



Legal Dentistry

CAN DENTAL ANESTHESIA LEAD TO DEATH? CRIME INVESTIGATION REPORT.

Anestesia odontológica pode levar à morte? Relato de investigação criminal.

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ABSTRACT

Emergency situations that may lead to the death of an individual, even when there is no cause directly related to the treatment, occur with certain frequency in dental offices. The purpose of this study was to report a case that involved an inquiry and police investigation related to the death of a female patient after the injection of two ampoules of 2% lidocaine anesthetic for dental treatment. The patient died despite assistance given by the professional and by SAMU (Urgent Mobile Medical Service). The legal authorities inquired into the possibility that the amount of anesthetic may have caused the patient's death. However, it was proven that the amount of anesthesia was adequate, and the recommendation of the Public Prosecutor's Office was for closure of the case because of lack of evidence justifying occurrence of the crime.

KEYWORDS

Forensic dentistry; Anesthesia, dental; Death, sudden; Tooth extraction; Emergencies.

INTRODUCTION

Emergency situations that may lead to the death of an individual, even when there is no cause directly related to the treatment, occur with certain frequency in dental offices^{1,2}. From 2006 to 2015, 17 cases involving patient deaths associated with or related to dental treatments were reported in the Brazilian press³.

In a survey conducted with 620 German dentists, it was discovered that vasovagal syncope was the most commonly related medical urgency among these professionals. Among the emergencies reported over the period of one year, there were 2 cases of cardiac arrest and 42 life-threatening events, including acute myocardial infarction, anaphylactic shock,

airway obstruction and cerebrovascular accidents (strokes)¹. In another study with 1093 dentists in England, Wales and Scotland, 2287 urgency and emergency situations were reported. The most frequent causes of medical emergency included seizure, swallowed foreign bodies, hypoglycemia, chest pain associated with angina pectoris, and events associated with diabetes².

With respect to outpatient dental treatment, the cases reported worldwide of death associated with anesthetic procedures are not rare, mainly when performed with nitrous oxide^{4,5}. In England and Wales, 48 deaths of patients were associated with anesthetic procedures between 1963 and 1968, and hypoxia was the main cause of death⁴.

There are few studies in the literature that analyze the criminal responsibility of dentists in cases of possible death of a patient caused by dental treatment. The purpose of this study was to report a case under investigation regarding the death of a patient after a dental anesthetic procedure, and to point out that dentists may be criminally liable if the patient's death occurs during dental treatment. The study discusses the legal aspects inherent to the case reported.

CASE REPORT

A 67-year-old woman was accompanying her husband on a dental appointment. However, the anamnesis performed by the dental surgeon indicated that the patient could not undergo the procedure due to health issues. For this reason, his wife asked if she could be

treated instead of her husband, during the time scheduled for her husband's appointment.

According to the depositions, the dentist began tending the victim by taking an anamnesis, according to which no obstacle was found to performing the dental treatment. The victim's daughter reported that her mother had no health issues, and that she was not taking any daily medication. Moreover, she had been submitted to dental treatments in the past with no complications. A restoration was performed, followed by an infiltrative anesthesia procedure to extract a residual root. Two ampoules of 20 mg/ml lidocaine hydrochloride with 0.04 mg/ml norepinephrine hemitartrate were injected.

The dentist reported that the patient felt ill after this procedure. He immediately placed the patient in a recumbent position and called SAMU (Brazil's Urgent Mobile Medical Service). The SAMU attendant advised the dentist to keep the patient lying in lateral decubitus and wait for rescue. Accordingly, the dentist took the patient, who could still walk, to the office waiting room. After laying her down, he went outside to ask the people who were at the bus stop in front of the clinic to guide the SAMU team to the scene of the incident.

At that moment, a woman introducing herself as a nurse, entered the building and started to perform thoracic compressions and mouth-to-mouth resuscitation on the patient. When SAMU arrived, the team continued the resuscitation maneuvers.

According to the SAMU attending file, the patient was receiving assistance when the team arrived on the scene. A

cardiac monitor was installed, and asystole (lack of electric activity and cardiac contractions) was verified. The team then initiated advanced cardiopulmonary resuscitation (CPR) maneuvers, including orotracheal intubation and adrenaline administration. Death was declared 30 minutes after the efforts were unresponsive.

The necropsy record attests that the cause of death was cardiac tamponade, hemopericardium and internal abdominal hemorrhage, as the result of the disruption of the heart and the liver caused by multiple fractures of costal arches (resuscitation maneuvers). The medical report also reveals that the rupture of the atrium and left ventricles of the heart were in areas of acute myocardial infarction. However, it cannot be determined whether the rupture of the heart was located in a previously injured area.

The Public Prosecutor sent the conclusive police inquiry records to the Prosecutor's health support biomedical service, requesting analysis of the document investigating into the anesthetic dosage applied for the dental procedure, and questioning if the procedures adopted by the professional involved were adequate.

In the inquiry, documents of the deposition of all those involved in the event were presented to the police authority, together with dental and necropsy records. The technical opinion was comprised of three main parts: a detailed record containing an organized description of the facts, according to the documents supplied, a literature review on the subject, and a discussion in which the professional's actions and omissions regarding the case were collated with the recommendations

reported in the pertinent medical-dental literature.

Although the case in process is public and not under judicial secrecy, the Public Prosecution of the State of Rio Grande do Sul authorized its publication in compliance with ethical aspects, undertaking to maintain the secrecy of those involved.

DISCUSSION

It is not infrequent to hear accounts from dentists throughout the world who face situations of urgency and emergency in dental offices. Commonly, these situations are not directly related to dental treatment or even of odontogenic origin, but still require the professional to be prepared to deal with these situations^{1,6}. In Brazil, professional omission of assistance in these cases may be taken as culpable homicide, Art. 121, §3 and §4 of the Brazilian Penal Code⁷.

The high frequency of emergencies in the European and North American medical-dental literature involves nitrous oxide sedation^{1,2,4}. It is worthy of note that, unlike what occurs around the world, it is not common in Brazil to administer sedation with nitrous oxide for outpatient procedures. According to a study of 17 cases of death in Brazil, dental extraction was the most common procedure associated emergency situations. The deaths were caused mainly by complications such as infection, and incidents occurring during procedures, such as mandibular fracture and hemorrhage³.

Aiming at shedding some light on the present case, it was decided that the adequacy of the anesthetic dose applied during the dental procedure be brought into question, considering that the dental

professional is required know the indicated and the maximum dose, among other aspects of the drug to be administered to the patient.

Lidocaine has been used in dentistry for almost seven decades. It is the most popular anesthetic in the United States, comprising over half of the 235 million anesthetic cartridges marketed annually, and is considered the most suitable anesthetic for dental treatments of patients, including children, due to its fast-acting and fast-lasting effects^{8,9}. In the specialized literature, it is consensual that the lidocaine used in dental offices is a safe anesthetic, given the rare allergic reactions associated with it^{10,11}.

The most common adverse reactions related to anesthetics are syncope, hyperventilation, nausea and vomiting, alterations of heart rate or blood pressure, and reactions that mimic allergies^{12,13}. Most of the adverse effects have a psychogenic idiopathic trigger, or may be the result of a pharmacological effect associated to a sympathomimetic vasoconstrictor^{14,12}.

Absolute contraindications for the use of lidocaine associated to norepinephrine are a history of hypersensitivity to the formula compounds and malignant hyperthermia (hyperpyrexia). Significant hepatic and cardiovascular insufficiency and hyperthyroidism are relative contraindications^{15,16}. The literature recommends only guided anamnesis before administering anesthetics, without performing specific exams. The maximum dose of lidocaine with a vasoconstrictor of 7 mg/kg should not exceed 500 mg¹⁴. The maximum recommended dose of lidocaine

without norepinephrine is 4.4 mg/kg, and the limit per session is 300 mg^{15,16,17}.

The recommended dose of norepinephrine for healthy patients is 0.34 mg, and 0.14 mg for patients with cardiovascular disease. According to the present case file, the dental surgeon conducted a pertinent anamnesis before injecting lidocaine with norepinephrine. The patient had no health issues, nor was she taking medication that contraindicated use of the drugs. The dental surgeon's report states that the patient was anesthetized with the content of two flaskets each containing 1.8 ml of anesthetic, that is, 0.78 mg/kg of lidocaine (17.7% of the maximum dose, considering her weight) and 0.072 mg of norepinephrine (21.4% of the maximum dose, considering her weight).

The most important documents to ensure the best professional defense in cases like the one under study include dental records containing the anamnesis, and a request for complementary exams, such as a periapical radiography. In all dental surgical procedures, the maximum dose of anesthetic should be observed, and the blood pressure should be measured during the physical examination, taking care to avert any intervening event that could affect blood pressure. This report relates a procedure of low complexity and low morbidity/mortality, and attributes the result to a fortuitous event.

In the case reported, the dentist took the anamnesis. This document should include the patient's data, main complaint, current illness history, medical and dental history, information on intake of medications and allergies, and research concerning other

pathologies. The patient must validate the document with his/her signature¹⁸. The records of this case did not contain a copy of the anamnesis, but the witness reports state the information that the patient had already performed previous anesthetic procedures without complications, and was unaware of any health problem.

It is important to emphasize that the importance of physical exams includes measuring the blood pressure of all patients routinely. In a study with 280 youths, mean age of 21.6 years, it was found that 4.3% had above normal blood pressure. A patient's blood pressure may also increase because of the stress associated with taking an anesthetic or undergoing dental procedures^{19,20}.

A situation like that of this case can be understood as fortuitous, since the anesthetic procedure was of low complexity, and not life-threatening. Although the call placed by the dentist to SAMU was the correct procedure, it is important to emphasize that the professional must be knowledgeable in first aid to give the victim the best possible care until the specialized assistance arrives, thus increasing the patient's chances of survival. Based on the symptoms that developed immediately after administering the medication, the dentist understood their severity and called SAMU. He followed the instructions given by the first care providers, thus showing that there was no negligence, imprudence, or malpractice on his part. For this reason, the case was filed.

In Brazil, the *judiciary* is saturated, despite government efforts to speed prosecutions. Data from 2013 reveal that

there were 95.14 million prosecutions in that year, but only 30% of the new cases were judged, and there were many lawsuits carried over from previous years. Moreover, in comparison with 2012, the number of proceedings in the Brazilian judiciary increased 3.3%, whereas there was an increase of only 1.8% in the number of magistrates, thus aggravating the legal system overload²¹. Simultaneously, complaints and lawsuits against dentists have increased in Brazil due to such issues as the efforts to elucidate the population, in order to raise awareness of their rights, and the greater number of pertinent legislations regarding citizens' rights^{22,23}. With this in mind, the resolution of cases by the district attorney is of utmost importance for providing the population with quick responses, and avoiding the institution of legal proceedings in the judicial system.

The Prosecuting Council in Brazil is an autonomous institution that must assure observance of laws and render legal decisions. It must also ensure police investigations are conducted with impartiality and without partisan bias^{24,25}. In the present case, the death of the victim occurred after administration of a local anesthetic by the dentist. The Prosecutor had no specific technical knowledge that could connect the patient's death with the actions or omissions of the health professional, in order to establish a causal nexus.

The technical contribution of the Public Prosecutor's medical and dental assessors was important in the investigation of this case. They played an important role regarding the anesthetic dose and the appropriateness of the procedures adopted

by the professional, and also enabled a comparison to be made between the procedures used and other data collected at pre-hospital admittance, data from the coroner, and dental-legal data laying the groundwork for filing the case and avoiding accusation of the judiciary.

FINAL CONSIDERATIONS

The dentist was legally qualified to conduct the anamnesis before beginning the professional procedure, to apply an adequate anesthetic, to provide first aid, and to call a specialized medical support team. There was no evidence justifying the occurrence of a crime; therefore, the Public Prosecutor recommended that the case be filed.

RESUMO

Situações de emergência que podem levar à morte de um indivíduo, mesmo quando não há causa diretamente relacionada ao tratamento, ocorrem com certa frequência nos consultórios odontológicos. O objetivo deste estudo foi relatar um caso que envolveu uma investigação e um inquérito policial relacionada à morte de uma paciente do sexo feminino após a injeção de duas ampolas do anestésico lidocaína a 2% para a realização de tratamento odontológico. A paciente faleceu apesar da assistência prestada pelo profissional e pelo SAMU (Serviço de Atendimento Móvel de Urgência). As autoridades investigaram a possibilidade de que a quantidade de anestésico poderia ter causado a morte do paciente. No entanto, foi comprovado que a quantidade de anestesia era adequada e a recomendação do Ministério Público foi de encerramento do caso devido à falta de evidências que justificassem a ocorrência do crime.

PALAVRAS-CHAVE

Odontologia legal; Anestesia dentária; Morte súbita; Extração dentária; Emergências.

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