

The Incidence of Complications Associated with Local Anaesthesia

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Abstract

Background: Considering local anesthetics are commonly used in medical practice, they are likely to be a significant source of drug-related complications in the hospital. Additionally, the physician will be more frequently presented with the treatment with high patients, resulting in an increase in the incidence of negative impacts. The study's goal was to determine the frequency of complications associated with local anesthetic.

Methods: This prospective observational study was carried out in the Department of Anesthesiology, M Abdur Rahim Medical College, Dinajpur, Bangladesh, from July 2020 to June 2021. In this study, 120 patients receiving local anesthesia were evaluated by questionnaire for risk factors, type and dosage of local anesthetic applied, type and duration of treatment, and complications associated with the administration of the local anesthetic. Statistical analysis of the results was obtained by using window-based computer software devised with Statistical Packages for Social Sciences (SPSS-22). **Results:** Of all patients, 45.9% had at least one risk factor in their medical histories, with cardiovascular diseases and allergies being the most frequent. The overall incidence of complications was 4.5%. It was significantly higher in risk patients (5.7%) than in nonrisk patients (3.5%). The most frequently observed complications (dizziness, tachycardia, agitation, nausea, and tremor) were transient in nature and did not require treatment. Severe complications (seizure, bronchospasm) occurred in only two cases (0.07%). Additionally, doses of local anesthetics proved not to be strictly determined according to body weight, especially for patients weighing less than 50 kg. **Conclusion:** In summary, it can be stated that local anesthesia can be considered safe. Nevertheless, the incidence of complications due to anesthesia can be expected to be further reduced if (a) patients are routinely evaluated for risk factors with an adequate medical history prior to treatment, (b) doses of local anesthetics are strictly determined according to body weight, (c) anesthetics with low concentrations of epinephrine are used, and (d) the concept of a differentiated anesthesia is applied.

Keywords: anesthesia, Local anesthetics, Epinephrine, Side effects, Complications.

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I. Introduction

Local anesthetics are commonly used in medical practice, thus they can be a major cause of drug-related issues in the Hospital. Furthermore, as life expectancies rise and medical and therapeutic treatments advance, today's physicians will be more frequently called upon to treat high-risk patients, resulting in an increase in the prevalence of systemic problems [1]. In 1966, Freitag [2] observed a 7% incidence of anesthetic issues (21 instances out of 299), while Persson [3] discovered a 2.5 percent incidence of side effects after reviewing 2960 cases in 1969. Lidocaine was developed for local anesthesia in 1976, and it has since been the most often used local anesthetic in the hospital (it accounts for more than 90% of all applications in Germany) [4]. It is now feasible for the physician to choose a local anesthetic from a wide range of options. According to the patient's unique risk factors and prior conditions, as well as the length and type of therapy. As a result, this differentiated local anesthesia might assist to lessen or even eliminate anesthetic-related adverse effects [5].

II. Methods

This prospective observational study was carried out in the Department of Anesthesiology, M Abdur Rahim Medical College, Dinajpur, Bangladesh, from July 2020 to June 2021. In this study, 120 patients receiving local anesthesia were evaluated by questionnaire for risk factors, type and dosage of local anesthetic applied, type and duration of treatment, and complications associated with the administration of the local anesthetic. Each physician who agreed to take part in the study received three questionnaires and information concerning the handling of the questionnaires. There were absolutely no limitations or specific instructions for inclusion of patients in the study with regard to biological data, type and duration of treatment, or type/branch of local anesthetic to be used. The physician was asked to document the treatment of the first three patients receiving anesthesia after receipt of the questionnaires. For each question, there was a detailed list of answers for the physician to choose from. Participants also had the opportunity to freely add relevant information. The data used in this paper represent only the results from those questions dealing with complications associated with local anesthetics. Statistical analysis of the results was obtained by using window-based computer software devised with Statistical Packages for Social Sciences (SPSS-22).

III. Results

All three values reached statistical significance at $P < 0.0001$ when compared with each other. Of the patients visiting the hospital, 45.9% had one (30.4%) or more (15.5%) risk factors in their medical history. Physicians most often encountered patients with cardiovascular diseases (22.1%), allergies (19.9%), metabolic diseases (10.4%), and pulmonary diseases (5.1%) (Figure 1). Also, 28.4% (773) of all patients were on a daily medication, with 7.9% taking more than two drugs daily. These patients were most frequently medicated with oral contraceptives (18.5%), ACE inhibitors/Ca-channel blockers (18.4%), thyroid/antithyroid drugs (15.1%), cardiovascular drugs (13.1%), antihypertensive drugs (9.2%), NSAIDS (7.4%), antidiabetic drugs (7.1%), platelet aggregation inhibitors (6.2%), psychopharmaceuticals (5.3%), Lidocaine drugs (4.4%), anticoagulating drugs (3.6%), diuretics (3.5%), drugs against hyperlipoproteinemia/hypercholesterolemia (3.2%). for internal use (1.9%), therapeutics against gout (1.8%), drugs against epilepsy (1.4%), and antihypotensive drugs (1.4%). Additionally, 6.0% of all patients self-medicated themselves without medical indication with NSAIDS (61.5%), psychopharmaceuticals or sedatives (20.7%), and antibiotics (6.7%) prior to their visits. Patients undergoing surgical procedures premedicated themselves in 9.5% of all cases compared to 4.3% of patients undergoing conservative treatment and 3.6% undergoing prosthetic treatment. Patients most often received surgical (36.2%) or conservative (33.8%) treatment. Prosthetic procedures accounted for 24.1%. Of all procedures, 46.5% took less than 20 min, and only 9.8% lasted longer than 90 min. Lidocaine (4%) with epinephrine 1: 200,000 (51.5%) and Lidocaine (4%) with epinephrine 1: 100,000 (38.7%) were the most frequently administered anesthetic solutions. Bupivacaine (3%) was used in only 3.0% and Lidocaine (2%) with epinephrine 1: 100,000 in 2.1% of all local anesthetics. The average doses patients received were highest for Lidocaine risk factors and that Lidocaine was given more often to patients without risk factors (Figure 3).

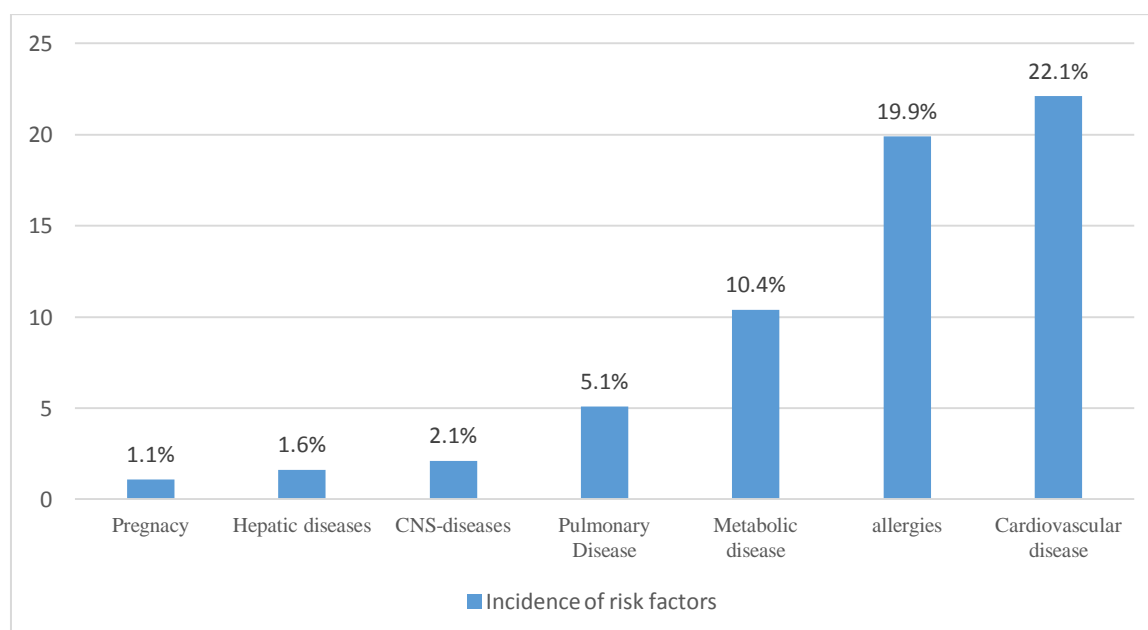


Figure 1: Incidence of risk factors

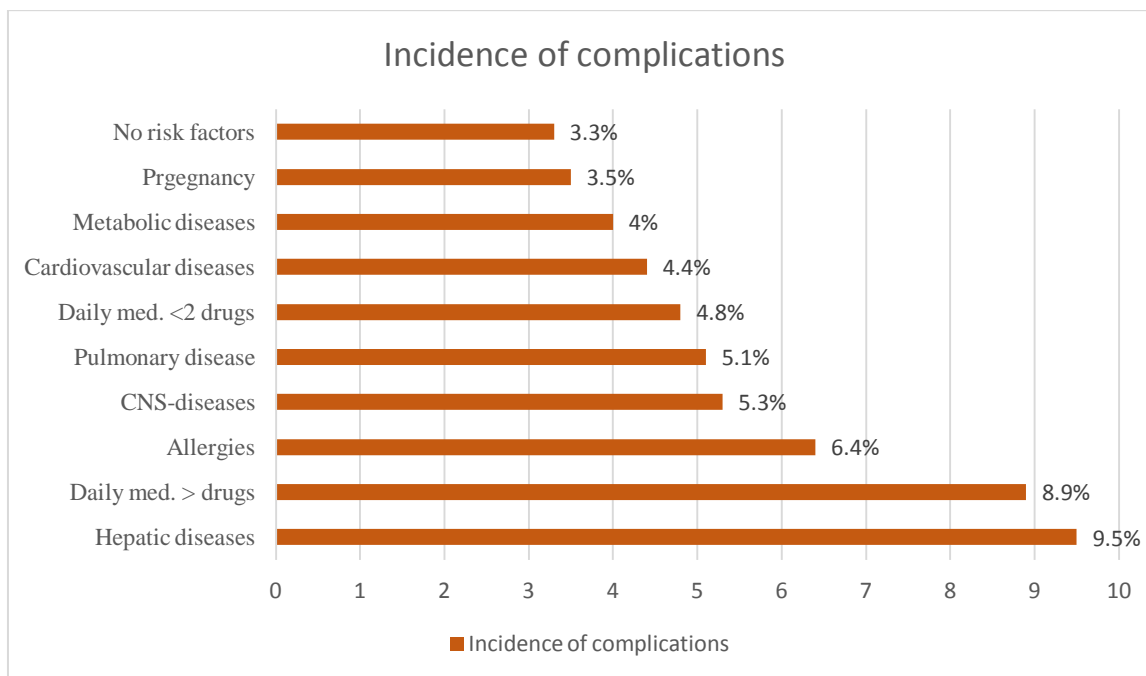


Figure 2: Incidence of complications in all patients depending on preexisting risk factors

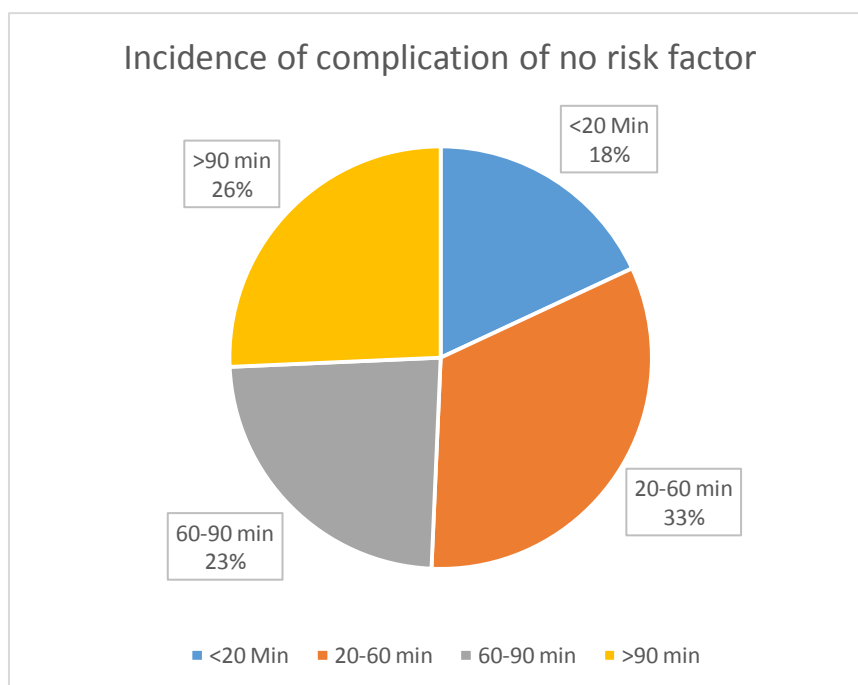


Figure 3: Incidence of complications depending on the duration of treatment.

IV. Discussion

This study would suggest that today's practitioner should be aware that more than 45% of patients will have one or more concomitant diseases in their medical histories and that about 20% of all patients will suffer from cardiovascular diseases or allergies. Severe side effects (one bronchospasm, one seizure) occurred in 2 of 120 cases reported (0.07%), which is ever, taking a medical history is not part of the daily comparable to the incidence of 0.05% of severe complication. According to a study performed by Jakobs, complications in general anesthesia [6]. Thus, reports on incidences of complications associated with it is essential for physicians to take a medical history in general (7.6%), (23.2%) and regional anesthesia (0.2%) order to reduce or even prevent side effects associated [7]. Side effects were observed in 5.7% of risk with anesthesia, because this enables the physician patients receiving local anesthesia, compared to to apply a differentiated anesthesia that meets. [9] Requirements of the patient [5,12] report an increase in side effects associated with general. Additionally, self-

medicated patients required Anesthesiologists) to 23.3% for ASA II patients, and reinjection more often (28.6%) and received higher even up to 33.8% and 34.9% for ASA III and ASA IV maximum doses of local anesthetic (3.4 ml). Taking into patients, respectively. Thus, with the lowest incidence account that 61.5% of the self-medicated patients will of complications being associated with local an- have taken NSAIDS or aspirin, it proves to be the safest anesthetic procedure ported by the findings of Reinhart et al [3], who showed compared to general or regional anesthesia. that people taking analgesics, NSAIDS, and antibiotics Nevertheless, this patient profile and the incidence of failed significantly more often to receive a sufficient side effects associated with anesthesia underline depth of anesthesia. Therefore, the increased incidence the necessity for taking an adequate medical history of complications for self-medicated patients might be or to the procedure, by far the simplest and most partially due to the fact that they receive higher total efficient method for the detection of risk factors. How- doses of local anesthetic. Additionally, it can be assumed that these patients are more afraid of interventions and may thus be more likely to show psychogenic reactions as well. Hidding and Khoury [14] also observed an increase in heart rate of more than 20 beats per minute in 4.1% of their patients, with a higher incidence of tachycardias for local anesthetic solutions containing 10 µg/ml (1: 100,000) of epinephrine. Additionally, it has been definitely shown that the increase in plasma catecholamine levels observed after anesthesia with epinephrine is mainly due to the exogenously applied epinephrine [15]. Thus, it should be investigated whether vasoconstrictor associated complications could be further reduced if local anesthetics with lowest possible concentrations of epinephrine were routinely used [16].

The higher incidence of complications observed with the application of Lidocaine is most likely due to the fact that Lidocaine is preferred applied to risk patients who already exhibit an increased overall incidence of complications. Lidocaine is still the local anesthetic of choice for patients with absolute contraindications to vasoconstrictors. Similarly, the low incidence of side effects associated with Lidocaine can be explained by the fact that it is given mainly to patients without any risk factors and that it is given in much lower doses Lidocaine. Additionally, it was only administered to 56 patients. Therefore, in order to draw valid conclusions about the incidence of side effects associated with Lidocaine compared with those associated, a patient group of >1000 would be necessary. No severe complications were observed in 600 patients with cardiovascular diseases, and it can be concluded that these patients can be safely treated under local anesthesia. This result is in accordance with the study of Cintron et al [18], who did not observe any cardiovascular complications after anesthesia with Lidocaine (2%) 1: 100,000 in 40 patients with recent (6-20 days) myocardial infarction even if a high stress intervention such as tooth extraction was performed. Also, Davenport et al [19] did not detect any significant cardiovascular changes after the application of Lidocaine (2%) 1: 100,000 in nine patients with stable cardiovascular disease. However, since 36.4% of all risk patients, including those with cardiovascular diseases, receive local anesthetics with epinephrine 1: 100,000, it should be investigated whether the incidence of minor complications could not be further reduced if local anesthetics with no or low epinephrine concentrations, who found that Lidocaine 1: 80,000 led to more pronounced alterations of cardiovascular parameters (cardiac output, heart rate, stroke volume, afterload, mean arterial pressure) in elderly patients. The treatment of any high-risk patients should also be limited to 30 min, since a significant increase in the incidence of complications, from 2.9 (for treatments <20 min) to 15.0% for treatments lasting 90 min or longer, was observed for patients with cardiovascular diseases. These results are supported by the findings of Walz et al [22], who observed a slow but continuous drop in oxygen saturation measured by pulseoxymetry in ASA III patients undergoing surgery. In several cases, initial symptoms of hypoxemia were recorded, especially if the treatment lasted longer than 30 min. The fact that true allergic reactions, with symptoms such as erythema, urticaria, mucosal edema, and bronchospasm, occurred in less than 1% of the patients is in accordance with the literature. [23,24] Allergic reactions have to be well differentiated from psychogenic reactions, since psychogenic reactions can often mimic allergic reactions with respect to cardiovascular symptoms such as tachycardia and hypotension as well as concomitant nausea, dizziness, sweating, or hyperventilation. However, psychogenic reactions typically lack specific allergic symptoms as mentioned above [23, 25]. In general, it must be stated that a differentiated local anesthesia that is well adjusted to the patient's specific requirements (type and duration of intervention, risk factors) is not applied in the daily routine [5]. Cheatham et al [26] came to a similar conclusion when examining local anesthesia application habits of physicians in Florida. They concluded that dose selection for children is not highly influenced by weight or age but, rather, by the desire to achieve a rapid and effective anesthesia. However, in order to avoid the administration of toxic overdoses, especially to low-weight patients, doses of local anesthetics have to be strictly determined according to body weight, and maximum recommended dosages must be respected.

V. Conclusion

It can be concluded that local anesthetics can, in general, be regarded as safe drugs. The vast majority of observed side effects do not impose a severe danger to the patient's health, are transient in nature, and do not require treatment.

Additionally, it can be assumed that evaluating every patient for risk factors and determining doses of local anesthetics strictly according to body weight will help to further reduce the incidence of -anesthesia-associated complications.

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