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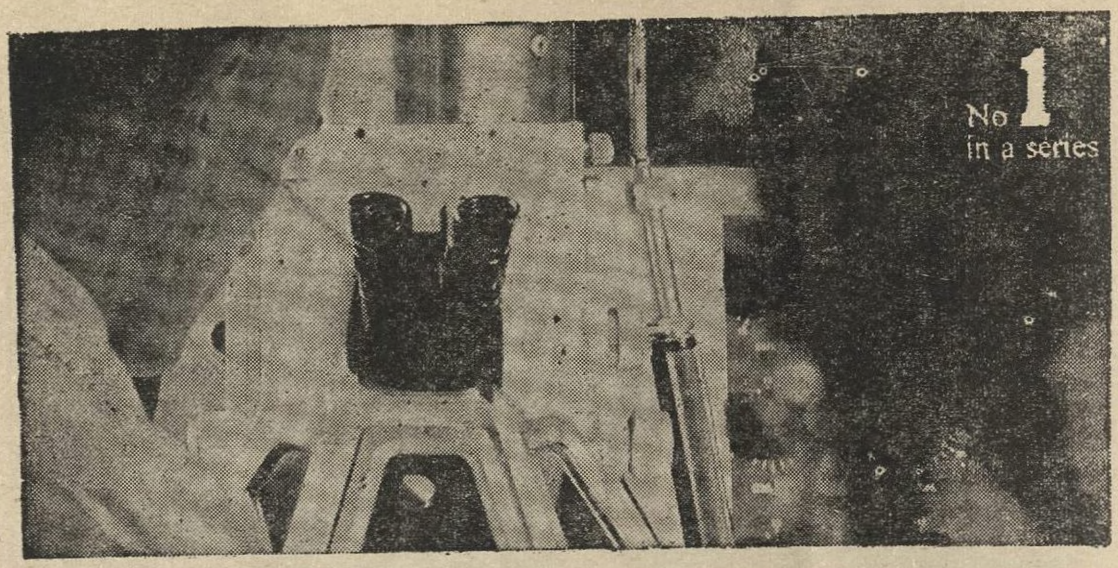

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CEYLON
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VOLUME 4

DENTISTRY OR STOMATOLOGY?

The most significant activity that the University Dental School has engaged in during the last two years is perhaps the effort to reconsider the conceptual basis of the field of Dentistry and to reformulate objectives of teaching and plan curricula in terms of new concepts.

Tacit assumptions accepted unthinkingly merely because they have come down the years with tradition are legion. The term 'Dental Surgery' for instance as a generic title for the whole field would suggest that Dentistry is characterized by Surgery. We know however that Oral Surgery is but a speciality within the general field. Yet the qualifying degree of the University is titled a degree in 'Dental Surgery' and the Dentists' Act stipulates that a qualified Dentist may use the title 'Dental Surgeon' or 'Surgeon Dentist'.

To what extent has this tacit assumption that Dentistry is Surgery influenced the practice of Dentistry to be dominated by extraction of teeth in this country?

Again the term 'filling' is established in common parlance both by the layman, which is excusable and by the profession, which is not. The operation involved cannot even remotely be described as a 'filling' implying an act of drilling a hole in the tooth and filling it up. We know that the operation is one concerned with reconstruction of the anatomy of the tooth and the re-establishment of its occlusal relationships.

Has the tacit acceptance that 'extraction is Cure' and 'filling' Prevention derived from these misconceptions?

Extraction of a tooth except in special circumstances, would imply failure rather than success of dental treatment, and restoration of a tooth is only incidentally concerned with treatment for dental caries.

Persistance of archaic termihology has undoubtedly influenced the trends of devolopment unfavourably and sidetracted the field into various blind alleys and cul de sacs.

For that matter even the term Dentistry could usefully be reconsidered, for it narrows the field down to the tooth or teeth. Yet every practitioner knows that it is unrealistic to regard the tooth in isolation. In no clinical situation can one not be involved in either the supporting or investing tissues, or the musculature, or the vascular supply and innervation, or the salivary environment, or the inter arch relationships and be concerned only with the tooth in issolation. Thus in every situation one is concerned with a whole group of tissuses-an Oral and Masticatory complex.

Should not the generic term for the field then refer to this tissue complex rather than to a single component of it - the masticatory component?

It would seem there is a strong case for the term Stomatology in preference that of Dentistry.

FORENSIC ASPECTS OF DENTAL SCIENCE

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(The first part of this article was published in the C. D J. issue Vol. 3 Dec. 1972)

Investigation of the Victim

Historically, there are many examples in which the value of dental evidence has been recognised in individual identification. One of the best known is the identification of Dr. Parkman, from incinerated fragments of Dental tissue and dental materials. For many years this subject has been neglected, dental surgeons being consulted infrequently only on such occassion as the situation demands, examples:- Rex V. Dobkin; Rex V. Haig; Rex V. Christie; Rex V. Ruxton.

Today, with the increase in the number of complex cases with 'dental aspects' covering the international field there is no place for the amateur no matter how enthusiastic. To obtain evidence the expert must follow a routine procedure where meticulous and methodical attention to details is required. Also, that the observations and findings can be studied and understood by dental experts in other countries. Therefore, if due recognition is to be given, as it deserves to be, to the part which dental evidence can play in crime and disaster investigations, consideration should be given to the expert examination and report, and the recording of details by a government or general dental practitioner.

Legal Aspects of the Dental Surgeon as an Expert Witness

As there are no dental specialists in forensic odontology, at present in Ceylon all practising dental surgeons, have to face the possibility of being approached to carry out identification work, and to make appearnces as witnesses in courts of law.

The report from the dental surgeon is a legal paper. Therefore, it has to be prepared carefully, based on his professional skill. The report is likely to be scrutinized and discussed in detail. Therefore, the dental surgeon must face these situations regarding the facts he has set down. The dental surgeon is called as an expert witness to guide and help the court to reach a verdict. He must use a method of comparison which is simple, accurate and yet easy for the lay person to understand and at the same time, show how he reached his conclusions. He must remember that he is dealing with lay people and not his colleagues of the dental profession. His evidence must be given in lay terms and not in medical language. He appears in the court of law with certain privileges not allowed to other witnesses. His status is peculiar, in that as an expert, he appears as an impartial witness to assist the court on matters concerning his profession. He is further privileged by being allowed to state an opinion.

Method of Examination

All investigations must begin with the basic examination of the material, whether it be human or animal, living or dead tissues, restorations, dentures or appliances. The dental surgeon may sometimes be asked to carry out his examination at the locus, but often he is required to do so in the mortury or laboratory.

I. At Locus

Each body at the locus must be tagged and numbered, with a record of the exact position when it was found, best done by diagrams or photographs made at the spot. After the remains have been removed in a special container to a suitable place for examination, the area should be carefully examined and sifted to search for displaced teeth, fillings, crowns and bridges and dentures. These should be placed in a special box for further investigations. The site from which these items we removed should be marked in the diagram. A preliminary charting and dental examination should also be made. Each body should be photographed and if the possible identity of the remains in unknown, this information should be obtained from relatives and other interested parties, which include a full physical description, including the teeth abnormalities, fillings, dentures, a photograph if possible, any information as to previous medical and dental treatment, and the names of those who have treated the person in the past.

II. In the Post - Mortem Room

A full detail examination should be carried out as follows:- (1) Charting; (2) Radiographs of skull and dentition; (3) Impressions taken and models cast of upper and lower jaws; (4) Assessement of age from the dentition; (5) Examination of any dentures or appliances; (6) Examination of restorations and tooth fragments in the body or found seperately: (7) Removal of the jaws if necessary.

III. Charting

Methodical exact charts essential for comparison with any data of dental treatment of the missing or suspected person must be made at this stage. Often dental data have to be produced for another country and transmitted over long distances (TELEX). Even within the same country there are no general rules as to the form and minimum contents of dental records. It is essential that progress be made towards the formulation of universally accepted 'uniform system of recording' dental data so that comparison can be made. Pending such an international chart, it would be advisable to use the code based on Zsigmondy's classification of 1861 still in use under the National health scheme in the United Kingdom. Our Dental School follows a similar code in charting. Denotations are :-

Tooth present and sound	●	Cavity	0
Tooth missing	—	Filling present	●
Tooth recently extracted	×	Artificial tooth	A
Root present	+	Crown	C
Tooth to be extracted	/	Direction of tooth movement	—>

The majority of cases fall under two groups. (A) Those with natural teeth and (B) Those with dentures. Charting is done with the same symbols used in dental practice, and to this chart should be added any observations made at the site.

(A) Natural Teeth

Chart and annotate (a) The number of teeth present; (b) Carious teeth; (c) Roots visible in the mouth; (d) Extractions-evidence of old or recent, healed or unhealed sockets; (e) Fillings - restorative material used, temporary dressings, crown and bridges; (f) Root fillings; (g) Apicectomy; (h) Irregularities in dentition-teeth and arch form, Angles classification, skeletal pattern and orthodontic applicances; (i) Remarks-example:- habits, occupation, socio - economic position; (j) Paradontal condition.

(B) Artificial Teeth

Examine, if the dentures are full or partial, upper, lower or both, materials used, make of tooth, shade and mould, type of base, situation of clasps and occlusal rests in partial dentures, and identification marks or numbers.

Dental Record of Patients

It is obvious that the experts' evidence alone (after the acquisition of dental records of victims) may be of little value without the co-operation of the general dental practioner or government dental surgeon, who may be called upon to submit their original records for comparison in court. It must therefore be stressed that if only adequate records are kept, can the work of a forensic odontologist be assisted. Such attention to detail in patients charting takes extremely little extra time, but would provide invaluable records for future forensic investigations. This is extremely important not only in view of the inevitable increase in mass castropies as traffic increases but also as a result of the steady increase in crime.

Denture Records

The large number of prosthetic appliances in use could provide immediate identifi-

cation of human remains in a high percentage of cases. This identification can only be facilitated if such appliances carried an identity mark leading to the source of origin. These marks should be easily distinguishable and unambiguous, and of a type as to be preserved under extreme physical and chemical assaults. Jerman in April 1969, describes an easy and inexpensive method of incorporating a metal strip into the dentures during the packing procedure. Imprinted on the metal strip is the wearer's social security number or the dental surgeons code number.

Photographic and Radiographic Records

Photographs are not only individual but also internationally understandable as a registration method. Gustafson, believes that colour photography is the best possible recording method, because it reveals a detailed description of the mouth. The photographs are taken with a reflecting mirror showing the labial and occlusal surfaces of the teeth and fillings. It cannot be denied that radiographic method can be used for registration purposes, but the procedure is expensive and time consuming.

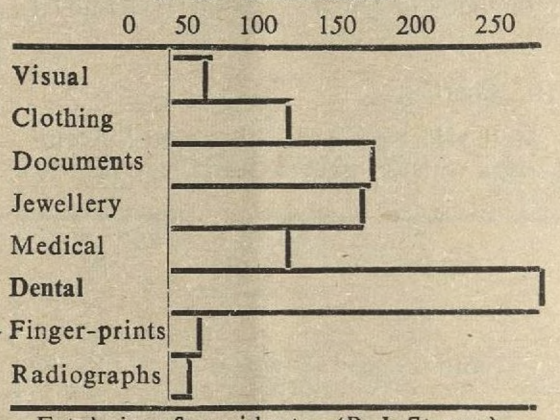
It is thus seen, that there is an obvious need for dental surgeons to take up the habit of comprehensive daily record keeping, for on this evidence and this alone that criminals have been brought to justice. We shall now proceed to see how dental records help in the identification of multilated bodies in mass disasters.

Mass Disasters

History records the work of dentists after great fires like the one in the Vienna Opera House in 1878, and that of the Bazar in Paris in 1897.

Mass disasters occur in peace and in war. The second world war revealed the harrows of mass executions in occupied territories. At the end of the war, an increase in international traffic, be it sea, land or air has coincided with rise in the disasters. Air crashes are almost a weekly occurence, while ship wrecks, train and bus accidents do occur infrequently. In recent years some large fires have occured both in the sea and on land. The disastrous fire in September 1949 on the Canadian ship **Naronic,** in which 118 persons perished is an example. Of the natural disaster the Aberfan coal tip, 1967 can easily be brought to mind. There were 144 victims of which 116 were school children. The graph of Steven, May 1969, shows the means of identification of thirteen fatal public transport accidents.

Occasions in which each means contributed in the identification



Fatal aircraft accidents (P. J. Steven)
The criminologist 4 : 12, May 1969.

From the graph above, it is beyond doubt that dental evidence is of the greatest importance when mechanical injury and the ravages of fire are severe.

In the Stockport air crash (June 1967), 72 passengers and crew were killed. 34 identified on dental data alone. Further 6 were identified on other incomplete evidence but confined dentally. Two gold crowns in one case, gold bucco-cervical inlay in another, a missing upper central incisor leaving no gap in the dentition, an unerupted second upper pre-molar each led to rapid identification. In each of the five cases when a partial denture was worn, it led to quick identification as no partial dentures replaced the same teeth. A record of the teeth clasped and the materials used, added certainty to the cases. Five of eighteen victims who wore full dentures, were identified by marks, name and number inserted on the denture. Others, visually or by jewellery and the rest were identified by noting material and technique in construction and by the shape of palatal relief areas in dentures.

In principal, the identification procedure in cases of mass disasters are but an

extension of the principles used in the identification of a single body. An interesting and valuable aid was introduced by the team investigating the Noronic disaster, namely the cross-eliminating chart. In this record each body and each person is indicated, the former horizontally and the latter vertically. When a body is positively identified the corresponding square is marked and horizontal and vertical rows are blackened. This system has been used subsequently by nearly all teams investigation large disasters.

Bite Marks

Bite mark investigation is a most interesting part of forensic dentistry, often a difficult one, because the bite-marks can never be taken to produce accurately the dental features of the originator. For one thing, they generally include only a limited number of teeth. Secondly, the material (food-stuff or human tissue) in which the marks are left, is probably a very unsatisfactory 'impression material' with unknown qualities of immediate and later shrinkage and distortion. Furthermore, these marks represent only. the remaining and fixed picture of an action, the mechanism of which may vary from case to case. For instance, we have as yet no precise knowledge of the possible differences between biting off a morsel of food and using one's teeth for purposes of attack or defence. Gross abnormalities in tooth and arch form might be readily recognised in the case of natural teeth, but complications do arise when the bite-marks are made of dentures.

Over the period of the last hundred years there have been many reports published covering bite-marks. These include cases involving assault, sexual crime and homosexuality in which the victim has been bitten by the assailant. There are a number of cases where animals have inflicted the bite, and numerous incidents where various materials usually food-stuffs, have been bitten and subsequently left at the scene of the crime. Inspite of these numerous reports, the annual occurence of such cases is rare and often many experts had only limited access to them Because of the difficulty in assessment and interpretation of the evidence, the experts feel that it is more reliable as a mode of elimination of suspects rather than of being able to state with authority that an individual did in fact inflict the injury. Each case therefore, must by assessed on its own merits. But, Simpson the famous pathologist in a forensic seminar held a few years ago said, "when the victim had been bitten by the assailant, the criminal might as well have left his visiting card or signed his name, as he could be identified from his teeth."

Recording of Bite-Marks

The recording of the bite-marks should be carried out on the bite-marks in situ, for removal of the tisuses, especially in a dead body will distort the mark mechanically. Morever, loss of moisture, causes skrinkage to occur. In the living subject the indentations soon become indistinct and obscured by bruising of the underlying tissues, and appear to have disappeared under the naked eye. However, by using ultra-violet lamp, slight injuries may sometimes become visible.

Preparation of study models from impressions, obtained from bite-marks has improved over the last few years with the advent of the rubber-base or silicon-base materials. As these impression compounds do not require water for mixing but uses an accelerator substance, the setting time of such compounds is under control. In addition to the elastic properties of such compounds very little damage is done to the material under examination. Furness in March 1968, has suggested a simple and accurate method of taking these impressions, recording them, and having it ready for production as court exhibits.

Bite-Marks on Food-Stuff

Whereas the bite-marks in the human skin appear as indentations by the incisal edges and cusps of the anterior teeth, in food-stuff the mark is produced by a shearing action of the anterior teeth. Variations are given independent of the consistency of food bitten. Bites in cheese, fruits and sausages show a more farvourable pattern than bites in bread, butter or cakes. Deterioration and dehydration distort the bite-marks. Nevertheless, an expert could relate models of a dentition accurately with freshly made bite-marks in suitable food-stuff.

Layton in 1966, reported a case in which a piece of cheese helped crime detection.

Following a burglary in a golf house, the police obtained two clues, a stolen car and a piece of cheddar cheese bearing a solitary bite-mark. Three suspects were later arrested and control bite-blocks were obtained voluntarily from two of them using a similar cheddar chees. Comparison of the plaster-casts made of the bite-blocks in the cheese found at the scene with those from the control specimens showed, in one case, twenty features of similarity. When presented with the evidence, this suspect admitted responsibility.

Bite-Marks on the Criminal

These bite-marks are usually caused by the anterior teeth and will be found on the criminal if the victim bites his assailant in self-defence. They not always as clear as the marks left on a victim by a sadist, as there may be no ripping of the skin or tissues. They may be found in cases of murder, rape, sexual offence, causing bodily harm.

A good example of this occured in Glasgow as reported by Harvey in 1968. A young woman was attacked, and in order to defend herself, she bit very hard on to one of the assailants fingers. She bit so violently that a piece of skin was torn from the finger of the attacker, who then ran away. The woman handed the piece of skin to the police, who fitted it photographically into the abrasion of a suspect's finger. The man was convicted.

Bite-Mark on the Victim

These marks prove a relationship between the victim and assailant, and they may be caused by:

(A) The Victim

This is most unusual but must not be overlooked. It will only occur on those parts of the body which can be reached by the victims own mouth. An example of this occured in Liverpool, where a girl was murdered by stabbing, and the assailant pushed the girls hand into her mouth in order to stop her from screaming. This unfortunate girls dental pattern was left on her own hand.

(B) The Criminal

When bite-marks are found in the victim they are most commonly caused by the criminal and are nearly always due to the lower anterior teeth. This is because the upper teeth hold the tissues in position, whilst the lower jaw moves and the lower teeth bite into the skin. The marks are usually well defined, being the marks of a sadist who bites his victim slowly and intentionally, and are often referred to as 'love' bites. They will be found most cammonly on the breast, neck cheek etc, and are quite different from the marks which are found on the assailant. The marks on the assailant are produced by the victim biting quickly in self-defence and therefore causing a tearing of the skin.

The Biggar murder case is presented because it has become a classic in Scottish criminal history. The first case in which forensic odontology had been used in evidence in a criminal trial to secure conviction. It is also unique in British criminal annals, for a warrant to take impressions, photographs and measurements was granted before the criminal's arrest and his being charged.

Gorden Haig, a youth aged eighteen, resident at that time in an approved school, was convicted of the murder of Linda Peacock, a school - girl aged fifteen, on August sixth, 1967.

Forensic report showed that on the inner aspect of the victims right breast there was a clear indication of a bite-mark. On one of the 28 suspects, the tip of the right upper and lower canines showed hypocalcification. It is rare in canine teeth, rare in the seventeen year old category, and rearer still when a pit forms on the tip of the canine, and even rarer when on the tips of two canines of the same person. It was found that the right upper canine had a larger pit than the lower. The canine mark on the photograph of the breast bite-mark of the victim had a red ring with a pale centre, and this could have been caused by the pit in the canine. In addition, the suspect's upper left lateral incisor showed a cavity in which a filling was missing. This cavity coincided with the photograph mark left on the girls breast. The left upper central incisor showed a mesio-distal fracture of the crown which

simulated the characteristic mark on the photograph.

At the trial on March 1968, the Crown was represented by Professor Keith Simpson, Dr. Warren Harvey and Mr, John Furness. The principle defence witness was Professor G. S. Beagrie. On the nineth day of the trial, Lord Grant of the High Court summed up as follows, "If all the evidence was accepted in the crown case there would not be enough to establish that the accused had committed the crime; that there were various factors but that did not point within reasonable doubt and it was for that reason that the dental evidence was of paramount importance" Speaking of forensic odontology he said, "This is a relatively new science, but there must be a first time. Scientific and medical knowledge advance as the years go by and it is comparatively recently that finger prints received their first recognition in the same court. The law must keep pace with Science."

Forensic Dentistry in Ceylon

Forensic dentisty is an appendage of forensic medicine in Ceylon, and little progress has been made by medical pathologists engaged in forensic work. Age estimation of individual by obsolete eruption tables has to some extent aided in the investigation of victim. Superimposition of photographs has been studied and bite-marks recorded in some cases not to clinch an indentification, but purely from the academic point of view Dental investigations for want of a dental expert have not been decisive nor even helpful.

The scope of forensic dentistry has expanded in recent years because of the steady increase in crime and the greater intensity of international traffic leading in large castroplies. In Ceylon, the march of crime continues with unabated vigour, and there appears to be a dangerous trend in the pattern of criminal conduct. 3,500 grave crimes were committed in the month of January, 1971. The murder rate from January to March 15th, 1970 was 142, while the murder rate for the same period in 1972 was 190. Today, we find that the murder rate continues to outstrip last years figures. Crime is on the march.

Forensic pathologists seldom consult dental surgeons when 'dental data' are required. Perhaps, they may be right in doing so, for want of experts in Forensic Odontology. However, if dental surgeons had been consulted on such cases, they would not only have taken an interest but also acquired proficiency in this speciality by experience alone. But, medical colleagues mainly suppose that the work carried out by dental surgeons could easily be done by the pathologist or the judical medical officer. Hence, their reluc ance possibly, to co-operate with the dental profession.

In other countries, the dental surgeon practically always, is in the investigating team comprising the police, J. M. O., and the medical pathologist. He has an equal position with his collegues in the medical field, and fully aware of the potentialities of his colleagues, the dental surgeon acquaints himself with other aspects not to hinder the progress of forensic work.

The detection of crime has always been a fascinating study, and dental evidence, has come to be of great importance of crime reconstruction - the identification of human remains of an otherwise unidentified body by means of dental data. Fires, following traffic accidents destroy corpses to such an extent that often teeth and restorations are the only remains available for the identification of victims.

A broad range of investigations can be performed by the dental surgeon particularly in the identification of dead and mutilated bodies. The procedure may appear simple from the medical officer's point of view, but it often requires a wide knowledge of different fields of dental practice and science. The investigation of teeth and fragments is connected with histology, histo-pathology and dental anatomy The resistance of the teeth and dental restorations must be known for identifying purposes, and the investigation of fillings, crowns fixed and removal prosthetic applicances requires a good knowledge of the different materials and methods used in dental treatment. A working knowledge of photography and impression techniques also helps him to deal with bite-marks in skin or food-stuffs. Obviously, only the dental surgeon can handle and examine dental evidence with any degree of

accuracy, so that this field above all, is a dental field.

Comparing dental data in the easiest and most fool-proof method in forensic odontology, but dental surgeons, generally sad to say, do not maintain adequate records for their patients. In government service, immediate treatment alone is recorded without charting the mouth. Often fresh recording sheets issued for subsequent visits. The sheets are not filed but bundled and stored away thereby rendering them forensically useless. Private dental practioners seldom chart the patients mouth, nor keep the charts up to date. In most cases, they record a few facts like operations without any notes about existing and previous dental condition. In addition they scrible a code understood only by themselves.

Forensic odontology is a very highly organised and developed science in the Scandinavian countries, and to some extent in America and Japan. So much so, it is being taught as a subject in dental schools. In other countries like the United Kingdom, it is still being taught by teachers of forensic medicine. Towards the end of 1969, the British Dental Council appointed a working committee on Forensic Odontology. Their terms of reference were to make recommendations as to how the furtherance and development of forensic science within the profession might be achieved and to formulate suggestions regarding the organisation by which the profession might improve its public service in the field. Their recommendations need close study. It is rather paradoxical that the dental student is made oblivious of his own field-an important branch of Dentistry. A dental student must have certain theoretical information at his disposal and also be acquainted with the practical work carried out in investigation, not from the point of view of transforming students into experts, but at least they must be taught to realise the possibilities of indentification which are available in teeth and restorations.

As there are no dental experts in Ceylon, almost all practising dental surgeons must be prepared to face the possibility of being approached to carry out dental identification work. Therefore, they must be adequately prepared for rendering proper assistance to the police, should they be asked to cooperate. Finally, before making an appearance in court, they must be acquainted with all the legal aspects as an expert witness.

Conclusion

Forensic odontology, a new and developing science has now been recognised for its importance in medico-legal investigations. It can no longer be regarded as a side branch of Forensic Medicine but as an integral part of Dental Science.

In view of this fact, an attempt has been made in this paper to introduce the subject of Forensic Dental Science, in the context of its value to all practising dental surgeons, who may face the possibility of being approached to carry out identification work.

Reading References

GUSTAFSON, G., 1966: Forensic Odontology, Staples Press, London.

PATHMANATHAN, K., 1971: Teeth as used in Evidence, a dessertation with the Dept. of Dental Surgery, University of Ceylon. 110 pages, 58 references.

THE SCOPE OF ORAL SURGERY AS A DENTAL SCIENCE

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It would be judicious to commence with a definition of Oral Surgery since the concept of this subject is interpreted variously both by administrators, as well as medical and dental practitioners. Because of these many misconceptions a precise definition of Oral Surgery its science and practice would be helpful and so I quote below a definition accepted by most dental scientists and authoritative practitioners of the art or science enunciated by no less an authority than Kurt H. Thoma:

Oral Surgery may be defined as a speciality encompassing all of the surgical diseases, injuries and developmental abnormalities of the oral cavity, teeth jaws and adjacent structures." (Kurt H. Thoma, 1948).

Historically the development of dental surgery occured from the early toothdrawer stage to a modern scientific profession with its proliferating branches, and developed as a parallel science with medicine and surgery. This development resulted directly from an awareness that dentistry was a health science having a common origin with the basic principles of medicine and surgery. The study of some aspects of physical and elementary material sciences, enabled the dental scientist to comprehend the use of materials such as plaster of paris, silver and gold alloys and acryllics which became the basic for the mechanistic aspects of dentistry. In medicine and surgery however, this aspect of mechanical and material sciences is included in the post-graduate study of biophysics and bio-engineering in orthopaedics, and anaesthesia in modern dovelopment:

Two schools of thought are evident in the progress of dental surgery. One suggests its divorce from medical science. This would only be possible to a very remote degree in the specialities of conservative dentistry and dental materials, but this again at a graduate level. The other school strongly advocates a closer association with medical science. (Bradlaw, 1962) This concerpt of a close asociation seems logical as there is a common quantum of knowledge in defined fields of anotomy, physiology etc. necessary for both dental and medical science. Some teachers even go further to suggest that dentistry should be a specialised field of medicine. (Bradlaw '61.[2]).

Modern dental training for the prospective dental graduate constitutes a programme geared to the treatment, prevention of diseases and abnormalities of the oral tissues. However in the fields of specialisation in oral surgery, oral medicine and oral pathology, the degree of basic knowledge required for such specialisation involves a greater depth in the study and practice of medical and surgical sciences such as surgery, pathology, bio chemistry etc. Where the undergraduate curriculum is adequate, this is achieved by the in-service training programmes such as the residency programmes of the American system or the House-officer, Registrar, Senior Registrar programmes prevalent in the United Kingdom. These systems have suitable post graduate courses and examinations dovetailed into their programmes. Where the undergraduate curriculum is inadequatse and there is no in service training or post-graduate teaching involved, it would be in the professional interest of the prospective specialist to train in medicine as well. This would not be a measure of snobbery but a means of supplementing the inadequancies of the undergraduate training. It is gross ignorence of the state of dental training and its working needs to suggest that dentists look for fresh unauthorised territory and oral surgeons for glamour by acquiring a medical qualification. The need for such a qualification results directly from the incomplete training programmes for dental graduates and the practice up to now of a reductionist thinking among dental policy makers to whom dental surgery implies the extraction and filling of teeth In Britain for instance, a medical training is not a requirement in every individual case for a post in oral surgery. The

obejctive being that staff can competently manage patients on whom oral surgical procedures have been carried out, and perform simple tasks of treatment and post surgical management. These are the facts relating to the requirement for a medical qualification.

Unfortunately in a greater part of the world with a few exceptions viz. Denmark, a majority of dental students are in dentistry as a second choice. (U.C.C.A. Report 1971 4.) Therefore when an opportunity is seen for practising dental science in a speciality that involves patient care, they seem to opt for it. This is the reason for the popularity of oral surgery as a special field.

The concept that a general surgeon is skilled in the art of cutting and therefore more competent to do oral surgery, has left its long trail of mishaps and misadventures which are now reflected in the number of patients referred by General surgeons to Oral surgery departments in clinics all over the world.

It is a distortion of the true situation to say that due to a few instances of over specialisation in the U. S. A, that the health sciences throughout the world have developed on a reductionist philosophy. On the contrary the concept is that every living human is entitled to the best available service that the country can afford. This is best provided in a pyramidal fashion, the simple problems solved by competently trained people at the lower levels to the more complex by personnel trained exclusively to deal with such problems. Thus a Rhinologist is first trained as a general medical person, then a surgeon and finally a specialisd surgeon.

Any health discipline grows or develops not by the administrators, manipulation of theoreticians or politicians, but by the disease patterns in society and the service it provides the community in which it develops. One of the main methods of development is to train both under-graduates and post-graduates among other categories of workers to provide exemplary and meticulous care of patients. An example of this is the high level of skill achieved by Conservative dentistry in most developed countries.

Oral surgery has a higher level of demand in Sri-Lanka partly due to the large back log of acute or essential surgical pathology and other abnormalities that require surgical treatment and the lack of adequate preventive measures which increases the existing burden. When this back log has been cleared, and the simultaneous essential preventive measures taken to reduce the numbers that are compelled to reach the stage needing surgical attention, then perhaps the demand for routine minor oral surgery would decrease, as shown in this field in the U.S.A. However preventive measures would not wipe out oral surgery as a speciality because of existing pathology developmental anomalies and trauma in the mouth and jaws. The concept that specialities are proliferating needlessly bears a closer examination. In the working life span of an individual competency in a general discipline can be achieved after post primary education within perhaps five to six years. But if a high degree of proficiency in a particular area is required in the rehabilitation of patients, then the training in that particular discipline requires a greater intensity and length of time. However since the life span of an individual is limited and a degree of specialised skill to optimum limits in all areas cannot be reached, it would be natural to limit the development of this skill to regional levels in the profession. This is achieved by growth and not by individual or arbitrarily laid drawn boundaries.

Taking surgery as a specific example, any surgeon should undertake treatment of a patient in those areas in which he has had adequate training, within the limits imposed by his working life span and to the acquisition of this knowledge. Likewise the limits imposed on an Oral surgeon by time and the available methods of training, will depend on the period he decides to spend of his working life training to be competent. This may take possibly 8-10 years, a period of 4 years for graduation and a further 4-5. years of post-graduate training including examinations, and the acquisition of the requisite techinical skills. This is achieved by a teaching programme that includes the surgical treatment of the pathological processes, developmental abnormalities and trauma of the mouth and jaws. (Recommendations of the American Board of Oral Surgeons and B.A.O.S.).

The statement often quoted — where does oral surgery end or head and neck, E. N. T. or plastic surgery begin, is a streile one. Any commencing pathology in the mouth and jaws should be legitimately treated by the oral surgeon and this includes any primary surgery necessitating his opening into the neck, on the contrary he may if facilities are available obtain the co-operation of a Head and Neck surgeon and work together in surgical procedures involving the neck, or an E.N.T. surgeon in surgical procedures involving the nose or ears. However if such a person is not available, the oral surgeon should be trained to treat to its legitimate conclusion the commencing pathology in the mouth, to the neck or paranasal sinuses. This is not an illusor position and can be achieved here in Sri-Lanka given the motivation and necessary co operation within the resources available.

A further argument that oral surgery is a superficial speciality and the only justification for its existance being the concept of occlusion. It is sufficient to say that in practice the man hours spent in understanding occlusion in the entire dental curriculum would amount to less than ten hours. This then is a theoretical position based on incomplete knowledge and experience. Let us pose the question of who would be most competent to treat a patient with a fractured facial skelton, a dental alveolar abcess or a tumour of the oral cavity? The obvious answer is the surgeon most familiar with oral tissues who has been trained to treat such conditions.

There are artificially or self imposed limits to this subject. The view that oral surgeons should not treat malignant neoplasms but send these cases to be treated by someone else, does not hold when pointed out that no E.N.T. surgeon sends his Ca of the nose to someone else nor does an orthopaedic surgeon exclusively treat trauma of long bones and send his neoplasms elsewhere Bearing this in mind oral surgical training as indicated in this article is being geared to achieving this end in countries such as U S.A., Switzerland, U.K , and the Soviet Union. In the present state of development it may not be possible to achieve universally these standards though many teachers and practitioners are achieving these standards in increasing propotions as shown by their work eg. Robert Walker, U. S. A., Seward and Mc Gregor, Britain. Obwegeser, Switzerland, Karepondwiz, U.S.S.R.

The scope of knowledge and skills required for training and advancement in surgery – oral, E.N.T., Head and Neck etc. require a basis of human biology, Human pathology, clinical patient management and certain technical skills. This can be organised in a coherent manner for oral surgery from the basis of a 1st degree in dental surgery, and where the dental undergraduate curriculum is deficient, an additional 1st degree in medicine. In the latter situation streamlining is achieved by exemption in overlapping areas until such time as the inadequacies of the dental curriculum are eliminated or a post-graduate programme set out to rectify or fill in the gaps.
(Royal Commission on medical and dental education 3).

The F.D.S. Examination is only one step in the process of specialisation in the U.K. It is a starting point for specialisation in any field and therefore only a B.D.S.at a higher level. In Ireland the examination is structured to enable the candidate to show an indication of his interest in a particular field by the emphasis of a detailed examination in the particular area such as Orthodontics, Oral surgery, Prosthetics etc. The acquisition of the F.D.S. with experience in minor oral surgery such as extractions does not imply specialisation in oral surgery, as much as an F.D.S. with a competence to provide a full upper and lower denture does not imply specialistic in Prosthetics. It is necessary to have at least three years in-course training in the speciality in addition to an F.D S. before a person can be said to have reached specialist competence. A guide to the position of oral surgery as an accepted discipline can easily be obtained by reference to any standard test book on the subject, in any developed language from Swedish to Japanese, having defined areas of work, routine, methods of treatment, accepted principles of management and a literature.

In the contest of Sri-Lanka to hold the view that we are producing competent people in the field of dentistry in general, and oral surgery in particular, needs very close examination. The dental graduate produced

over the last decade is an improvement on previous years. But the rate of progress is extremely slow. It is essential that the dental graduate is trained in patient management, skills of operative technique, material sciences and all other skills provided in the basic B. D. S. course, with an increased quantum of training in preventive dentistry which was lacking in previous training programmes. This does not mean in effect an underscoring in areas such as oral surgery and over emphasis in preventive dentistry in the basic training programmes. The dental surgeon is expected to treat his patients for a specific dental ailment and not become a forwarding agent except in tooth filling and extractions, as in the case of auxillary health worker who carries out a doctor's prescription.
(Alfred Duckworth et al. 5).

No amount of administrative manipulation or sectarian mud slinging will achieve results unless the five years spent in dental training is meaningfully structured and above all implemented to enable the dental graduate to specialise in the areas of need or that of his choice. The broadest categories of specialisation proportionately to graduation should be in the areas of need reviewed from time to time, and at the present moment for Sri-Lanka it is in Community or Preventive Dentistry. This can be achieved by making Community or Preventive Dentistry meaningful and challenging speciality and not by tinkering with the training of the dental graduate. An over emphasising or underscoring of any areas of graduate training, or propounding superficial impressions as facts of current thinking in training or using as illustrations extreme situations to justify pre-determined positions, will not achieve this.

Finally the question of - "parasitism of surgeons and oral surgeons on the ignorent public"-the pontifical and patronising attitude that the poor public is ignorent does not wholly bear out. The public is made up of individuals and when groups of individuals find out that patients are satisfactorily treated and return to work the public esteem to such services is established. This is evident in hospital statistics. (Administrative Report D.H.S 1966-67 6).

The preventive worker on the contrary like the anaesthetist, is not seen to be as closely involved in the treatment of his patient as the curative worker. Thus it becomes the responsibility of the administrative leaders and educators in the profession to study problems objectively motivate and implement the changes. The misuse of a group of trained professional men such as the dental surgeons to do simple repititive tasks along with the attempt to resolve problems of education and malnutrition among others, the solutions of which are infinitely wider issues than dental education per se, even if the dentist has a part to play in it, further frustrates them.

Finally as health educators and professional teachers we should endeavour to train graduates who could use their basic training and skills to serve the community and not confuse this issue with the problems of a society built on a hierarchical system based on money wealth. Such problems need a political solution. Perhaps then we would function better in our chosen field.

REFERENCES

1. Kurt H. Thoma - Testbook of Oral Surgery Vol. 1 2nd edition, Mosby.
2. Presidential Address G.D.C. 1971, Sir R. Bradlaw. B.D.J. Vol. 131, No. 1. 1971.
3. Proposal for planned change in dental education, Allred H., Duckworth R. et al B D.J. Vol. 135. No 5 1972.
4. Report of the Royal Commission on Medical Education 1965 - 68 (1968). H.M.S.O. London.
5. U.C.C.A. Report (University Admission) 1971, Cheltenham.
6. Administrative Report of D.H.S. for 1966-67. June 1970.

SUB-MANDIBULAR SALIVARY GLAND ENLARGEMENT – A Case Report

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A. H. P. M. a 24 years old male from Thissamaharama presented at the Dental Clinic Kandy, with a lump in the left sub-mandibular region. He had been refered by the dental surgeon, Hambantota, who had queried a sub-mandibular salivary calculus.

The patient had noticed the swelling about six months ago. At the beginning a painful swelling occured only during meals. Later it was permenantly present, becoming bigger and painful during meals. About once month the lump became painful tender to touch and larger in size. This exacerbation was not related to meals and it persisted for a few days, subsiding without treatment.

On examination a small swelling could be seen in the left sub-mandibular region, just anterior to the angle of the mandible. The skin over the swelling appeared to be normal. Apart from this swelling no other abnormality could be seen in the head and neck region.

The lump measured about 2" x 1½", was firm on pressure and not tender. It had a smooth surface though the borders were irregular. It was not fixed to the underlying tissues – being mobile in all directions. The skin too was mobile over the lump.

Intra – orally there was no swelling in the floor of the mouth. Openings of both Wharton's ducts seemed to be normal and not inflamed. Oral hygiene was satisfactory.

On bimanual palpation no lumps could be felt in the duct and there was no discharge of pus from the duct. Salivary flow from the left duct seemed to be much reduced compared to that from right.

Parotid and Lachrimal glands were found to be normal. The general condition of the patient was satisfactory. There was no history of heart disease, rheumatic fever, diabetes, T. B. bleeding disease, etc. The patient has had mumps at the age of 8 years.

Extraction of 6 had been done 3 years previously. No regular dental attention had been possible

Family history – not relevant.

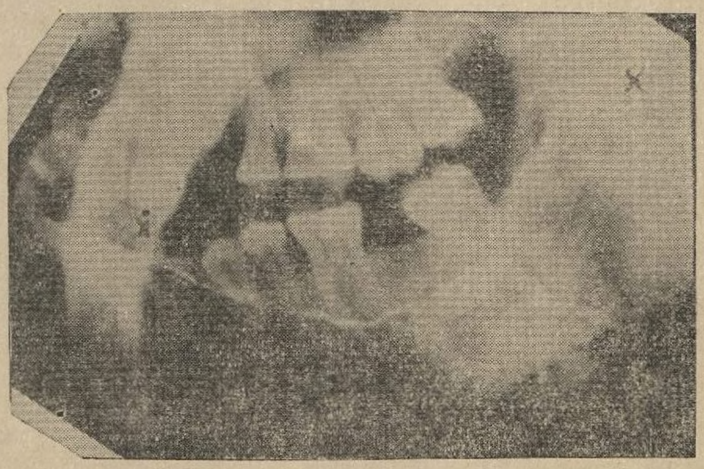
Personal history–Smokes 5 cigarettes a day. Does not take liquor. Does not chew betel. Cleans his teeth with a brush once a day before breakfast.

Investigations :–

The following investigations were carried out.

(1) Radiological :–

(a) Occlusal view of the floor of the mouth, did not reveal any calculi in the sub-mandibular duct.



(b) A sialogram of the left sub-mandibular gland was performed using lipiodol. The radiologist reported:- "Multiple strictures of the main duct, with dialatations between two stictures close to the gland. Normal filling of the gland. Emptying normal."

"Sausage string" appearance due to multiple strictures with dialatations of segments, seen in advance cases, was not seen here. The gland itself appeared to be normal with no evidence of sialectasis.

(2) Rate of salivation:- Could not be measured accurately as the proper collecting equipment (cannula and special suction cup) was not available. Salivary stimulation with lime juice did not produce any flow from the left duct.

(3) Blood examination — N. A. D.

(4) Urine examination — N. A. D.

Diagnosis;-

A diagnosis of multiple strictures of the left sub-mandibular duct predisposing to stagnation and recurrant infection, was arrived at.

Treatment:-

As the function of the gland was much reduced, ligature of the duct was decided upon, as the most suitable line of treatment.

Prior to surgery the teeth were scaled and septic 6/5 were removed under local anaesthesia.

The patient was placed on antibiotics; cr. penicillin 500,000 units b d. and streptomycin ½gm. daily, starting from the day before the operation.

Operation:-

General anaesthesia, via naso-tracheal tube was used. A nylon bristle (blue coloured) was introduced into the duct. The papilla was grabbed with untoothed tissue forceps and a two inch incision was made using No. 15 blade, over the duct with the blue coloured bristle seen through the mucous membrane acting as a guide line. The duct was dissected out to a distance of about 2" from the opening. The lingual nerve was identified. The sub-mandibular duct was ligated with catgut (3/o) at a point about 2cm. from the opening and again at 1cm. from the first ligature. The incision was closed with three silk (3/o) sutures.

The patient was put on a bland diet, in order to minimise salivary stimulation. He had a bigger and painful swelling on the first post operative day. Next day it had subsided to the original size and there was no pain. He was discharged from the hospital on the fourth post operative day.

Discussion:-

Recurrent infection of the salivary gland and the duct, acts as a stimulation of excess mucus secretion, and also provokes the proliferation of the lining epithelial cells. These two factors lead to stagnation of secretions, which is thick and viscid due to the excess content of mucus. This predisposes the gland to further infection.

What factors predisposes the normal gland and the duct systom to infection, in the first place? It is believed that some agent, probably a virus — the mumps virus according to some — damages the secretary cells of the gland, resulting in reduced secretion. This leads to stagnation, which predisposes the systom to infection.

Ligature of the duct of any gland results in the atrophy of the exocrine part of the gland. This is the principle behind the method of treatment undertaken here. The gland is gradualy but completely replaced by fibrous tissue.

The method of treatment is decided by the rate of salivary secretion and the presense or absence of changes in the main

duct, ie; dialatations. When the rate of secretion is less than 0.9 ml/min., after parasympathetic stimulation with 5mg of pilorcarpine, ligature of the duct could be done. This is specialy so when there are main duct changes.

When the rate is higher than 0.9ml /min. and when there are no main duct changes, salivary stimulation carried out for a fairly long period may give good results, Salivary flow will prevent stagnation and recurrance of the infection, there by allowing the gland to recover. Stimulation is usually done by asking the patient to chew sour fruits like lemon, lime, orange, etc. as often as possible.

Excision of the whole gland is indicated only in cases with multiple calculi in the branch ducts.

The only complication of ligature of the duct is the development of a salivary fistula but this is rare if case selection has been correct.

Acknowledgments :-

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References :-

(1) Hill, W , (1969) Br. J. Surg. 57, 494.

(2) Buchanan, A., (1970) J. Oral Surg., 43, 549.

PREVENTION AND MANAGEMENT OF DENTAL CARIES.

(Paper presented at the Ceylon Paediatric Association - Lady Ridgeway Hospital for Children Colombo.)

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Introduction:

In lay terms dental caries would refer to the decay and disintegration of the teeth. It is so prevalant in all civilized societies that most people both clinicians and laymen would be familiar with it. The lesion is characterised by disintegration of the enamel and dentine with resultant cavitation, yellow, brown or black pigmentation and debris.

It is however not often realized that disintegration and cavitation of the tooth represent the terminal stages of the carious process and not its initial or even necessarily its active phase. Thus attempts to control dental caries that are based on directing efforts to the late stages cannot be regarded as very logical.

The earliest detectable lesion of the carious process has been identified as a sub surface demineralization of the enamel without any breach of the surface enamel which latter persists as a hard acid resistent shell. (Darling 1958). This lesion can be detected as a white spot on the smooth surface sites at which carious lesions commonly develop. They cannot at this stage be detected with a probe since there is no interruption in the continuity of the enamel surface. Therefore at this very early stage the only available means of detecting the lesion is by careful visual examination or specialized X'ray investigation. Thus measures seeking to prevent and manage dental caries would hold better promise of success if they were 'advanced in time' so to speak, so that they could be brought to bear during the early demineralization phases of the carious process rather than after disintegration and cavitation of the enamel and dentine have occured.

Aetiological Considerations:

It is of course not possible to answer the question, 'what is the cause of dental caries' in the same manner as perhaps one could the relation of the tubercle bacillus to tuberculosis. Although micro - organisms have been demonstrated to be always present in clinical caries one cannot hope to satisfy classical criteria such as Koch's postulates.

To state that one does not know the cause of dental caries is not however the equivalent of saying that nothing is known about the disease. The position may be regarded as akin to that of cancer where a large body of knowledge has accumelated although one must continue to say that the cause of cancer is not known.

The most practical approach to the question is to regard dental caries as a multifactorial disease process since many of these factors have been isolated and identified. One need not await the final unravelling of a single cause, if there be one. before launching measures to deal with the disease. The factors being known, their control would provide possible avcnues for interrupting and inhibiting the carious process at various points in its sequence.

Aetiological and related factors:

A number of factors, both those which may be regarded as having aetiological links with the carious process as well as those which are definitely related though not aetiologically so, have been identified. These may be identified as follows. (Massler 1969)

a) Micro-organisms : Two organisms are known to be definitely involved; an enterococcus presently known as Streptococcus mutans regarded now as a cariogenic streptococcus and Lactobacillus acidophilus which is invariably found in occlusal caries which begins in the macrofissures (pits and fissures) of the occlusal surfaces of teeth. The former is associated with smooth surface caries (buccal, proximal, and more rarely, lingual).

Though these two orgonisms are acid producing not all acidogenic bacteria are capable of producing carious lesions, particularly on smooth surfaces. Only dextran producing streptococci (Strep. mutans) can produce smooth surface caries. These too cannot manifest their cariogenic propensities without the presence of plaque which is necessary to provide them with a stable matrix in which to thrive. The lactobaccilus though not a dextran producing organism probably can exert its cariogenic properties since the macrofissures would enable the organisms to establish themselves undisturbed.

b) Diet: The relationship between sucrose and high prevalance and incidence of dental caries has now been well established. On the list of cariogenic sugars sucrose ranks highest. Others like glucose, maltose, lactose and fructose are much less cariogenic, the last two being the least so. Foods containing sucrose particularly in sticky starchy forms as in sweets, toffees and chocolates are particularly potent. However it is known that a high consumption rate of sugar cane does not promote caries through refined white sugar does.

c) Plaque: Bacterial plaque is basically formed by a variety of micro-organisms usually thread forming leptothrix and streptothrix. When these grow on the enamel surface they form a dirty grey furry mass that becomes pigmented with age. These organisms are not cariogenic per se, but if cariogenic streptococci infect the plaque and grow, producing sticky adherent dextran (a polysaccharide breakdown product of carbohydrate metabolism) and acid the plaque becomes cariogenic plaque. Without these pathogens plaque is merely dirty and unaesthetic but not cariogenic. It is also known that if bacterial plaque is infected with toxin producing organisms a toxic gingivitis or periodontal disease may result.

d) Acid: The chemico parasitic theory of Miller still forms the foundation for understanding the carious process. It postulates the production of weak acid by microbial fermentation of carbohydrate residues in the mouth. The acid so produced decalefies and dissloves the inorganic part of the tooth. More recent work (referred to earlier) has shown that demineralization initially occurs as a sub surface phenomenon, the enamel surface itself remaining intact. If strong acid were present the enamel surface would show etching instead of a sub surface decalcification.

e) The Enamel surface; Newly erupted enamel is immature, that is, its cryrstalline structure is porous and chalky and easily penetrated and dissolved by acids. It is not fully calcified being only seventy percent inorganic. Immature and chalky enamel is highly susceptible to acid action and caries attack. As the young enamel is bathed by caries free saliva salivary ions and pigment penetrate and fill the intercrystalline spaces. Mature enamel is about ninety two percent inorganic. At the same time the apatite cyrstals that compose the enamel become gradually rearranged into a compact mass so that mature enamel appears as a very dense, much less penetrable glassy hard structure highly resistent to acid action and caries attack. This process is progressive with age. There is evidence that this process of enamel maturation is significantly accelerated in the presence of fluoride.

f) The Enamel and Dentine: The inorganic constituent of enamel and dentine is a hydroxy apatite. Chemically it may be represented as $Ca_{10}(PO_4)6\ (OH)2$. Addition of fluoride alters this crystal structure to that of a fluorapatite where some of the hydroxyl ions are substituted for by the fluoride ions giving the crystal lattice a more stable configuration. Fluorapatite has proved to be much more resistent to caries attack than is hydroxyapatite.

g) Saliva: One may speak of a "carrier state" as long as cariogenic organisms float in the saliva without colonizing on the tooth surface. As long as these organisms are present in the saliva all teeth must be regarded as at risk. The presence of even a single carious lesion in the mouth renders all the teeth caries susceptible. There is also good evidence from observations in both experimental animals and humans that in caries active saliva the enamel does not mature but remains chalky and caries susceptible for prolonged periods of time.

(h) Cummulative Nature of Caries: The carious process is known to commence early

in life, about two and half years of age and is cummulative. Also three periods of exacerbation of the carious attack have been identified viz. 4-8, 11-18 and 55-65 yrs. (American).

Principles of Caries Control:

A knowledge of the factors would suggest the possible lines along which a strategy could be developed to control dental caries. Thus theoretically it would be possible to prevent or control the carious process by controlling all or some of the factors that have been identified. Control of those factors like plaque which may be considered 'junctional' factors (since other factors are dependant on it to become effective) would be particularly important since by controlling them several other factors could be simultaneously controlled.

The micro-organisms could be eliminated or reduced with antibiotics, but this method is not resorted to unless the patient has rampant caries The problems associated with antibiotic therapy are the usual ones of developing resistrains, hypersensitive reactions and the alterations of the normal oral microbial flora with consequent monilial invasion.

Diet can be controlled by restricting the free use of sucrose and replacing with non or low cariogenic diets. However it might be noted that such a measure may not be feasible in an underdeveloped country such as ours where food options would only be of theoretical interest to most people at the low income levels.

Plaque may best be eliminated by thorough oral prophylaxis guided by disclosing solutions. Addition of dextranase (an enzyme which can break down dextran) to the food of caries susceptible and infected experimental animals on a high sucrose diet has succeeded in effectively inhibiting the formation of carious lesions. Whether such a measure could successfully be applied outside the experimental situation remains to be seen.

Plaque must be regarded as a crucial factor since its elimination will automatically eliminate the effects of the micro-organisms, diet and acid. The enamel surface can be controlled by the application of topical fluoride (eg. 10% SnF_2).

The substance of the enamel and detine can be strengthened and rendered resistent to caries by systemic fluoride given either through fluoridation of drinking water supplies or as fluoride tablets.

The saliva can be rendered caries resistent by eliminating all active and arrested carious lesions in the mouth. This would require, a) the extraction of all carious teeth present that cannot be conserved and b) opening all other carious lesions, removing all carious material and sealing with soft amalgam or a suitable dental cement.

Early onset and the cummulative factor may be controlled by instituting the measures mentioned above very early in caries susceptible children. It would be particularly important to ensure that the six year old molar which is the first permanent tooth to erupt should do so into a caries free salivary enviroment. Therefore all caries should have been eliminated several months before eruption of this tooth to give it a chance to acquire caries resistance by normal maturation of its surface enamel. Finally the periods of exacerbation could be controlled by intensifying treatment and giving frequent short term appointments to all children during these high risk age periods.

It would have been noted that any caries control program must necessarily be directed to the age group between about four and eighteen or nineteen years of age. This is dictated by the three factors of early onset, cummulative nature of the process and periods of exacerbations. The exacerbation at 55 to 65 years usually is one of root caries and factors other than those considered are also present.

In order to determine the suitable context or contexts in which the measures suggested above could be applied it would be very useful to first develop a conceptual framework in terms of which some perspective on the problem of prevention and management of dental caries might be obtained.

Dental caries might be viewed from three basic standpoints. Firstly one might view it in the familar clinical situation of the disease

as it manifests in the individual patient. The disease could also be viewed per se as it were outside the contex of the individual. In such an event one would be involved with it in a laboratory oriented situation studying such aspects as its histopathology, biochemical reactions and so on rather than its clinical manifestions. There is also a third standpoint from which one could view this problem, namely from that of the group. In such a situation one is likely to be concerned with epidemiological features; prevalance, incidence and distribution characteristics of the disease rather than either its histopathological and biochemical or its clinical features.

Thus in summary one might say that the problem could be viewed a) as the lesion per se, b) as the lesion in the individual patient and c) as the lesion distributed in the population.

The advantage of thus laying down a conceptual basis for thinking would be readily evident, for the problem is better clarified and feasible solutions begin to appear. Thus the strategy we envisaged could be applied in two contexts (if we ignore the laboratory situation), namely in the clinical and group or field situations). We might now consider the relative merits of each. In the clinical situation the procedure one would follow could be thus: a) Extract all grossly carious teeth that are beyond conservative treatment in the patient.

b) Open all other carious lesions, remove all carious material and seal with a suitable dental cement.

c) Carry out a thorough oral prophylaxis to eliminate all plaque.

d) Apply topical fluoride.

The patient can now be regarded as 'caries controlled.' He can be reviewed in six to eight months for signs of any recurrence of caries. During the interim period he can complete conservative and other treatment necessary.

In the field situation the procedure would be similar with the addition perhaps of fluoridation of drinking water supplies, a contuining Dental Health Education program and possibly control of the dietary factor if the group being treaetd is an institutionalized one like children in a boarding school. Also in a field situation most of these procedures would be carried out by auxillaries like School Dental Nurses and Dental Hygienists.

Although it is seen that prevention and management of dental caries can be carried out in both the clinical and field situations closer examination will show that the clinical context is not the one more suitable for the purpose. In fact the tendency of many clinicians to confine themselves to uttering platitudes regarding the virtues of prevention but showing scant evidence of really believing in its efficacy derives from a failure to grasp at a conceptual level the fundamental difference between the clinical and group situations.

The clinical situation is essentially 'a 'demand and supply' one. The patient is ill and so demands treatment and the doctor complies. The group situation on the other hand is more a 'need and supply' one. Here the patient (population) is not aware that it is ill or that it is at risk from illness. It is the doctor who is aware that there is a need for preventive measures to be taken. Thus here the doctor would be supplying an actual need of the patient. In the clinical situation on the other hand the patient's demand may not in fact always correspond to his actual need. For example a patient may demand an extraction of a tooth while his actual need would be for measures that will make it unnecessary that he should lose this part of his anatomy.

There is another noteworthy difference that is quite fundamental: In the clinical situation the patient goes to the doctor (P—> D) The patient is highly motivated to do so because he is ill. The appropriate organisation required would then be the establishment of a hospital where all the equipment, facilities and personnel are assembled and made available to the patients seeking treatment. The only other requirement would be that of siteing the hospital, that is, it should be accessible to the hinterland it serves.

In the group situation the population is poorely motivated to come to the doctor since as a group there is no great consciousness of exposure to risk of illness. Other problems of daily living often take precedence. Thus in the group situation the doctor must go to the patient (D—> P). The organisation needed is not a centralised hospital type one but a flexible, mobile one where the initiative is always with the doctor rather than the patient.

Applied to the problem of controlling dental caries one could easily see that the clinical context is not the most suitable in which to apply the strategy that we have envolved. At best what can be achived in this situation is secondary prevention where some scope exists for measures to prevent the spread or abort the sequalae of the disease. The best chance for acheiving the objective of primary prevention of dental caries would lie in the group context.

On the basis of the aetiological and other factors considered one could say that cotrol of dental caries in the population should be sought through control of the disease in the age groups between about 4 to 19 years. It is immediately seen that this group is the school going group and is an ideal one for a preventive program since it is virtually a captive population. The problem of control of dental caries is not one of complexity. The control of the factors enumerated can be done relatively easily. It is the size of the problem that presents the main challenge. Therefore one might guess that it is organisational efficiency rather than technical expertise that would decide success or failure of a population directed dental caries control program.

References :

1. Darling. A. I. : Studies of the lesion of enamel caries. Its nature, mode of spread and points of entry. Brit. Dent. J. 105 : 119. 1958.

2. Massler. M. : Teen-age Cariology. The Dental Clinics of North America. April, 1969. W. B. Saunders Company.

TOWARDS A STANDARD SPECIFICATION FOR TOOTH POWDER

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It is the general opinion of Dental Surgeons that almost all the tooth powders available in our market are of poor quality and most of them are unsafe or harmful for general use. This opinion is based on the impressions gained in general practice where numbers of large patients are seen who use tooth powders and pastes. The powder is generally used with the index finger as the applicator and polisher. The paste is used with the brush. Three is thus a fundamental difference in the method of use which should be noted.

General impressions gained have been considered at discussion groups and seminars but there does not appear to have been any study of this problem which is a very important and urgent one.

I talked to one of the tooth powder manufacturers who said that he catered to the majority of the population. According to a market survey he had carried out sixty five percent of the Ceylon population use tooth powder, twenty percent use tooth paste and the rest use river sand or charcoal or nothing at all. He also added that he was an industrialist carrying on a government approved industry and enjoying a tax holiday.

The profession has made its opinion based on impressions. The industry is satisfied with the market survey and the tax holiday. The public continues to use tooth powders because it is cheap, and because radio and other mass media say it is good. In contrast tooth paste is freely recommended by the Dental profession as being quite safe. Again this too is not based on any scientific grounds or in reference to any standard.

The Bureau of Ceylon standards recently appointed a committee consisting of all interested parties which included manufacturers, consumers, technical officers of the Bureau, Govt. Analyist's department, CISIR, quality control laboratory and a Dental surgeon to go into this question. Some portions of the draft proposals are reproduced below for information.

CEYLON STANDARD SPECIFICATION FOR TOOTH POWDER

Foreword

This Ceylon Standard has been prepared by the Drafting Committee on Tooth powder. It was approved by the Agricultural and Chemical Divisional Committee of the Bureau of Ceylon Standards, and was authorised for adoption and publication by the Council of the Bureau on .....

Tooth powder when used with the tooth brush, assists in the removal of food particles, surface stains, accumulations of micro-organisms and deposits from teeth through a simple cleaning action.

A good tooth powder would exhibit minimum abrasive quality, consistent with maximum cleaning efficiency and effective polishing action. Highly polished teeth resist retention of dental debris, and remain cleaner longer.

Tooth powders contain polishing agents, surface active agents or detergents and colours, flavours and sweetening agents. Additives for special action(s) may be present.

In the preparation of this standard, considerable assistance has been derived from

publications of the Federal Supply Service, General Service Administration of USA and the Indian Standards Institution.

1. SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for tooth powder.

2. TYPES

The tooth powder shall be classified into the following two types:

Type I – Foaming

Type II – Non-foaming.

3. REQUIREMENTS

3.1 **Description:**

3.1.1 The tooth powder shall be a smooth, free-flowing, fine powder without any lumps. It shall not contain any hard abrasive materials.

3.1.2 The tooth powder shall not irritate the oral mucous membrane of human subjects or produce unpleasant symptoms.

3.1.3 The distribution of the basis materials shall be uniform,

3.2 **Composition:**

3.2.1 The basic material used as polishing agent shall be one or more of the following:-

(a) Calcium carbonate,

(b) Magnesium carbonate,

(c) Dicalcium phosphate,

(d) Tricalcium phosphate

(e) Tetracalcium phosphate

(f) Sodium metaphosphate

(g) Sodium Orthophosphate

(h) Hydrated alumina

(i) Amorphous precipitated Silica

and (j) Charcoal.

3.2 2 Surface active agents or detergents may also be used. These ingredients shall conform to the provisions of British Pharmacopoeia International Pharmacopoeia or British Pharmaceutical Codex.

3.2.3 The preservations, flavours and colours used in tooth powder shall satisfy the requirements given in the Ceylon Food & Drugs Act No. 25 1949.

3.2.4 Additives for special action may be included, provided the manufacturer files an application which provides adequate evidence that the additive used is safe for use under the conditions prescribed,

3.2.5 The tooth powder shall also meet the requirements given in Table I, when tested according to the relevant methods given in Column 4 of the Table.

TABLE I — REQUIREMENT FOR TOOTH POWDER

Serial No.	Characteristic	Requirements		Methods of Test (Ref. to Clause No.)
		Type I	Type II	
1.	Moisture and volatile matter per cent by mass max.	5.0	5.0	6.1
2.	pH of 10 per cent acqueous suspension	8 - 10.5	6 - 9	6.2
3.	Heavy metals (as Pb) parts per million max:	20.0	20.0	6.3
4.	Arsenic (as As_2O_3)	2.0	2.0	6.4
5.	Fineness			
	(a) Particles retained on 150 m sieve per cent by mass max.	0.1	0.1	6.5
	(b) Particles retained on 75 m sieve per cent by mass max.	2.0	5.0	
6.	Abrasion	To pass test		6 6

METHOD OF TEST

6.1 **Determination of Moisture and Volatile Matter**

Procedure - Take about 2 g of powder in a tare petridish weigh accurately. Dry it at 105° in an oven till constant mass. Cool in a desicator and weigh. Calculations -

Moisture and volatile matter, per cent by mass

$$= \frac{M1 - M2}{M1} \times 100$$

Where M1 = Mass in g of the powder taken for test

and M2 = mass in g of the material after drying

6 2 **Determination of pH value**

6.1.2 **Procedure** - Take 5 g of the material in a 100ml beaker. Add 45ml of freshly boiled and cooled water and mix well. Determine the pH with a pH meter using glass and calomel electrodes.

6.5 **Determination of Fineness**

Procedure - Place about 50 g of the material accurately weighed in a 75 m sieve and shake till no more material passes through the seive. Transfer the residue with the help of a brush to a tared sheet of glassed paper and weigh. Calculate the mass of the material retained on the sieve and express it or a percentage by mass of the material taken for the test.

Place the residue obtained in Clause 7.5.1 in the 150 m sieve and

proceed as in Clause 7.5.1. Transfer the residue left on the sieve to a glazed paper and weigh. Calculate the mass of the residue as percentage by mass of the material taken for the test in Clause 7.5.1.

6.6 **Test of Abrasion**

Outline of the method – Make a paste of the material with water, place on a glass slide, subject it to reciprocating strokes from a metal cylinder. Then examine the glass for any scratching.

Apparatus – The abrasion test apparatus consists essentially of the following parts.

Class slide – soda lime, (non-corrosive) microscope, slide.

Metal Instrument – The metal or alloy shall be of hardness 56 to 64 HRB (using 100 kgf load and a 1 6mm ball). The instrument shall be of the shape of a cylinder or diameter about 20mm.

Re-agents:-

Petroleum Jelly

Dilute Nitric acid – approximately 4N.

Procedure – Make a paste of the material with water. Place the paste of the glass slide. Rub the paste with the metal instrument, making 100 double strokes with metal cylinder, applying a thrust of about 6.9 kN/M^2 of about (0.07 kgf/cm 2). Carry out a control test at a site near to that used with the sample, using petroleum jelly in place of the sample. After both tests are completed, place the glass slide in hot dilute Nitric acid to remove particles of any metal alloy adhering to the glass slide. View the slide in transmitted and reflected light. If the sample shows more scratching on the glass than in the control test repeat the test to eliminate the possibility of accidental defective spots on the glass slide. If the repeat test also shows more scratching by the sample than in the control, the sample shall be taken to have failed the test.

Notes: Ignore apparent polishing effects which may in some illuminations appear to be changes in surface, but which are not line scratches.

(b) Chemical:

Items	CHARACTERISTIC	Requirement	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
9	Moisture and volatile matter dired at 105° C w/w	5.0%	2.80%	6.30%	3.00%	8 90%	2.80%	6.60 %
10	Organic matter w/w		2.54 ,,	22.70 ,,	13.20 ,,	10.38 ,,	10 24 ,,	3.31 ,,
11	Silica (as $Si0^2$) w/w		90.10 ,,	0.30 ,,	7.90 ,,	70.10 ,,	0.06 ,,	84.75 ,,
12	Titanium (as $Ti0_2$) w/w		0.13 ,,	not detected	0.01 ,,	0.35 ,,	not detected	0.05 ,,
13	Iorn (as Fe_20_3) w/w		0.81 ,,	0.33 ,,	0.65 ,,	0.38 ,,	0.23 ,,	1.27 ,,
14	Alumina (as 41_20_3) w/w		0.43 ,,	0.44 ,,	0.17 ,,	1.23 ,,	0.09 ,,	0.69 ,,
15	Calscium (as $CaC0_3$) w/w		0.82 ,,	65.90 ,,	75.52 ,,	6.60 ,,	85.41 ,,	1.09 ,,
16	Magnesium (as$Mg0$) w/w		0.45 ,,	0.14 ,,	0.60 ,,	0.27 ,,	0.11 ,,	0.16 ,,
17	Sulphate (as $S0_4$) w/w		not detected	2.07 ,,	not detected	1.10 ,,	0.13 ,,	1.09 ,,
18	Phosphate		not detected	not detected	,,	not detected	not detected	not detected
19	Lead	20. p.p.m.	,,	,,	,,	,,	,,	,,
20	Arsenic (as As_20_3)	2.0 p.p.m.	4.0 p.p.m.	,,	,,	2.0 p p.m.	,,	0.5 p.p.m.

Six brands of tooth powders available in the market were studied, and the results are as follows :–

This report refers specifically to the samples tested.

(a) Physical:

Items	CHARACTERISTIC	Requirement	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
1	Colour		Pink	Cream	cream	light pink	off white	Pink
2	Odour		peppermint	Camphor	camphor	camphor	cinnamon oil	camphor
3	When applied on gums		burning sensation	Slightly bitter taste	burning sensation	burning sensation	burning sensation	burning sensation
4	pH of 10% adequoss solution	6–9	7.4	7.0	6.9	7.8	8.4	7.4
5	Foaming power		nil	nil	nil	nil	nil	nil
6	Fineness:							
	i. Particles retained on 150 micron sieve (B. S. Sieve No. 100) w/w	0–1	1.0%	6.0%	7.0%	6.0%	0.04%	26.6%
	ii. Particles retained on 75 micron sieve (B. S. Sieve No. 200) w/w	5–0	6.0%	3.0%	7.0%	16%	0.40%	19.0%
7	Microscopical examination of the material retained on both the sieves.		silica	Vegetable bark	Vegetable bark & silica	silica	—	silica
8	Abrasion test	To Pass Test	unsatisfactory	satisfactory	unsatisfactory	unsatisfactory	satisfactory	unsatisfactory

An appeal to the Dental Profession

Please make your valuable contribution to the Ceylon Dental Association Building Fund.

This is a vital step forward for the elevation of the profession.

Your co – operation and co – ordination is most welcome.

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