

# CHAPTER 1

## Introduction

### 1.1 Statement of the problems and objectives

Achieving local anesthetic success is a crucial part of successful dentistry. If adequate anesthesia is not provided, not only the patients will get the bad dental experience but the dentists will also be stressful.

Although local anesthesia is extensively used to control pain in dental practice, there are many studies that have demonstrated of its failure, especially in mandibular teeth. Wide range of anesthetic success in mandibular teeth has been reported to be between 32-90% (1-4).

The causes of anesthetic failure depend mostly on two major factors, operator and patient dependent factors. The poor anesthetic technique is operator dependent factor. When the anatomy variation, inflammation, as well as psychological status such as anxiety and fear are patient dependent factor.

Inflammation is one of the important contributing causes of anesthetic failure. Several recent studies have reported that the success rates of pulpal anesthesia in teeth with irreversible pulpitis were between 10-75% (5-12). As a result of inflammation, the success rates of the teeth diagnosed as irreversible pulpitis are less than that of the normal teeth without inflammation. There are several explanations of why it is more difficult for the inflamed pulp tissue to achieve the profound anesthesia than the normal pulp does (13). First, inflammation affects the nociceptors, causing the increasing not only in the size of their receptive field but also the occurrence of tetrodotoxin resistant (TTX-R). Consequently, pain threshold is decreased. Second, inflammation induces tissue acidosis, causes poor distribution of anesthetic agent, and lowers the binding to

the specific anesthetic binding site in the nerve cell. Third, inflammation increases blood flow; decreasing of the anesthetic concentration may then occur.

Achieving profound anesthesia in inflamed teeth has always been the challenging issue in dentistry. The researchers have been trying to increase anesthetic success in irreversible pulpitis teeth, including changing the local anesthetic agents (5, 6, 14) increasing the volume of the solution (9, 15, 16), using the supplemental injections (3, 7, 10, 17-21), and using the adjuvant drugs (11, 22-26). Each attempt variously increases local anesthetic success.

Most previous researches (5-11, 14), that studied the anesthetic success of inflamed teeth, reported the success only in the permanent teeth with irreversible pulpitis of subjects who were older than 18 years of age. Whilst, in clinical practice, the anesthetic failure in young permanent teeth, not only found in the teeth diagnosed as irreversible pulpitis but also in the normal pulp with deep caries and reversible pulpitis. Despite these teeth also have an inflammation (27), there is currently no anesthetic success rate report of these teeth in literatures. Because young permanent teeth are different to aged permanent teeth (28-33), in terms of differences in size of pulp chamber, quantity of innervation, blood vessel, and connective tissue, the success rate of pulpal anesthesia in these groups of teeth may also be different.

To date, the data regarding the success rate of pulpal anesthesia in young permanent teeth with deep caries is limited. Because inferior alveolar nerve block alone can not completely provide pulpal anesthesia, especially in inflamed teeth, supplemental injection techniques are usually needed. The most suitable supplemental in this age group should be intraligamentary injection because it effectively increases success of pulpal anesthesia with rapid onset and does not damage the developing permanent teeth.

Therefore, the purposes of this study were to study the success of pulpal anesthesia by the inferior alveolar nerve block in young permanent teeth with deep caries, diagnosed as normal pulp, reversible pulpitis, and irreversible pulpitis; to study the success of pulpal anesthesia by the supplemental intraligamentary injection after the failure of inferior alveolar nerve block in young permanent teeth with deep caries, diagnosed as

normal pulp, reversible pulpitis, and irreversible pulpitis and to compare the success rate of pulpal anesthesia between different diagnoses, which are normal pulp, reversible pulpitis, and irreversible pulpitis.

## **1.2 Anticipated benefits**

The anticipated benefit of this study was to prove that only inferior alveolar nerve block administration can not provide profound pulpal anesthesia in inflamed pulp teeth and intraligamentary injection may be used to increase success rates of pulpal anesthesia.

This research provides a basic knowledge for future research and clinical application to cope with the inflamed pulp teeth that may have pulpal anesthetic problem in restorative and endodontic procedures.



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