**Customized Facial Protection Shield during COVID-19 Pandemic to Protect Surgeons Wearing Surgical Loupes While Performing Surgical Procedures**

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**Abstract**

The novel Coronavirus SARS-CoV-2 (COVID-19) was identified in early December in Wuhan, China [1]. The World Health Organization (WHO) declared Corona Virus disease 2019 (COVID-19) a global pandemic on March 11, 2020, classifying the outbreak as an international emergency. In accordance with the directive from the Indian Government and guidelines from the Indian Medical Association all elective surgeries were discontinued during lockdown. The major challenges faced by most surgeons including the authors was, to be adequately protected while performing emergency surgical procedures for micro-vascular trauma, hand injuries and facial poly-trauma [2-4]. Non availability of adequate supply of Personal Protection Equipment added to the difficulties.

Micro-vascular repair, crush injuries of hand and poly-traumatic facial injuries are time-consuming surgeries. Proper illumination and magnification with surgical loupes are imperative for most of these [5,6]. For the safety of surgeons and health care workers from droplet-transmitted infections, a set of personal protection guidelines for health personnel responding to the COVID-19 epidemic were published by Chinese physicians. It was recommended that personal protective equipment of various levels should be used as appropriate [7]. The available Personal Protective Equipment (PPE) with the protective eye glasses is not very accommodating to the use of surgical loupes. Other options tried were, using a visor of a helmet on top of the loupes but it causes additional pressure transmitted to the surgeon’s nose and forehead with reduced visibility due to fogging. The limiting factor of moving visor glass further away from the face was decreased stability, and compromised protection.

**Innovation & Technique**

To overcome the above-mentioned concerns, the authors looked for a solution to provide customized complete facial protection, utilizing commonly available materials. The authors’ “indigenous face shield” was made using Over-Head Projector (OHP) plastic sheets. This material was found to be easy to work with, sturdy enough to stay in place and has excellent transparency. Four apertures were punched at appropriate distances at the upper edge of the sheet to accommodate the thread/string which is used to tie the sheet around the shield. The same customized facial shield can be adapted to be used for routine works by surgeons of other specialties necessitating wearing surgical loupes during the COVID-19 pandemic.

**Keywords:** Corona virus; COVID-19 pandemic; Facial protection shield; Fogging; Personal Protection Equipment (PPE); Surgical loupes

**Objective**

The aim of the indigenous customized facial shield was to provide the surgeons adequate protection while performing (emergency) surgical procedures of micro-vascular trauma, hand injuries and facial poly-trauma, with the incorporation of loupe optic system into the shield. The same customized facial shield can be adapted to be used for routine works by surgeons of other specialties necessitating wearing surgical loupes during the COVID-19 pandemic.
the surgeon’s forehead (Figure 1) and micropore tape is applied (Figure 2). Two pieces of sponge are fixed with the OHP sheet at the upper edge keeping 3 cm distance on each side of midline of OHP sheet (Figure 3). Another longer sponge is put over the first pair of sponge and fixed with OHP sheet with micropore (Figure 4). The arrangement of sponges will make it more comfortable, absorb the perspiration on the forehead and also keep sufficiently sized gap for free air circulation and prevention of fogging. The face shield is worn on normal spectacles and upper border of the frame is marked (Figure 5). Upper border of the loupes spectacles is aligned with the marking and the upper part of both optic cylinders are marked (Figure 6). To accommodate the loupes optic system, two “X-shaped” markings were made at appropriate measured points on the sheet (Figure 7). These “X shaped markings were incised so as to create an aperture with four triangular flaps which can easily accommodate the loupes optic system to pass through it (Figure 8). Multilayered micropore tape was used to seal the minute gap created after passing the loupes through the sheet. We have used the above-mentioned indigenous face shield in 27 surgeries now. We have found it to be very comfortable, easy to wear, safe, very light weight, cost effective, completely accommodating the loupes magnification optic system and completely prevented fogging (Figures 9 and 10).

Figure 1: Creation of four apertures at upper border in OHP [Over Head Projector] sheet.

Figure 2: Thick elastic thread passed through apertures and tape applied.

Figure 3: Fixation of two sponges.

Figure 4: Fixation of longer sponge.

Figure 5: Marking of upper border of spectacle frame.

Figure 6: Marking of upper part of optic cylinders of loupes.

Figure 7: "X-shaped markings were made at appropriate measured points on the sheet.

Figure 8: "X shaped markings were incised so as to create an aperture with four triangular flaps which can easily accommodate the loupes optic system to pass through it.

Figure 9: Multilayered micropore tape was used to seal the minute gap created after passing the loupes through the sheet.

Figure 10: We have used the above-mentioned indigenous face shield in 27 surgeries now. We have found it to be very comfortable, easy to wear, safe, very light weight, cost effective, completely accommodating the loupes magnification optic system and completely prevented fogging.
Conclusion

As per the authors, it may not be the ideal solution, but in exceptional times such as the COVID-19 pandemic, when the resources are scarce and the emergency medical procedures need to be constantly performed, innovative solutions such as the customized face shield can help maintain the safety of the healthcare workers while giving the surgeons the flexibility to use magnification loupe systems for all emergency surgeries. The authors suggest the utility of the customized face shield for elective surgical procedures like hair transplantation in time to come as the COVID-19 pandemic may last for a long time.

References


Video Link: https://youtu.be/LvE4pPPzI8Q