بسم الله الرحمن الرحيم

" إِنَّ الَّذِينَ أُوتُواْ الْعِلْمَ مِن قَبْلِهِ إِذَا يُتْلَى عَلَيْهِمْ يَخِرُّونَ لِلأَذْقَانِ سُجَّدًا وَيَقُولُونَ سُبْحَانَ رَبِّنَا إِن كَانَ وَعْدُ رَبِّنَا لَمَفْعُولاً وَيَخِرُّونَ لِلأَذْقَانِ يَبْكُونَ وَيَزِيدُهُمْ خُشُوعًا "

صدق الله العظيم

[الإسراء :١٠٧-١٠٩]

Infiltration Anaesthesia Versus Inferior Alveolar Nerve Block In Extraction Of Mandibular Molars.

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Dedication

To the spirit of my parents.

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التخدير بالإرتشاح مقارنة بالتخدير الحاصر للعصب في خلع ضروس الفك السفلي

رسالة
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كجزء من مقومات الحصول على درجة الماچستير في جراحة الفم

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The use of local anaesthetics is one of the most widely used processes in the daily practice of dentistry. Various local anaesthetic agents are prepared for this purpose. However, studies aiming at finding safer and more effective local anaesthetic agents continue. Practices that started with the discovery of cocaine in 1884 continued and became more widespread with the discoveries of procaine in 1904 and lidocaine in 1948. [1]

The inferior alveolar nerve block is the most commonly used technique for anaesthesia in the mandible, especially the mandibular molars. However, it has challenges of its own [2]. Passing through layers of soft tissue and muscle and depositing the anaesthetic in adjacent to the mandibular foramen can be very difficult [3]. Anatomical variation among patients, including the course of the nerve, location of the mandibular foramen, accessory nerves also innervating the area can all make consistency with this technique challenging [4].

For procedures in the mandibular arch, in adults, the thickness of buccal cortical bone precludes buccal infiltration approaches producing pulpal or lingual soft tissue anaesthesia, necessitating administration of local anaesthetic by nerve block techniques. The use of nerve blocks has several disadvantages compared with the infiltration technique [5].

One drawback is the greater failure rate which is reported at approximately 15%, A second disadvantage is the greater incidence of complications such as trismus, hematoma or paresthesia associated with nerve block as compared to infiltration. A third drawback is the requirement of anesthetizing the entire branch of the inferior alveolar nerve, even if only one tooth is being treated. Therefore, any local anaesthetic that would permit use of infiltration in the mandible would be of great value in dentistry [6].

Mepivacaine, the most local anaesthetic used in Egyptian dental practice, is as effective as 2% lidocaine in obtaining analgesia in healthy or inflamed lower molars after inferior alveolar nerve block [7] but practically**,** it is not effective enough if injected by buccal infiltration to anaesthetize mandibular molars for extraction.

Articaine hydrochloride (AH), a local anaesthetic of the amide group, was synthesized and offered for clinical use in 1976 in Germany. The use of Articaine was initially limited to European countries; however, it was later used in Canada and, after the approval of the Food and Drug Administration, Articaine began to be used in the United States in April 2000 [6].

Many studies were done to asses the efficacy and accuracy of articaine as a local anaesthetic for oral and dental procedures, it is widely used owing to its faster onset and similar success rate compared to other alternatives [8] . Articaine HCI has been claimed to be efficacious for anaesthesia of mandibular pulpal and lingual soft tissue by infiltration. [9] This would be of important clinical benefit as it is in contrast to commonly used anaesthetics which are efficacious by infiltration for labial soft tissue and maxillary pulpal anaesthesia only [10].

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The aim of this study was to evaluate the efficacy of articaine anaesthesia administered by infiltration technique in comparison with the traditional inferior alveolar nerve block technique using mepivicaine in extraction of mandibular molars.

Local anaesthesia forms the backbone of pain control techniques in dentistry. It has been defined as "a loss of sensation in a circumscribed area of the body caused by a depression of excitation in nerve endings" or "an inhibition of the conduction process in peripheral nerves". [11] The word "anaesthesia" is derived from the Greek language. The word "an" means without; and "aisthetos" means sensation. The word was coined by Oliver Wendell Holmes in 1846. [12]

While describing the theories explaining the mechanism of action of local anaesthetic agents we must first know the proposition of the theory; and then study the evidence available in the light of present scientific studies reported in the literature. [13]

Acetylcholine theory:

Proposition: Acetylcholine is involved in nerve conduction.

Evidence: Acetylcholine is a neurotransmitter at the nerve synapses. However there is no evidence that acetylcholine is involved in neural transmission along the body of neuron.

Calcium Displacement theory:

Proposition: local anaesthesia was produced by displacement of calcium from membrane sites that controlled permeability to sodium.

Evidence: studies have shown that variation in concentration of calcium did not affect local anaesthetic potency.

Surface charge theory:

Proposition: local anaesthetic agents act by binding to nerve membrane; and charging the electrical potential at the membrane surface. Local anaesthetic agents made electrical potential at the membrane surface more positive, thus reducing the excitability of nerve by increasing threshold potential.

Evidence: current evidence showed that:

a. Resting potential of nerve membrane; remains unaltered by local anaesthetic agents, i.e. they do not become hyperpolarized.
b. Conventional local anaesthetic agents act within the channels in the nerve membrane rather than at membrane surface.

Membrane expansion theory:

Proposition: local anaesthetic molecules diffuse to hydrophobic regions of excitable membrane, expanding some critical regions in nerve membrane; and thus preventing an increase in permeability to sodium ions.

This theory explains local anaesthetic activity of benzocaine which does not exist in cationic form, yet exhibits potent topical anaesthetic activity.

Specific receptor theory:

It is the most favoured theory today.

Proposition: local anaesthetic agents act by binding to specific receptors on sodium channels in the nerve membrane.

Evidence: biochemical and electrophysiological studies have shown that specific receptor sites exist in sodium channels either, on

(i) external surface

Or (ii) internal surface of nerve membrane.

Once local anaesthetic agents gained access to receptors, permeability to sodium ions is reduced or eliminated; and nerve conduction is interrupted. [14]