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Containment Device to Minimize Spread of Aerosol While Using Motorized Drill in Head and Neck Surgical Cases in COVID-19 Pandemic

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Abstract: During the COVID-19 pandemic , aerosol generating medical procedures(AGMP) present risks to health care workers due to airborne transmission of severe acute respiratory syndrome corona virus 2(SARS-CoV-2).Delaying head and neck oncological surgeries and facial trauma is done with extreme caution .A literature suggests that use of high speed rotating devices during this procedures is potentially AGMP. The aim of this device is to minimize the spread of generated aerosol during the use of rotating instrument like drills and protection of health care worker during COVID-19 pandemic.

Index Terms **- Containment Device,Soread of Aerosol,Head and Neck Surgery,COVID-19.**

During the COVID-19 pandemic , aerosol generating medical procedures(AGMP) present risks to health care workers due to airborne transmission of severe acute respiratory syndrome corona virus 2(SARS-CoV-2). A literature suggests that use of high speed rotating devices is potentially AGMP. The aim of this technique is to minimize the spread of generated aerosol during the use of rotating instrument like drills in head and neck surgery.

Facial fracture are not emergency but they may require timely surgical intervention to prevent sequeale of infection, permanent deformity and cosmetic disfigurement. If facial fracture left untreated than unacceptable sequelae will quite difficult to treat as compare to initial fracture. Postponing lifesaving malignancy surgeries must be done with thoughtfulness and extreme caution ,as postponements can majorly affect long term survival, persistent morbidity and the efficient utilization of careful human resources. As high viral load within the oral cavity/ nasal-oropharyngeal mucosa, management of facial fracture is very high risk surgical procedure. Instrumentation during management of facial fracture liable to aerosolize the viral particles[1]. If viral particles become aerosolized, they remain viable and infectious in aerosol for at least 3 hours[2]. High risk of infection can be attributed to the unique nature of Oral and Maxillofacial surgical interventions who deals with surgical procedure involving the use of drills and other rotary instrument causing aerosol generation[3].

Looking to the above facts, it is imperative to look for more protection while operating these cases. At present no ideal protective device/s is available which serve the purpose. So authors tried to overcome the problems of spreading aerosol by making an indigenous protective device from over-head projector sheet [OHP] which can contained the generated aerosol to a larger extent in a “Containment Device”. According to the procedure, we made the required sized containment devices and sterilize them by ETO. The device has three holes at an appropriate site, one each for drill, irrigation and suction cannula[**Figure 1&2**].

Figure 1 Containment Device

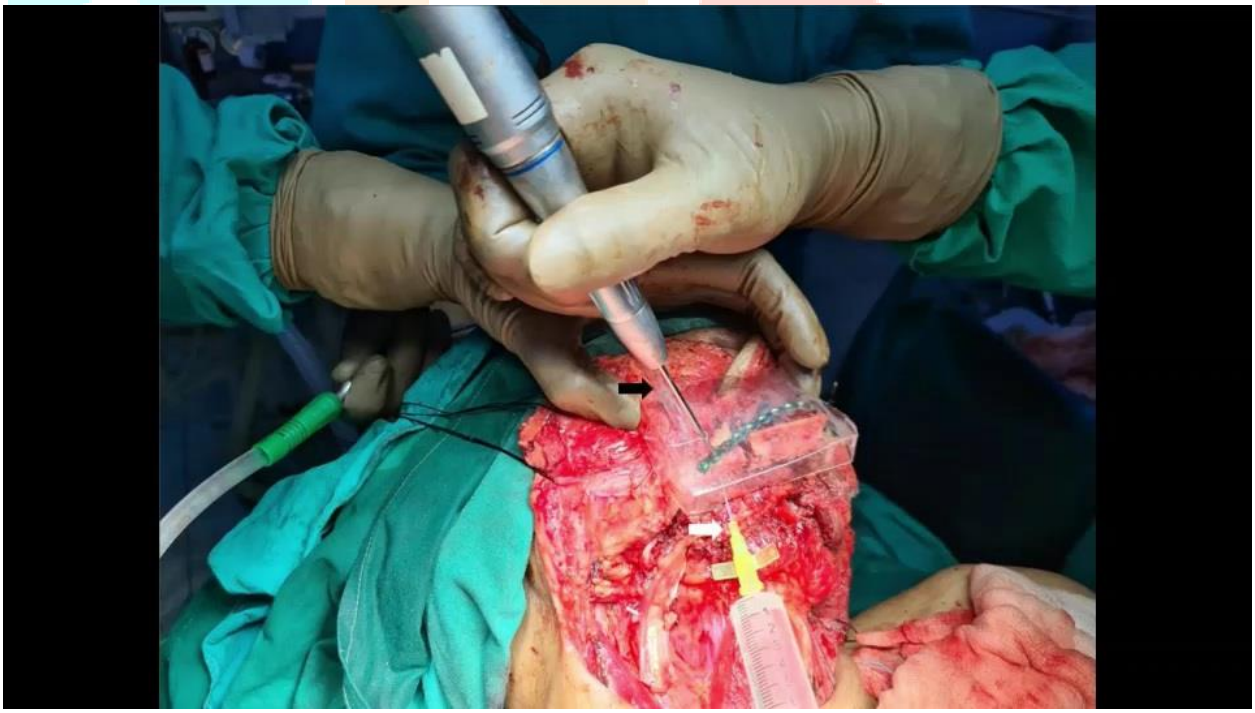

Figure 2 Black arrow at suction cannula and white arrow at irrigation cannula

While operating, the hole for drill is exactly align with the hole of the plate so that drill make a proper hole. Irrigation can be done through another hole by either needle or intra venous cannula attached to syringe filled with saline. The third hole for suction cannula can be used for suctioning the generated aerosol. The generated aerosol is contained to the device to a larger extent, thus reducing the chance of aerosol spread in operating atmosphere. Although this innovative device is not the "Ideal Device" to prevent the spread of generated aerosol but using this device for drilling will definitely minimize the spread of aerosol to a larger extent.(Video Link; https://youtube.be/c266EqDVCFs)

Despite the fact that our device would not negate the requirement for proper PPE, it would unquestionably diminish the danger of contamination of the external layer of PPE. The more body parts are covered with PPE the better protection it offers but also associated with increased difficulty in donning and doffing PPE. There is possibility of self contamination(25-67%) when doffing of PPE[4]. Our innovative device is simple to make and effective in minimizing the spread of generated aerosol in operation theater.

We have used this device in total 9 cases,5 cases of mandibular reconstruction by free fibula osteo-cutaneous flap, 3 cases of mandibular fracture and case of hand reimplantation for bone fixation. We found this customized device very simple to make, easy to use, very cost effective, replicable and effective way to minimize the spread of generated aerosol to protect the health care workers in operation theater.

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