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## 10-Minute EBD: Does Articaine Compared to Lidocaine Result in a Higher Risk of Paresthesia?

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# Does Articaine Compared to Lidocaine Result in a Higher Risk of Parasthesia?

By Ben Balevi, DDS, MSc

## Clinical case

Last week you aborted treatment on a healthy 40-year-old patient because you could not establish profound block anesthesia with Xylocaine 2% (1:100,000EP). She returns today for a second attempt to follow through with your restorative treatment plan of excavating an asymptomatic carious lesion from tooth #31 and restoring it with composite resin.

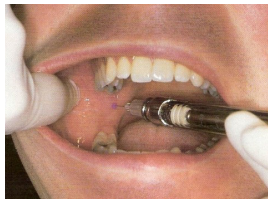
Before getting started, the patient asks, “What makes you think the freezing is going to work this time?” You tell her that since her last session, you searched the dental literature and found a recently published systematic review reporting that 4% articaine (Septacaine) is 2.5 times more effective than 2% lidocaine (Xylocaine) at achieving profound dental local anesthesia.<sup>1</sup>

She thinks to herself and then verbalizes, “Articaine? I think I heard it can cause permanent numbness.” She is reluctant to go any further until she understands the likelihood that this could happen to her. Your understanding is that articaine is a safe local anesthetic contraindicated for those with a known hypersensitivity to it or when administering epinephrine should be avoided. However, you are aware of the low risk of parasthesia from other local anesthetics, but not sure if this also holds for articaine.

Since you are unsure and the treatment is not urgent, you postpone the restorative treatment for another week. This allows you to follow through with

In adults undergoing dental block anesthesia, does articaine, compared to lidocaine, result in a higher risk of paraesthesia?

### Clinical Scenario



A difficult-to- numb patient was given the option of mandibular block anesthesia with 4% articaine. She questions the risk of parasthesia with this alternative injection.

### Literature Search Strategies



**Databases** — Pubmed and Cochrane Database of Systematic Reviews.  
**Search terms** — articaine, Septocaine, Lidocaine, Xylocaine, dental anesthesia, dental, anesthetic, parasthesia, neurotoxicity.  
Twelve articles (three systematic reviews, two narrative reviews, four retrospective studies, two case series and one RCT) were retrieved.

### Evidence Summary



- Parasthesia from administering a mandibular block anesthetic is reported to be as rare as 1 in 13 million to as low as 1 in 20,000
- Evidence suggests 4% articaine may double the chance of establishing profound block anesthesia compared to 2% lidocaine, with a very low risk of causing parasthesia.

another EBD analysis on the potential risks of articaine to the patient.

## PICO question

To address the patient's concerns, you start by defining the issue in the form of the following clinical question: In adults undergoing dental block anesthesia, does articaine, compared to lidocaine, result in a higher risk of parasthesia?

You further break down the question into its PICO components to assist your search for available evidence available to answer this question:

- P** = Adults undergoing dental block anesthesia.
- I** = Articaine.
- C** = Lidocaine.
- O** = Parasthesia.

## Literature search pathway

Using the PICO as your guide, you proceeded to list the following search terms:

- Articaine OR Septocaine.
- Lidocaine OR Xylocaine.
- Dental AND (anesthesia OR anesthetic).
- Parasthesia OR neurotoxicity.

You believe these terms will efficiently find the best evidence available on the Cochrane databases of systematic reviews and PubMed.

Evidence-based medicine considers evidence from a well-conducted systematic review of randomized control trials to be the most valid to guide clinical decision-making.

You first search Cochrane and find a recent update to a review on the effect-  
*(Continued on Page 28)*

## Table of evidence

	Citation	Study	Risk of paraesthesia /Conclusion
1	Jean-Pierre et al. 2021 <sup>4</sup>	Systematic review	0.000007%–0.003% No difference in risk between reviewed local anesthetics
2	Martin et al. 2021 <sup>1</sup>	Systematic review	No reported case of paraesthesia in the articaine and lidocaine groups
3	St George et al. 2018 <sup>2</sup>	Systematic review	No reported case of paraesthesia in the articaine and lidocaine groups
4	Toma et al. 2015 <sup>5</sup>	Review (narrative)	Risk is very rare globally No difference in the risk between local anesthetics
5	Kingon et al. 2011 <sup>6</sup>	Case series	Reports on 5 cases A review of the literature concludes the risk of paraesthesia is 1 in 26,000 to 1 in 750,000 No difference in the risk between local anesthetics
6	Sambrook et al. 2011 <sup>7</sup>	Retrospective analysis based on surveying oral surgeons	1 in 27,415 No difference in the risk between local anesthetics
7	Yapp et al. 2011 <sup>8</sup>	Review (narrative)	Risk is very rare No difference in the risk between local anesthetics
8	Garisto et al. 2010 <sup>9</sup>	Retrospective analysis of FDA data (USA) from 1997-2008	1 in 13,800,970 Incidence of paresthesia with articaine was higher than with other local anesthetics
9	Gaffen et al. 2009 <sup>10</sup>	Retrospective analysis of insurance data (Ontario, Canada) from 1998-2009	1 in 609,000 injections Incidence of paresthesia with articaine was higher than with other local anesthetics
10	Pogrel 2007 <sup>11</sup>	Cases series	Reports on 5 cases A review of the literature concludes the risk of paraesthesia is 1 in 20,000 to 1 in 850,000 No difference in the risk between local anesthetics
11	Malamed et al. 2001 <sup>12</sup>	RCT	Not clear if any cases of paraesthesia with either articaine or lidocaine Found no difference in risk of adverse events between articaine and lidocaine
12	Hass et al. 1995 <sup>13</sup>	Retrospective analysis of insurance data (Ontario, Canada)	1:785,000 injections Incidence of paresthesia with articaine was higher than with other local anesthetics

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tiveness and safety of local anesthetics.<sup>2</sup> This review concludes that articaine may be slightly more effective than Xylocaine, but none of the studies reported any cases of paresthesia in any of the reviewed local anesthetics.

Knowing that paresthesia is a rare event and unlikely to occur in all randomized trials, you open up your search to clinical cases, case-control studies, prevalence studies, observational studies, and other review papers on PubMed. You exclude *in-vitro* studies and studies performed on animals.

PubMed is a free online database with more than 34 million citations.<sup>3</sup> Applying the same search strategy (see above), PubMed retrieved 37 articles. After further review of the abstracts and biography of cited papers, only 12 articles met your a-priori inclusion/exclusion criteria. Three were systematic reviews, two were narrative reviews, four were retrospective studies, two were case series, and one RCT (see table of evidence on Page 27).

### Evidence summary

Parasthesia from administering a mandibular block anesthetic is reported to be as rare as 1 in 13 million to as low as 1 in 20,000. However, only three of the 12 articles concluded the risk with articaine was higher, but still very low, as with other dental local anesthetics.

Science guides evidence-based clinical decisions in the context of the patient's preferences and values. Evidence suggests 4% articaine may more than double the chance of establishing profound block anesthesia compared to 2% lidocaine, with a very low risk of causing parasthesia. The evidence suggests this risk is likely no different than any other local anesthesia and that ar-

ticaine is acceptable for routine use. The patient knowing this evidence can assess the trade-offs and will likely make the reasonable decision to consent to articaine with confidence. ●

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### About the Author

**Ben Balevi, DDS, MSc**, received degrees in engineering and dentistry from McGill University, and a graduate degree in evidence-based health care from the University of Oxford. He is the recipient of the Evidence-Based Dentistry Practice Award granted by the ADA and the International Association for Dental Research. He is an adjunct professor with the University of British Columbia's Faculty of Medicine and a full-time solo-private practitioner focused on the delivery of evidence-based dentistry and patient-centered care, in Vancouver, British Columbia, Canada.



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