



Hazards of Surgical Smoke for the Fetus and Pregnant Women in the Operating Room Despite Covid_19 Vaccination

Amirmohammad Merajikhah*

- M.Sc in Surgical Technology, Dept. of Operating Room, Faculty of Paramedical Sciences, Sabzevar University of Medical Sciences, Sabzevar, Iran.



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* **Corresponding author:** Amirmohammad Merajikhah,
E-mail: amir.meraj74@gmail.com

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Dear Editor,

Pregnant women also typically work in the operating room during pregnancy and are exposed to surgical smoke. The surgical staff is totally disclosed to the lot risks of the surgical plume. Rather fume emitted in surgery rooms can impact other operating room patients and locate them at a serious hazard [1]. The surgical plume is contained 95% water and almost 5% Particles [2]. Pregnancy is a vulnerable stage needing more care and caution regarding the woman and her fetus. Pregnant women are especially exposed to respiratory disease and serious pneumonia since they are in an immunosuppressive situation because of the physiological modifications during pregnancy [3]. Besides pregnant women being considered exposed to SARS-CoV-2 disease [2]. According to the essence of disseminating the virus via this fume, it can be mentioned that the surgical team and operating room personnel, and rather patients, probably become infected by the SARS-CoV-2 [1]. Thus COVID-19 infection throughout gestation may be attached to acute

matrilineal morbidity. There are numerous unknowns for pregnant women throughout the pandemic of the coronavirus disease 2019 (COVID-19). Surgical plume producers are usually utilized in the operation room, and Surgical smoke is a typical by-product of the usage of these devices in the operation rooms. Women surgeons have a more heightened amount of infertility and pregnancy risks than the all-around population [2]. Data has told that surgical smoke can spread the coronavirus to the members of the operating room [1]. COVID-19 is also a recent pandemic virus, the virus can possibly spread through the surgical plume and infect the members of the surgical team and the entire operating room personnel [1]. Since there is no definite solution for surgical smoke, The SARS-CoV-2 mRNA vaccines are cheered for pregnancy; also, those can be an assured option for mothers and their fetuses [4]. This muted hazard hasn't been analyzed, and the virus can be disseminated to the operating room staff through surgical plume from electrocautery, laser, diathermy, or any surgical plume producer device

[1]. This fine particle is mainly entrained in the bronchioles and alveoli after inhalation. They exert a more significant effect on numerous systems of corporality than particles with bigger diameters [2]. Due to the small gauge and complex mixture of particles in the surgical plume, these particles can cause harmful unfavorable effects on the corporality that should differ from other kinds of particles [2]. Surgical plume causes a negative impact on various kinds of cells, indicating that the healthiness hazard of surgical plume exposure shouldn't be neglected [2].

On the other hand, the hydrogen cyanide in surgical smoke synergizes with carbon monoxide to limit oxygen transmission to the tissue [5]. Surgical smoke contains carcinogenic substances that can affect pregnant women in operating rooms. Surgical smoke also contains benzene, which can poison the mother and fetus [6]. Complications such as toxicity, mutagenicity, and carcinogenicity from surgical smoke also threaten pregnant women in operation rooms. Surgical smoke may transmit microorganisms such as HPV (Human Papilloma Virus), HIV (Human immunodeficiency virus) and their components to mothers [5]. Even surgical team personnel who came in contact with surgical smoke containing HPV developed nasopharynx warts [5]. Despite this, all the surgical team personnel who experienced nasopharyngeal warts said to wear standard surgical masks [5]. Tiny particulate matter disposal is closely associated with congenital heart defects, such as transposition of the great arteries, perimembranous ventricular septal defect, and atrial septal defect [2]. About the surgical smoke, fine particles are said to be less than 2.5 μm [7]. However, particles can penetrate the protection mechanisms of the upper respiratory system and arrive at the alveoli and systemic circulation [7]. Present evidence confirms the impact of fine particles on the growth of the embryonic heart in humans and animals, indicating a feasible risk of exposure to fine particles from surgical plumes on heart evolution [2]. So, tiny particles in surgical smoke lessen the heartbeat; also surgical smoke contents can cause fetal toxicity [2].

Pregnant women may work in operating rooms until the last months of pregnancy. All these people, in addition to performing long surgeries, constantly inhaling surgical smoke. This smoke can cause acute and chronic injuries to the fetus and mother by affecting the mother and the fetus. However, different techniques can be used to reduce the effects of this smoke. Ways to reduce the effects of this smoke include the following.

Typical ventilation of surgical rooms lonely isn't satisfactory for absorbing components generated

by surgical plumes. At the same time, the compactness of this smoke can decrease in the operation rooms since the smoke may be transmitted between surgery rooms in the operation room. The two major Regional exhaust ventilation techniques utilized to decrease surgical fumes for the operating room staff are transportable surgical plume evacuators and surgical suction devices. Operating room suction devices are created to absorb liquids and blood at the fields, so they suck the surgery plume at a slow speed. If these systems are utilized, an appropriate filter should be established, changed routinely, and then eliminated. Also in Laparoscopic surgery, High-efficiency particulate air, Ultra Low Penetration Air, and Charcoal filters must be inserted at the output of endoscopic ports to screen the gas utilized for pneumoperitoneum. Also, these filters in endoscopic applications can filter the surgical plume generated by human tissue coagulation.

Masks N95 and N99, N100, P95, P99, P100, R95, R99, and R100 should be employed for safety in operation, despite it is an important moment that elastomeric half-mask and (powered air-purifying respirators) PARPs don't be utilized during surgical processes since exhalations Unfiltered threatens the sterile site [6]. The best resolution for handling surgical plumes is to continually educate every operating room staff and team about the hazards and methods to diminish and remove this smoke. Learning can be provided from the beginning of the student's admission into the appropriate fields and must be trained by the personnel continually. On the other hand, pregnant women in operating rooms should work in environments away from the surgical field, such as reception and PACU (Post-anesthesia care unit), as well as use N95 masks. Also, Health care providers should be aware of the dangers of surgical smoke for pregnant women in operating rooms. Pregnant women are exposed to surgical smoke in operating rooms; In addition to numerous physiological risks, this smoke can lead to the transmission of viruses. Therefore, it is recommended to use vaccination and protection against it to create more immunity.

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