

# Atraumatic Restorative Treatment in Dentistry

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## ABSTRACT

Atraumatic restorative treatment (ART) is recommended for use worldwide, not only in developing countries but also in more industrialized countries. Atraumatic Restorative Treatment (ART) is considered to be accepted, both by children and by adult patients. ART is based on the maximum preservation of sound tooth tissue and the minimum discomfort, since there is use of hand instruments also reduces pain due to reduced vibrations occur while use of rotary dental instruments. The use of minimal invasive dentistry and patient comfort is of utmost importance, especially for the school children and anxious and uncooperative patients. Twenty-five years later, ART was accepted by the World Health Organization (1994) and the FDI World Dental Federation (2002). It is included in textbooks on cariology, restorative dentistry and minimal intervention dentistry.

**KEYWORDS:** Atraumatic Restorative Treatment, Caries, Glass Ionomer Cement, Non-invasive Technique

## INTRODUCTION

Dental caries (DC) is defined as an infectious microbiologic disease of the teeth that results in localized dissolution and destruction of the calcified tissues.<sup>1</sup> Dental caries is the most widely spread oral disease in the world, yet it tends to go untreated in underserved communities in both developing and industrialized countries. The World Health Organization actively promotes atraumatic restorative treatment as a viable approach to meet the need for treatment of dental caries. Atraumatic restorative treatment is currently used in 25 countries and is part of regular training programs for oral personnel in at least 3 countries.<sup>2</sup> This approach called "Atraumatic Restorative Treatment" (ART) consists of manually cleaning dental cavities with hand instruments and restoring them with an adhesive fluoride-releasing material. This technique was developed as an exclusive method for prevention and control of dental caries for a rural population with minimum hand instruments and in the absence of power supply. Atraumatic restorative treatment uses manual excavation of dental caries, which eliminates the need for anesthesia and use of expensive equipment and restores the cavity with glass ionomer, an adhesive material that bonds to the tooth structure and releases fluoride as it stimulates remineralization.<sup>3</sup> This approach is a breakthrough towards achieving the goal that all people should retain as many teeth as possible: "Teeth for life".<sup>4</sup>

## HISTORY

The ART was developed in Tanzania in mid-1980s as part of a community-based primary oral health program. The technique consists of caries removal using hand

instruments only, followed by restoration of the cavity with an adhesive filling material, such as glass-ionomer cement (GIC).<sup>5</sup> The earliest attempts to remove caries involved the use of a hand drill. Chemomechanical caries removal is a non-invasive technique eliminating infected dentine via a chemical agent. This process not only removes infected tissues but it also preserves the healthy dental structure, avoiding pulp irritation and patient discomfort.<sup>6</sup>

ART was initially developed in response to the need to find a method of preserving decayed teeth in people of all ages in underserved communities where resources such as electricity, piped water, conventional dental equipment and finance were rarely available or non-operational. The approach that ultimately became known as ART was pioneered in the mid-eighties (1980s) as part of a primary oral health care program of the Dental School in Dar es Salaam, Tanzania.<sup>7</sup> 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 programs. ART was originally introduced for economically less developed populations. However, it also has applications in the industrialized, more affluent part of the world:

- Introducing oral care to very young children, not previously exposed to dentistry
- For patients with extreme fear/anxiety
- For mentally and/or physically handicapped patients and for the home-bound elderly and those living in nursing homes
- In high-risk caries clinics, as an intermediate treatment, to stabilize conditions.<sup>8</sup>

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## IDEAL REQUISITES OF ART MATERIAL

The ideal requisites of ART are as follows<sup>9</sup>:

- Be biocompatible
- Be tooth colored
- Have forgiving handling properties
- Be insensitive to moisture or desiccation
- Harden without special equipment
- Form stable bonds to enamel and dentin
- Seal marginal gaps against bacteria
- Release fluorides and/or remineralization agents
- Release a chemotherapeutic agent when required to arrest disease
- Exhibit excellent durability

## TWO DECADES OF ART

The development and research of the Atraumatic Restorative Treatment (ART) approach, two decades have already passed since the start of the first major study on ART in Khonkaen, Thailand.

### Early research

In the early 1990's, research into the ART approach was spearheaded by a few dedicated workers who saw the true potential for this approach. This research was neither easy nor straight forward since it was often conducted under difficult conditions in the field on shoestring budgets. Moreover, such research was often not appreciated or valued by our peers since ART challenged traditional concepts of restorative treatment and caries management. Despite the early resistance by many to the ART approach, some of whom considered ART to be "third-world dentistry" or "dentistry out of Africa" or even "dirty dentistry", time has proven such pundits wrong.

### International acceptance

The extremely encouraging results of the first ART studies led to support of the approach by international health organizations including the World Health Organization (WHO), the FDI World Dental Federation, the IADR and later the Pan American Health Organization (PAHO). This latter organization, through funding of the Inter-American Development Bank (IDB), also organized Project PRAT, a study whose main objective was to demonstrate the cost-effectiveness of the ART.<sup>10</sup>

## INDICATIONS FOR THE ART APPROACH

The indications for ART are based on the strengths of the approach for certain situations combined with the evidence base for its effectiveness. Thus, the indications can largely be divided into two levels, the patient and the tooth.

**Indications at the Patient Level:** At the patient level, one of the major strengths of the ART approach is that it is well accepted by patients. The high acceptance is

because, unlike most traditional restorative treatment of vital teeth, ART rarely requires a local anaesthetic. This is largely because of the minimally invasive nature of the approach where only necrotic tissue is removed and where remaining sound tissue is retained. Moreover, since rotary instrumentation is not used with ART, the threatening sound from this and the necessary high-volume suction is absent.

**Indications at the Tooth Level:** There is now evidence to show that ART single-surface restorations using high-viscosity GIC have a high survival rate in both primary and permanent teeth. Taken that ART restorations are both minimally invasive and caries protective when compared to other traditional restorative methods, ART restorations might therefore be considered a treatment of choice for single-surface caries lesions. The evidence suggests that ART restorations can be used for multiple surface caries lesions in primary teeth but that, as for other multiple-surface restorations in primary teeth, the survival rates are lower than those for single-surface restorations.<sup>11</sup>

## TECHNIQUE OF ART

**New Approach For Controlling Dental Caries:** The treatment approach that can provide curative care to the disadvantaged population is called Atraumatic Restorative Treatment (ART). Currently, the glass-ionomers that leach fluoride and minimize the onset of secondary caries are used. The often cited disadvantages of glass-ionomers, namely low wear resistance and strength, are minimized because of the cavity preparations of the ART technique usually results in relatively small restoration. Furthermore new glass-ionomers with improved wear resistance and strength are being developed scientifically for the ART technique.<sup>12</sup>

**Instruments And Material Consideration:** The correct instruments should be used for each treatment procedure. The success of any treatment depends on the operator knowing the functions of the various instruments and using them correctly.

### Instruments

Mouth Mirror, Explorer, Pair of tweezers, Dental Hatchet, Spoon Excavator, small Spoon excavator, medium Spoon excavated, large Applier/carver, Glass slab or paper mixing pad and Spatula

### Materials

Cotton wool roll, cotton wool pellet, Clean water, Glass-ionomer restoration material, Liquid and powder measuring spoon, Dentine conditioner, Petroleum jelly, Wedge Plastic strip, Articulation paper

**Operator Consideration:** The operator's work posture and positions:<sup>4</sup>

- It should provide best view for the operator inside of the patient's mouth and both operator and patient should be comfortable.
- The operator sits firmly on the stool, with straight back, thighs parallel to the floor and both feet flat on the floor.

- The head and neck should be still.
- The height of the stool must allow vision to the patient's teeth clearly.
- The distance from the operator's eye to patient's tooth is usually between 30 and 35 cm.
- The operator should be positioned behind the head of the patient.
- The exact position will depend on the area of the patient's mouth to be treated.
- If the patient's mouth is considered to be at the center of a clock face, the range of positions from which the operator can perform all tasks lies on an arc from 10 to 1 on the clock.
- The direct rear position i.e. 12o' clock and the right rear position i.e. at 10o'clock are the most commonly used position.

**Assistance:** Oral care is best provided by a team consisting of an operator and an assistant.

- However assistants may not always be available. In such a situation the operator will have to provide oral care alone.
- When treating patient's, particularly children using ART, it is a great advantage if another person can mix the glass – ionomer.
- This allows the operator to concentrate on the cavity and maintain effective saliva control.
- The operator should first demonstrate the use of instruments and the mixing procedure and train that person until he/she is able to mix the liquid and powder together correctly.

#### Seating Position of Assistant

- The assistant works at the left side of a right handed operator.
- The assistant should sit as close to the patient support as possible, facing the patient's mouth.
- The assistant's head should be 10-15 cm higher than the operator, to allow the assistant to see the operating field and can pass the correct instruments.
- The assistant needs a flat stable surface ie.a table.

#### Patient Position

- ART requires correct patient and operator positions.
- A patient lying on the back on a flat surface will provide a comfortable and stable position for lengthy period of time.
- A head rest made of firm foam or a rubber ring with a cover that improves the comfort of the patient.
- So the patient should be placed on a flat surface, e.g. a bamboo or wooden bed, an appropriate portable dental bed, or a table..
- The patient is positioned so that the saliva collects in the back of the oral cavity.
- The operating field is now over the operator's lap at the height of the operator's chest.

**Patient's Head Positions:** The patient can assist the operator by tilting, turning the head and opening the mouth wide enough to provide access to the area of operation.

These three movements are needed:

1. Tilting the Head
  - a) Backward tilt lifting the chin for access to upper teeth.
  - Forward tilt dropping the chin for access to lower teeth.
2. Turning the Head
  - a) Central Position b) Left turn c) Right turn positions resulting from turning the patient's head.
3. Mouth opening
  - a) fully open b) Partially closed, to relax the cheek muscles for better access to buccal surfaces. The mirror is then used to hold the cheek away from the buccal surfaces.

#### HYGIENE AND CONTROL OF CROSS INFECTION

- If available, always wear gloves.
- Cleaning and disinfection of surface in the working place can be done by using cotton gauzes impregnated with a methyl spirit (Alcohol)
- In a clinic, instruments can be sterilized in an autoclave or a pressure cooker.
- If not in the clinic, a pressure cooker or a pan with a lid to boil the instruments can be used.

#### ART RESTORATIONS STEP-BY-STEP

- Step 1. Preparation Of The Art Instruments And Materials Before The Clinical Procedure
- Step 2. Isolation Of The Operating Site
- Step 3. Examining The Cavitated Tooth
- Step 4. Gaining Adequate Access To The Caries Lesion
- Step 5. Cavity Cleaning
- Step 6. Conditioning The Cavity And Adjacent Pits And Fissures
- Step 7. Mixing Gic
- Step 8. Restoring The Cavity And Filling The Pits And Fissures
- Step 9. Finishing The Art Restoration

#### ADVANTAGES OF ART

The advantages of ART include the following:

- The use of easily available and relatively inexpensive hand instruments can be used.
- A biological friendly approach involving removal of only decalcified tooth tissue, which results in relatively small cavities and conserves sound tooth tissue.
- A straight forward and simple infection control practice without the use of autoclaved handpieces.
- A chemical adhesion of glass ionomer that reduces the need to cut sound tooth tissue for retention of restorative material.

#### LIMITATION OF ART

- Long-term survival rates of glass ionomer ART restorations and sealants are not yet available, the

longest study reported so far is of three years duration.

- The technique acceptance by oral health care personnel is not yet assured.
- The possibility exists of hand fatigue from the use of hand instruments.
- Hand mixing might produce a relatively unstandardized mix of glass ionomer.<sup>13</sup>

## CONCLUSION

ART is not a compromise but a perfect alternative and biological treatment approach for developing countries and special groups in the industrialized world. It requires minimal cavity preparation that conserves sound tooth tissue and causes less trauma to teeth. Need for local anesthetics are reduced and so is the psychological trauma to patients. Simplifies infection control as hand instruments can easily be cleaned and sterilized. ART approach is very cost effective since it is a friendly procedure. It makes restorative care more accessible for all population groups.

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