

# The role of anaesthesia and nursing in dental radiology centers

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## Introduction:

Advancements in imaging technology have greatly simplified the process of diagnosing maxillofacial disorders in the last several years. In recent years, there has been a rise in the use of 3D radiographic diagnostic exams in the field of dentistry and the maxillofacial region. These exams, when analyzed using software that facilitates the viewing of images and various graphic reworking, have many advantages over the traditional method of using multiple radiographs to diagnose and treat pathologies and conditions (Mangano, C., et al., 2018; Alkhayer, A., et al., 2020). Due to its accessibility and prevalence in dental clinics, CBCT has become the most popular and extensively utilized 3D test in general dentistry. From endodontics, where the FoV is very small for individual teeth, to orthodontics, where the FoV is far greater, the ability to change the FoV while preserving a very high picture quality finds its utility in a wide variety of applications.

Here, the risk of biological harm from the patient's exposure to radiation must perpetually have in mind, and for this reason, MRI (magnetic resonance imaging), for imaging methods that employ ultrasound, is experiencing a surge in popularity. Both are being studied more and more for their potential dental clinical applications; however, ultrasound examinations rely on human operators, while MRI examinations are becoming more complicated as a result of the lengthy data acquisition durations required to achieve extremely high resolutions (Reda, R., et al., 2021; Kocasarac, H. D., et al., 2018).

Diagnostic radiology is distinguished by its concentration on diagnosis rather than therapy, making it one of only three fields, alongside anatomic pathology and laboratory medicine, that prioritize diagnostic processes (Balogh, E. P., et al., 2015). In contrast to anatomic pathology, radiography plays a crucial role in the early stages of a patient's treatment and continues to provide diagnostic information throughout the course of treatment. Contrary to laboratory medicine, the interpretation of pictures is closely reliant on the expertise of the radiologist.

Magnetic resonance imaging (MRI) is a significant advancement in diagnostic technology due to its improved ability to visualize anatomical structures with more detail. Due to its noninvasive nature and absence of ionizing radiation, MRI is the preferred diagnostic method. Often, the resolution is higher

compared to the resolution achieved by computed tomography scans. MRI is employed for a wide range of diagnostic investigations and is demonstrating its utility as an interventional instrument.

Magnetic resonance imaging (MRI) is a significant advancement in diagnostic technology due to its improved ability to visualize anatomical structures with higher precision. MRI is the preferred diagnostic method since it is non-invasive and does not involve the use of ionizing radiation. Often, the resolution is better than what is achieved by computed tomography scans. MRI is widely employed for a variety of diagnostic examinations and is increasingly valuable as an interventional instrument (Jacobsohn, P. H., 1988).

### **Types of dental anaesthesia**

Most dental treatments can be done in the outpatient department with local anesthetic infiltration, nerve blocks alone, or mild sedation, which is great for worried patients. However, general anesthesia is needed for pediatric patients, patients with mental disabilities, or patients who truly have an allergy to local anesthetic medicines. The use of conscious sedation, deep sedation, or general anesthesia is reserved for all other important dental procedures that need admission to the inpatient department. Prior to administering any kind of anesthesia or sedation, a thorough physical examination, including a systemic and general assessment, should be conducted, along with any pertinent investigations (Kothari, D., et al., 2013).

### **Local anaesthesia (outdoor/dental chair) in dentistry:**

In dentistry, many local anaesthetic medications have been utilized. The two main classes of local anaesthetic are those belonging to the ester and amide groups. Aside from tetracaine, the ester group of local anaesthetic (procaine, benzocaine, chlorprocaine) has a short half-life, a high allergy reaction rate, and a short shelf life. However, amide chemicals such as Procaine, Lidocaine, Bupivacaine, and Ropivacaine are remarkably stable and rarely cause allergic reactions. Optimal local anesthetic agents have a variety of desirable characteristics, such as a short half-life, enough duration, reversibility, tissue non-irritancy, little or no systemic toxicity, rapid metabolism, and room temperature stability. Due to its

near-perfect safety record as a local anaesthetic agent, lignocaine with adrenaline is the medication of choice for most dental procedures (Corbett, I. P., et al., 2005).

### **Testing of local anaesthetic drugs:**

While most people have little to no problem with local anaesthetic, they do have the potential to cause a wide range of serious side effects, including allergic responses. Although allergic responses have been recorded in less than 1% of cases with local anesthetic drugs, the actual incidence is unclear. There was no actual allergy to the local anesthetic medication in any of the 5018 individuals examined in another investigation for intradermal or patch testing, it is best to utilize local anesthetic medications that do not contain preservatives or vasoconstrictors, as additions containing preservatives, such as bisulfites and methyl paraben, might provide false positive results. Nevertheless, individuals who have a history of allergic disease or drug allergy should always undergo testing (Baluga, J. C., et al., 2002).

### **Types of local anesthesia used in dental practice:**

#### **1) Topical:**

Local anaesthetic can be painlessly injected into non-keratinized tissues (such as the oral mucous membrane) up to a depth of 2-3 mm using topically applied anaesthetic. Topical anesthesia frequently makes use of lignocaine swabs (4%), spray (10%) and benzocaine (20%). A bioadhesive patch containing lignocaine has been a successful method for dental professionals to reduce the discomfort associated with needle sticks (Lee, H. S., 2016).

#### **2) Infiltration:**

Direct injection of 2% lignocaine with or without epinephrine into the buccal, gum, or palate tissue at the location of the dental operation is called infiltration.

#### **3) Blocks:**

Near the nerve, inject 2% lignocaine with or without epinephrine to numb the entire area innervated by the nerve. This is useful for blocking the inferior alveolar nerve, the mandibular nerve, and other similar structures.

## **Monitored anaesthesia care in dentistry:**

Although most dental procedures can be done under local anesthesia, patients who are particularly difficult to work with, such as young girls, those with mental or physical impairments, or those who are afraid of needles or surgery may benefit from light sedation that allows them to remain conscious during the examination but not during the procedure itself. This is especially true for lengthy, complicated, or multiple procedures that need to be done in a single appointment. Conscious sedation and deep sedation are two forms of anaesthesia used in dental procedures, and they involve different medicines and methods.

## **General anaesthesia in dentistry**

General anesthesia is a carefully regulated condition of unconsciousness, characterized by a partial or complete absence of defensive reflexes. Frequently, general anesthesia is not selected as an option in dental treatment because of its significant morbidity and death rates. General anesthesia is recommended for pediatric and teenage patients who have several teeth affected, local infection, allergies or sensitivities to local anesthetics, or who have mental disabilities or epilepsy. General anaesthesia in dentistry encompasses three primary categories of surgical procedures: Dental chair anaesthesia, Day care anaesthesia, and In-patient anaesthesia.

## **Single tooth anaesthesia (STA):**

This advanced pressure-sensing technology ensures rapid and continuous monitoring, allowing for precise administration of anesthesia to the specific tooth requiring repair. As a result, it minimizes pain in the area and offers enhanced comfort while causing less harm to surrounding tissues compared to conventional methods.

## **Electronic dental anaesthesia**

Transcutaneous electrical nerve stimulation (TENS) is a method used to alleviate pain in several diseases such as obstetric analgesia, low back pain, trigeminal neuralgia, and atypical facial neuralgia. Despite being initially utilized in dentistry in 1967, the use of TENS in dental anesthetic has lately resurfaced. Two electronic pads are positioned either inside or outside the mouth, and a low electrical current is

applied through these contact pads, specifically targeting a precise electronic waveform to the nerve bundle located at the base of the tooth. This can be used either on its own or in combination with N<sub>2</sub>O:O<sub>2</sub>. Several authors have discovered that it is quite efficacious, particularly when it comes to children.

### **The role of nursing in dental radiology centers:**

The phrase "dental nurse" is commonly used in the field of dentistry. However, it is regrettable that India does not have a professional body of dental nurses. A dental nurse is a crucial member of the dental team, although this role is filled by a diverse range of persons, ranging from unqualified individuals to registered nurses who are professionals in the field. The gap can be attributed to the absence of standardization and the inadequate training and certification of dental nurses.

### **Duties of a Dental Nurse:**

Dental nurses are certified dental practitioners who offer clinical and additional assistance to registered professionals and patients. If a dental nurse is trained, competent, and indemnified, **they can do the following tasks:**

1. Organize and uphold the clinical setting, which includes the apparatus.
2. Implement infection prevention and control protocols to prevent the occurrence of physical, chemical, and microbiological contamination in the operation or laboratory.
3. Assist the operator by providing support directly next to the chair during treatment.
4. Arrange and organize the necessary equipment, materials, and patients in order to perform dental radiography.

### **Dental nurse's skills and abilities:**

To begin, it is essential that dental nurses possess the standard set of competencies expected of all nurses. The following characteristics:

1. Computer and internet skills at the beginner, intermediate, and expert levels.
2. Keep information confidential.
3. Regularly and actively contributes to team projects

4. One can develop empathy.
5. Clear and concise expression in both writing and speech.
6. Dedication to upholding corporate and ethical standards.

#### **Additional Skills Dental Nurses Could Develop Include**

1. Organize and arrange the necessary equipment, materials, and patients in order to conduct dental radiography.
2. Providing support in the care of patients who are undergoing conscious sedation.
3. Additional expertise in aiding in the care of orthodontic patients.
4. Performing the tasks of pouring, casting, and cutting study models.

#### **The role of radiology in dental centers:**

Some individuals have contended that merely observing an image will inherently result in a comprehensive diagnostic hypothesis, which is then followed by a purposeful examination for characteristics that validate the first diagnosis. Formerly regarded as a type of "retrograde" reasoning, this non-analytical method enables the physician to reach a decision by comparing the radiological image to a comparable image previously observed previously.

Traditional dental training imparts students with fundamental knowledge in the foundational or basic sciences, which will serve as the basis for their future clinical education. Our use of the phrase "basic sciences" pertains to the underlying causes of aberrations at the cellular and biochemical levels, as well as the normal structure and function of the body. Recent research indicates that the fundamental basic sciences are crucial in improving diagnostic accuracy in inexperienced practitioners (Baghdady, M. T., et al., 2009)

Dental imaging examinations have a direct correlation with the process of diagnosing, planning, and treating dental conditions. Nevertheless, the availability of imaging services for dental treatment may not always meet the expectations of the population.

**Legal Nature of Radiology:**

It is commonly acknowledged that subjecting a patient to ionizing radiation during a radiograph might be considered an assault or battery, even though no physical touching is involved.

It might be argued that practitioners have a greater responsibility to inform patients about radiology than other diagnostic services due to the fact that ionizing radiation is invisible.

The lengthy time that passes between exposure and the appearance of any pathology, patients' overall ignorance regarding ionizing radiation and specific doses of various radiographs, the lightning-fast advancements in technology, which have led to both reductions in dosages for certain dental radiographs and increases for others, and changes in the resulting recommendations for diagnostic protocols all contribute to making this duty more onerous than it would be for other dental treatments.

**Records:**

The practitioner or entity responsible for recording radiological records is the rightful owner of those records. Most of the time, this is the dentist or oral radiologist, but in today's world, there may be a modern dichotomy between ownership and access if the practice owner isn't also a practitioner.

Naturally, with the advent of digital radiology, it appears that numerous individuals can now own, maintain, and control images all at once. Regardless of the number of copies, the practitioner retains ownership and must always comply with the requirements of applicable privacy laws when providing copies. A legitimate, signed release form is required whenever an image request is made (Conceição, L. D., et al., 2018)

**Intraoral versus extra oral radiography:**

In general, dentists who work in primary care have traditionally been responsible for taking and analyzing X-rays of the inside of the mouth. This is because if these patients were referred to radiology services, the overall cost of dental care would increase significantly. The delivery of medical radiological services is a major limitation in the field of general dentistry.

Indeed, intraoral radiography plays a crucial role in numerous dental operations, rendering them impossible to execute well without it. Such procedures encompass endodontics, emergency pain management, and implant therapies (Zafar, M. S., & Javed, E., 2013).



**Conclusion:**

Dental disease is a major public health issue that has a considerable influence on quality of life, leading to decreased performance and overall well-being. There is a significant disparity in the oral health condition between the urban and rural populations and developed nations. Qualified and trained dental health planners and policymakers are necessary to comprehend the distinct requirements and resources for creating a successful policy. The Dental fraternity in India bears the responsibility of implementing such policies in partnership with the state and national governments, with the aim of enhancing oral health and overall quality of life across the nation.

The field of dental anesthesia has seen significant advancements since its initial implementation. It is important to highlight that the use of newer medications, procedures, and advanced technology has significantly decreased the occurrence of illness and death related to dental anesthetic. It is important to note that most procedures performed under local anesthesia are supervised by the dental surgeon rather than the anesthesiologist. Therefore, the use of minimal monitoring devices such as a pulse oximeter to monitor vital signs during the procedure, in the absence of a standby anesthesiologist, could raise an alarm before the occurrence of serious complications.

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