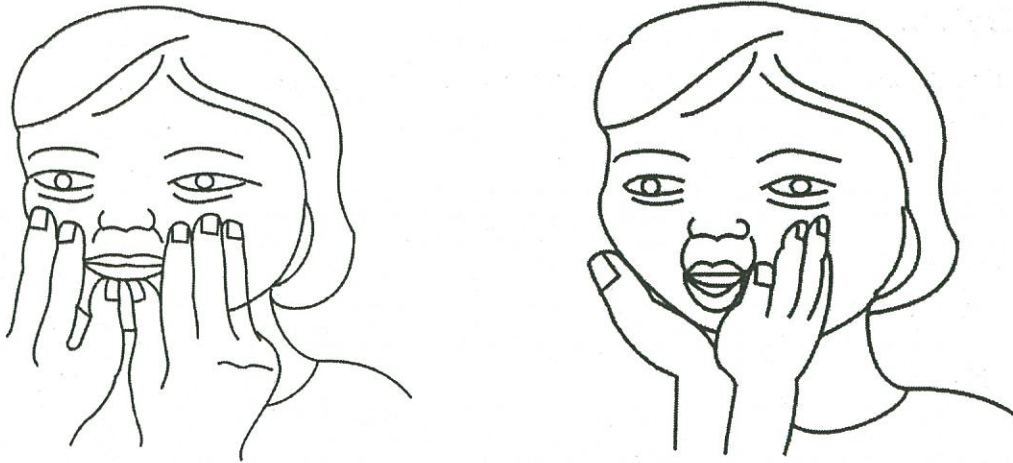


Fig. Desensitisation technique

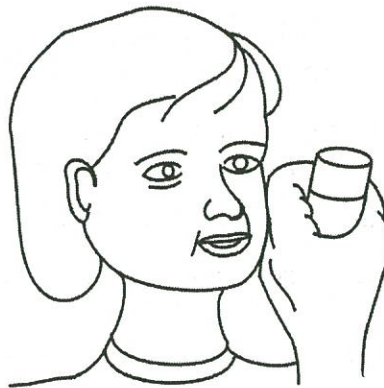


Fig. Vibration to the oro motor region

### *Mouthing Experience and Practice*

Infants put everything to their mouth and this enhances their oro motor control. The concept of mouthing means to put everything to the mouth. This mouthing should occur during infancy or early childhood as it helps to develop oro motor control.

It enables the child to explore texture, taste and temperature through the use of food, toys, fingers and other items which assist in the development of sensorimotor organization and discrimination.



## **JAW CONTROL**

There is jaw thrust, jaw retraction, jaw asymmetry, exaggerated opening or closing, poor lip closure and tongue thrust.



### **1. Two finger and front approach**

- Tip of the feeders thumb is placed in the center of child's chin at the base of the lower lip, inward and upward pressure is applied to control jaw opening and closing.
- Feeder's index finger is placed under the chin, at the base of tongue to control jaw movement.
- Feeders wrist may be placed on the upper chest to facilitate upper trunk flexion and chin tuck.

### **2. Three finger and side approach**

- The therapist thumb is placed on child's jaw line to control lateral movements, index finger on child's chin for inward and upward pressure to control jaw and lip movements.
- Middle finger under the chin to control jaw opening, jaw control is not needed for every child. It needs to move the jaw during feeding but enough stability to experience a more functional feeding pattern.
- If there is oral sensitivity, slow desensitization is to be done and then jaw control is gradually increased as child develops tolerance.
- Tactile rubbing done by towel, cloth, hanky and various other soft surfaces, first distally from the body, then face and mouth (use different toys and add flavors).
- Rubbing the gums with (T) finger, one quarter of mouth at a time.
- Start from back of the mouth, small circular movements with fingers.

## THERAPY TO CLOSE LIP AND JAW

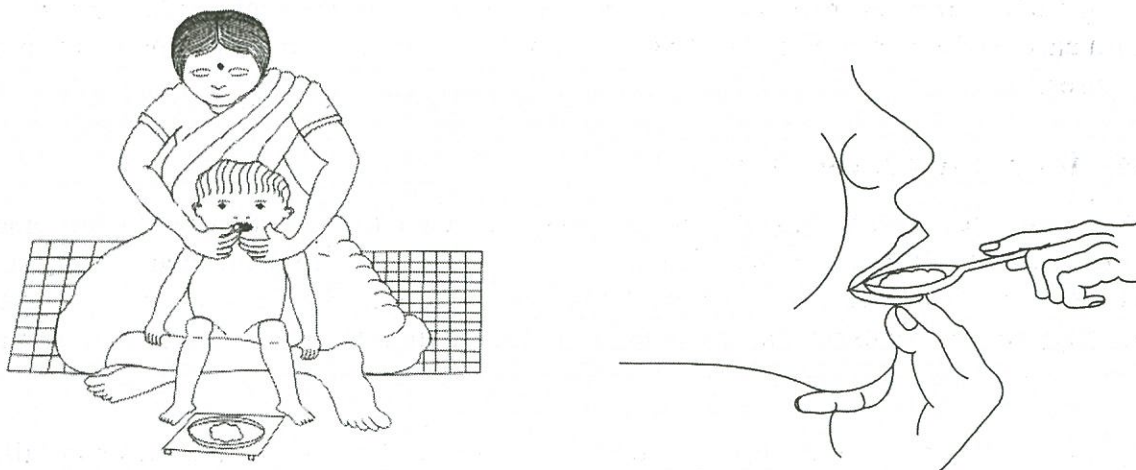


Fig. Facilitating feeding and swallowing

### Food intake

- Prepare the child before feeding that helps him to use intake abilities.
- Equilateral, stable to functional position is necessary.
- Spoon is placed to encourage chin tuck and midline orientation, on 1/3rd way back on tongue with down pressure.
- The spoon should be taken out from mouth diagonally, to bring two lips together.
- Food is placed on side of tongue below the teeth to facilitate the formation of bolus.
- In tonic bite, the spoon quickly removed to prevent bite reflex (the spoon should not touch the gums or teeth.)
- Cut out cup is more beneficial to regulate food flow and accommodate the nose.
- Symmetrical stable and functional position is necessary, child's head should not be tipped backward as it increases the possibility of aspiration.
- Downward pressure on the sternum will induce chin tuck.
- Tepid foods are more readily accepted than hot or cold food.
- Straw drinking causes hypersensitivity, so it should be reevaluated.



## **CAUSES OF FEEDING AND DRINKING PROBLEMS**

In clients who are profoundly handicapped, problems may arise from persistent immature feeding patterns being retained or abnormal patterns of feeding occur. Other physical and behavioral factors may also influence feeding behaviour. Feeding problems may arise from one or a combination of the following causes.

### **Abnormalities of the nervous system**

Disorder of muscle tone may affect the posture of the body as a whole and or the specific movement of the tongue, lips, jaw and soft palate. Muscle tone disorders are related to damage and immaturity of the nervous system (brain and nerves supplying the face, trunk and limbs). Muscle tone disorders may lead to spasticity (increased muscle tone), flaccidity (decreased muscle tone), or athetosis (fluctuating muscle tone).

In spasticity, movements of the tongue, lips and jaw may be very limited, the muscles may stiff and resist attempts to move them passively and certain fixed postures may be maintained. In flaccidity, the muscles may be floppy, postures cannot be held against gravity, head control is poor and the movements of tongue, lip and jaw are slow, weak and ineffective. Athetosis often leads to extraneous movements of the head and limbs with the tongue, lips and jaw being over-active leading to poorly controlled motor sequences.

It is important to differentiate between seemingly similar patterns of behaviour and the pattern result from differing muscle tone disorders. For example, tongue thrusting (the protrusion of the tongue outside the confines of the teeth or lips) may be due to increased muscle tone or decreased muscle tone. In the former state the tongue may appear long and dagger-like, feel stiff and may be very difficult to push back into the mouth. In the latter state, the tongue may protrude loosely between parted lips, may be rounded, feel soft and easy to push back behind the teeth.

#### *a. Abnormal oral reflexes*

Damage to the nervous system may lead to oral reflexes being absent, slow to emerge, or retained for a long time, thus preventing the more mature movements of the tongue, lips and jaw from developing. For example, the suck-swallow reflex may be retained, leading to suckling movements, being elicited whenever the mouth is stimulated by food or a utensil such as a spoon or cup rim.

#### *b. Abnormal sensitivity*

Some clients may be very sensitive to touch and over react, whilst others may have little awareness of touch, changes in temperature, taste and texture of food.



### *Physical abnormalities of the face, dental arches, teeth, palate and jaw*

These structural anomalies may alter the relationship of the upper and lower jaws, the space available for tongue movements within the mouth, the ability of the lips to maintain contact and closure and the ability to close off the nose from mouth during swallowing: For example, a very small lower jaw (micronathis) may make it difficult for the tongue to be contained in the mouth, malocclusions or small, absent or rotated teeth may make biting difficult. If neuro-motor abilities are good, compensatory tongue and lip movements may occur, but the combination of neurological problems and physical abnormalities may lead to an inability to perform certain oral functions successfully.

### *Other medical and physical conditions*

These may alter or disrupt the progress to mature feeding. Abnormalities of the digestive system may lead to a reflux of the stomach contents into the gullet, causing inflammation, possible ulceration and considerable discomfort. Food allergies may also affect the diet that can be offered. In some instances, early feeding experiences may lead to a habitual reaction to certain food consistencies. For example, the client may reject any form of lumpy or solid food, despite having adequate oral-motor skills to cope with these food textures successfully.

### *Inappropriate feeding utensils, food consistencies and feeding routines*

Certain feeding and drinking utensils may lead to abnormal feeding patterns occurring or the prolongation of immature feeding behaviours. A failure to move a client on to more solid diet at the appropriate time of his / her development may lead to a preference for only one taste or texture of food. Inconsistent feeding routines or handling may prolong feeding difficulties. For example, a large spoon may cause persistent gagging in hypersensitive client; the use of a trainer cup may prolong suckle-drinking, the continued presentation of liquidized food may lead to a rejection of lumpy or textured food.

Those working with clients, who have profound handicap, should become familiar with the neurological, physical and behavioural causes of feeding problems. Abnormal behaviours need to be isolated, described, differentiated and related to possible causal factors.

### *Management of feeding problems*

Remediation procedures and the management of feeding problems will vary according to the needs, capabilities and age of the individual clients concerned. For older clients, course participants need to consider, why they may wish to change faulty but well established feeding patterns (social, dietary or health reasons) and if change is a realistic goal for the client, there will also be a need to consider which aspects of the total feeding behaviour require change and in what way the change should be introduced. It should be remembered that younger clients may respond more readily to a feeding programme as the faulty feeding patterns are less likely to be firmly established.



## **Dysphagia**

Swallowing involves a network of muscles and nerves working simultaneously. When one and/or both become impaired, the inability to swallow occurs. Dysphagia is defined as “the loss of or difficulty in chewing/preparing food in the mouth and swallowing.” The meaning of dysphagia has been extended to include “behavioral, sensory, visual, and cognitive awareness of upcoming eating situations.” This influences the types of interventions chosen.

### *Intervention Techniques for dysphagia*

Intervention for persons with dysphagia often include strategies such as postural changes, changes in diet and food consistency, oral stimulation, exercises and swallowing maneuvers. Posture techniques redirect the flow of foods and change pharyngeal dimensions. Such techniques may include the chin-up position, head rotation, and the head-tilt.

Increasing person’s awareness of the presence of food in the mouth when oral sensory stimulation is impaired can facilitate swallowing. This can be achieved by several methods including: gentle application of pressure on the tongue by using a spoon, the use of a sour stimulus such as lemon juice and barium, or the presentation of food for chewing which often increases the sensation to swallow. By using cold thermal-tactile stimulation against the facial arch increases awareness and facilitates pharyngeal swallowing.

Clinician instructs the person to inhale, holding their breath while pushing down on a hard surface. When finished, the person is instructed to cough. This procedure helps to close the entrance to the airway as well as increase laryngeal elevation and tongue base retraction. The effortful swallow increases posterior tongue motion during swallowing. The person is instructed to squeeze hard with their muscles as they swallow. The pressure exerted along the tongue, increases tongue base movement. The simplify maneuver is designed to increase laryngeal elevation and cricopharyngeal opening. The clinician instructs the person to swallow several times. The person is instructed to pay attention to the movement of the “Adam’s apple”. Once the person is aware of the voice box lifting and lowering, they are instructed to hold the swallow for a few seconds. This procedure increases elevation of the larynx, retraction of the tongue base and airway closure.

Exercises, aid in alleviating dysphagia for some persons. These exercises involve range-of-motion (ROM) and resistance exercises. ROM exercises are used to improve movement of the lips, jaw, oral tongue, tongue base, larynx, and vocal folds. The clinician instructs the patient to elevate the tongue towards the front and the back as far as possible. This procedure helps to improve speech as well as oropharyngeal swallowing. Pushing the tongue against a tongue blade or lollypop stick helps to improve range of motion and strength. Other exercises used to improve tongue control involve placing the end of rolled gauze piece in the mouth of the person. The clinician maintains control of the other end in order to alleviate the potential for accidental swallowing. These exercises help the person to improve their ability to control food in the mouth.

The person with dysphagia can use breath control exercises while bent over or pushing against a hard surface to increase vocal fold closure, to increased pharyngeal structures, and to improve the quality of airway closure. Having the person repeat “ah” using a hard glottal attack with each vowel strengthens vocal fold adduction as well. The person who engages in falsetto exercises elevates the larynx similar to that of normal swallowing. These exercise improve laryngeal functioning and voice quality.

When all of the a for ementioned compensatory methods and/or exercises have been tried with little success, often modifying the person’s diet can reduce dysphagia. This may include changing the consistency of the person’s meals by including a product called “Thickening”. For the dysphagia person, a diet of pureed food like consistency becomes necessary. However, pureed foods result in liquids easily, separating during the pureeing process, increasing the risk of aspiration.

The clinician can assist in the prevention of aspiration by changing foods from an liquid consistency to semi solid to solid consistency

### **Things that can be done to Improve Saliva Control...**

- Developing better eating patterns.
- Improved posture.
- Behaviour modification programs.
- Special appliance (lip sensor, palatal trainer, teeth bands).

### **Also make him try...**

- Wiping with a handkerchief or scarf instead of a bib.
- Praise a dry chin.
- Encourage regular tooth brushing.
- Remind your child to swallow.

Using toys such as whistles and curly straws, and by having the child to blow bubbles or cotton balls, their ability to control lip protrusion and tongue retraction improves. In addition, these oral motor toys accomplish the following:

- Improves abdominal muscle strength.
- Prolongation of controlled exhalation.
- Jaw stability when biting on a mouthpiece.
- Jaw-lip dissociation.
- Jaw-tongue dissociation.
- Lip closure for saliva/drooling control.



- Bite, suck, and swallow reflex.
- Improves airflow.
- Sensory awareness for improved articulation.
- Improved tongue muscle tone.

## **Therapy Strategies**

These techniques are designed to actually change the physiology of the swallow.

### **Icing**

This is a technique used by Occupational Therapist & Physiotherapist. It may be effective in decreasing the tone, stimulate sensory nerves etc & is currently in use. The external surface of the lower cheeks and the mouth are typically iced and the velum and uvula may also be treated.

### **Thermal Stimulation**

Evidence, regarding the efficacy of this procedure is mixed, but it is commonly used.

Thermal stimulation involves tapping or rubbing the person's anterior facial pillar with an iced dental mirror. In each treatment "set" the tapping/rubbing and it is done about five times. As immediately often the completion of set as possible the patient is instructed to swallow and may be given a small amount of liquid through a straw. The extra stimulation provided by the iced mirror is supposed to alert the nervous system, allowing the swallow response to occur more rapidly.

Recommends doing thermal stimulation three times per day. Suggests stimulation of the anterior facial pillar on the person's good side. I would like to do both sides and only when the person is taking a break in between oral-motor exercises. There are doubts about the efficacy of thermal stimulation. The research is quite conflicting and from my own experience after working with the persons having swallowing problem, it's efficacy is doubtful.

Sensory stimulation (for apraxia of swallowing or reduced sensation). It may involve presenting a warm or cold bolus, presenting foods with strong tastes or textures, or pressing the spoon on the tongue when food is presented.

### **Suck-swallow technique**

The person produces an exaggerated suck with the lips closed followed by an exaggerated vertical back-tongue motion prior to swallowing attempts (Have the person suck on a lollypop). The sucking action pulls saliva to the back of the mouth, and this seems to help trigger the swallow more rapidly. So, this technique is also based on the idea that increases oral sensation may help to trigger the swallow.

## **Chewing**

For some cases, this provides the extra oral sensation necessary to trigger the swallow. If this technique is used, the person must also chew liquids prior to swallowing.

## **Range of motion exercises**

Exercises are done to improve the range of motion of the lips, tongue, and jaw, to improve coordination, vocal fold adduction, laryngeal elevation and tongue base retraction.

Range of motion exercises involves the moving target structures as far as possible from rest position, holding them at the most distal point for a few seconds and then relaxing.

Resistance exercises involves moving against pressure. For the tongue, use a tongue blade.

## **Posture to facilitate swallowing**

Specific postures are used to compensate for the particular types of dysphagia by changing the way food moves through the pharynx. It is a good idea to have the person try using these postures during the radiographic study. This way idea can be built up of how it works.

If the person's problem is delayed initiation of the swallow, then chin tuck will help in eating. The chin should be close to the neck while eating. This head-down posture moves the tongue forward, enlarging the vallecula. The vallecula can then contain the bolus a little longer than usual, allowing more time for the larynx to elevate and the vocal folds to adduct. It also narrows the airway and puts the epiglottis in a over-hanging position.

If the person has poor tongue control, swallow in a head-back position, allowing for more drainage. When a person swallows in this position, it may be dangerous to give him/her thin liquids. Also, if the person has both poor tongue control and problems with airway closure, he/she could swallow in this position by using the supraglottic swallow. (Remember that only persons with fairly intact cognition can effectively use the supraglottic swallow.)

In case of unilateral paralysis of the pharynx, the person should turn his head toward the paralyzed side before swallowing. This closes the sinus on the paralyzed side and keeps food on the functioning side of the pharynx.

If there is a unilateral paralysis of both the oral cavity and pharynx, the person should swallow while tilting the head toward the better side. This technique prevents pocketing and also sends the bolus down the functioning side of the pharynx.



Note that the head should only be turned toward the affected side in case of unilateral paralysis of the pharynx alone. If the oral cavity is also affected, use the tilting technique (tilting could be used for pharyngeal problems alone if turning is too difficult for the person).

If the person is pocketing food in the oral cavity, it may be necessary to teach him/her to sweep the buccal cavity with a finger.

## **Dysphagia Management**

### Oral preparation phase

- Poor lip seal
  - Put button with string between lip and teeth, pull against hand pressure and against lip pressure, as client tries to keep lips sealed.
  - Sustain /i/ position for 1 s., sustain pucker for 1 s., seal lips for 1 s. If no seal, use tongue blades.
- Poor tongue movement
  - Range of motion exercises for tongues (lateral, up, back, protrusion).
  - Resistance exercises for tongue (lateral, up, protrusion).
  - Tilt head forward and backward for chewing and back to initiate swallow.
- Poor cheek control
  - /u/ to /i/ stretch and hold.
  - Hold wide smile with lips tight against the teeth.
  - Lateral pull and hold of the lips.

### Oral phase

- Position food in the back of the mouth.
- Tongue exercises.
- Thermal stimulation - ice, water(hot/cold), against walls of the pharynx for five to ten minutes, 3-4 times per day.
- Suck, swallow
- Slow down the eating rate
- Pharyngeal phase
- Swallow maneuvers
  - Take a deep breath and hold the breath as you exhale slowly(for glottic closure).
  - Keep holding breath while you swallow.
  - Cough immediately after the swallow.
  - Take a deep breath and hold breath very tightly.

- Hold and bearing down as you swallow.
- Ensure the client swallows saliva and attend to the laryngeal elevation.
- When the client feels that the larynx move upward, force it to stay up with laryngeal muscle activity, squeeze the neck with the muscles.
- Reduce backward movement at the base of the tongue - effortful swallow.

As the client swallows have him or her squeeze hard with all muscles.

- Tongue lateralization - hold it for 1 sec and release.
- Tongue anterior-posterior range - hold it for 1 sec and release.

### *Resistance Exercises*

- Push tongue against a tongue blade, sucker, finger. Push up, side, and forward for 1 sec at maximum range of movement.

### *Bolus Control Exercises*

Gross Manipulation of Material.

Gross movement of Bolus is to be done after each attempt, person should judge success and indicate location of bolus/ when person is able to make movements with speed (3 directions in 1 sec), use other materials.

- Side to side
- Forward and backward
- Circular fashion
- Middle to side
- Back to middle

Mastication

Reduced range of tongue movement laterally

- Mash food by pressing tongue against roof of mouth
- Positioning the client
- Position food on most mobile side of tongue

Reduced buccal tension/buccal scarring

- Rounding lips "oh".
- Stretching lips broadly "ee".
- Alternating two postures may increase tension.



## Drooling and its Management

- External pressure on affected cheek.
- Position - Placing food on unaffected side.
- Posture - Tilting head towards unaffected side.

### Reduced range of mandibular movement laterally

- Exercises involves opening of jaw as widely as possible and hold maximum opening for one second; opening and moving jaw to each side as far as possible and extend position in each direction for one second; move jaw around in a circle as far as possible.

If unable to lateralize, normal occlusion will occur then teach mashing food with tongue against palate, in order to broaden diet options.

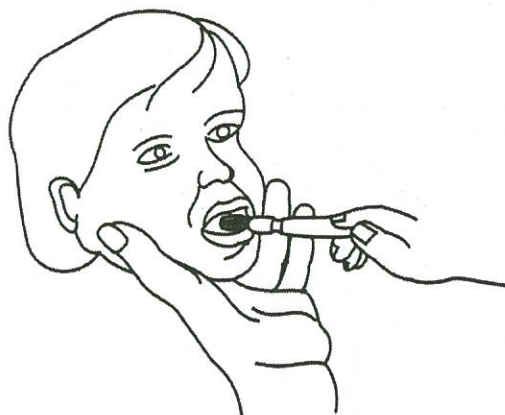


Fig: pressing the tongue with spoon or tooth brush

### *Preparatory Phase*

#### Reduce labial Closure

- Exercises :- Stretch lips in /i/ position and hold it for one second.
  - Pucker lips as tight as possible and hold it for one second.
  - Bringing lips together and hold it for one second.
  - If closure is not possible, close lips against spoon or object, increase, closure time.
  - Relax & perform as many times as possible.
- Buccinator apparatus

### Reduce tongue movement to form bolus

- Exercises
  - Indirect therapy
- Interim measure
  - Posture - Tilt head forward to keep bolus in anterior part of mouth until it is ready to initiate swallow. At the start of swallow, person can change posture as appropriate.

### Reduce range and coordination of tongue movement, to hold bolus

- Exercises
  - Indirect therapy
- Interim measure
  - Position - Hold material securely against front of roof and swallow immediately. Do not manipulate bolus.
  - Posture - Head tilted downward, to keep the bolus in anterior position.

### Reduce ability to hold bolus in normal position

- Give paste bolus and ask person to hold bolus against anterior to mid portion of palate with tongue.

### Reduced oral sensitivity

- Position - Food on more sensitive side of oral cavity.
- Temperature - Use of cold liquid, may help to localize material in mouth.

Taste-Use of mild spices may improve sensitivity to localization.

Therapists employ handling techniques and the use of assistive device to enhance head control, normalize muscle tone and stabilize body position. The intent is to promote jaw stability, to elicit mouth and lip closure, to decrease tongue thrust and to facilitate swallowing.

## **Facilitation Techniques**

Facilitation techniques are used to encourage the control of food and liquid, are described in detail in Warner(1981b). These techniques include the following

Young clients may best be helped by lap feeding where the posture of the head and shoulders can be controlled by the care-giver. For older and adult clients the seating position may need careful



consideration and seating should be adapted when necessary. The physiotherapist should be consulted for advice on seated posture. General aim is to support the shoulders in a forward position and to keep them upright, to maintain a right angle between the chin and neck. If posture control is a problem, additional padding with cushions or foam rubber may be required to maintain a balanced and symmetrical posture with good head support.

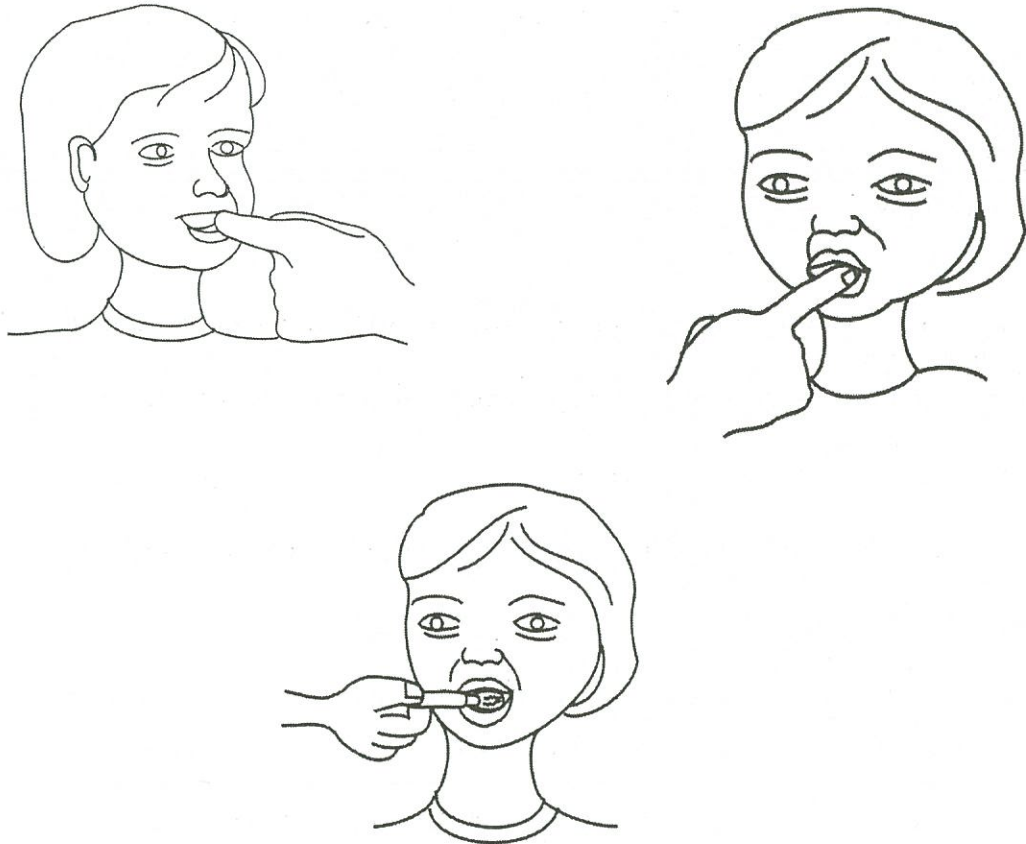


Fig.

*(b) Facilitating oral movements*

The posture, movements and coordination of the tongue, lips and jaw for food reception, biting, chewing and swallowing can be assisted and improved by a number of techniques and physical manipulation. Procedures to establish more normal movements of the tongue, lips, jaw and counterbalance abnormal muscle tone include techniques to encourage and increase the tolerance to touch(desensitization), the application of brief periods of temperature change on affected muscles(icing), the facilitation of movements through tapping, stroking and stretching affected muscles (Proprioceptive Neuromuscular Facilitation[PNF]), the selection of appropriate feeding utensils and gradual alteration of the consistency, texture and taste of food.

The techniques outlined are very precise and the advice of a speech therapist is essential for each client. Incorrect application of the techniques may exacerbate the client's problems rather than help to improve them.

## **Tongue Thrust (Oromyofunctional) Disorders**

Tongue thrust is a common name used to describe orofacial muscular imbalance. It has also been called review or immature swallow. Nearly all infants swallow by pushing the tongue forward. By the time they reach the aged children have automatically changed to a normal swallowing pattern, which involves squeezing the tongue in the mouth instead of pushing it forward against the teeth.

Research studies suggest hereditary factors, learned behavior such as thumb sucking and /or medical possible causes for tongue thrust. For what ever reason, a person experiences a delay or interruption in maturational process and fails to progress to an adult swallow pattern.

### **Symptoms**

A person with tongue thrust may demonstrate one or more of the following symptoms:

- Facial grimace and / or pursing of the lips when swallowing.
- Mouth breathing due to allergies or enlarged tonsils and adenoids.
- An open bite condition of the teeth.
- Difficulty with speech, especially the /s/ and /z/ sounds.
- When at rest, (for example, while watching television or reading a book) an open mouth posture with a for tongue position is noted.

Tongue thrust may first be identified by the dentist because of irregular positioning of the teeth. It is detected by a speech pathologist when a child has difficulty making certain sounds.

Childrens and adults, before or during orthodontic treatment, are often referred to a speech pathologist for therapy. They are recommended when a problem in speaking and / or irregular positioning of the teeth exists and that can cause tongue thrust.

If the tongue thrust behavior is not corrected, orthodontic treatment may take longer and a person may experience back when orthodontic treatment has ended and their braces are removed.

Components of tongue thrust therapy include exercises for the lips, tongue and jaw that are designed to incorrect or immature swallow to an adult pattern that is beneficial to the positioning of teeth and to correct a speech sounds. The condition can usually be corrected in three to six months.

oral myofunctional therapy corrects an infantile swallowing pattern which adversely affects the formation of the dental arch. Since the structures involved in a tongue thrust include the tongue and teeth, it has been hypothesized that articulation of speech sounds is also affected.



## **Oral Facial Myofunctional Disorder (OMD)**

**Summary:** Deviant swallow and/or orofacial hypotonicity (facial droop) can adversely affect jaw structures and positioning of teeth with a negative effect on ability to masticate (chew), swallow and produce speech sounds.

**Definition:** The tongue moves forward in an exaggerated way during speech, chewing and swallowing. The tongue may also lie too far forward at-rest. The tongue may push against the teeth or protrude through the teeth. This pressure interferes with normal tooth eruption and alignment of the teeth and jaws. Continuous forward tongue posture causes a child to look, speak and swallow differently.

**Causes:** The most frequent cause of OMD is a blocked airway from enlarged tonsils, adenoids or from allergies. An open-mouth breathing pattern can become habituated and continue even after successful medical treatment of the airway blockage. Secondary causes include deviant dental alignment, excessive thumb sucking, lip licking, teeth clenching and grinding.

### *Remediation for OMD*

- Medical management for nasal airway blockage.
- Dental/orthodontic intervention for alignment of teeth and jaws.
- Speech treatment by speech pathologist to help both speech and swallowing problems. Typically this follows medical treatment and may precede, continue in conjunction with orthodontic treatment or follow completion.

The remedial programme includes :-

1. Initial evaluation of lip, palate, tongue and facial muscles both at rest and during complex movements needed for both clear speech and adequate swallowing.
2. Monthly therapy sessions to demonstrate and teach at-home exercises to:
  - Increase awareness of oral, lingual and facial muscles and postures.
  - Improve oral and facial muscle strength and coordination.
  - Establish normal speech articulation and swallowing patterns.

For children and adolescents a parent attends the therapy sessions to learn the exercises and then assists in the daily exercises at home.

Typically the process is completed in 6 months with consistent at-home practice.

3. Follow-up evaluation: Six months post completion of the training to ensure that the normal speech and swallowing patterns have continued.

Oral facial Myofunctional Disorders(OMD) describe abnormal function of the oral and facial muscles. OMD also usually involves a combination of a tongue thrust swallow and abnormal lip and tongue resting positions. The basic problem is excessive pressure. Just as the orthodontist can move teeth by applying controlled force with wires and bands, the abnormal pressures of OMD can adversely influence the formation of the bony oral structures and / or position of teeth.

The excessive pressure caused by OMD may contribute to the development of speech problems and may make dental malocclusion worse.

#### Significant factors in development of OMD

- Prolonged thumb sucking
- Prolonged finger sucking
- Pacifier sucking
- Chronic upper respiratory disorders
- Enlarged tonsils
- Short lingual frenulum
- Large tongue

Research has shown a high incidence of /s/ distortion or “lisp” in individuals with a tongue thrust. The tongue comes too far forward in between the upper and lower front teeth resulting in a /th/ sound for instance “thithter” rather than “sister”. There are a number of other sounds that can also be distorted as a result of OMD. They are /sh/,/ch/,/j/,/z/,/t/,/d/,/l/,/n/ and /r/. When there is a combination of OMD and related articulation errors, it is often difficult to correct the speech distortions through traditional speech therapy alone. This is because the sounds that are most often affected by OMD require retraction and elevation of the tongue for correct production, whereas, OMD is characterized by a forward and low tongue function.

Therapy involves an individualized regimen of therapeutic oral and facial muscle exercise to develop a correct swallowing pattern and appropriate tongue and lip resting postures.

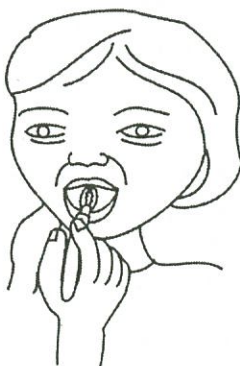


Fig. Facilitating oral movements



## **Parental Role in OMD therapy**

Your child cannot carry out his / her therapy programme alone. For a child to change a pattern as basic as swallowing, there must be a willingness to direct a lot of thought and practice toward that goal. Parental supervision and participation are necessary to achieve this objective. When parents are informed, interested and supportive they can make an enormous difference toward helping their child maintain a positive attitude and the dedication necessary to achieve a correction of OMD. This will facilitate orthodontic treatment and stability and ensure a lifetime of dental health.

## **Pro-speech's Approach to Orofacial Myofunctional Therapy**

Pro-speech offers a unique and effective approach to remediate orofacial myofunctional disorders. The core of our program is to develop the client's intrinsic motivation to achieve success.

### **At Pro-speech we:**

- Boost self-esteem.
- Foster a positive therapy environment.
- Implement a "Team Approach" to eliminate orofacial myofunctional habits.

## **Examples of Common Oral-motor Issues**

Some common oral-motor dysfunctions seen in the clinic involve assessment and treatment of the muscles of mastication and talking. Low muscle tone around the lips, for example, often presents as difficulty controlling secretions (drooling), spillage of food from the mouth during dining and difficulty with the formation of certain consonant sounds that involve precise lip control.

Poor control and/or sensory loss of the cheek muscles makes dining difficult as food may fall into the space between the cheek and gum, and control of the bolus is lost.

When muscles of mastication are weak, proper chewing and bolus breakdown are affected. Difficulty in taking liquid from a straw is often present with low or high muscle tone, as underlying weakness makes it difficult to form a complete seal around a straw.

## **Straws, Bubbles and Whistles**

In order to correct the underlying weakness secondary to muscle tone issues in the oral cavity, a strengthening program that targets the appropriate muscle groups is put into place. After careful clinical assessment and input from the clinical team, a therapist may choose from a variety of interventions specific to the patient's needs.

Interventions may be implemented by the therapist as a result of standardized assessments such as jaw-strengthening protocols, which involve precise treatments based on results of standardized tests. Therapists may also be trained in specialized interventions for which data upon assessment is interpreted and a variety of interventions may be implemented based on the data collected. In many cases, however, observations during functional activities provide valuable clinical information from which to determine treatment options.

Clinical observations tell us what is actually happening with an individual during typical activities carried out by that person. For a person who demonstrates the signs of poor lip control or weakness as evidenced by the examples given in the preceding section, a therapist may evaluate lip control and strength, and intervene with lip control exercises that facilitate lip closure using blow toys. A blow toy product may be chosen based on the findings during the evaluation. The challenge for the individual is customized based on elements inherent in the outcome.

For example, in intervention with an individual who displays low lip tone, poor lip closure, jaw retraction or protrusion and has difficulty with the suck/swallow/breathe cycle, a therapist may choose the Plastic Lip Whistle. The therapist recognizes that a minimal amount of lip closure is needed to use the outcome. The structure of the whistle facilitates jaw alignment and the challenge meets the ability of the individual. Additionally, cyclical breathing patterns can be practiced with this type of outcome as valuable auditory feedback is generated for the benefit of both the therapist and the individual.

For more precise lip control and lip placement, the smaller Windmill or Whistles provide a greater challenge to the cheek and lip muscles since a full lip seal around a small opening is necessary to engage the moving part and keep it turning. The Mini Flutes and Slide Whistles require a greater amount of lip control as the flow control openings on the mouthpieces need to stay open in order to work. On the other hand, the Siren Whistle works on lip closure, but does not require precise control.

In cases where both ocular and oral activities need to be addressed, bubble toys provide movement to the cheek and lip muscles, sustain prolonged lip rounding facilitate visual tracking. Again, the inherent elements in the outcome choice determine the best challenge for the individual based on clinical observations.

For example, when lip closure, cheek strength and visual tracking are all of clinical significance, the Bubble Visions blow toy provides moderate challenge to lip closure, inherently challenges cheek control and provides an added dimension of visual stimulation through the prism lenses to keep individuals engaged during visual tracking exercises.

If grasp is an issue, the absence of fine-motor control does not rule out the use of bubble wands. The Bubblin', Gelly, Wand can be used via a gross grasp. The wand can be activated by dipping in the solution and moving it from side to side across the air to generate bubbles, or it can be used to facilitate lip seal by blowing into the back of the toy, which features a built-up area for mouth placement.



There are many different therapeutic uses for the products listed in the oral-motor section of catalog. We have named just a few. As therapists, we have learned to modify, grade and change interventions based on our clients' needs, their rates of progress and the amount of challenge needed for an optimal therapeutic intervention. We hope we have given you a few ideas that will stimulate additional uses of innovative products for you and your clients. Above all, products are designed to introduce an element of fun and smiles into your therapy sessions.

Table: Direct and Indirect Approaches to Improve Oral Sensorimotor Function in Infants and Young Children With Feeding and Swallowing Problems

Type of Approach	Purpose
Direct Oral "exercises"	Stimulate structures for function Encourage mouth exploration Caution: Invasive and may be aversive; may increase secretions
Indirect Alterations in environment  Position and seating  Communication signals	Reduce distractions Improve ability to focus Caution: Limited social interactions  Better support for feeding Improve trunk and head control  Touch and verbal cueing for hearing impaired Alter texture, taste and temperature of food Change timing intervals for food presentation Vary size of bolus.

## Management of Oral Sensory Deficits

### *Common Abnormal Responses in Children with Oral Sensory Disorders*

Table : Types of Abnormal Sensory Responses in Children with Oral Sensory Disorders

Type of Responses	Signs and Symptoms
Hyporeaction	Diminished response to sensory input Craving foods with increased oral input Drooling Inclination to overstuff mouth with food
Hyperreaction  Sensory defensiveness	Excessive reactions to sensory input resulting in abnormal reflex patterns and increased postural tone  Emotional responses to sensory input Sensory input perceived as a threat Aversion to toothbrushing Texture avoidance



Children with hyporeactive responses to oral input often have diminished responses to all sensory experiences. They commonly demonstrate poor sucking and chewing because of reduced oral discriminative abilities. These children may benefit from a sensory environment that tends to “wake up” or “alert” the nervous system to allow them to focus on meal time (Klein & Delaney, 1994). The room should be well lit. Furnishings and utensils can be brightly colored. Food of strong and contrasting flavors can be presented to help the child have increased sensory feedback. Some children respond to foods with increased oral input. Such children may benefit from animated feeders who use body language and voice to engage children and to increase overall responses. In addition, sensory awareness of mandible, lips and cheeks may be enhanced in some children by tapping and stroking with the middle finger from midcheek to the mouth, around the lips and to the mandible. A drop of liquid placed at the corner of the lip or in the cheek pocket may encourage increased activity of the lips and cheeks usually pursing of lips and “tightening” of cheeks. Functional activities should follow immediately to include nipple, cup or spoon for feeding.

### *Oral Sensory Management for Hyperreactive Responses*

Children with hyperreactive responses demonstrate an exaggerated response to oral input. These children often benefit from an inhibitory approach to sensory input in an environment that is modified to decrease sensory input. For example, dim lighting, muted colors, bland tastes and neutral temperatures may be appealing to such children. The feeder may move slowly and calmly, using a quieter voice and should verbally prepare the child for what to expect during the feeding process. In addition, these children typically need positioning that promotes stability.

### *Management of Oral Sensory Defensiveness*

Children with oral sensory defensiveness demonstrate an emotional response to sensory input. They take only a limited variety of tastes and textures orally. Food refusal is frequent. Caregivers need to develop a trusting relationship with these children, who need to be verbally prepared for what to expect. Treatment is explicitly child focused and the caregiver must anticipate the child’s cues carefully. These children are more defensive about the face and mouth than any other parts of the body. Thus, a whole body approach to sensory input is recommended. Children will likely to respond for carefully graded approaches to tactile input that are designed to alter input in incremental steps as they tolerate. A physical-handling approach to sensory defensiveness incorporates techniques that can be used during and apart from mealtimes. Firm-pressure tactile input is given to the face, lips, or inside the mouth. Caution is advocated, particularly for the invasive process of intra oral stimulation. Children should not become stressed with any intervention procedures. A treatment approach that addresses sensory defensiveness should not be time-consuming. It should be easily incorporated into the child’s typical daily routine and be acceptable to caregivers. They may not have time with feeding problems, who also may need time-consuming medical appointments and other therapies.

Programmatic integration into daily routines emerges as an obvious approach, given that children who are orally defensive often resist caregiver’s attempts at toothbrushing, which results in poor oral hygiene. Thus, oral sensory programs that are incorporated into the daily toothbrushing regimen are encouraged. Similarly, treatment recommendations that can be incorporated into the mealtime routine are sought.



Caregivers can incorporate proprioceptive input by placing spoons or cups with firm but gentle pressure at midtongue during mealtimes. Oral sensory experiences may be graded by modifying the taste, temperature or texture of foods one at a time in small steps, so as not to overwhelm the child. Oral sensory experiences can be considered in a hierarchy that systematizes gradual changes. Children may be seen individually with their parents with guidelines for follow-up at home. Some children with relatively mild sensory deficits may benefit from a group programme where parents are involved as they help each other with suggestions and insights.

## **EXERCISES & GAMES FOR IMPROVED ARTICULATION AND ORAL MOTOR PLANNING**

For young children with articulation delay, oral motor exercises and toys provide a fun and active method for improved articulation and oral motor planning. By using toys such as whistles and curly straws, and by having the child blow bubbles or cotton balls, their ability to control lip protrusion and tongue retraction improves. In addition, these oral motor toys accomplish the following:

- Improved abdominal muscle strength
- Prolongation of controlled exhalation
- Jaw stability when biting on a mouthpiece
- Jaw-lip dissociation
- Jaw-tongue dissociation
- Lip closure for saliva/drooling control
- Bite, suck, and swallow reflex
- Improved airflow
- Sensory awareness for improved articulation
- Improved tongue muscle tone

These activities are fun and exciting for children and families! Please enjoy these suggestions along with exercises that will facilitate sensory awareness and muscle tone resulting in improved tongue posture, tone, and articulation. Here are just a few of the oral exercises we practice:

- Open and close mouth slowly several times. Be sure lips are closed all the way.
- Pucker lips for a kiss, hold, and then relax.

- Spread lips into a big “clown smile” and then hold.
- Pucker, hold, “clown smile,” and hold. Repeat alternating movement several times.
- Stick out tongue and move slowly from corner to corner of lips. Hold in each corner and then relax and repeat.
- Lick all around upper and lower lips. Pretend you are licking off peanut butter!
- We hope that you enjoy these exercises!

Table: Oral Sensorimotor Treatment for Anatomic Structure Problems

Structure / Problem	Treatment
Jaw thrust (increased tone)	Mouth play with fingers and toys Assisted toothbrushing Soft object held between teeth to promote jaw closure
Jaw retraction (increased tone)	Prone positioning Forward pull under jaw
Jaw clenching (decreased tone)	Mouth play to get gradual opening Pleasurable stimulation on face
Jaw instability (decreased tone)	Activities to encourage jaw closure
Tonic bite reflex (not related to tone)	Pressure at temporomandibular joints Sensory stimulation Coated flat spoon to protect teeth
Lips-retraction (increased tone)	Finger tapping or vibration to cheeks and lips Jaw stability procedures
Limited upper-lip movement (increased and decreased tone)	Varied food textures and temperatures Tapping and stroking Straw drinking with low tone
Cheeks - reduced tone	Stroking and tapping on cheeks, especially at temporomandibular joint.
Reduced sensory awareness	Varied food textures and temperatures Drop of liquid at the corner of the lip



Tongue thrust (increased tone, or respiratory stress)	Jaw stabilization Thickened liquid released at lip Food placed at sides on molar tables for gums) Exercises for lateral tongue movement Spoon placed at midtongue with downward pressure
Tongue retraction (increased or decreased tone)	Prone position Tongue stroking from back to front Chin tuck position when upright (older child) Upward tapping under chin
Tongue hypotonia (decreased tone)	Varied textures and tastes to increase Sensory input Food or liquid added gradually
Tongue deviation	Maintenance of head midline Stimulation of less active side with finger, toys, toothbrush
Tongue-limited movement	Varied textures, temperatures, tastes Vibration
Soft palate (nasopharyngeal reflux)	Upright or prone position Angled bottle used for prone position Cheek and tongue function activities Thickened liquids (if normal swallow)

Table : Conservative intervention for children with drooling

Goal	Recommendations
Improve sensory awareness	Experience contrast: (vary texture and temperature of food and objects) Help the child to know when chin is wet or dry
Improve jaw, lip and cheek control	See recommendations in the table Chin strap may assist jaw closure during meals for children with hypotonia; caution; strap should not force the jaw to close. Lip closure activities Straw drinking may increase lip and cheek activity.
Keep face dry	Wiping reminders Wrist bands may aid spontaneity for wiping “Secret signals” between child and caregiver may offer reminder without others knowing.

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