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LETTER TO THE EDITOR

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Effect of intraosseous injection versus inferior alveolar nerve block as primary pulpal anaesthesia of mandibular posterior teeth with symptomatic irreversible pulpitis: a prospective randomized clinical trial

Sir,

I read with great interest the article recently authored by Alireza Farhad, Hamid Razavian & Maryam Shafiee (76:06, pp. 442-447, 2018): Effect of intraosseous injection versus inferior alveolar nerve block as primary pulpal anesthesia of mandibular posterior teeth with symptomatic irreversible pulpitis: a prospective randomized clinical trial. Acta Odontologica Scandinavica, DOI: 10.1080/00016357.2018.1428826. I would like to discuss some points with the authors.

In the introduction

The authors state that "at first, IO was administered as a supplemental anaesthetic technique to IANB" (p. 1). Otté who, in 1896, introduced the intraosseous technique (cited by Nogué) as well as Nogué, in 1907 [1], and later in his book "Anesthésie" [2], considered intraosseous anaesthesia as a primary technique, not a supplemental technique.

The authors affirm that "there is limited evidence regarding of efficacy of IO as a primary anesthetic technique for teeth with symptomatic irreversible pulpitis". Two studies conducted with the Quicksleeper CCLAD can be added to the list: Villette et al. showed a success rate of 77.3% (100% after re-injection) [3]; Terrer et al. [4] compared IO anaesthesia with Quicksleeper VS IANB, with a success rate of 86% (100% after re-injection).

The authors point out that, for IO anaesthesia, "some concerns exist regarding the increase in blood pressure" (p. 1). In fact, the systemic effects of intraosseous injection concern heart rate rather than blood pressure alterations. A quick search in the available literature found 16 articles dealing with hemodynamic changes in IO anaesthesia; only three of them investigated diastolic, systolic, mean arterial pressure [6–8]. Numerous studies do show that injecting anaesthetic solutions with vasoconstrictors will trigger a heart rate increase, but the heart rate will usually return to the initial values in less than 4 min [5]. There are no clinically significant changes concerning blood pressure (mean, systolic, or diastolic) [6–9]. On the other hand, Brand et al. explain that hemodynamic variations during dental anaesthesia are greatly influenced by the vasoconstrictor but also by the pain and anxiety associated with the injection. The increase of catecholamine secretion can be more than 10 times the base rate [10], or even 50 times, as stated by Isen [11].

In the materials and methods section

For the Inferior Alveolar Nerve Block (IANB), "if lip anesthesia did not occur within 15 min after IANB, the technique of injection was assumed to be incorrect and the patient was excluded and replaced with another patient" (p. 2). Not achieving lip anaesthesia after 15 min is called a missed block. Although missed IANBs are usually administrated by dental students by lack of experience, unable to deposit the anaesthetic solution at immediate proximity of the IAN, it has been shown that even skilled operators miss blocks [12], whatever the reason (anatomic variations or technical errors). Alternatively, when lip anaesthesia is achieved with no pulpal analgesia, it is a failure of the IANB. Both situations clarify why Malamed writes: "Of all nerve blocks in Dentistry and with few exceptions in Medicine too, the inferior alveolar is the most elusive of consistent success" [13]. This explains – at least partially – why researchers and clinicians are trying to find alternatives to that block. Therefore, the seven cases of missed blocks should be added to the failed blocks for evaluating the real success rate of the IANB, because, whatever the reason (missed block or failure) analgesia is not provided and in a normal clinical setting, it would be impossible to treat the patient on the dental chair. Including these cases in the results would greatly modify them, statistically, in favour of intraosseous anaesthesia: the success rate for the IANB anaesthesia dropping dramatically to 18.9%.

Dealing with IO anaesthesia: it is my clinical experience that the injection point should be distal to the tooth being treated [14], because the vascularization in the mandible is unidirectional and in a postero-anterior direction, so that the anaesthetic solution injected will flow in an anterior, not posterior direction. Villette and al. suggested that primary IO anaesthesia for mandibular molars with pulpitis could prove more efficient by injecting the anaesthetic solution, with the so-called "osteocentral" technique using the Quicksleeper™ CCLAD in the inter radicular space of the first or second molar: they hypothesized that it reduces the distance

between the tip of the needle inside bone and the roots apices, thus increasing the concentration of anaesthetic at the correct location [15].

In the results section

The results provided by this study are globally conform to those observed in other studies. One could have wished more details as to the onset time (the very short onset being an advantage), and the duration of the pulpal analgesia with IO anaesthesia, as it is generally considered to be relatively short. It is widely admitted that onset is almost immediate, and that duration lasts approximately 45 min, which is more than adequate to access the pulpal space and complete biomechanical preparation, in full agreement with the authors' statement.

In the discussion section

The authors write: "the lower success rates in patients with symptomatic irreversible pulpitis may be due to [...] anatomical variations such as cross innervation and accessory innervation" (p. 3): these anatomical variations may lower the success rate whatever the pathological status of the tooth involved (asymptomatic or symptomatic).

Other studies comparing IANB and primary IO anaesthesia, or with IO anaesthesia alone are not cited by the authors (in fact, they are not readily available as they are not in English): Villette et al. [3] and Terrer et al. [4].

The authors write that "contraindications of IO include [...] difficult perforation due to high thickness, developing teeth" (p. 4).

The difficult perforation due to high thickness of the buccal cortical plate is indeed a potential problem: to alleviate this difficulty, Gréaud et al. [15] introduced a new intraosseous anaesthetic technique, which they named "osteocentral". The penetration is performed with a Ø 0.3–16 mm needle, through the summit of the septum, where the cortical is the thinnest. The perforating needle will easily cross micro trabeculae inside bone rather than trying to cross a thick buccal cortical plate. The depth of the needle penetration allows to inject as close as possible to the apex. This new intraosseous technique is now widely used.

Numerous studies by Cabasse et al. [16], Sixou et al. [17–20], Trentesaux et al. [21], Noirrit et al. [9], and Amédée [22] show that it possible to perform intraosseous anaesthesia in children with mixed dentition.

Regarding the choice of Mepivacaine 3% plain: the adjunction of a vasoconstrictor to anaesthetic formulations in intraosseous anaesthesia drastically augments the success rate [5]. The authors justified that they "intended to control the confounding effect of epinephrine on heart rate and blood pressure" by using plain mepivacaine (p. 4). They controlled the effect of exogenous epinephrine (that is usually added in anaesthetic formulations) by avoiding it. But they ignore the release of endogenous epinephrine as a response to the stress induced by an inadequate analgesia ... due to the lack of epinephrine in the anesthetic solution. As explained by Isen [11], the resting level of epinephrine in blood is 10 ng/L; during stress (among other causes: inadequate analgesia), the level of epinephrine in blood can climb up to 500 ng/L (×50) continuously bathing the cardiovascular system as long as the stress agent is applied, whereas the exogenous epinephrine injected during a local anaesthesia will exert a short action (less than 10 min). Therefore, avoiding epinephrine in IO anaesthesia could prove quite counter-productive on cardiovascular level, as well as for success rate and duration of the pulpal analgesia.

Finally, Reader et al. conclude that "a plain solution of 3% mepivacaine should be used in patients sensitive to epinephrine" [5]. I would add: in these patients only.

Disclosure statement

No potential conflict of interest was reported by the author.

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