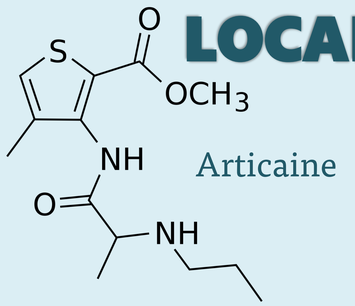
LOCAL ANESTHETIC SOLUTIONS IN DENTISTRY: A COMPARATIVE STUDY



Articaine

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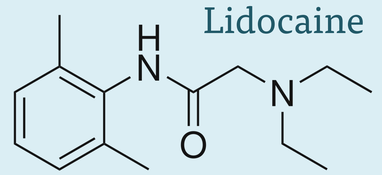


Lidocaine

Keywords: local anesthetic , articaine, lidocaine, dentistry.

Introduction

Pain control requires the study of local anesthesia. Local anesthetics have been available in dentistry since 1884 and today lidocaine and articaine are most often used. The main question is which one is more suitable and presents more advantages.

Material and methods

In order to carry out the study, there were studied a large number of dental books – 14 and foreign clinical studies from PubMed – 7, researchgate – 4, emedicine – 5 and US Library – 6.

Purpose: Analysis of specialty literature to determine if articaine or lidocaine is more effective.

Results

The chemical and pharmacologic properties of a local anesthetic can give valuable information about the clinical effects . The most important ones for both articaine and lidocaine are listed in **Table 1**.

The dissociation constant (pKa) affects the onset of action. Lower pKa, means that more molecules are present to diffuse through the nerve, thus the onset time is decreased.

Characteristic	Lidocaine	Articaine
pKa	7.7	7.8
pH	7.38	7.35
Lipid solubility	4.0	17.0
Protein binding, %	65	95
Metabolism	Liver	Liver, blood
Half – life, min	90	27

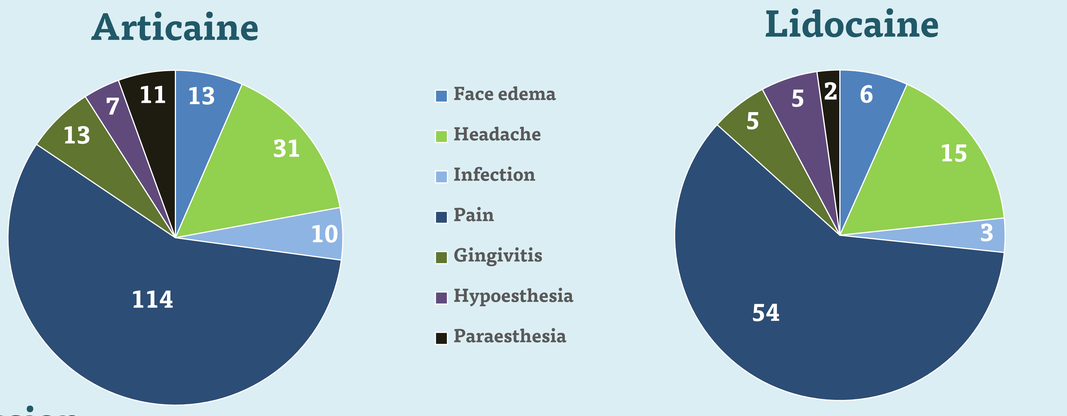
Table 1. Physicochemical and pharmacologic properties of lidocaine and articaine.

Lipid solubility affects the anesthetic potency. Increased lipid solubility enhances diffusion through the nerve, which itself is 90 % lipid (Malamed 2013), more easily. Articaine differs from lidocaine,because it contains both ester and amide linkages. As a result, it is more lipid soluble (Isen 2000).

Protein binding affects the duration. Increased protein binding allows anesthetic cations to be more firmly attached to proteins located at receptor sites. Thus the duration of action is increased.

Approximately 70 % of lidocaine undergoes liver biotransformation . Patients with poor liver function are unable to biotransform it at a normal rate. This leads to increased toxicity. The extra ester linkage in articaine alows it to be 90-95 % metabolized with the help of the cholinesterase enzyme in blood, and only 5-10 % in the liver. This feature is clearly demonstrated when the half-life between articaine and lidocaine is compared, 27 min versus 90 min.

Malamed & al conducted a study to compare the safety between articaine 4 % with adrenaline 1:100 000, and lidocaine 2 % with adrenaline 1:100 000. A total of 1325 subjects participated in these study, 882 in the articaine group, and 443 in the lidocaine. These are the most common adverse effects :



Conclusion

Lidocaine is considered to be more safe, being administrated to children under 4, pregnant woman and allergic pacients, but articaine has a 1,5 times bigger potency, it diffuses faster, binds better with the plasmatic proteins and also is better for pacients with liver problems.

Paraesthesia is the most common side effect of articaine (Jacques A. Baart), but lidocaine also can cause adverse events, which must be taken in consideration.

If we have a standard patient, then articaine will be more suitable to use.