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Abnormal Change in Arterial Blood Pressure after Adrenaline-Containing in Lidocaine Infiltrated into Oral Submucosa during General Anesthesia

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Abstract

Sudden severe hypotension also occurs in an otherwise stable surgery when adrenaline-containing in lidocaine is infiltrated and care must be taken when using adrenaline-containing in lidocaine because it occasionally induces several adverse reactions. We report the case of a 16-year-old man who scheduled for oral surgery in which abnormal arterial blood pressure changes occurred after adrenaline-containing in lidocaine infiltrated into oral submucosa.

Keywords

Hypotension, Local Anesthetic with Adrenaline, Submucosa, General Anesthesia

1. Introduction

Adrenaline-containing in lidocaine is widely used for dental treatment and oral maxillofacial surgery. Nevertheless, care must be taken when using adrenaline-containing in lidocaine because it occasionally induces adverse reactions, such as hypertension, hypotension, tachycardia, bradycardia and arrhythmia [1] [2].

We reported severe hypotension, abnormal change in arterial blood pressure (ABP), which were induced

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when adrenaline-containing in lidocaine was infiltrated into oral mucosa during general anesthesia.

Written consent for publication was obtained from the patient.

2. Case History

A 16-year-old man, 54 kg, was scheduled to undergo sagital splitting ramus osteotomy. His medical history included infantile asthma. He was prescribed no drug. In lever function, AST was 36 IU/l and γ-GTP 81 IU/l. In respiratory function, %FVC was 73%. All other laboratory values were within normal ranges.

He was administered atropine (0.25 mg) and midazolam (3.5 mg) intravenously 30 min before admittance to the operating room. Anesthesia was induced with propofol (100 mg), fentanyl (50 μg) and vecronium bromide (6 mg), and then maintained with sevoflurane (1% - 1.5%) in oxygen (33%) and nitrousoxide (66%) after endotracheal intubation. The ventilator settings were as follows: high tidal volume 500 ml, respiratory rate 10 breaths/min, peak airway pressure <20 cm H_2O, PEEP 0 cm H_2O. A catheter was inserted into an arterial dorsalis of his foot after the induction. Arterial blood pressure (ABP) was measured via its catheter. When the state of hemodynamics and respiratory were stable, the maxillofacial surgeon infiltrated into the tissue around the right side of the ascending ramus with using 10 ml of 1% lidocaine in combination with 1/100,000 adrenaline (100 mg of lidocaine and 100 μg of adrenaline). The local infiltration was applied at 3 or 5 points on the incision of the oral mucosa for almost 15 seconds. Immediately before change of ABP, his arterial systolic BP (A-SBP) was 122 mmHg, arterial diastolic BP (A-DBP) was 60 mmHg and heart rate (HR) was 62 bpm. At 122 seconds after local anesthesia, his A-SBP fell down suddenly to 58 mmHg, A-DBP decreased to 38 mmHg and the duration of through was approximately 60 seconds. His HR increased to 76 bpm with sinus node rhythm. After approximately 60 seconds in ABP changes, A-SBP rose up rapidly to the value of before change of ABP (**Figures 1(a)-(c)**). The surgery was completed successfully approximately 270 min after this episode. Anaphylactic reaction, for example, wheal, ruber, urticaria, and edema etc., was not found during operation. This patient was discharged from hospital very well two weeks after this episode.

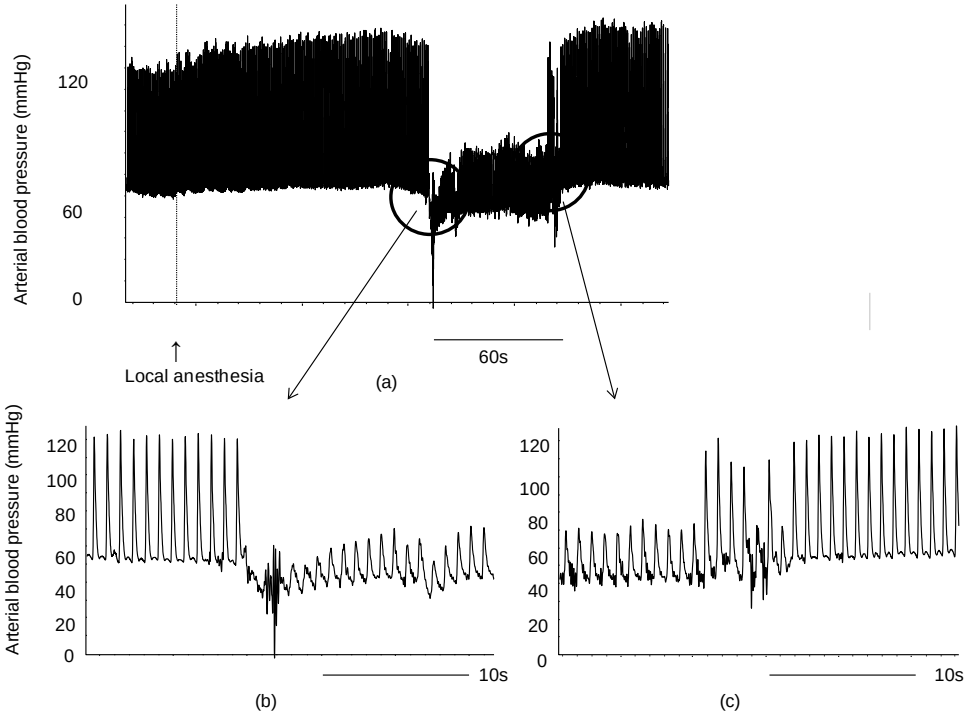

Figure 1. Changes in arterial blood pressure. (a) In our case, ABP decreases rapidly with a delay of 122 seconds after injection and the duration of the through is about approximately 60 seconds. Rapidly, ABP increases to the value of before change of ABP. (b) Arterial systolic blood pressure falls down suddenly to 60 - 70 mmHg. (c) Arterial systolic blood pressure rises up rapidly to approximately 120 mmHg.

3. Discussion

We found out two important clinical issues. Abnormal arterial blood pressure change occurs after adrenaline-containing in lidocaine infiltrated into the oral submucosa. This change, hypotension, is temporary but severe.

First, abnormal arterial blood pressure change occurs after adrenaline-containing in lidocaine infiltrated into the oral submucosa. In our case, at 122 seconds after local anesthesia, ABP fell down suddenly and the duration of through was approximately 60 seconds and HR increased from 62 to 76 bpm. After approximately 60 seconds in ABP changes, ABP rose up rapidly to the value of before change of ABP (**Figures 1(a)-(c)**). Blood pressure decreased due to Adrenaline were not rare and there were many previous reports that severe hypotension induced by adrenaline occurred during General Anesthesia [3]-[5]. In previous reports a typical hypotension was shown that ABP decreased solely to minimum and increased slowly to the value immediately before injection compared with our case, and the average time from infiltration to the lowest pressure was 102 [3] or 124 seconds [5], and pressure restored quickly 90 seconds [3] and the duration of the trough was 92 seconds [5], and HR varied almost 10% from baseline [3] [5]. Type of change of ABP in previous reports [3]-[5] was different from our case but the degree of decrease in ABP, the average time from filtration to the lowest pressure, the duration of through and HR varied were almost the same as our case. Therefore, it is possibility that changes of ABP in our case are induced by adrenaline after infiltrated into the oral submucosa. Adverse reactions, such as hypertension, hypotension, tachycardia, bradycardia and arrhythmia, were due to anaphylaxis, reaction to vasoconstrictor and overdosage of adrenaline, etc. [1] [2]. The hemodynamic effects of adrenaline are dose-dependent and different dose adrenaline may active different types of sympathetic receptors. A rate of 1 to 2 μg/min, through rarely used, should predominantly activate β_2-receptors with resulting vascular and bronchial smooth muscle relaxation. A rate of 2 to 10 μg/min should predominantly activate β_1-receptors to increase heart rate, contractility, and conduction and decrease the refactory period. Dose in excess of 10 μg/min cause marked α-stimulation with generalized vasoconstriction [6] [7]. And the major mechanism for the occurrence of the hypotension was presumed activation of β_2-receptors [6]-[8]. Though we do not have enough data to know the reason why hemodynamic changes in our case occurred, we thought that the absorption of adrenaline is different, the blood levels of adrenaline are low which mainly excite β_2-receptors and β_2-receptor-induced vasodilation in muscle beds would occur suddenly [7]-[9]. However, in this case, we did not know whether inadvertent intravenous injection occured, and why it could not be a Bezold Jarisch reflex simply. But there is no report about hemodynamic change patterns like our case. Thus, hypotension associated with adrenaline does not always occur with slow decreases in systolic and diastolic ABP.

Second, this change, hypotension, is temporary but severe. In this study, A-SBP decreased from 122 mmHg to 58 mmHg, A-DBP decreased from 60 to 38mmHg and the duration of through was approximately 60 seconds. The temporary but severe hypotension was observed within almost 1 min. Therefore, when we observe the severe hypotension after local anesthetic infiltration into the oral submucosa, we may avoid administering intravenously atropine sulfate or an adrenergic agonist, ephedrine hydrochloride, *et al*., in haste. The other report indicated that since the hypotension commonly lasted only 90 seconds or so, and then BP would increase to nomotensive or hypertensive level, no treatment but careful observation was the best treatment in this condition [3].

4. Conclusion

Abnormal arterial blood pressure change occurs after adrenaline-containing in lidocaine infiltrated into the oral submucosa and this change, hypotension, is temporary but severe. The effects of infiltrated adrenaline-containing in lidocaine on hemodynamics are variable and difficult to anticipate. Therefore, we do not judge whether the effect of adrenaline-containing in lidocaine differs depending on the region of the body at which it is introduced. It is prudent to consider the possibility of marked severe hypotension when adrenaline-containing in lidocaine is infiltrated into the oral mucosa.

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None

Conflict of Interest

The authors declare that they have no conflict of interest.

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