

Safety Assessment of Dental Local and Regional Anesthesia after COVID-19 Vaccination

Rais Mohammed Amir^{1*}, Riali Abdeouahid Youcef², Hedimi Zineddine², Nacer Amine²

¹Department of Dentistry, Faculty of Medicine of Algiers, University Algiers

²Department of Dental Medicine, Faculty of Medicine, University Saad Dahleb Blida

DOI: [10.36347/sjds.2021.v08i08.001](https://doi.org/10.36347/sjds.2021.v08i08.001)

| Received: 23.07.2021 | Accepted: 28.08.2021 | Published: 01.09.2021

*Corresponding author: Rais Mohammed Amir

Abstract

Original Research Article

Backgrounds and objectives: Recently, a particular importance has been attributed to the receive of the Covid-19 vaccine in order to hope minimizing the spread of the pandemic and to reduce the very high mortality rate especially lately with the appearance of the Delta variant, however, a very large part of the population still hesitate for fear of the probable side effects falsely reported by the social media, among these risks, the contraindication of local or regional dental anesthesia after Covid-19 vaccination because of potentially fatal complications, until proven otherwise, this rumor remains false but threatens however a good progression of the vaccination, the objective of this research is to evaluate the safety of the realization of a dental local or regional anesthesia after the Covid-19 vaccination. **Methods:** This study was conducted on 288 patients, the control of 140 patients was done by a complete medical examination while the health status of 148 patients was assessed by a telephonic interview, the participating patients must present their vaccination's proof with a date of vaccination that does not exceed one week before their dental care or surgical procedures requiring local anesthesia, 252 of these studied patients consulted having their first dose of the vaccine while only 36 patients who received the second dose, pregnant women are excluded from the study, only complications of local or regional anesthesia related to the three vaccines Sinovac, Sputnik V and AstraZeneca were studied because they are the only three vaccines available in Algeria, this research excludes the study of possible complications of general anesthesia in relation to the vaccines Covid-19, complications and side effects were sought within one week of the administration of local or regional anesthesia, beyond one week, the participant was excluded because of the possibility that other origins might distort the study. **Results:** No deaths, no particular complications or major fatal manifestations such as cardiac arrest, paralysis attack or Ischemic stroke were reported in the entire study population, only mild side effects were noted such as fatigue, fever and nausea in 47 patients, headaches in 67 patients, 11 patients had oral ulcers and 7 had diarrhea, these symptoms did not require hospitalization and disappeared within a week in (97%) of cases. **Discussions and conclusion:** Our results prove the safety of performing local or regional anesthesia necessary for any dental or oral procedure after Covid-19 vaccination, however, it is preferable to postpone anesthesia and any dental care or stressful surgical procedure for a minimum of 2 weeks after Covid-19 vaccination to avoid weakening the immune system, it is also recommended to ensure as much as possible the good performance of an effective anesthesia.

Keywords: Dental care, Immunization, Lidocaine, Local anesthesia, Major complications, SARS-cov-2, Vaccine, Surgery.

Copyright © 2021 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution **4.0 International License (CC BY-NC 4.0)** which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Definitely, the appearance of the new corona virus in December 2019 has changed the world radically, its very rapid spread, its morbidity and its high mortality has pushed researchers to work hard to finally make available vaccines against this new virus, all types of vaccine available whether classical or recombinant DNA have proven very effective in

preventing infection, reducing the rate of hospitalization in infected patients and numbers of deaths, and therefore all the authorities, especially the WHO, call for the generalization of Covid-19 vaccinations and to make the maximum number of people aware of its necessity, and despite the high mortality of SARS-CoV-2, especially with the appearance of the new very aggressive variant Delta, a large proportion of the population remains against vaccination for several

Citation: Rais Mohammed Amir *et al.* Safety Assessment of Dental Local and Regional Anesthesia after COVID-19 Vaccination. Sch J Dent Sci, 2021 Sept 8(8): 252-257.

reasons like fear of the short- and long-term side effects of the vaccine, some people still believe in the conspiracy theory and others simply consider it as a personal precision [1-4].

Unfortunately, while social media was supposed to be a source of motivation for vaccination and awareness of its great effectiveness proven by several researches, it also becomes a source of false rumors without scientific sources that can very strongly influence the decisions of people especially those who hesitate taking the vaccine, recently one of the rumors is the absolute prohibition to perform a dental local or regional anesthesia after receiving the vaccine for fear of major complications, this rumor was able to change the opinion of a large number of people, and thus hinders the progress of the vaccination.

In dentistry, anesthesia is considered necessary in the vast majority of dental care, for dental extraction procedures and surgeries, it is considered by far the most critical step in the proper management of patients being the cornerstone in pain control, ensuring adequate and correct local anesthesia is critical to the success of dental care and patient safety, the majority of commonly used dental local anesthetics belong to the amide category such as (lidocaine, mepivacaine, bupivacaine, prilocaine), but there is the amide category that also contain an additional ester linkage (articaine), ester-based anesthesia is rarely used as infiltrating anesthesia and are generally used as contact anesthesia to reduce syringe pain at the time of injection, despite its safety in most cases, oral local and regional anesthesia can sometimes cause various side effects when patient receives a large dose of local anesthetic, or when its intravascular administration occurs which led to systemic toxicity. Systemic complications can also be an allergy, psychogenic reactions or methemoglobinemia considered as a life threatening complication, side effects can be also hematoma, numbness prolongation, headache, edema, needle fracture, blurred vision, dizziness, vomiting, soft tissue injuries etc.,. However, a safe administration can be achieved if the necessary precautions are taken into consideration by a qualified dentist who has had appropriate training taking into account the patient's history and his actual diseases [5-7].

Despite the fact that anesthesia, dental care, surgical procedures and stress can alter the effectiveness of immunization by reducing the immunity, overall, there is no direct evidence of any major interaction between common vaccines and frequently used local anesthetic [8-10], the main objective is to prove that no major complications or fatal risks exist after the administration of local or regional anesthesia in patients who have received Covid-19 vaccine.

METHODS AND MATERIALS

The study was conducted on a randomly selected population (N= 288) patients who received the Covid-19 vaccine and dental anesthesia in the same week, data were collected by performing a complete health examination of 140 patients who returned to the public health institution Sidi M'hamed Bouchenafa and several private dental clinics for a check-up and by means of a telephonic interview of 148 patients.

The study group consisted of 110 males and 178 females with a median age of 49 years and a range of 18 to 84 years, 252 of the included patients are vaccinated with only the first dose while only 36 already had their second dose, the results are attributed only to Oxford-AstraZeneca vaccine, Sputnik V and Sinovac as they are the only vaccines available in Algeria [11].

The presentation of the vaccination proof is the decisive criterion for inclusion; the patient must have undergone the vaccine at most one week before the dental procedure requiring oral anesthesia (figure1).

	Date	N° du lot	Site (bras droit/gauche)
1 ^{ère} injection	10.9.21	202105018P	S6
2 ^{ème} injection			

Fig-1: Example of an immunization card considered as the main criterion for inclusion in the study

The evaluation of the health status and the search for possible complications is done within one week after the dental procedures, beyond one week, the patient is excluded from the study, and pregnant women also were excluded from this study.

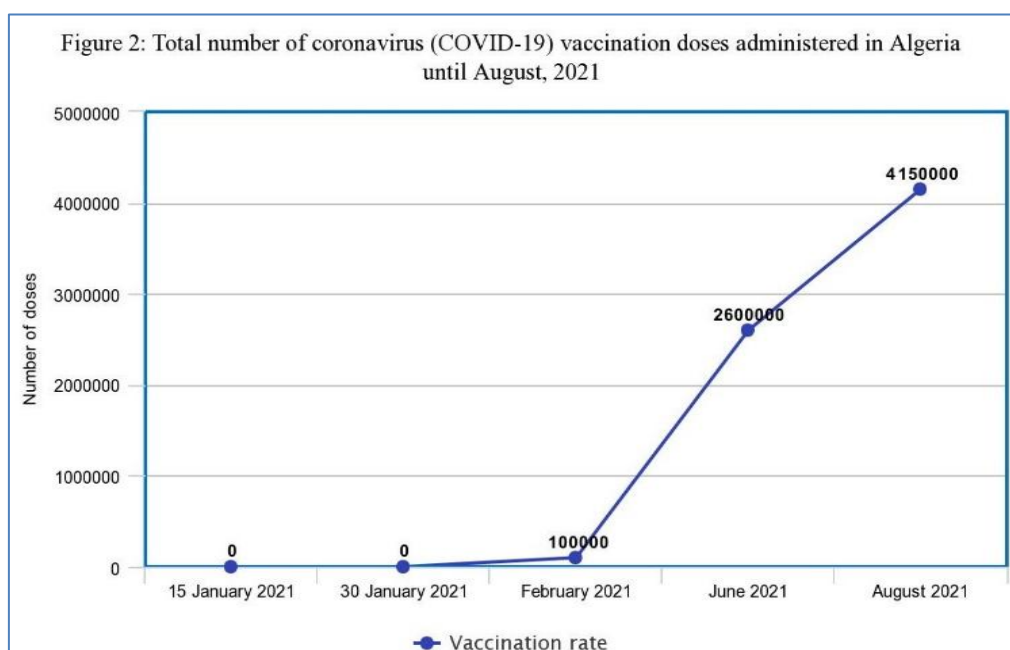
A determination of chronic diseases in the participating patients was made, 24 patients were diabetic of which only 5 use insulin and 19 take metformin, 19 patients were hypertensive, 3 were asthmatic, 7 had a BMI greater than 30%, only one female patient with breast cancer currently under chemotherapy and only one female patient under methotrexate for Rheumatoid arthritis.

Of the 288 participating patients, 248 patients had only one injection of anesthesia during their dental care, 39 patients had two injections while in only one patient, three cartridges were administered needed for

surgical extraction of an ankylosed lower molar after flap elevation, this tooth was initially considered easy but after failure of normal avulsion and after radiograph intake, surgical intervention was required, only 13 patients received an inferior alveolar nerve block while the rest received local anesthesia, analgesics, antibiotics and anti-inflammatories were prescribed as appropriate.

No medical or surgical procedures were performed under general anesthesia, which excludes it from the study results.

This descriptive study was conducted between June and August 2021 in Algiers in a period of maximum vaccination rate given the poor health situation due to the third wave as shown in (figure 2) [11, 12], the analysis was done with SPSS statistics 19 and Google forms.



RESULTS

On 288 patients who had local or regional anesthesia for a dental procedure in the same week of COVID-19 vaccination, no deaths, no particular side effects were reported, no major life-threatening complications such as cardiac arrest, Ischemic stroke, Paralysis attack, vaccine-induced prothrombotic immune thrombocytopenia (VITT), hematoma or hemorrhage were reported, no severe reactions and no evidence of interference between the vaccine and the anesthesia were noted, regarding the anesthesia itself, no particular failure or a shorter than normal duration of anaesthesia and no numbness that exceeds one day was noticed.

However, 47 patients (16.3%) had fever, fatigue and nausea, 32 patients (11%) had oral ulcerations, 67 patients (23.2%) had headache and only 7 patients had diarrhea.

In (77%) of participating patients, these symptoms disappeared within the next two days and in (97%) of patients, all these symptoms disappeared within a week.

Similarly, no fatal complications were noted in diabetic, hypertensive and obese patients, the two

female patients with breast cancer and rheumatoid arthritis had no particular signs or complications other than fatigue, pallor and nausea directly related to their chemotherapy drugs, these symptoms remained constant for more than a week but did not require hospitalization or urgent care.

DISCUSSION

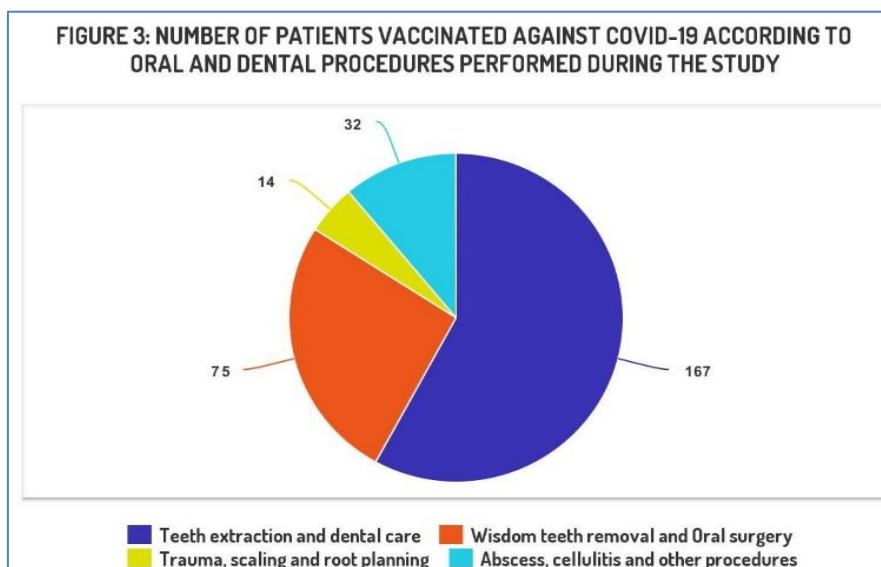
Recently one of the great achievements in the medical world is the development of Covid-19 vaccines in record time, several researches demonstrate a great effectiveness of this immunization in the prevention of covid-19 infection, reduction of the number of critically ill patients and a major decrease in deaths, with the recent emergence of the highly aggressive variant Delta, the immune system in unvaccinated patients seems to be unable in a large percentage to fight this infection, a large number of critical cases have been recorded with a very high mortality rate, so in reality, the main role of immunization is to make the body able to defend itself against the Sars-Cov-2 by stimulating the immune system and therefore the production of antibodies specific to this virus, however, the effectiveness of vaccination implies an immune system unaffected by any disease, medication or surgical procedure that may disrupt it [12-14].

Stress also has a great impact on the immune system, it has been established experimentally that stress hormones that bind to β 2-adrenergic receptors reduce the immune response and that this is achieved through a decrease in the production of certain inflammatory cytokines required for the elimination of viruses, also, surgical procedures and anesthesia are confirmed to be immunosuppressive, lesions caused by surgery, hypo microcirculation, hyperglycemia, hypothermia and pain have also immunosuppressive effects, and thus the combination of surgery with administration of dental local or regional anesthesia along with stress can have a major impact on the effectiveness of immunization, thus, a good control of the interactions between the central nervous system, the hormonal system and the immune system is highly recommended [9-14].

However, complications directly related to Covid-19 infection found in a vaccinated patient who has undergone surgery under local or regional anesthesia can only be considered similar to a Covid-19 complication in an unvaccinated patient or a patient with insufficient immunity to eliminate the virus [15], thus, there is no evidence of a possible complication arising specifically from the administration of local or regional anesthesia in a vaccinated patient, confirmed by the results of this research carried out on 288 patients randomly selected, this study shows no deaths, major complications or life-threatening side effects after receiving anesthesia and dental care including surgical

procedures in patients recently immunized against Covid-19, despite the fact that the period between the vaccination and using dental anesthesia during which the search for major complications was carried out was very limited to two weeks maximum, and sometimes much less given that some patients received the Covid-19 vaccination and the dental act requiring anesthesia in the same day (in the public health establishment Sidi M'hamed Bouchenafa, patients were suffering from a long chain for the vaccination, some of them in order not to lose their turns made consultations in the stomatology department and some of them performed free dental care requiring the administration of anesthesia in the same day of vaccination).

Indeed, yet several types of intervention were performed as shown in (figure 3), results of patients health status control showed no major or particular complication, this means the administration of anesthetic molecules such as Lidocaine and Articaine with or without epinephrine does not interfere with vaccines and their adjuvants such as aluminum salts widely used to reinforce immunity, also, the dose administered causes no specific complication as long as it does not exceed the authorized threshold and no change in the effectiveness of the anesthesia or its duration has been noted, Similarly, the combination of dental anesthesia and covid-19 immunization showed no increased prevalence of potentially dangerous complications of anesthesia such as hematoma, systemic toxicity and methemoglobinemia etc....[5-7].



Nevertheless, mild side effects caused separately by both anesthesia and vaccination such as headaches, fatigue, nausea and vomiting are still present, their prevalence seems to be slightly increased in vaccinated patients who underwent stressful dental treatment or oral surgery under local or regional anesthesia, however, a complete disappearance in the next two days has been noticed in most cases. Similarly, fever was widely noted in these patients but its exact

origin which may be relative to the vaccine or the postoperative time cannot be easily determined, meanwhile, fever noticed were mild in all patients and disappeared during the week [16].

Erythema and oral ulcerations found in a minority of patients also appear to be a mild side effect of Covid-19 immunization, usually they appear between

the third and sixth day after vaccination and disappear completely within the next three days [17].

Furthermore, the safety of performing local or regional anesthesia with dental care in patients recently vaccinated against Covid-19 is also established in patients with chronic diseases such as diabetes, hypertension or even patients suffering from obesity, but it should be noted that giving antibiotics for diabetics and administering an anesthesia without vasoconstrictor in hypertensive patients to maintain a good blood pressure should be performed as appropriate and recommended, no difference in symptoms was noted in female or male patients and in patients who received both vaccine doses or those who only received the first vaccine dose, also no particular difference were noted in a specific type of vaccine among the three type studied.

Regarding the two female patients considered highly immunocompromised because of anti-cancer treatment by chemotherapy for the woman suffering from breast cancer and the woman under methotrexate for her rheumatoid arthritis, the postoperative symptoms were generally related to immunosuppression, pallor, fatigue and vomiting [14], these symptoms remained even after a week of dental care, antibiotic coverage was systematic, fortunately, no dangerous deterioration or particular complications were recorded.

Overall, the 0% percentage representing a total absence of deaths, serious side effects and major manifestations like paralysis, cardiac arrest, Ischemic stroke and any other life-threatening complications and the no urgent care or hospitalization needed for managing mild symptoms reflect the safety of administering several types of anesthetic molecules such as lidocaine, or Articaine with or without epinephrine, administering dental products like eugenol, giving antibiotics and performing dental care or surgical procedures such as tooth extraction, wisdom tooth surgeries or flap elevation, as well as in Covid-19 vaccinated patients with no general disease as in vaccinated diabetic, hypertensive and immunosuppressed patients, however, these results definitely do not reflect good immune status and subsequent vaccine effectiveness taking into account the negative impact of stressful and immunosuppressive procedures such as anesthesia and surgery on the immune system, that's why anesthesiologists recommend postponing elective surgeries and all non-urgent dental care requiring the anesthesia administration for at least two weeks after receiving the vaccine, but also to not make difficult the interpretation of certain postoperative or post-vaccination symptoms [8, 14, 18, 19].

CONCLUSION

Although this study denies initially the rumor and proves the absence of death or major side effects and life-threatening complications after the administration of local or regional anesthesia in patients recently vaccinated against COVID-19 with Sinovac, Sputnik V and Oxford-AstraZeneca vaccines, it is imperative to study also if whether there are complications after the administration of general anesthesia and the study of the safety of all other types of Covid-19 vaccines since it is not only a question of studying in detail the possible side effects of the Covid19 immunization but also an issue of awareness-raising to the vaccination, considered until now as the only solution to stop the spread of the pandemic and to prevent its high mortality especially with the constant appearance of very aggressive variants like the Delta and the Colombian variants.

ACKNOWLEDGMENT

We thank all the private dentists who helped and allowed us to examine their patients in their offices during this study.

REFERENCES

1. Moghadas, S. M., Vilches, T. N., Zhang, K., Wells, C. R., Shoukat, A., Singer, B. H., & Galvani, A. P. (2021). The impact of vaccination on COVID-19 outbreaks in the United States. *medRxiv*.
2. Jara, A., Undurraga, E. A., González, C., Paredes, F., Fontecilla, T., Jara, G., & Araos, R. (2021). Effectiveness of an inactivated SARS-CoV-2 vaccine in Chile. *New England Journal of Medicine*.
3. Bernal, J. L., Andrews, N., Gower, C., Robertson, C., Stowe, J., Tessier, E., & Ramsay, M. (2021). Effectiveness of the Pfizer-BioNTech and Oxford-AstraZeneca vaccines on covid-19 related symptoms, hospital admissions, and mortality in older adults in England: test negative case-control study. *bmj*, 373.
4. Haas, E. J., Angulo, F. J., McLaughlin, J. M., Anis, E., Singer, S. R., Khan, F., & Alroy-Preis, S. (2021). Impact and effectiveness of mRNA BNT162b2 vaccine against SARS-CoV-2 infections and COVID-19 cases, hospitalisations, and deaths following a nationwide vaccination campaign in Israel: an observational study using national surveillance data. *The Lancet*, 397(10287), 1819-1829.
5. Decloux, D., & Ouanounou, A. (2021). Local anaesthesia in dentistry: a review. *International Dental Journal*.
6. Cummings, D. R., Yamashita, D. D. R., & McAndrews, J. P. (2011). Complications of local anesthesia used in oral and maxillofacial surgery. *Oral and Maxillofacial Surgery Clinics*, 23(3), 369-377.

7. Yalcin, B. K. (2019). Complications associated with local anesthesia in oral and maxillofacial surgery. *topics in local anesthetics*.
8. Lin, C., Vazquez- Colon, C., Geng- Ramos, G., & Challa, C. (2021). Implications of anesthesia and vaccination. *Pediatric Anesthesia*, 31(5), 531-538.
9. Siebert, J. N., Posfay- Barbe, K. M., Habre, W., & SIEGRIST, C. A. (2007). Influence of anesthesia on immune responses and its effect on vaccination in children: review of evidence. *Pediatric Anesthesia*, 17(5), 410-420.
10. Currie, J. (2006). Vaccination: is it a real problem for anesthesia and surgery?.
11. Royal Hospital for Sick Children, Yorkhill, Glasgow, U.K. Mariam, S. (2021). Cumulative number of COVID-19 vaccination doses in Algeria 2021. STATISTA. August 2021. <https://www.statista.com/statistics/1220399/total-number-of-covid-19-vaccination-doses-in-algeria/>
12. Algeria: the latest coronavirus counts, charts and maps". graphics.reuters.com. June 2021. <https://graphics.reuters.com/world-coronavirus-tracker-and-maps/countries-and-territories/algeria/>
13. Burki, T.K. (2020). The Russian vaccine for COVID-19. *Lancet Respir. Med*, 8:e85–e86. doi: 10.1016/S2213-2600(20)30402-1.
14. Yang, E. V., & Glaser, R. (2000). Stress-induced immunomodulation: impact on immune defenses against infectious disease. *Biomedicine & pharmacotherapy*, 54(5), 245-250.
15. Faddoul, A., & de la Jonquière, C. (2020). L'anesthésie au temps du COVID. *Le Praticien en Anesthésie Réanimation*, 24(4), 181-185.
16. Menni, C., Klaser, K., May, A., Polidori, L., Capdevila, J., Louca, P., & Spector, T. D. (2021). Vaccine side-effects and SARS-CoV-2 infection after vaccination in users of the COVID Symptom Study app in the UK: a prospective observational study. *The Lancet Infectious Diseases*.
17. Mazur, M., Duś-Ilnicka, I., Jedliński, M., Ndokaj, A., Janiszewska-Olszowska, J., Ardan, R., & Polimeni, A. (2021). Facial and Oral Manifestations Following COVID-19 Vaccination: A Survey-Based Study and a First Perspective. *International Journal of Environmental Research and Public Health*, 18(9), 4965.
18. Short, J. A., Van Der Walt, J. H., & Zoanetti, D. C. (2006). Immunization and anesthesia—an international survey. *Pediatric Anesthesia*, 16(5), 514-522.
19. Bertolizio, G., Astuto, M., & Ingelmo, P. (2017). The implications of immunization in the daily practice of pediatric anesthesia. *Current Opinion in Anesthesiology*, 30(3), 368-375.