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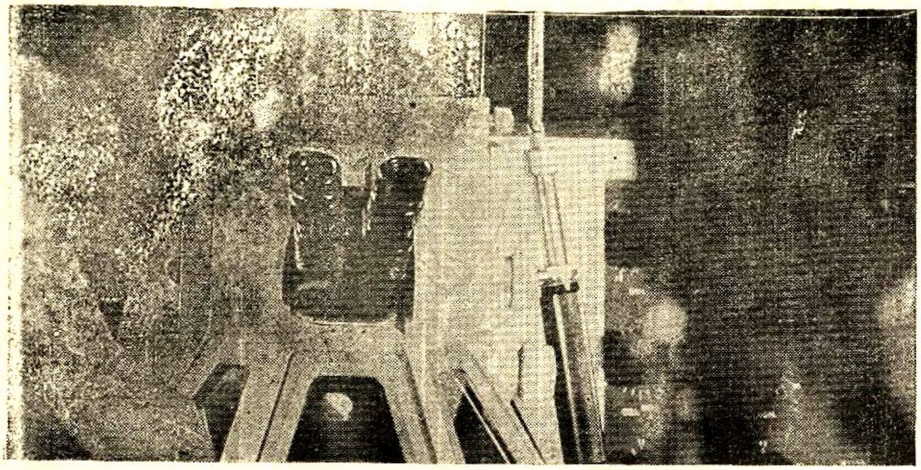

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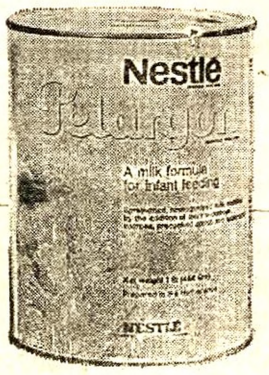

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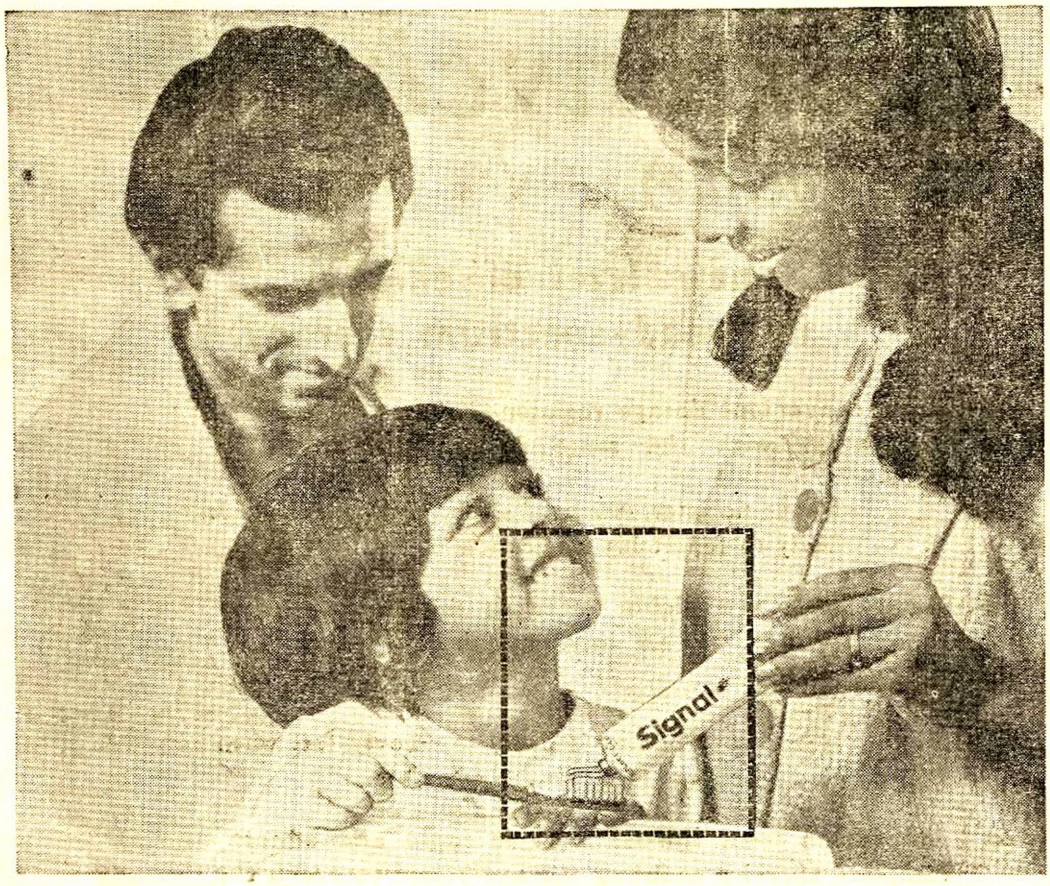

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A LEVER PRODUCT

CEYLON DENTAL JOURNAL

VOLUME 3

A National Association plays a vital part in any profession. It is through the medium of a united group that every profession could effectively express it's policies, views, hopes and aspirations. It is at meetings of a National Society, that members could learn from others with more experience and education, exchange ideas, contribute in some measure, large or small, towards the betterment of the profession, get to know and understand one another and develop fellowship and sometimes lasting friendships among themselves.

On the sixth of December, 1932, twelve pioneers who formed our Association stated that "the Objects for which the Association is established are the Promotion of Dental and allied sciences, and the maintenance of the honour and the interests of the Dental Profession, by the aid of all or any of the following:-

(a) Periodical meetings of the members of the Association, and of the Dental Profession generally.

(b) The publication of such information as may be thought desirable, in the form of a periodical journal, which shall be the Journal of the Association.

(c) The occasional publication of transactions or other papers.

(d) The grant of sums of money out of the funds of the Association for the promotion of the Dental and the allied sciences, in such a manner as may from time to time be determined on,

(e) The maintenance of the spirit and provisions of the Dental Ordinances and Acts by such lawful means as may be necessary.

(f) The encouragement of a Dental Benevolent Fund, for the relief of decayed or necessitous Members of the Profession.

(g) And such other lawful things as are incedental or conducive to the attainment of the above objects."

After forty years of existence, let us look back on our successes and failures. Have we realised our objectives? Fulfilled our ambitions? What remains to be done? Have we as members of a respected professional body, taken the interest that we really should have shown in the affairs of our Association? The answers to these questions are quite obvious when we remember that less than a third of our profession subscribe to our Association and on an average, less than one tenth attend our not - too - frequent meetings.

A Council of seven members may have been adequate at a time when our numbers were small and our activities limited. But at the present time, with fifty qualified men and women entering our profession annually, the executive committee should necessarily expand to enable International Relations, Publications, Social activities, Dental Health Education etc to receive greater attention and also attract hitherto unutilised talent among our membership. This would not only relieve an already over-worked Council, but also provide opportunities to many others to contribute their share towards the progress of the profession.

Institutions founded by man, if unnecessary or superfluous, wither and die; if purposeful and important, they grow and expand. The continuing existence of these institutions is in reality, their own insignia of success. Certainly by this standard, as well as by many others the Ceylon Dental Association has proved its importance. Therefore, on this happy occasion, our fortieth anniversary, let us resolve to get together and build a stronger association, make our united voices be heard in the right places and provide advice and guidance for the future of the profession and Dentistry in Sri Lanka.

VIRAL HEPATITIS AND THE DENTAL SURGEON

V. S. KARUNAGARAN L.D S. (Ceylon), F.D S., R.C.S. (Edin.)
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There are two types of viral Hepatitis caused by two distinct types of viral agents. Infective Hepatitis where the virus enters the body by the oral route and serum Hepatitis where the virus enters the body only through an injection.

Infective Hepatitis

This disease caused by a viral agent effecting the liver is transmitted through food and water contaminated with infectious faecal matter. Although this is the usual mode of infection, it can also be transmitted by blood transfusion and parenteral injections.

The incubation period is from 12-40 days. This is followed by a prodromal stage where malaise. nausea, fatigue and anorexia are the usual symptoms. There may be a high temperature, and Jaundice is the end result. There is viraemia and invasion of the liver prior to the onset of Jaundice. Injury to the Hepatic parenchymal cells or focal death takes place without damage to the reticulum.

Serum Hepatitis

Transmission of the viral agent in this disease is always through a parenteral inoculation in the form of transfusion of blood or injection of medicine or local anaesthetic or by a needle contaminated with blood containing the virus. Thanabalasunderam (1972) suggest a possible oral route by swallowing infected blood material.

The incubation period is very long, 30-180 days. The onset is very insidious. A prodromal stage where malaise, fatigue, nausea and anorexia are present, precedes the onset of Jaundice. It takes from 1-18 days for the Jaundice to appear.

The differences between the two types of viral Hepatitis are shown in this table.

Incidence of viral Hepatitis is on the increase, serum Hepatitis contributing a large proportion: Fig (1) shows the incidence of hospital admissions of viral Hepatitis in Ceylon (Mendis Epidemiologist Health Department - personal communication).

	INFECTIVE HEPATITIS	SERUM HEPATITIS
1. Incubation Period	10-40 days	30-180 days.
2 Age	Mostly under 30	Any Age.
3. Mortality	Very Low	Fairly High.
4. Fever	Often High	Rarely over 100 F.
5. Chills	Often	Rare.
6. Route of Entry	Often oral or Parenteral	Paranteral only.
7. Blood-Australian Antigen gel diffusion test	Negative	Positive.

In a partial survey in the city of Rochester there were 98 reported cases of viral Hepatitis, confirmed by blood examination, 61 of these had a history of parenteral injections, and of these 61, 33 cases were exposed to injections for the purpose of dental treatment (Buck et al),

Foley & Gutherine (1966) reported 15 cases of Serum Hepatitis following dental procedure, of which 3 were fatal. This represented 30 of cases of Hepatitis in one hospital over a period of two years. Syringes used for local anaesthesia were the probable cause.

Injections following tatooing and scratches from contaminated thorns have been reported (Gabinus and Johnson 1962). This shows that one can get serum Hepatitis from injuries, sustained by handling contaminated instruments and needles, immaterial of how slight the injury is.

It has been estimated that 0.0001 c.c. or 1/750th af a drop of infected blood is sufficient to produce Serum Hepatitis whereas 0.01 c.c, or 1/7th of a drop of contaminated blood is sufficient to produce Infective Hepatitis.

Some workers (Drake et al) quote 0.00004 c.c. of whole blood is sufficient to transmit Serum Hepatitis.

In a short survey of patients admitted with liver disease Thanabalasunderam (1972) reports 40 admissions of Viral Hepatitis out of which 15 were diagnosed as Serum Hepatitis and 6 of the infective cases had Australian Antigen test + ve. (ie they too were serum Hepatitis). This includes the case of a Dental surgeon who might have swallowed blood products from contaminated fingers. In this group there were two deaths both Australian Antigen diffusion + ve.

Many more Dental surgeons, Physicians and Nurses contact Hepatitis than the average citizen. Sub-clinical cases may occur without Jaundice, where certain amount of liver damage has occured. In view of the long incubation period, even the source of contact will go undetected.

How can the conscientious Dental Surgeon protect himself and his patients from the possiblility of parenteral inoculation of ineffective or serum Hepatitis virus?

A good medical history is a must before any surgical procedure including the administration of a local anaesthetic for a cavity preparation to place a filling. Always include in this questions about viral Hepatitis or Jaundice. If there is a history of Jaundice the Dental Surgeon should take the precaution to protect himself by using gloves when attending on the patient. If there has been a possibility of an accidental inoculation of infected blood while attending on a patient the Dental Surgeon should immediately take gamma globulin to protect himself from developing Hepatitis.

For protecting the patient, proper sterilisation of all instruments is the answer. Virologists differ in their views about the sterilisation methods to destroy viruses, especially the ones causing viral Hepatitis. Autoclaving for 15 minutes at 126°C and 20 lbs. per square inch pressure is recommended. The sure way is to use disposable needles and syringes.

A regime of sterilisation suitable for the cartridge type of syringes recommended by Walker and Dorothy Geddes, is quoted. This regime may be followed in general for sterilisation of all dental instruments. Appropriate methods should be chosen depending on the circumstances.

Recommendation

Bacteriological and Virological sterility can only be ensured if the syringe (including needle) is thoroughly cleaned and held at a suitably high temperature for a sufficient time. Prior to any method of sterilisation all organic matter must be removed from instruments by scrubbing with soap and water or using such other devices (ultrasonic vibration) as are recognised as efficient. Heat will fix and coagulate any protein left on a needle and this may protect organisms.

Destruction of Bateria

The following methods of sterilisation are therefore recommended as adequate for the destruction only of those bacterial organisms likely to be contaminants of dental local anaesthetic syringes.

(1) Autoclaving. Alternative regimes

3 minutes at 134°C. (30 lb. per sq. inch.)
or 10 ,, at 126°C. (20 lb. per sq. inch,)
or 15 ,, at 121°C. (15 lb. per sq. inch,)
(M.R.C,) (1959)

Timing should commence after the appropriate temperature and pressure have been reached, maintained for the appropriate time and the autoclave then allowed to cool.

(2) Dry Heat. 160 °C. for sixty cansecutive minutes (M. R. C., 1962). Each oven has its own recommended instructions, but owing to the ease and frequency with which errors and irregularities can occur, each should be recalibrated at regular intervals Chemical indicators, such as Browne's tubes Nos. 3 and 4, which give an unequivocal colour change indicating that adequate heat treatment has been given, should be inserted with each batch of instruments (B. M. J., 1959). Inadequate sterilisation can pass unnoticed unless such precautions are taken.

(3) Boiling Water. 100 °C for ten consecutive minutes (M R.C., 1962). If efficiently performed this method will destroy all pathogenic bacteria, except those such as the tetanus bacillus which produces resistant spores.

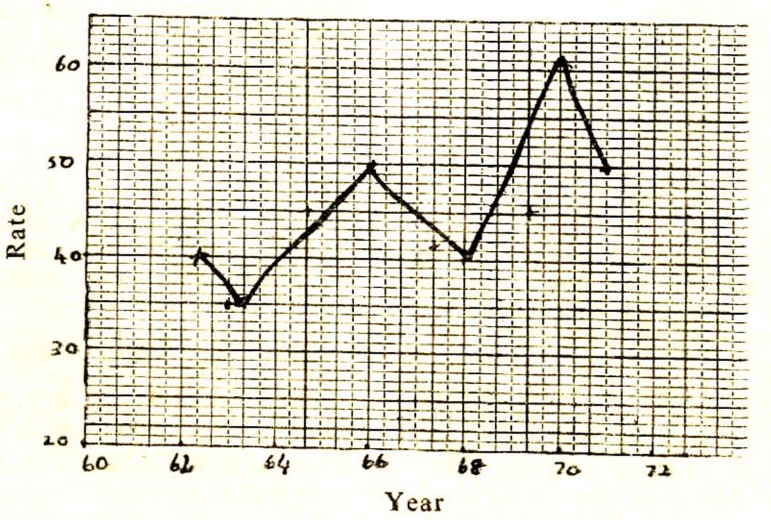
All processes must be timed and no other instruments added during the period of sterilisation.

Storage

Suitable methods of storage must be provided. With autoclaving and dry heat an adequate shelf life can be achieved by prepacking the syringes in suitable containers or in paper specially prepared for the purpose. After boiling, the syringes may be removed from the steriliser with sterile instrument forceps and, if not used immediately, transferred into an antiseptic solution in which they must be completely immersed. Suitable solutions would be aqueous hibitane (Chlorhexidene 5 per cent) in a covered dish, which should itself be sterilised when the solution is changed once a week or more often. Aqueous hibitane is preferred to the 'spirit' type since it is permissible to use the needle with a trace of antiseptic and this circumvents the difficulty of sterilic rinsing.

VIRAL HEPATITIS

Hospital Admissions
per 100000 Population



Elimination of Viruses

The medical profession has accepted the principle of the use of disposable needles and syringes for all intravenous work and recommends as desirable similar precautions for all injections or inoculations. It would appear that the only sure way of preventing the transmission of homologous serum jaundice is for the dental profession to do like wise; use disposable needles and discard all partially used cartridges of local anaesthetics.

Summary:

Every Dental Surgeon is exposed to the risk of contacting Viral Hepatitis during his pratice. Due to the nature of his work he can contact serum hepatitis.

Patients undergoing dental treatment too are exposed to the risk of contacting Viral hepatitis.

Incidence, mode of infection methods of prevention and sterilisation contaminated instruments are discussed. A regime of sterilisation suitable for dental instruments is recommended

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Personal communication — Thanabalasundaram R. S. et.al (1972) Ceylon Medical Journal Vol. 17: Australia antigen in Liver disease

Walter R. O. et.al — British Dental Journal Vol. 118:4 Sterilisation of Syringes.

SOME CURRENT TREATMENT PROCEDURES FOR CLEFT LIP AND CLEFT PALATE.

K. Bamberadeniya L. D. S. R. C. S (Eng) D. P. D. (U St. Andrews)

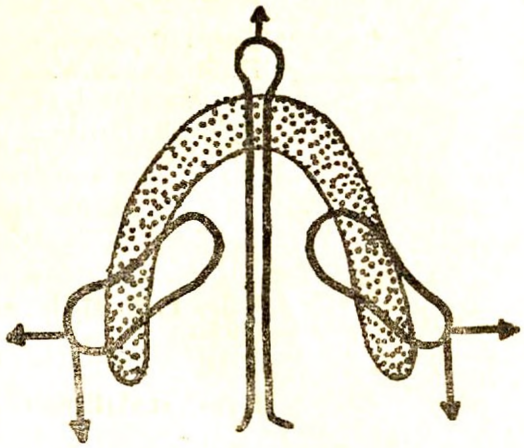
The causes of cleft lip and palate, like other congenital deformities, are not well understood. While it is not yet proven that heredity is the dominant factor, it is likely that many congenital clefts of the lip and palate are transmitted through the germ plasm of one or both parents. In the more recent years many investigators have adopted the view that a hereditary factor must be an important causal element. There is evidence too for emotional stresses in the mother during early pregnancy. Several investigators have incriminated cortisone therapy, viral infections and malnutrition as possible causes. The thalidomide tragedy is still fresh in our memory. The protective influence of folic acid and Vitamin B 6 therapy is accepted by many clinicians.[4]

The occurence of congenital cleft of the lip and palate is more prevalent than most people realise. Unfortunately in Ceylon there are no records or accurate information compiled as to the incidence of this deformity. In Denmark and Norway, however, where very careful records are kept, cleft palate occured once in every 665 live births.[5] This high prevalence may possible be due to the greater numbers of successfully treated patients proceeding to marital life.

DEFECT

In a cleft lip and palate there has been a failure of union of the mesoderm of one or both maxillary and fronto-nasal processes, which normally unite within the 8th week of intrauterine life. Thus the upper jaw is divided into 2 or 3 body-segments which move in response to any force acting on them. There is usually some deficiency of tissue too. After birth, due to the abnormal muscle balancing forces a further widening of the cleft and the displacement of the segments occur.

In the normal palate the growth of the nasal septum distributes forces equally. But the unattached segment in a unilateral cleft, and both posterior segments in a bilateral cleft are pushed apart and displaced asymmetrically. Further the tensor-palati muscle is non functional and the outward pull of the pterygoid muscle is unopposed so that the segments are pulled apart posteriorly. (Figure 1)



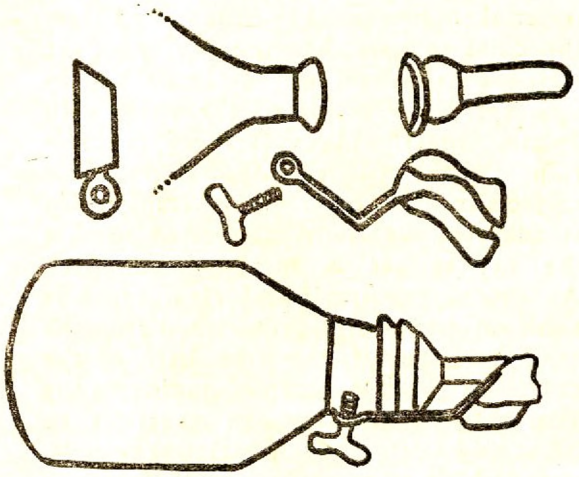
In the bottle fed babies the tongue and the teat move the palate still further apart. The centre line is characteristically displaced to the unaffected side.

Treatment methods

The treatment of the cleft lip and palate may be achieved by surgery or by prosthesis, or by a combination of surgery and prosthesis. The treatment in the infant is aimed at (1) Enabling him to take in adequate nourishment so that he is physically fit for surgery (2) Moving the cleft palate segments into correct alignment, which will facilitate lip and palate surgical repairs. (3) Making his speech acceptable. (4) Obtaining a correct swallowing pattern.

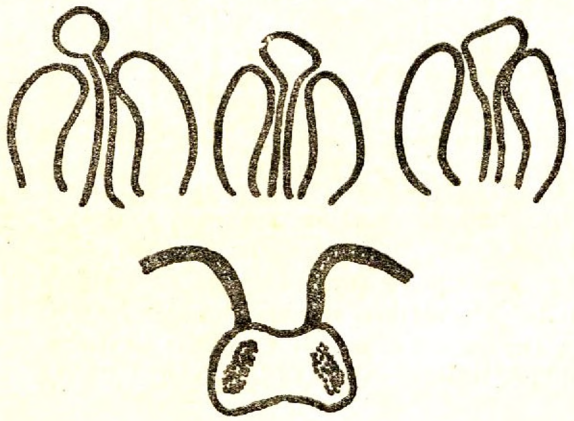
Prosthetic appliances in the new born

In the new born infant, feeding by spoon is slow and tedious. The infant tends to lose a major part of the feed due o his inability to create a negative pressure in the oral cavity. A palatal hood, fitted to the bottle, [7] over the teat prevents the milk from entering the nasopharynx. (Figure 2)



Elastic strapping is employed very early after birth to move an unattached premaxilla into alignment

McNeal[8] described a modified pressure appliance worn on the upper jaw, which will move the cleft segments towards the corrected arch. The principle is that a base plate is made which fits the model where the segments have been corrected in progress ive stages. The pressure on the plate caused by the lower edentulous jaw, moves the segments to the new position in the palate. This procedure is known as presurgical dental orthopaedics. (Figure 3)



These arch correction plates have to be fitted as soon as possible after birth in order to catch the first growth spurt.

Aligning the segments before lip surgery is an advantage because 1. The segments form a firm base for the lip and affords support to the nostrils.

2. It reduces the width of the lip, helping the surgeon to manage with less extensive freeing of tissue from the anterior surface, in order to obtain tension free flaps. With less tension there is less interference in the maxillary growth and less chance of the repair breaking down post - operatively.

3. It also restores continuity of the lip and permits the function of the circumoral muscles.

If presurgical treatment is not undertaken the lip repair could be done 3 months after birth. However, if the lip repair follows presurgical treatment it is usually done about 6 months after birth.

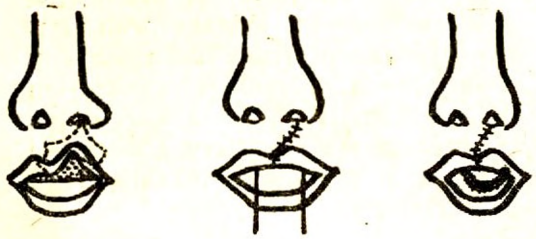
Huddart[3] states that the actual time of operation has got to be a compromise between the child big and strong to stand the surgery, the parents anxiety for hastening the operation for social reasons, and the presence or absence of a displaced premaxillary segment.

The unattached premaxillary segment presents an extremely difficult factor in the rehabilitation programme. In many instances the premaxillary segment is resected altogether at the initial lip closure because of its position. This unfortunately causes the arch to collapse and brings about complications later.

LIP SURGERY

Formerly, the lip repair operation was a simple labioraphy. Mirault advocates this method which is chiefly aimed at rendering bloody the edges before they were sewn together.

The sole technique applied nowadays[5] is one of labioplasty introduced by Veau. The two main principles are mobilisation of the soft tissue even up to the infraorbital foramen, by which tension is avoided, and dissection of the orbicularis muscle in both lip halves after incisions along special lines. The ensuing suturing is done in layers. (Figure 4) A further improvement on



these have been the flap designs of LeMesurier and Millard. The latter's design being very popular because a minimal amount of tissue is discarded. There is also a possiblity of recorrection.

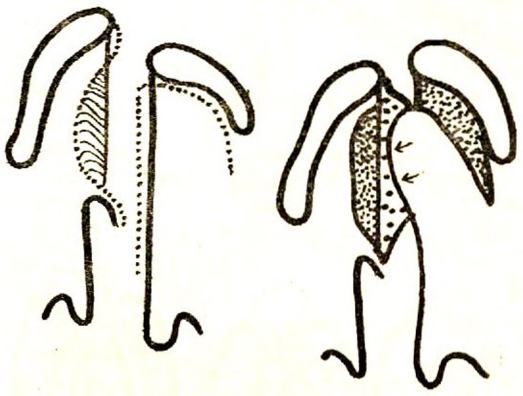
After the closure of the lip, a new set of muscle forces are set up by the completed circumoral muscles, drawing the bony segments together making the subsequent surgical repair of the palate considerably easier for the surgeon.

In 1955 McNeal[9] also described a stim ulation appliance in order to approximate the cleft segments. He explained that the normal growth forces, if intensified in the normal directions, would stimulate the deposition of bone (Figure 5)

In this appliance, the movement of the tongue causes the pressure pads at the edge of the cleft to stimulate. However, as to whether the stimulation causes the apposition of bone at the margins of the cleft has not been proven.

Palate Surgery

The surgery of the palate is usually undertaken between 12-18 months before the child forms a definite nasality of the cleft speech pattern. There are many techniques for the repair of the palate. In Palato-vomero-plasty, a mucoperiosteal flap is detatched from the sloping free surface of the vomer. This flap, which is adherent superiorly is everted so that the raw surface is turned downwards.[5] An oblong mucoperiosteal flap, which is adherent posteriorly is detatched from the lower surface of the free half of the palate to an extent corresponding to the hard palate. This flap can generally be stretched by detatching the palatine vesssels, after which it is shifted medially, with the bloody surface turned upwards. The raw surfaces of the two flaps are joined by means of a few "through going" sutures (Figure 6)



In bilateral cleft cases, there are tech niques and modification, too many to describe. No one procedure for surgical closure is adequate for all types of palatal clefts. The method selected depends largely on the extent of the cleft and the anatomy and physiologic details of the related parts.

Post Surgical Period

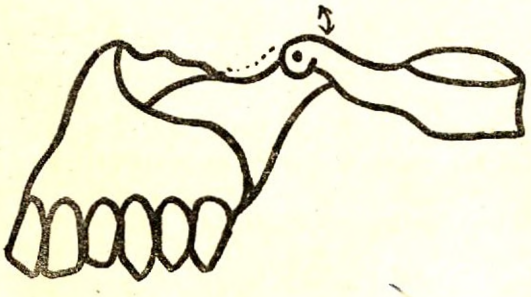
After surgery, till the child is about 5½ years, no further treatment is undertaken except in the nature of prophylaxis, aimed to preserve the dental arch intact as far as possible. Since the teeth are deciduous, no orthodontic treatment is necessary except to achieve the maximum growth potential.

Secondary surgical treatment is underta ken around 5½ years to close any residual fistulae and to elevate the tip of the nose (in bilateral) or relieve the ala of the nose (in unilateral clefts). With the eruption of the permanent dentition orthodontic treatment is instituted with a view to restoring the normal dental arch.

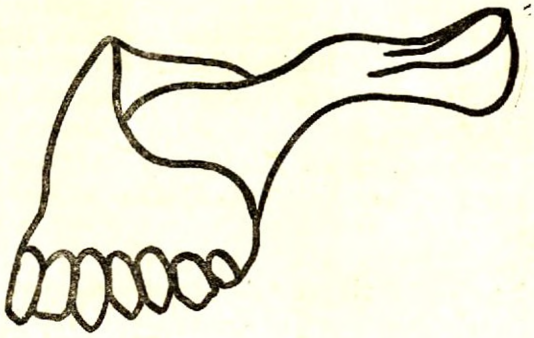
Conservative treatment is necessary for bridging absent teeth or crowning misshapen teeth. Grossman[3] describes a rather revolutionary concept of moving the entire segment very rapidly by means of cap splint appliances, with tubes or expansion device combinations. He states that in this manner the teeth are brought into good alignment by giving broader maxillary arches, which allow tongue space and hence better, speech.

PROSTHETICS

The use of Prosthetics is elective in instances of gross tissue deficiency. A cleft palate obturator consists essentially of a denture part and a velum part. There are two types of obturators[7] (1) Those with a movable velum – (connected to the dent ure part with a hinge) – The velum moves with the soft tissue. (Figure 7) (2) Station



ary velum obturator, in which the velum is rigidly connected to the denture part. The soft tissue close on the lateral and posterior surface of the appliance, in their various movements (Figure 8)



With either of them the patient learns to control the passage of air through the mouth and the nose during various speech sounds.

SPEECH THERAPY

The fitting of a satisfactory obturator does not end the treatment. Velar valving is assessed by examination of saggital roentgenograms and functional tests.

Cleft palate speech is difficult to eradicate. The patient should be given help as early as possible. Speech therapy[6] should be designed to educate the patient in correct speech habits – particularly in the correct pronunciation of the consonants of the plosive class – P,B,T,D,K,G.

REHABILITATION

The cleft palate person, as it might be seen, presents a series of complicated clinical problems, and it requires the coordinated effort of many specialised practitioners.

The patient is handicapped in many ways and a programme of treatment must be planned to contribute to the restoration of the whole person. He is not only a prosthetic problem – Nor is he merely a surgical problem He represents more than that. He is a person who is gravely handicapped and finds personal and social adjustments quite difficult.

A cleft palate child is usually very reticent and shy because of his facial appearance and the unpleasant speech. He would prefer to avoid speech whenever possible. He finds it difficult to compete with normal children.

An understanding teacher can assist him in his social adjustment. A competent teacher can materially improve his speech by helping to practise his newly learnt speech habits.

A cleft lip and palate patient can be rehabilitated to become an asset to society only through the coordinated efforts of specialists in surgery, dentistry, psychology and speech correction, who have had particular training and experience in cleft palate problems.

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A DENTAL EXTRACTION PERFORMED UNDER ACUPUNCTURE

G. S. AMARASEKERA, *F. D. S., R. C. S. (Eng.)*
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The idea of putting acupuncture to test, by utilising it for a dental extraction was first suggested by Dr. Carlo Fonseka of the Faculty of Medicine, Colombo.

The extraction of a tooth is a simple dental operation, but one which involves much pain unless there is complete anaesthesia of the region involved. Hence the selection of an extraction of a tooth to test the efficacy of acupuncture. If acupuncture failed, the administration of a local anaesthetic was a simple procedure which could be done immediately. A tooth in the upper jaw was selected for the same reason, since infiltration anaesthesia works quicker than a mandibular block.

A third year medical student who had his /8 outside the dental arch and which necessitated removal offered himself as the guinea pig. The time of operation was fixed for the afternoon of 16th September, 1972 and the location was the consultant's surgery at the Dental Institute, Colombo.

The acupuncturist was Dr Mrs. Thambirajah, a doctor trained in the Peking University, who had learnt this form of traditional treatment during her medical studies in China.

Instruments Used

The needles used were about six inches in length, pointed at one end, about 1 mm in diameter and brass coloured. Only one of these needles was used.

Preliminary Procedure

Before the patient was taken into the surgery, Dr. Mrs. Thambirajah wanted to speak to him in privacy for about ten minutes.

Surgical Procedure

The patient was seated on the dental chair, and a little Gentian Violet was applied on his left ear lobe. The patient looked quite calm and composed. Dr. Mrs. Thambirajah examined the ear lobe very carefully and pricked it at one point. That she was looking for an exact location was obvious from the attention she paid to the geography of the area. (She informed us later that the ear lobe had to be divided into eight squares of which she had to select the right one.)

The insertion of the needle to the ear lobe did not seem to cause any pain. About half an inch of the pointed end of the needle was inserted at an angle. Dr. Fonseka was requested to note the time of insertion of the needle. From then onwards, Dr. Mrs. Thambirajah continued to turn and twist the needle, but did not insert it beyond the initial depth. We were asked to talk to the patient who was all the while smiling and talking. Since we had to maintain a conversation with the patient, we resorted to "The Thoughts of Mao" which seemed opportune for the occasion.

At the end of fifteen miuutes, Dr. Thambirajah requested that the tooth be extracted. A pair of forceps which is normally used for upper molars was used. The forceps was gently adapted at first but since the patient showed absolutely no signs of pain, pressure was used to determine the degree of anaesthesia. After about two minutes, the tooth was removed, with the patient showing no signs of pain whatsoever.

During the extraction too, the point of the needle was inside the ear lobe of the patient, and it was being manipulated by the acupuncturist. The needle was withdrawn only after the tooth was extracted. The amount of bleeding from the tooth socket was more or less the same as seen after a normal extraction of a tooth. There was a drop of blood on the ear lobe too.

Post-operative Remarks by Patient

The patient on being questioned said that he did not experience any pain, but was quite aware of what was happening all the time. He said that he felt the pressure of the dental forceps and the force of the movements of the forceps during extraction, but did not feel any pain. All of us present during the procedure felt that there was no pain connected with the acupuncture or the surgical procedure.

One fact that we failed to record was the area of anaesthesia covered by the acupuncture. Was it only the upper jaw? Or did it cover the entire side of the face?

We intend following this up with the removal of a lower impacted molar in the near future, under acupuncture. This dental operation, which takes about 15 to 20 minutes and involves the reflection of a flap and drilling of bone, may help us to assess the efficacy of acupuncture as a form of anaesthesia to be used for oral - surgical procedures, and will also give us an insight into this form of anaesthesia which remains an enigma.

FORENSIC ASPECTS OF DENTAL SCIENCE

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The teeth and jaws are elements of the human body which show many particular characteristics in development, morphology and pathology. They reflect many conditions having prevailed for shorter or longer periods throughout life. They are characteristic of the individual and are more indestructible than other body tissues showing very slow post-mortem changes, whereas some of the materials used for restorations and dentures are quite indestructible. Besides, the oral cavity itself appears protective to the external elements. Consequently, these may well represent useful evidence in forensic investigations. Furthermore, the bite-marks left by the teeth in various substances may reveal sufficiently peculiar dental evidence to make it possible to identify the teeth that made them.

Over the years dental surgeons from all over the world have become interested in this fascinating study - the forensic implication of teeth and jaws. Although there is a tendency to associate the process of identification with crime, violence or homicide, it should be appreciated that air and sea disasters, explosions, fire. industrial accidents and nature herself can unleash forces of violence which far exceed those produced by man. Murderers sometimes dismember and mutilate the bodies of victims, including teeth to hinder identification. The bodies may be placed in different chemicals, or destroyed in a fire, so that relatives and friends cannot recognise them. Fires following disasters often leave corpses which are mutilated to a degree previously unknown, thus making identification by ordinary means impossible. Teeth and dental restorations often are the only means available for the identification of victims. This indestructible nature of the tooth is well appreciated in consideration of the fact that the teeth and jaws were the only remains of ancient man found existent after many thous. and years. Thus, in the field of physical anthropoloy, the evidence from teeth and jaws has played a significant part in tracing the evolution of man.

One of the pioneers of dental identification, namely the famous forensic pathologist Professor Keith Simpson said thus- "a subject which in the last few years has come to be of first class importance in crime detection - identification of human remains or an otherwise identified body, usually the victim of a crime, by means of dental data. Dental data has come to provide details of a kind comparable with the infinitesimal detail that was previously thought likely to be present only by finger - prints.

Basic Concepts of Forensic Odontology

Forensic Odontology is that branch of Odontology which, in the interest of justice, deals with the proper handling and examination of dental evidence, and with the proper evaluation and presentation of dental evidence Obviously only a dental surgeon can handle and exami ne dental evidence with any degree of accuracy, so that this field above all is a dental field. where three major divisions can be recognised, namely:— (1) The examination and evaluation of injuries to teeth and jaws (2) The examination of dental remains (whether in fragments or complete, including all types of restorations), and (3) The examination of bite-marks with a view to possible identification or subsequent elimination of a suspect.

Injury To Teeth and Jaws

Over the years, injuries inflicted on victims of criminal assault or of traffic accidents have shown a marked increase in number and severity. A small group may sustain injury during dental trertment - by accident, negligence or even malpractice on the part of the operator. Injury to a person's teeth often result in a legal claim not only for restoration but also for damages. Independently, both the claimant, the person held responsible and the insurance company (if any), may want the professional opinion of an expert with regard to whether an injury has infact been sustained, whether it was caused in the manner alleged, whether it was the

actual extent described, whether it can be and should be restored as proposed and whether the costs claimed are reasonable.

Legal Aspects

The examination of dental remains of unknown persons or bodies with a view to possible identification represent by far the most comprehensive field of activity in forensic dental work. The death of a citizen is officially certified by the issue of a death certificate which obviously must contain social data – name, parents' name, place and date of birth and occupation of the person concerned. The death certficate is the only document which normally will permit the will of the deceased to come into force, as well as permit the legal solution of all problems related to death such as questions of inheritence and succession to property, the collection of insurance policies and pensions, and the right of the spouse to remarry. In case of insurance claims, many examples of imposters have been reported. Their identification has been established thus unmasking the fraud. Several cases are recorded where an attempt has been made to obtain the insurance payment without the person really being dead. In criminal courts, identity of a person charged with crime must be established for it will be of prime importance when the accused pleads in defence of mistaken identity. When murder has been committed, identification of the victim is also essential for it helps the police in their investigations and may indeed be the first step in bringing the criminal to justice. Identity is also necessary in unmasking the fraud of people having criminal reasons to disappear and appear under a false name.

Legally then, the death certificate is a very important document. No death certificate can be issued for a person whose social data is unknown. As only physical features remain in the unknown body, it becomes imperative to establish the social identity of that body in an indirect way. That is by showing that the physical identity of the body is the same as that of a certain missing person whose social data is already known.

Apart from the requirements of the law, people often have a strong personal wish to know the fate of relatives who have been missing for sometime or are likely to have been involved in a disaster with other victims.

Dental identification in based on three asumptions:— (1) That an idea exists as to the possible identity of the victim (2) That dental records affording sufficient data can be obtained and (3) That relatives and friends may have noticed certain peculiarities of the teeth which may provide a clue to the recognition of the individual concerned. But one of the most challenging aspects of identification work is met with when ante – mortem data on a missing person cannot be presented for examination or remain untraced. The dental expert is then faced with the task of interpreting his findings in the unknown body as to race, sex, profession, habits, socio – economic position, previous disease or anything else which may facilitate in indicating who the missing person might be, so that antemortem data can be searched and produced for comparison.

Dental Clues to Identity

Many guiding factors help in the investigation as to the identity of a body. Their studies have been exhaustive. Hence, it is not possible to go into details of each and every aspect of these clues. Nevertheless, because of their varied nature and importance they have been enumerated:— 1. Race 2. Sex 3. Country 4. Occupation 5. Habits 6. Socio-economic position 7. Technique, quality and brand of restoration 8. Age estimation 9. Pulp for blood grouping 10. Radiographs 11. Lip-prints 12. Palato-prints 13. Superimposition of photographs 14. Facial reconstruction 15. Fractured, dislocated teeth and tooth-sockets 16. Saliva.

Identification of Individuals by Dental Means

Identification by comparison (from dental records) as opposed to reconstructive methods is the simplest and most foolproof method in forensic odontology.

The adult human dentition consists of 32 teeth, each one having its own characteristic shape, size and position in the dental arch. If one or more teeth are extracted, the tooth pattern of that individual

is permanently changed. The extraction of one to 32 teeth therefore gives a tremendous range of variations. These variations may be further added to by the fact that some of the remaining teeth may or may not be filled and when it is further realised that each tooth has five surfaces, one or more containing a dental restoration, it becomes obvious that the possibility of finding two identical mouths is rather remote. This then brings dental pattern on to a similar basis as finger-prints and the possibility of two mouths being exactly the same becomes as remote as finding two persons with the same finger-prints.

Any alteration in the dental pattern will be recorded by the Dental Surgeon making the alteration to his patient in the form of an extraction, filling, crown, bridge or a prosthetic appliance. In some cases, dental evidence can be of prime importance and may even be the only evidence or clue which the police may have concerning a particular crime.

The details and variations in the work of identification can best be illustrated by refering to actual cases from literature past and present. Since space does not permit, mention is made only of a few cases of importance in forensic odontology.

One of the earliest cases occured in America in 1850. Webster, Professor of Chemistry in Harward University, was sentenced to death for the murder of his colleague Dr. Parkman and attempting to get rid of the body by burning it in his chemistry laboratory. From the ashes in the furnace were retrieved numerous small pieces of jaw bone, three blocks of artificial teeth and some melted gold. The outstanding features of the dental evidence were the peculiar shape of one half of the jaw bone (after assembly) and the details of the prosthetic appliance which has been made for Dr. Parkman, a short time before his death. Parts of the artificial denture found were sufficient to prove that it had been made to fit the peculiar shape of the jaw and the models in the possession of the dentist. This Parkman case remains an outstanding one in the field of forensic dentistry, superceded in importance from the point of 'dental evidence' only by the case of Haigh in 1950. In this 'Haigh acid-bath' case described by Simpson, the murderer tried to dispose the teeth and jaws or even the whole body by means of strong sulphuric acid. However, the only object which resisted the acid was a pair of acrylic dentures. A London dental surgeon recognised them as dentures made for Mrs. Durand Deacon, the missing woman. Haigh was arrested, charged for murder and convicted, identity being proved on the evidence of artificial dentures alone.

That an identification can be made on a body devoid of teeth was demonstrated by Simpson in1946, In this sack murder' case, the edentulous jaws of a woman contained three roots. A cast of the jaw recorded by the dentist was traced. The denture models were identical with those from the dead woman. Even in crimes where there is no violence, dental evidence may yield important clues. Knott experienced a case where an upper partial denture was found on the floor of a tea-kiosk after a burglary. This kind of evidence may be of considerable importance in helping to locate the person responsible and later at the trial.

In the cases just described, dentures or an edentulous mouth helped in the identification, but it is often possible to establish identity when fillings or fixed restorations are present.

Simpson in 1943, described a dramatic case in which the unknown body was identified by residual dental data and an upper jaw. While demolishing a Baptist church (London), workmen found under a cellar floor, a partly dismembered body which, was thought, had lain for about 12 to 18 months. Lime had been strewn over it, preserving a fracture of the larynx which suggested that death was due to strangulation. Parts of the arm and legs together with the jaw had been removed possibly to avoid identification. The premises were unoccupied, but the war-time watcher, a man named Dobkins, was suspect since, at the time when the body was disposed of, his wife had disappeared after attempting to obtain arrears of maintenance from him. The dental surgeon who had attended on this woman was traced and he produced a chart from his records of the condition of the upper jaw dentition of this patient when last seen. This was then compared with that of the upper jaw found in the cellar.

They were identical in (a) number and position of teeth (b) situation of fillings (c) mark left by the fitting of a denture (d) thickening of the weight-bearing area of the molar sockets and (e) remains of roots recorded as left in the jaw upon extraction. The dental surgeon had no difficulty in identification, and Dobkins was convicted for murder and hanged.

Among British trials, this is the first in which dental evidence played a primary part, so that in the field of forensic dentistry, it might rightly be regarded as a classic case.

A case of murder by burning in which intra-oral findings were helpful in the identification of the victim is reported by Suzuki and Hadano in Augnst, 1969. The charred body of a young female was found on the banks of the Tama river in Japan. Clothes were burnt as was 80% of the skin. The oral cavity was examined. The soft tissues were normal and 31 teeth present. Alginate impressions were made, models cast and restoration findings reported on the models. The extent and pattern of attrition placed her age at approximately 20 years. The quality of restoration workmanship suggested that the victim had been treated by different dentists. A porcelain crown on the upper right incisor, a restoration that does not fall within the regular insurance scheme, led to the identification of the victim.

On July 15th, 1967, a dying woman was found near a cliff foot-path in Torquay. She died before admission to a hospital. A careful search of the scene failed to reveal any information of identity. She had been the victim of a savage attack and her face was battered beyond recognition. Hence visual identification was out of the question. In response to police requests for information, a 20 year old girl, who had graduated from university and had taken a holiday job at a hotel in Torquay, was reported missing. Her dental records were obtained and compared with the data of the deceased and identification affected.

How radiographs helped in the identification of the body of a young adult male discovered at Storrington in September, 1967 is reported by Champs. The body had been reduced to a skeleton since it had lain in the long grass for sometime. The pathologist removed the jaw of the deceased at the time of the post-mortem examination, because there were a number of dental restorations present in the teeth, Age of the victim was assessed from dental data and the police investigated a number of missing persons in the same age group as the victim and obtained the report of a dental surgeon concerning one of the missing person who fitted the description. With the report, there were a number of radiographs and attention was drawn to the lower wisdom tooth regions on both sides of the jaw Radiographs were taken of these regions of the lower jaw of the deceased at approximately the same angle. On comparison of the two sets of radiographs, it was possible to establish the similarity of the features of the jaw of the decea sed with those of the record of treatment supplied by the dental surgeon. The victim was positively identified by these results.

In the Mearns murder case described by Ruddiman and his associates in May, 1968, proof of murder was established by an entry bullet wound visible in the right occipital region and proof of identification was established by systematically comparing the dental record of the jaw.

(To be continued)

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FLUORIDATION

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What is Fluoride?

Fluorine – symbol F with atomic weight 19 is a chemical, gasseous element of the halogen group. Owing to its extreme activity, being one of the most chemically active subs tances known, fluorine is never found free in nature.

Flourine does not occur in ionic form. Flouride occurs in ionic form with a negative charge. This difference is important. Flourine cannot be kept in glass. It is a reactive element because in the outer shell of electrons in the structure, it falls short by one, (where it should have eight, it has only seven). The strong affinity for the electron makes it reactive, when completed the fluorine becomes fluoride. This difference is of significance. Fluoride is found widely in nature, in soil, plants and sea water. No plant or animal can form without coping with the fluoride ion. Every form can cope with the fluoride ion provided the concentration is not high.

The occurrence of fluoride in the human body, in the bones, teeth and soft tissues was noted by Gay Lussac about one hundred and fifty years ago, but the fluoride content of the teeth was first investigated by Ehrhardt, a German scientist, in 1847. Later in 1892 Sir James Crichton Browne, in an address to the British Dental Association, stressed the importance of a fluoride supply during the development of the teeth and the consequence of its deficiency in the production of inferior enamel. Further significant observations were made in 1907, when the aetiology of mottled enamel, prevalent in certain areas of the United States, invited the attention of two American dentists, G. V. Black and F. S Mc Kay A brilliant programme of epidemiologic studies was carried out in 1916 which led to the demonstration of caries inhibiting properties of fluoridated water.

It began with the observation of a peculiar condition of the dental enamel. Fredrick S. McKay investigated this and found it highly prevalent in Colarado Springs and the surrounding area. It was observed in long term residents who had been born there or come there at an early age.

The aetiology then was some thing in the environment which was active during the formation of teeth. This mottling was also observed in many other communities and was known as Colarado Brown Stain. Within any community the persons affected had almost invariably been users of the same water supply No other experience nor way of life was showed by these communities. The conclusion thus was inescapable and the agent responsible for mottling was some common constituent of the community water supply and this was the only explanation consistent with facts.

McKay had advised a family in Oakely with external mottling to obtain their water supply from a private spring and he observed that they became free of mottling This observation led him to advise all the people of Oakely to abandon their old water supply and tap a spring from a new source This revealed that the children born in Oakely subsequent to a change in water supply were free from mottling.

McKay sent several samples of suspected water for analysis to a chemist H. V. Churchill who was applying new methods of spectrographic analysis. He identified fluoride in each of them ranging upto 14 p p.m.

The results of their research led to confirmatory observations from all over the world that mottling was associated with high amounts of fluoride in the water supply. From about 1930 American observers became aware, that not only was mottling proportional to the fluoride content of drinking water, but also that the incidence of caries was reduced in a district where mottled enamel occurred. Since both phenomena were related to and associated with fluoride, H. T Dean of the United States Public Health Service initiated a number of field surveys in regions, where it was found that the caries incidence was some 50 - 60 per cent less, the fluoride content of water was approximately 1 p p m. and that the teeth were without perceptible mottling. The optimal content of 1 p. p. m. first determined empirically was assessed on a

a scientific basis in respect of the quantitative relationship existing between the degree of mottling and the amount of natural fluoride in the communal water supply.

Experimental adjustment of the fluoride content of drinking water has been done to prove that fluoride is the operative factor in the reduction of caries. It was added to drinking water of communities who had consumed water containing little or no fluoride.

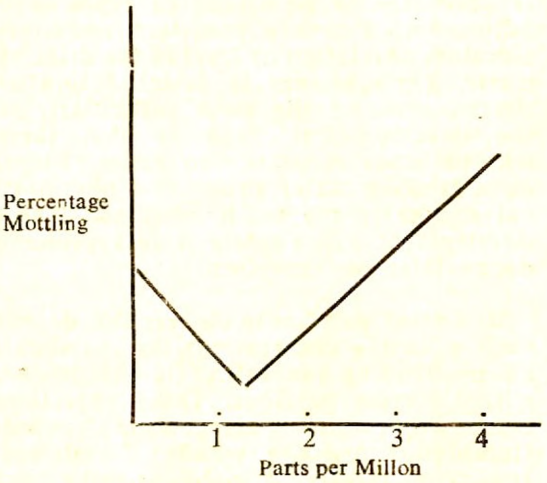
In 1945 studies were done in two cities in the United States of America, Grand Rapides and Newburgh; and one in Canada at Brantford, Ontario. All the communities had drinking water containing not more than 0. 1 p. p. m. of fluoride. Base line studies were carried out to determine the prefluoridation prevalence of caries in different age groups in those cities and also in comparable central cities. Fluoride was then added to the water in three study areas to bring the concentration upto 1 p. p. m. The results of seven years was summarised by Dean in 1954. The data revealed 60% reduction in dental caries prevalence in the six and seven year old children, slightly less reduction in caries in the ten and eleven year old children, but never theless a benefit in comparison to prefluorid ation prevalence. In this study Kingston was used as a control and in Kingston there was a high rate of caries which after seven years was double that of Newburgh Grand Rapides and Brantford revealed reduction in caries similar to Newburgh. Grand Rapides was compared to Aurora where the water had a natural fluoride content of 1. 2 p p. m. and these two places were similar on comparison.

The most recent studies in Grand Rapides has been by Arnold in 1962 and concerned with fifteen years of fluoridation studies. The observations made were that children between 12 - 14 years showed a reduction in caries by 50 - 60% and between 15 - 14 years, by 48–50%. No undesirable cosmetic effects due to mottling were observed.

In the United Kingdom three areas were studied namely, Anglesey, Watford and Kilmarnock where the drinking water had a low concentration of fluoride. Part of Anglesey; Sutton and Ayr were used as controls. Following baseline examination the fluoride content of water in study areas were adjusted to 1 p.p.m. The results revealed dramatic reduction in caries prevalence in deciduous teeth of children upto five years. Protection afforded to six and seven years was less because their deciduous teeth were not adequately exposed to fluoride concentration during the formative period.

How affective is Fluoride?

The fluoride content in water causes mottling of the teeth. The question is when does this mottling become unacceptable?



Several workers had done investigations on this optimum concentration. The findings revealed that the mottling dropped as the concentration approached 1 p. p. m. (parts per million) and then increased steadily and continuously. Fluoridation could be considered safe upto 2 p. p. m. Even at 2 p.p.m. 10% detectable mottling occurred and this was dependent on expert examination.

An advance in preventive dentistry is thus the discovery and recognition that communities of people born and bred in areas where drinking water contains 1 p p.m. of fluoride have reduced dental caries compared to similar communities consuming drinking water which is free or virtually free of fluoride.

Suitable adjustment of the fluoride content of water is now available as a public health measure which will reduce dental caries to manageable proportions.

Fluoridation will never abolish caries but will ensure at least 50% reduction of caries in the young and produce benefits for adult life. Thus it has been established beyond any measure of doubt that the consumption of water with 1 p. p. m. fluorides reduced the incidence of caries to half that compared to those consuming fluoride-free water. The benefits of fluoridation will be in adult life to those consuming fluoridated water during the formative period of the teeth.

Fluoridation thus means that a substance is advocated to be placed or replaced or adjusted to a certain predetermined concentration or dilution or level in the drinking water. The substance is designed to alter the structure of the teeth particularly in the developmental stage so that there will be more resistance to caries. Fluori de in drinking water produces a physiologi cal change in the tooth substance during development and renders it less prone to decay later on erruption.

It is most peculiar to observe that despite such scientific observations that so simple an unoffending ion as the fluoride ion has stirred human passions. These objections come from those antagonistic towards fluoridation and are without foundation. It is due largely to public apathy and resigned acceptance of dental dicease.

Widespread confidence in the safety and efficacy of water fluoridation as a prophylactic measure in the control of caries is reflected in the resolution of the 22nd World Health Assembly (Boston 1969).

The recomendation was the introduction, by a number of states, of fluorides to the community water supplies in areas where the total fluoride intake by the population was below optimal levels (below 1 p. p m.) for protection against dental caries.

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FLUORIDES AND DENTAL HEALTH

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Fluorine, 17th in the order of abundance of elemen s in the earth's crust, is the most electro-negative of all chemical elements. It is so violently reactive that it rarely or never occurs in nature as elemental fluorine, but as a fluoride. It is found in combination with calcium as fluorspar, with calcium and phosphorous as fluorapatite, & with sodium and aluminium as cryolite. It also occurs in sea-water, in the endemic regions in soils and rocks, in many foods as a trace element and in most supplies of drinking water where the concentration varies from a trace to 14 or more parts per million in some parts of the world.

Fluorine Content of some Foodstuffs

Food	Fluorine content (ppm) fresh weight
Tea, average of 10 samples	97.0
Tea	3.2 - 178 8
Mackeral canned	12.10
Sardines ,,	7.3
Salmon ,,	4.5
Beef	2 0
Spinach*	1.8
Cheese	1.62
Coffee	0.2 - 1.6
Butter	1 5
Egg white	1.5
Chicken	1.4
Egg whole	1.2
Honey	1 0
Cocoa	0.5 - 1.0
Milk	0.5 - 1 0
Radish	0 8
Cabbage without leaves	0.8
Rice*	0 67
Egg yolk	0 6
Onion*	0 6
Glucose	0 5
Chocolate plain	0 5
Rhubarb	0.4
Carrots	0.4
Grape fruit edible portion	0.36
Orange edible portion	0 34
Sugar	0.32
Tomatoes*	0.24
Wine port	0 24
Banana	0.23
Potatoes*	0.2
Beer	0.2
Cucumber	0 2
Pork	< 0.2
Sweet Potatoe	< 0.2
Mutton	< 0 2
Pear	0.19
Mango	0.18
Papaw	0.15
Beans green	0.15
Cabbage*	0.13
Beans light green	0.11
Water melon	0.11
Pumpkin	0.10
Coconut fresh	0.00.

* Unspecified.

That bones and teeth have always contained fluoride is proved by the fact that anthropologists can use a technique of fluoride estimation for determining the age of fossils many thousand years old.

Fluoride absorption is passive in nature. the mechanism being one of simple diffusion, The rapidity of absorption, appearance in blood and distribution in the body leads to the conclusion that no active transport mechanism is involved in the process. Besides absorption from the entire gastro-intestinal tract, absorption through the skin and lungs may take place where hydrogen-fluoride is being handled. Soluble fluorides are rapidly and nearly completely absorbed from the gastro-intestinal tract, while the absorption from less soluble fluoride compounds is incomplete, depending on solubility, physical properties of crystals, particle size, mode of intake etc. The absorption of soluble fluorides in drinking water, regardless of the amount of fluoride in the water supply is nearly complete. Since all beverages naturally contain fluoride-ions derived from the water used in their preparation, it is to be expected that fluoride absorption is as complete from them as from

plain water. Absorption of fluoride from milk is slower than that from water, but the ultimate percentage absorbed is nearly the same from both sources. (Cremer et al 1970)

Tea is a very rich natural source of fluoride, the content ranging from 3.2 to 178.8 ppm on a fresh weight basis, and the average concentration of generally used tea being around 100 ppm. It has been demonstrated that fluoride in tea is somewhat less available than that in water. (Muhler 1970)

Solubility of the inorganic fluoride and the calcium content of the diet determine the absorption of fluoride from the diet. About 80% of the fluoride normally present in the human diet is absorbed. If calcium or aluminium compounds are added, the fluoride being bound in a less soluble form, absorption is markedly reduced to about 50% and faecal excretion increased.

The principal means of fluoride excretion is through urine. It is also excreted in faeces, sweat and deposited in the skin which is shed. Traces of fluoride occur in human milk, saliva, hair and presumably in tears. (Hodge et al 1970)

Flourides are present in body - fluids and tissues and large amounts occur in calcified tissues. Blood plasma is the most convenient and reliable indicator of the concentration of fluoride in body-fluids and the mean plasma fluoride of normal human beings is in the range 0.14-0.19ppm. The rise in plasma - fluoride level following ingestion of fluoride in food and water is temporary and is limited in degree. The fluoride content of calcified tissues usually stands in the following descending order - cementum, bone, dentine and enamel. (Armstrong et al 1970)

The age of the subject and the amount of fluoride taken in food and water are the chief factors that influence the concentration of fluoride in dental tissues. After the age of about 30, the uptake of fluoride by enamel ceases. The concentration of fluoride in permanent teeth is consistently more than in deciduous teeth, formed under the same conditions. During the pre-eruptive stage of the first deciduous tooth, the effect of fluoride is purely systemic. After the development and calcification of the permanent teeth, the effect is on the surface, and during the intervening period, from about six months to about twelve years, the effect is both systemic and surface in nature.

The distribution of fluoride within the tooth is not uniform. The fluoride levels in the outer layers of enamel are 5 to 10 times higher than in the inner layers. This probably is due to the enamel surfaces of the teeth continuing to acquire fluoride from the oral fluids after eruption. In dentine, the highest fluoride content is found towards the pulpal surface, decreasing in amount as the enamel is approached. This too is due to the continued acquisition of fluoride by the mineral of this tissue. Secondary dentine, which forms slowly throughout life and has prolonged contact with tissue fluid of the pulp has a higher concentration of fluoride than the more rapidly formed primary dentine. With age, there is a rise in the fluoride concentration in dentine, which is due to a rise in fluoride concentration in primary dentine and the increase with age of the proportion of secondary dentine in the tooth. (Jenkins 1970)

For many years, a properly balanced diet, including vitamins minerals and the correct proportion of protein, has been recommended as a sure means of preventing dental decay. However, although balanced diets are certainly beneficial for oral health as well as for general health, studies have shown repeatedly that there seems to be no direct correlation between dietary deficiencies and dental caries. On the other hand, it has been found that in some parts of the world, that the lowest incedence of caries occurs in very poorly nourished communities. A classic example of this is found in India, where nutritional deficiences are very common, and in addition, a very high percentage of the poorly balanced diet comes in the form of carbohydrates. Yet, one of the lowest caries rates in the world is found in India. In attempting to explain this seeming paradox, investigators found that the under-nourishment, the low number of calories, was caused by the people eating less frequently, resulting in the 'acid' level in the dental plaque being too low to enable bacteria to attack the dental tissues for a greater number of hours of the day; that people, specially in the lower income groups, have little opportunity to eat refined sugar

and sweets made from it; and that there was a relatively high fluoride content, derived from food sources, in most Indians' teeth.

Research on the effects of fluorides on dental health and general health has been carried out for nearly half a century. and is still continuing. Scientific literature contains more than 9000 references on the safety and efficacy of fluoridation. Flouridation is the carefully controlled addition of minute amounts of fluoride to community water supplies in order to reduce dental decay, the addition being a supplement to the fluoride naturally present in most drinking water, calculated to raise the fluoride content to the level of one part in a million parts of water. In smaller concentrations, the decay rate is proportionately higher, and in greater concetrations, mottling of enamel occurs. The remarkable ability of fluorides to reduce the incedence of dental decay has not been completely understood. Perhaps in the near future, fresh modes of action of fluorides will be discovered. At the present time. the theories that have attracted the most attention are:- i. that fluorides reduce the solubility of enamel in acid. ii. that fluoride acts as an inhibitor of the bacterial enzymes responsible for produciug the acid which is believed to attack the enamel. iii. that fluorides affect the protein matrix of the enamel. But the safety of consuming water containing one ppm of fluoride has been thoroughly investigated and the evidence attesting to the safety of fluoridation is overwhelming Further, there is no scientific evidence that fluoride at the level of one ppm, consumed continuously over a long period of time, has any deleterious effect on the general health of children or adults.

Ireland in 1960 became the first nation to make fluoridation compulsory. Hong Kong is served by fluoridated water. More than a third of Canada's population, approximately 4. 8 million persons and 82 million Americans drink fluoridated water. They live in communities where public water supplies either contain natural amounts of fluoride or mechanically added amounts of this decay preventive. In England, the government supports fluoridation to the extent of reimbursing local authorities for legal costs which might be incurred in legal proceedings over implementation of fluoridation. Over half the population af New Zealand, about one fourth the population of Australia, and in Holland over a quarter of the population drink fluoridated water.

According to expert opinion and thorough investigations, the most effective method of administering the necessary amount of fluoride is the fluoridation of water supplies, which involves no effort on the part of parents or guardians and the teeth of all children benefit. This process is no more complicated than waterpurification. and is not as hazardous to the operating personnel as chlorination Investigations in many fields have proved that fluoridated water has no adverse effect on industrial processes and causes no extra corrosion or damage to water pipes. The only limitation in this procedure is that this method could be utilized only in areas served by pipe-borne water.

Where fluoridation of water supplies is impractical or even impossible, other methods of applying fluoride have been tried with varying degrees of success.

1. Topical Applications

Studies undertaken to evaluate the effect of various methods of topical application of fluorides have proved a significant reduction in the incedence of caries. Although less effective than fluoridation of water, benefits are immediate. However, if this method of treatment is to be effective, it demands great attention to detail, and is so time consuming that purely from an economic point of view, it is often less expensive to fill cavities than to prevent them by topical applications of fluoride.

2. Fluoride Lozenges

Successful trials have been conducted with chewable fluoride containing lozenges. From this method could be expected the combined advantages of systemic administration for unerupted teeth with the immediate benefit of direct topical application for the erupted teeth.

3. Fluoride Gels

The application of fluoride gels by means of specially prepared maxillary and mandibular trays has been tried. Though

a remarkable caries reduction of 75-80% has been claimed with daily treatment, this method is more impracticable than more simple methods.

4 Fluoride Prophylactic Pastes

The use of prophylactic pastes containing fluoride for the polishing of teeth and restorations has been advocated, but a mature judgement of their effectiveness cannot be formed due to lack of clinical evidence.

5 Fluoride Dentrifices

The incorporation of fluorides into dentrifices is another logical and practical approach. While the benefits derived from topical applications on a few occasions would be limited, the frequency of the use of dentrifices would be expected to enhance the benefits. For normal use, a 0.1% concentration of fluoride in dentrifices is considered safe to avoid toxic hazards.

The abrasives and other constituents of the dentrifice must be compatible with fluoride. This could be effected by utilizing abrasives such as insoluble sodium metaphosphate, calcium pyrophosphate or acrylic particles. It is to be expected that the greatest success in caries reduction is achieved on the readily accessible labial and lingual surfaces and less on proximal surfaces and still less on pits and fissures. While there is still no conclusive evidence to prove the efficiency of one therapeutic compound, results with monofluorophosphate and amine fluorine compounds are encouraging and consistent, while stannous fluoride causes a slight brown staining of the teeth.

6. Fluoride Mouthwashes

Rinsing is a practical method of fluoride therapy. The solution should be expectorated after use. Therefore this method is unsuitable for very small children. It has been shown that daily rinsing of the mouth with a dilute solution of fluoride was more effective than occasional rinsing with more concentrated solutions.

Factors affecting metabolism, such as interfering ions which are present in dentrifices and vitamin-mineral supplements are not normally found in mouth-washes. Therefore it could be assumed that any fluoride swallowed after the administration by mouth wash, is probably absorbed rapidly and metabolised. Additional studies are required to determine the metabolic fate of fluoride provided in a mouth-wash.

7. Fluorides in Salt

Since domestic salt is used in all households, it has been advocated as an alternative vehicle for fluoride in the same manner it has been used already for ensuring an adequate intake of Iodine in areas deficient in this element. But the value of fluoridated salt has been questioned because of the low intake of salt during the first years of life.

8. Fluorides in Milk

The benefits of adding fluorides to milk appear to be similar to those arising from salt fluoridation. Owing to the large number of distribution centres for milk, this method is likely to be more expensive and less easy to implement than fluoridation of water or salt. The addition of fluorides to milk has the disadvantage that the supplementary intake of fluoride will markedly decrease in the course of the first ten years of life.

9. Fluorides in Arificial Fertiliser

The use of artificial fertiliser in the production of vegetable and animal foodstuffs could contribute to an increase in fluoride intake But on economic grounds, fluoridation by way of fertiliser is quite out of the question.

10. Fluoride Tablets

Of all the alternative methods of adding fluoride to the diet of those using water with less than one ppm of fluoride, the daily consumption of a fluoride tablet has received the most serious consideration and study. To obtain cariostatic benefits comparable to those seen in children who have used a community water supply containing one ppm fluoride from birth, tablets containing one mg of fluoride should be prescribed daily, preferably after meals. Practice with infants varies, many authorities recommending a daily dose of 0.5 mg, in general, the ultimate systemic benefits of continued ingestion are similar to those produced by

fluoridated water over the same period. Where ever fluoridation of water is not possible or acceptable or the water supply itself is not suitable for its implementation, out of all the alternate methods, the daily administration fluoride tablets seems to be the most successful. But the use of tablets requires close co-operation between dental personnel, parents, school teachers and physicians.

II. Fluoride Vitamin Supplements

While persons ingesting fluoride tablets tend to lose interest in this form of therapy after some time it has been suggested that interest is maintained by patients when supplemental fluoride is provided in a vitamin-fluoride preparation Commercially available preparations frequently contain vitamins A, C, and D and a few contain some members of the vitamin B complex too.

Thus it is clear that the possibilities of fluoridation are many and varied. Since unchecked simultaneous fluoridation by different methods could give rise to over dosage, strict co-ordination is essential.

Dental caries is by far the most widespread of all diseases. It is a disease that shows an alarmingly increasing rate, specially in the developing countries and against which the curative resources are inadequate even in the most developed countries. Adjusting the fluoride content of drinking water is the simplest, surest and cheapest way of assuring the proper amount of fluoride for maximum dental caries protection to every member of the community.

There are many questions yet to be answered. The final answers to questions on the action of fluorides, their best concentrations in topical applications, the proper doses to be administered in tablets, the best means of utilising the various methods available for fluoridation etc remain to be discovered. But the ability of fluorides in very low concentrations to cause a remarkable reduction of caries, the beneficial effects on tooth form and appearance, on eruption time and alignment in the dental arches and on the frequency and severity of periodontal disease have been established. In fact, fluoridation remains one of the best supported public health measures in history.

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ANALYSIS OF FLUORINE CONTENT OF SOME WATER SUPPLIES IN CEYLON

Place & Source	Fluorine content P.P.M.
Talatuoya Hosp: Water Supply	0.14
Kadugannawa – Well	0,08
Teldeniya Hosp: Stand Pipe	0 06
Heenagama – Well	0 09
Nawalapitiya Hosp. – Tap	< 0.1
Wattegama — Spring	0.09
Galagedera – Tank	0.2
Dambulla R. House – Deep Well	0.13
Matale Hosp. – Spring	0 09
Pollonnaruwa Hosp – Tap	0 34
Rattota – Well	0 03
Eheliyagoda Hosp Well	0.1
Marapana – Well	< 0 1
Welimaluwa Well	,, 0.1
Dalugedera Bridge – Kalu Ganga	,, 0 1
Ratnapura – Well	,, 0 1
Mahadeniya – Well	,, 0 1
Balangoda – Well	,, 0 1
Kirindiwela – Walawe	,, 0.1
Balangoda – Well	,, 0.1
Kolonne Korale – Well S.M S.	,, 0 1
Beliatte T. C. – Well	0-3
Tangalle – Well	0.2
Deniyaya – Tank	< 0.1
Ketanwila Bazaar – Well	0.1
Kekanadura – Well	< 0.1
Walagama Bazaar – Well	0.3
Akuressa Bazaar – Well	0 1
Kamburugamuwa – Well	0-3
Hanbantota – Reservoir	0.1
Weligama U.C. – Well	0 1
Mawarala R. Hospital – Well	0.1
Matugama – Well	< 6.1
Sarikkamulla – Well	,, 0 1
Kuda-Aruggoda – Well	,, 0.1
Beruwella U.C. – Well	0.1
Alutgama T.C. Market – Well	0.55
S.H.S. Office, Kalutara – Well	< 0.1
Boralugoda – Well	,, 0 1
Horana U.C. – Well	,, 0.1
Morontuduwa – Well	,, 0 1
Egaloya – Well	0.1
Agalawatte – Well	< 0.1
Batepola Well	,, 0.1
Morathibe – Well	0 40
Kidapola – Well	0.15
Polgahawela – Well	0.20
Polgahawela – Well	0.40
Conawa C.D. Well	0.20
P.U. Premises, Hettipala – Well	0.85
Pannala Public Well	0 45
Hiripitiya V. C. Office, K'gala	1.1
Public Market Well (Maho)	3 05

Place & Sauce	Fluorine content P.P.M.
Attaragalle Colony, Ambanpola	1 35
Vyravapuliyan Kulan Rd. – Well	1.65
M. H. Mankulam – Private Well	0.55
Mullaithivu Hospital – Well	0 20
Puthkuliyirippu – P.U. Well	0.15
Thodakkodu – Public Well	0 15
R. C. Church, Adampan – Well	0.50
Chinaikudiruppu – Public Well	0 10
Chilaw – Deduru Oya Sample No. 1	0.15
Marawila Hospital – Public Well	< 0.1
Chilaw – Deduru Oya Sample No. 2	0.10
Nattandiya – Private Well	0.10
Kopay Hospital Well	0,2
Grand Bazaar – Well	0.3
Tellipallai – Private Well	0,3
Pandathiruppu R. H. – Well	< 0.1
G. H., Kilinochchi – Well	0.1
Delft – Private Well	0.1
Koddamunai – Well	0.1
Valaichenai Mosque – Well	0.1
Koddamunai – Public Well	0-3
Tirukovil – Well	< 0.1
Kalmunai – Well	,, 0.1
Amparai – Tap	,, 0.15
Elpitiya – Tap	,, 0.1
M. H. Pitigala * Public Well	,, 0.1
Baddegama – P. U.	,, 0.1
Bentota Private Well	,, 0.1
Maha-Induruwa – Well	,, 0.1
Ambalangoda – Public Well	,, 0.1
Hikkaduwa – Well	,, 0,1
Unawatune – Well	,, 0 1
Hiniduma C. H. – Stream	,, 0.1
Udugama Hosp. – Well	,, 0.1
Kodageda – Well	,, 0.1
Galle M. C. – Tap	,, 0.1
Obeysekara Town – Tank	,, 0.1
Homagama – Well	,, 0.1
Yakkala – Well	,, 0.1
C. D. Padukka – Well	,, 0.1
Wellampitiya – Well	,, 0.1
Dehiwala – Well	,, 0.1
Dunagala – Well	,, 0.1
Ketakalapitiya – Well	,, 0.1
Mirigama – Well	,, 0.1
Ja-ela – Well	,, 0.1
Moratuwa – Well	,, 0.1
Negombo – Well	,, 0.1
Anuradhapura – Well	,, 0.15
– do – – Well	,, 0.35
Kahatagasdigiliya – Well	,, 0.9
Anuradhapura Hosp. – Well	,, 0.1

(Dept. of Health, 1958)

CEYLON DENTAL ASSOCIATION

FORTIETH ANNIVERSARY CELEBRATIONS

6th December, 1972	—	Exhibition on 'Dental Health' at the Dental Institute, Colombo, declared open by the Minister of Health, Mr. W. P. G. Ariyadasa. A large gathering of invitees was present.
7th to 9th December, 1972	—	Exhibition open to the public.
6th December, 1972	—	Newspaper Supplements on 'Dental Health' in the 'Daily News' 'Sun', 'Dinamina', 'Dawasa', and 'Thinakaran'.
6th & 8th December, 1972	—	Radio Talks, Panel Discussions on 'Dental Health' in Sinhala, Tamil & English.
10th December, 1972	—	Seminar on 'Dental Health' at the Auditorium of the C.I.S.I.R., Colombo, inaugurated by His Excellency William Gopallawa Esqr., President of the Republic of Sri Lanka.
10th December, 1972	—	Lunch at the Ceylinco Hotel.

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COMMITTEES

Exhibition

M. M. Mukthar, (Chairman), A. R. Abeyasinghe, L. Tilakaratne, L. S. W. Dassanayake, S. Goonesinghe, V. S. Karunagaran, A. Nagendren, S. Sivasubramaniam, K. H. T. de Silva, Gunadasa Amarasekara and Neil Gunawardhana.

Newspaper Supplements

A. Ranjan Abeyasinghe (Chairman), Gunadasa Amarasekara, L. S. W. Dassanayake, A. Nagendren, H. G. Perera, V. S. Karunagaran, M. M. Mukthar, K. H. T. de Silva, S. Sivasubramaniam, & Neil Gunawardhana.

Radio Programmes

A. Ranjan Abeyasinghe, (Chairman), Gunadasa Amarasekara, V. S. Karunagaran, S. Sivasubramaniam, & Neil Gunawardhana.

Seminar

L. S. W. Dassanayake, Siromani Abeyratne, A. Ranjan Abeyasinghe & Neil Gunawardhana.

Lunch

C. Narendren & S. Balakrishnan.

Souvenir

S. P. Gratien & S. Surendren.

Seminar Programme

8.45 a.m. to 9.00 a.m. — Arrival of Invitees.

9.05 a.m. — **Arrival of His Excellency, William Gopallawa Esq. President of the Republic of Sri Lanka.**

9.05 a.m. to 9.10 a.m. — **Presenting the Members of the Council to His Excellency.**

9.10 a.m. — **Lighting the coconut-oil lamp by His Excellency.**

9.15 a.m. to 9.20 a.m. — **Welcome Speech by the President of the Ceylon Dental Association.**

9.21 a.m. to 9.30 a.m. — Inaugural Address by His Excellency.

9.31 a.m. to 10.50 a.m — **Seminar on "Dental Health"**

1. **Introduction**
   Professor S. B. Dissanayake,
   Head of the Dept. of Dental Surgery,
   Faculty of Medicine,
   University of Sri Lanka,
   Peradeniya.

2. **Administrative Aspect**
   Dr. Somadasa Weeratunge,
   Secretary, Ministry of Health.

3. **Educational Aspect**
   Professor S. R. Kottegoda,
   Dean, Faculty of Medicine,
   University of Sri Lanka,
   Colombo.

4. **Curative Aspect and Hospital Service**
   Dr. Gunadasa Amarasekera,
   Surgeon-in-Charge,
   Dental Institute,
   Colombo.

5. **Preventive Aspect and School Dental Service**
   Dr. Neil Gunawardhana,
   Dental Surgeon,
   Dental Nurses' Training School,
   Maharagama.

10.51 a.m. to 10.55 a.m. — **Vote of Thanks.**

National Anthem.

11.00 a.m. — **Adjournment.**

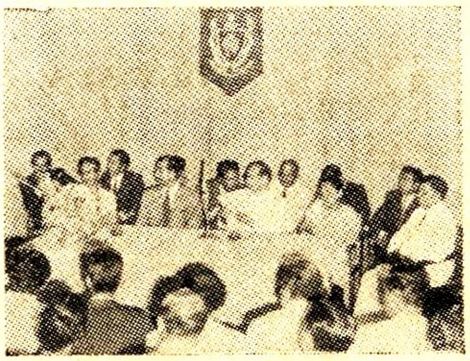
111, Kynsey Road,
Colombo 8.

Hony. Secretary
Ceylon Dental Association.

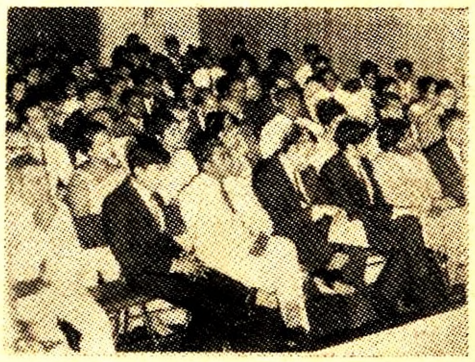
The arrival of the President of the Republic of Sri Lanka, Mr. William Gopallawa and the Deputy Minister of Health, Mrs Siva Obeysekara

The president of the Republic of Sri Lanka being greeted by the members of the Council, Ceylon Dental Association.

The President of the Republic of Sri Lanka declares open the Seminar on Dental Health by lighting the traditional coconut oil-lamp.



The Seminar in Progress.



Members of the profession and distinguished guests.

Mr. W. P. G. Ariyadasa, Minister of Health declaring open the Exhibition on "Dental Health" by lighting the traditional coconut oil lamp.

The Minister being conducted through the exhibition.

Dr. A. Ranjan Abeyasinghe, Vice President Ceylon Dental Association, proposing the vote of thanks.

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