

ART

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INTRODUCTION

Although dental caries has decreased substantially in the industrialized countries over the last two three decades but from a global perspective yet it remains a wide spread problem. Carious lesions not only tend to go untreated in people living in underprivileged communities of the developing countries but also in highly industrialized countries. Untreated caries often progresses to a stage such that, when treatment is provided, all that can be done is extraction of the decayed tooth.

A new method for treating dental caries that involves neither drill, water, nor electricity has been developed that can provide curative care to the disadvantage population is called Atraumatic Restorative treatment Technique.

The Atraumatic Restorative Treatment approach for dental caries is often abbreviated to the acronym ART. ART is something nice, beautiful, enjoyable.

In the ART approach, caries is removed by hand instruments only. The cavity and the pits and fissures in the same tooth surface are then carefully cleaned with a weak acid. Restorative material that bonds chemically to tooth tissue is applied to the cavity and the pits and fissures of the same surface. In this approach, a restoration and a sealant are obtained in one procedure. It removes the need for expensive dental equipment – no drill, no electricity, just simple hand instruments. ART is patient – friendly with only a minimal potential for pain. Infection control is relatively simple, as only a small set of hand instruments is used.

Who benefits from ART ?

Remote communities with no dental services.

Towns and villages without electricity.

Housebound elderly.

Elderly living in nursing homes

The physically or mentally handicapped.

“Is ART really a new approach?”

The answer is both “yes” and “no”.

No, because for generations dentists have relied on hand instruments only; when equipment was out of order, electricity unavailable or the patient too frightened to accept the normal equipment in the dental office. However, only temporary filling materials were applied which would not last long. Such an approach was seldom studied and publications are hard to find.

And yes, because ART is an innovative approach for several reasons :

ART is a determined effort to make long lasting restorations with hand instruments only.

The idea of ART is strongly supported by the modern scientific approach to controlling caries : maximal prevention, minimal invasiveness and minimal cavity preparation. The use of hand instruments alone leads to preservation of tooth structure.

Recent improvements in restorative materials, the chemical bonding to the tooth and fluoride release by, e.g., glass ionomers have given ART a solid practical basis.

From the outset, a determined effort has been made to investigate the appropriateness, acceptability and effectiveness of ART.

History of ART :

Some 10 years ago, the WHO Collaborating Centre for Oral Health Services Research at the University of Groningen, the Netherlands, worked on a proposal for the Minister for Development Cooperation of the Netherlands – to develop a model for primary oral health care for refugees and displaced persons. From the issue of refugees, forced migration deprived and undeserved populations it is only a small step to become aware of the other main issue. That is, dental caries is left virtually untreated in the majority of people living in the non-industrialized, economically less developed countries of the world. In fact, this group with no access to proper oral care – constitutes at least two thirds of the world's population.

At that time – 1988 Dr.Jo Frencken was in the Netherlands, in between his assignments out in Africa. He persuaded Taco Pilot to include in the refugee project the treatment of caries by hand instruments only, as had been pioneered in Tanzania in the mid 1980s. the other important topic we agreed upon was to test this new approach under “real-life” conditions.

The community field trial compared ART with the mobile conventional equipment – cavity preparation – amalgam approach started in 1991 in rural Thailand with the assistance of Professor Prathip Phantumvanit, Dr.Yupin Songpaisan and the staff of the University of Khon Kaen, in North Eastern Thailand. Subsequently, reports at IADR meetings and abstracts appeared.

In April 1994, the World Health Organization introduced ART as part of the World Health Day and the celebrations of the Year of Oral Health in Geneva with a press conference, demonstrations, a brochure, etc.

A symposium devoted to ART was held at the 1995 IADR Singapore meeting and the proceedings have been published in a special volume of the Journal of Public Health Dentistry.

A manual was produced especially for those oral care workers who are not familiar with the standard restorative treatment procedures for caries. The present manual is the third

updated edition. The original English version has been translated into French, Spanish, Portuguese, Japanese, Chinese, Arabic and into the languages of Thailand, Laos, Cambodia, Vietnam, Indonesia, Malaysia and Mongolia. In fact, even more versions might exist.

Drawing on his experiences in Thailand, Dr. Jo Frencken started another series of community field trials in Zimbabwe in 1993. This was followed by Dr. Evert Van Amerongen in Pakistan, Dr. Christopher Holmgren in China and Dr. Frencken and Dr. Beiruti in Syria. Other studies have been conducted or are still in progress – in Cambodia, Argentina, Papua New Guinea, Tanzania, South Africa, Hong Kong, Malaysia, Poland and Sweden. Smaller, unpublished studies have been carried out in Fiji and other South Pacific Islands, the Philippines, Indonesia, Vietnam and Gambia. An interesting study is going on in Finland, to test the approach on the home bound elderly. At least 10 universities around the world are carrying out clinical or laboratory experiments on ART related questions.

ART has been placed on the agenda of the International Dental Federation (FDI) and the FDI Commission to consider ART's appropriateness, effectiveness and potential training programmes.

Major Milestones in Development of Atraumatic Restorative Treatment, 1992-95 :

ART forms a major component in a model for community oral health care in refugee and displaced persons encampments.

The Basic Oral Health Workers training in restorative care in one of the refugee camps in Thailand was solely based on ART.

Three year results of ART restorations are available from Thailand.

WHO adopted ART as a principal theme on World Health Day for the Opening session of the year of Oral Health in April 1994. Since then, interest in ART from all parts of the world has been overwhelming, as shown in the remainder of this list.

Information on ART has been requested from and provided to 75 countries.

Promotional presentations and lectures have been given in 28 countries.

ART courses have been held in 19 countries attended by representatives from a total of 75 countries.

Requests for clinical courses have been received from an additional 18 countries.

ART is now part of the regular training program of oral health personnel in Cambodia, Fiji and Zimbabwe.

ART is now being used in 25 countries.

ART field trials are in progress in 11 countries and a further 17 countries have plans to bring field trials.

ART related clinical and/or laboratory studies are in progress at the universities of Adelaide, Amsterdam, Hong Kong, Ho Chi Minh city, Cape Town, Kuopio, Milano, and Nijmegen.

The ART manual is available in English, Spanish, and in the languages of Thailand, Laos, Cambodia, Vietnam, and Japan. Translations into Chinese and French are in progress, while translation into Arabic is under consideration.

Guideline for a research protocol or clinical studies of the ART technique and materials have been developed.

An Electronic information network (ART-ODONT) was launched at the 73rd IADR Meeting in Singapore in 1995.

Development of the ART Approach :

The early ART studies could be considered pilot studies where the approach was being defined and developed. Later studies in Zimbabwe and those being carried out in Pakistan, Hong Kong and China have benefited from the experiences gained from the earlier ART studies. For example the “press finger” technique was first introduced in the Zimbabwe study in 1993. In this technique, glass ionomer material is pressed over the total tooth surface, filling the cavity with a top layer and sealing the adjacent pits and fissures. The pressure is executed with a petroleum jelly coated gloved finger (Frencken 1996). In addition, the newer glass ionomers developed for ART has shown higher survival results in the most recent studies.

ART APPROACH

Frencken J.E. (1996) reported that ART approach to the management of dental caries which has become available through the combination of a better understanding of the dental caries process that permits the employment of minimal cavity preparations and the development of reliable and effective adhesive restorative materials. The approach involves excavating cavitated dentine caries with hand instruments, then restoring the cavity and sealing any associated fissures and pits with an adhesive restorative material. As such it is a combined preventive and restorative procedure, resulting in a sealant restoration.

Frencken J.E. (1998) stated that, unlike conventional cavity preparations, where sound tooth tissue is inevitably removed either intentionally for mechanical retention or unintentionally, the use of hand instrument with the ART approach limits tooth tissue removal to removal of dead tissue and therefore insensitive carious dentine. Local anesthesia is therefore rarely required to make this approach atraumatic to both the patient and the tooth.

Until recently ART has mainly been used under field conditions, and thus the adhesive restorative material used has been glass ionomer which does not require mixing machines and curing lights. The further advantages of this material include chemical bonding to enamel and dentine (Wilson, 1988).

Long term and slow release of fluoride into enamel, dentine, saliva and plaque (Retief

1984, Forss 1991, Hatibovic 1991, Forsten 1996).

Reduced caries progression in tooth tissues that are in contact with the material (Tencate 1995, Qvist 1997), and pulp friendly material (Hume W.K. 1988).

The use of other adhesive materials such as resin-modified glass ionomers, compomers and composite resins are also likely to be suitable materials for ART, but their application for this approach requires evaluation.

IS ART REALLY ATRAUMATIC ?

The atraumatic restorative treatment (ART) approach was originally developed in the 1980s as a means of managing dental caries in disadvantaged areas where extraction would otherwise prevail (Frencken et al 1994). The name of this approach implies that the treatment is atraumatic. In the context of ART, atraumatic could mean the treatment causes no or minimal trauma.

To the patient in terms of pain or discomfort.

To the decayed tooth both in terms of conservation of sound tooth tissue and with respect to the pulp; or that,

Any trauma experienced is less than in other invasive techniques.

The question arises whether to promote ART as a truly atraumatic approach to the management of carious lesions. Compared to non-invasive approaches such as diet counseling, oral hygiene promotion, fluoride applications and other chemical treatments to arrest the carious process, the answer must be 'no'. However, ART must be considered in the context of other restorative procedures for caries. These are all invasive since it is not possible to remove soft, carious tooth tissue prior to restoration without some form of drilling vibration or scraping. Thus, irrespective of the form of invasive intervention some patients will always consider they have experienced some discomfort. This in turn could be considered to be a form of trauma to the patient.

On the other hand, if the ART approach to cavity preparation uses hand instrument alone, is more acceptable to patients and therefore less traumatic. The study conducted by Destri 1997 incorporated a modified ART group where carious cavities were opened with rotary instruments followed by the removal of all remaining soft carious tissue with hand instruments. Despite this small difference in treatment approach, there was significantly more discomfort reported in the modified ART group than in the ART group ($P < 0.05$). It is unlikely that the opening procedure with rotary instruments itself caused physical pain. Either the use of rotary instruments induced

anxiety in the patients thereby leading to an expression of discomfort or the vibration induced by the drill was considered uncomfortable. Regardless of the reasons it is apparent that patients prefer the ART approach to the use of rotary instruments. This holds true irrespective of the person who performed the treatment.

Description of the ART Technique

As with any other oral treatment procedure, ART requires a proper patient-to-operator position. This requirement usually is not a problem in a dental surgery, but requires particular attention in other working environments. A number of devices have been developed and one that is very useful is a light weight, cushioned headrest attached to the short end of a table combined with a foldable cushion for the comfort of the person receiving the treatment.

Since its inception, the ART technique has undergone revisions aimed at improving the basic technique. Unlike many other restorative procedures, usually there is no need to give local anesthesia when using the ART technique because temperature induced pain from using a drill is avoided. Because the technique mainly involves the removal of decalcified tooth tissue, pain can be minimized, and often does not occur at all. Thus, fear of dental procedures is reduced.

The principal steps of ART are described below which are based on illustrations in the ART manual.

Isolate the tooth with cotton wool rolls. Only the tooth or teeth to be treated need to be isolated. Rationale : It is easier to work in a dry environment than a wet one. Cotton wool rolls are available in all parts of the world.

Clean the tooth surface to be treated with a wet cotton wool pellet. Have a small cup of water available. Separate the cotton wool pellets from each other. Then dry the surface with a dry pellet. Rationale : The wet cotton wool pellet removes debris and plaque from the surface, thus improving visibility. The extent of the lesion and any unsupported enamel then can be identified.

Widen the entrance of the lesion. This step is necessary only if the entrance is small. Place the working tip of the dental hatchet in the entrance and rotate it backwards and forwards. For opening very small cavities, the corner of the working tip is placed in the cavity first and rotated. Rationale : The hatchet replaces the bur. By rotating the instrument tip, unsupported enamel will break off, creating an opening large enough for the small excavator to enter.

Remove caries : Depending on the size of the cavity, use either the small or the medium sized excavator. Remove caries at the dentin-enamel junction before removing caries from the floor of the cavity. If working without an assistant, deposit the soft, excavated caries on the cotton wool roll placed next to the tooth. Thin unsupported enamel can be broken away carefully by placing the hatchet on the enamel and pressing gently downward. Wash the cavity with lukewarm water or a small cotton wool pellet. Rationale : All soft caries should be removed.

Thin, often decalcified, unsupported enamel is relatively easy to break off. The enamel and the dentin-enamel junction need to be thoroughly cleaned to prevent caries progression and to obtain a good seal of the coronal part of the restoration. By cleaning the cavity in the proximity of the dentin-enamel junction before that closest to the pulp, any pain caused through the cleaning process is limited to a few moments at the end of cavity preparation.

Provide pulpal protection if necessary. This step is used only for very deep cavities and is achieved by applying a setting calcium hydroxide paste to the deeper parts of the floor of the cavity. The cavity floor does not need to be covered completely because it will reduce the area available for adhesion of the filling material. Rationale : Calcium hydroxide stimulates repair of dentin and glass ionomers are biocompatible. In a recent study on the fate of soft caries dentin left under glass ionomer fillings, hardening after seven months was reported.

Clean the occlusal surface. All pits and fissures should be clear of plaque and debris as much as possible. Use a probe and a wet pellet for cleaning. Rationale : The remaining pits and fissures will be sealed with the same material used for filling the cavity.

Condition the cavity and occlusal surface. Use a drop of dentin conditioner on a cotton wool pellet and rub both the cavity and the occlusal surfaces for 10 to 15 seconds. The conditioned surfaces should then be washed several times with wet cotton wool pellets. The surfaces are then dried with dry pellets. Rationale : Conditioning increases the bond strength of glass ionomers.

Mix glass ionomer according to manufacturer's instructions. Do not alter the powder liquid ratio.

Insert mixed glass ionomer into the cavity and overfill slightly. The mixed material is inserted using the flat end of the applicator, and plugged into corners of the cavity with the smooth side of an excavator or with a ball burnisher. Avoid the inclusion of air bubbles. The material also is placed over pits and fissures in small amounts.

Press coated gloved finger on top of the entire occlusal surface and apply slight pressure. Petroleum jelly (Vaseline) is used to coat the gloved finger to prevent the glass ionomer from sticking to the glove. Place the finger on top of the mixture, apply slight pressure for a few seconds, and remove the finger. Rationale : The finger pressure should push the glass ionomer into the deeper parts of the pits and fissures. Any excess material will overflow the occlusal surface and can be removed easily. A smooth restoration surface will result and reduce the need for carving.

Check the bite : Place articulating paper over the filling / sealant and ask the patient to close. The petroleum jelly (Vaseline) left on the surface will prevent saliva contact with the filling / sealant while the bite is checked.

Remove excess material with the carver. Usually only small corrections are required.

Recheck the bite and adjust the height of the restoration until comfortable.

Cover filling / sealant with petroleum jelly(Vaseline) once again or apply varnish.

Instruct the patient not to eat for at least one hour.

For restoring proximal cavities, a plastic strip and wedges are used to produce a correct contour to the filling.

Advantages and Limitations of ART :

The advantages of ART include the following :

The use of easily available and relatively inexpensive hand instruments rather than expensive electrically driven dental equipment.

A biologically friendly approach involving the removal of only decalcified tooth tissues, which results in relatively small cavities and conserves sound tooth tissue.

The limitation of pain, thereby minimizing the need for local anesthesia.

A straightforward and simple infection control practice without the need to use sequentially autoclaved handpieces.

The chemical adhesion of glass ionomers that reduces the need to cut sound tooth tissue for retention of the restorative material.

The leaching of fluoride from glass ionomers, which prevents secondary caries development and probably remineralize carious dentin.

The combination of a preventive and curative treatment in one procedure.

The ease of repairing defects in the restoration ; and

The low cost.

From experience gained thus far, the ART technique is a non threatening oral procedure. This characteristic has the great advantage of making oral care more popular among the population – in particular, the young. Fear inducing situations caused by threatening dental equipment are not involved, and there is no noise from a drill or from suction equipment. The maximum number of instruments in the mouth at anyone time is similar to that used during an oral examination, the mirror in one hand and a work instrument in the other. ART is therefore, patient –friendly.

Obviously, one of the greatest advantages of ART is that it makes it possible to reach people who otherwise never would have received any oral care. The technique allows oral care workers to leave the clinic and to visit people in their own living environments, e.g. in senior citizen homes, institution for the handicapped, villages in rural and suburban areas in economically less developed countries, and in their own homes. From a health point of view, these possibilities must be considered a huge advantage.

Furthermore, ART supports health education and promotion programs, particularly in areas where oral care relies heavily on pain relief through extraction and oral health education. Using ART, a comprehensive package of education / promotion, prevention, curative treatment, and pain relief can be established and delivered to the population through a low cost, out reach oral health program.

The limitations of ART include the following ;

Long – term survival rates for glass ionomer ART restorations and sealants are not yet available; the longest study reported so far is of three year’s duration.

The techniques acceptance by oral health care personnel is not yet assured.

At the moment tissue is limited to small and medium sized, one-surface lesions because of the low wear resistance and strength of existing glass ionomer materials.

The possibility exists for hand fatigue from the use of hand instruments over long periods.

Hand mixing might produce a relatively unstandardized mix of glass ionomer, varying among operators and different geographical/climatic situations.

The misapprehension that ART can be performed easily – this is not the case and each step must be carried out to perfection.

The apparent lack of sophistication of the technique, which might make it difficult for ART to be easily accepted by the dental profession; and

A misconception by the public that the new glass ionomer “white fillings” are only temporary dressings.

Some of these disadvantages of glass ionomers, such as low wear resistance and reduced strength, are being addressed. When improved materials become available, larger one surface and small to medium sized multisurface lesions might also be managed with the ART technique. Also, the variation in mixtures of hand mixed glass ionomer can be reduced by making the materials more user friendly, a particularly important factor in the economically less developed countries where less than optimal operating conditions exist. The development of appropriate hand instruments will facilitate the execution of the ART technique and, one hopes, reduce the possibility of hand fatigue.

WHY A NEW RESTORATIVE :

Because of the need to find an alternative to AMALGAM....

Discussion in many parts of the world on the continued use of amalgam as a restorative filling material has caused certain countries to actively encourage dentists to cease using such materials by the year 2000. In other countries, no recommendation have been made either way. However with the rapid development of new adhesive dental restoratives that have become available over the past few years, it would seem sensible to try and find modern purpose designed materials that can be used as an alternative to amalgam in Class I and Class II situations.

Because the very young have special needs....

For many years paediatric dentists have been looking for an aesthetic posterior restorative that contains fluoride, adheres chemically to tooth structure without the need for an additional adhesive bonding system and with adequate strength that can be finished and polished in one

visit. Such a material would not necessarily need to last as long as amalgam but rather be capable of lasting the time that deciduous teeth are retained in the mouth.

Because the very old have special needs....

Geriatric patients have particular needs because many times the dentist is working outside the dental surgery – may be in a nursing home or in the patient's own home. For these occasions they need a new generation, simple to use adhesive restorative that releases fluoride and can be applied quickly, effectively and allow the restoration to be completed in a matter of minutes.

Because a real long term temporary with Fluoride release is required...

Thirty years ago, temporary or intermediate restorative zinc oxide material became popular with the dental profession because they fulfilled a need to provide patients with a restoration that could perhaps last for a few months. Today, with modern technology, the new generation of intermediate restorative materials should be able to provide better aesthetics, last longer and provide real long term results lasting years rather than perhaps a few months.

WHY NEW FUJI IX GP :

When it comes to restorative dentistry, the introduction of a new generation wear resistant, high strength, fluoride releasing, adhesive glass ionomer must be of significant importance. Therefore, the introduction of Fuji IX GP for general practice is a real breakthrough in many ways...

Simplicity of use

Time saving technique

Packable and condensable consistency

Extra strength and wear resistance

Lowest solubility of any glass ionomer restorative material

Extra fast placement / finishing technique.

Added to this the ionic bond to tooth structure, excellent biocompatibility and remineralisation effect from good continual fluoride release.

FUJI IX GP :

Glass Ionomer for Posterior Use :

Packable

Fast setting

High strength

Wear resistant

Chemical bonding

Significant fluoride release

Lowest solubility

Radiopaque

6 Vita shades A2, A3, A3.5, B2, B3 C4

Choice of Capsules or Powder & Liquid Presentation

FUJI IX GP : General Practice Glass Ionomer Cement :

Indications for Use :

Final restorative Class I, II deciduous teeth.

Geriatric restorative Class I, II, III, V cavities and cervical erosions.

Final restorative Class I and Class II adult dentition in non-load bearing situations.

Intermediate restorative for heavy stress Class I, II cavities.

Sandwich and core build-up material.

Fissure sealing material for permanent teeth.

FUJI IX IS A.R.T. :

When GC, learned of the field trials in Thailand involving the ART technique, the Research and Development Department made available for evaluation their most advanced conventionally cured glass ionomer cement.

This material exhibited significantly improved physical properties as well as uncharacteristic packability and condensability not normally found in glass ionomer cements.

The W.H.O. evaluation team quickly adopted this new material for use because of ease of handling, speed of set and obvious strength.

The new material was subsequently named after the ART Technique which teaches 9 steps in cavity preparation and placement for glass ionomer cements... Hence Fuji IX.

Fuji IX GP has been modified slightly from the original Fuji IX formulation and is being released in a range of shades and in both capsule and powder/liquid delivery.

ART and the Public's Oral Health :

In common with other treatment procedure, ART should not be used in isolation. It should be supported by measures that control the reasons why a treatment was needed in the first place.

These measures usually include educational and promotional oral health activities, as well as preventive services, other restorative procedures and methods for the control of pain.

The first step in introducing ART into a primary health care system is to teach the skill required to perform the technique. A manual is available that, in its present format, is largely oriented toward nondentally trained personnel. A more scientifically oriented manual will be available soon. The best way to learn how to perform the ART technique is to participate in a clinical course. To date, courses have been held in some 19 countries.

In Zimbabwe, the entire government dental workforce has been oriented toward ART. In various parts of the country, oral care programs have been initiated bringing oral care to a larger part of the population than ever before. The incorporation of ART into primary oral health care was considered a great step forward in the government's endeavor to improve and extend oral health care to a much greater part of the population. A demonstration program was

developed focussing initially on students in their first year of secondary school. The following describes the demonstration program.

The oral health services and promotion program consists of the following elements;

Examination of students to identify those who need care;

Delivery of oral health promotional activities to individual in both the school class room settings and outside;

Provision of preventive oral health measures, including scaling and the sealing of tooth surfaces using glass ionomer;

Treatment for dental caries using ART;

Discussions with school staff on maintaining good oral health in their students after the oral health team has left; and

Evaluation of the overall program and the care provided each year.

The program started in March 1993 in six secondary schools in the Greater Harare area. Of all the students examined, 95 percent required some form of preventive or curative treatment. The program currently is carried out by dentists and newly qualified dental therapists. In addition, the program is being incorporated into the teaching of third year dental therapy students where the students assist the operators, provide oral health education, and carryout scaling and ART as time permits.

So far, the program has been well received by school staff and students, the vast majority of whom are very pleased with the care that they otherwise never would have received.

COMPARISON OF PRESERVATIVE DENTISTRY AND ATRAUMATIC RESTORATIVE TREATMENT (ART) :

Preservative dentistry represents an ultraconservative philosophy of delaying the placement of the first restoration or replacement of restorations until evidence of cavitation or definite failure is observed or is highly likely. This approach places the primary emphasis on accurately diagnosing carious lesions; monitoring the progression, arrest, or remineralization of incipient lesions; educating patients to shift them to a low caries risk; and varying the treatment protocol and recall interval according to the patient's estimated risk of caries initiation or progression. Teeth with cavitated lesions are restored. Noncavitated lesions in high risk patients are arrested by reducing bacterial levels and potentially remineralized through the application of fluoride and/or chlorhexidine or other appropriate bactericidal agents at specific intervals. Successful application of preservative dentistry principles should lead to maximum conservation of sound tooth structure, minimal use of anesthetic, minimal pain, a reduced risk for endodontic treatment and tooth extraction, and an increase in the mean survival time of the affected teeth.

Atraumatic restorative treatment is based on the treatment of cavitated lesions by excavation of carious tissue and restoring the site with a relatively technique insensitive fluoride releasing

material such as a highly viscous glass ionomer. The material must be placed and finished in treatment areas that lack electricity, radiography equipment, dental handpieces, curing lights, and air water syringes. In principle, atraumatic restorative treatment should yield outcomes similar to those associated with preservative dentistry, including avoidance of pain and need for local anesthetic injections, minimal surgical intervention, conservation of sound tooth structure, reduced risk for subsequent endodontic treatment and tooth extraction, and increased survival time of the affected teeth.

In underprivileged communities of developing countries as well as under served populations of industrialized nations, operative dentistry and endodontic therapy are not economically feasible and extraction is the main option for treating teeth with extensive caries damage.

In contrast, preservative dentistry focuses on avoiding or delaying the placement of the initial restoration and subsequent replacements of restorations. The philosophies of preservative dentistry and ART may be similar in that the greatest emphasis is placed on those individuals at highest risk for caries progression.

When the benefits and drawbacks of a given caries treatment are considered, the treatment in question is usually compared with traditional alternatives for treating the population under the specific economic and personnel constraints in question. For preservative dentistry in industrialized countries, the delayed placement and replacement of restorations is contrasted against traditional surgically invasive restorative treatment.

Preventive Aspects of Ideal ART Materials :

The ideal direct filling, ART material should;1) be biocompatible; 2) be tooth colored; 3) have “forgiving” handling properties; 4) be insensitive to moisture or desiccation; 5) harden without special equipment; 6) form stable bonds to enamel and dentin; 7) seal margin gaps against bacteria; 8) release fluoride and/or remineralization agents; 9) release a chemotherapeutic agent when required to arrest disease; and 10) exhibit excellent durability. Fluoride released from restorative material serves three principal roles. It inhibits bacterial action as the pH of plaque fluid decreases, inhibits demineralization as the pH decreases, and enhances remineralization as the pH increases.

The highly viscous glass ionomer materials currently used for ART meet several of these criteria. However, they may be quite deficient in their ability to seal marginal gaps against bacteria and in their sensitivity to desiccation. Furthermore, although they release fluoride over the lifetime of the restoration, this fluoride release alone may not prevent caries progression in all cases. In fact, it is highly unlikely that fluoride alone will prevent caries for patients at the highest risk of the disease. Katz 1982 pointed to use chlorhexidine in conjunction with fluoride to achieve caries arrest and remineralization of adjacent areas of the affected teeth.

Frencken et al reported 3 year results for a study of secondary school children whose teeth were treated by two dentists or two dental therapists with either Type II glass ionomer sealants (ChemFil Superior, Dentsply, DeTrey) or one surface ART restorations using the same material. The sealant was applied to teeth with early enamel lesions and some small dentinal lesions. They found that 85.3% (80.9% to 89.7%) of the ART restorations survived at 3 years compared with 50.1% (25.9% to 68.5%) of partially and fully retained sealants.

Dunne et al in 1996 found that the depths of caries inhibition of Fuji II LC glass ionomer cement and the conventional ChemFil glass ionomer cement were comparable. Although resin modified glass ionomer cements may be more durable than conventional glass ionomer, these materials typically require occlusal adjustment with a handpiece and bur and finishing with abrasive disks. These material would be unsuitable for ART in situations where electricity is not available.

CONCLUSION

The greatest part of the world's population has no access to restorative dental care.

One of the main obstacles is the traditional manner of treating caries, which relies on electrically driven equipment. Compared to conventional treatment approaches, ART is still very young.

The basic concepts of the ART technique are the removal of decalcified dental tissue using only readily available hand instruments, following the modern concepts of cavity preparation, and the use of a high technology adhesive restorative material.

Much progress has been made in researching various aspects of the ART approach. More experience in the actual technique of cleaning carious cavity with hand instrument has been gained and newer, physically stronger glass ionomers have been marketed as a result of its existence.

These developments have most probably led to the higher survival results of ART restorations in permanent teeth in the more recent studies.

ART is based on a sound concept of caries management.

This fact and the results achieved from field studies, should guide oral health care work towards considering ART as an additional means of providing care to the general public.

ART has gained popularity ever since its inception.

It has become a subject for study in many countries.

This is an essential and welcome development that will assist the oral health community in

understanding the limitations and strength of ART not only in clinic but also in the field.

This technique has the potential to make oral health care more available to a larger part of the worlds population than before.

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