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'POLIDON' Approach- a Novel Solution for the ENT and Skull Base Surgeons in COVID-19 Era

Mostafa Kamal Arefin[1]*,Muhammad Shaharior Arafat[1], SkNurul Fattah Rumi[1], Nazmul Islam Munna[2], Abu Yusuf Fakir[3], Kamrul Hassan Tarafder[4], Ashraful Islam[5], Khorshed Alam Mozumder[6], and AF Mohiuddin Khan[1]

[1]*Otolaryngologist, Department of ENT & Head Neck Surgery, Dhaka Medical College Hospital, Bangladesh*

[2]*Professor of Otolaryngology, Line Director, Medical education &health manpower development, Directorate General of Medical Education, Bangladesh*

[3]*Professor of Otolaryngology, Additional Director General of Medical Education, Bangladesh*

[4]*Professor, Department of ENT & Head Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Bangladesh*

[5]*Professor& Head, Department of ENT & Head Neck Surgery, Bangladesh Medical College Hospital, Bangladesh*

[6]*Professor, Department of ENT & Head Neck Surgery, Holy Family Medical College Hospital, Bangladesh*

Abstract

Health care providers (HCP) of ENT and Skull base surgery are highly vulnerable and mostly infected with novel coronavirus ; as they have to examine and perform procedures directly in oral cavity, oropharynx, nose, nasopharynx, where novel coronavirus remains in plenty. ENT & Skull base surgeons need to do lots of aerosol generating procedures (AGP). Most of the endoscopic and microscopic ENT & skull base surgery, are AGP; like- mastoid surgery, sinus surgery, surgery of pituitary gland. We thought about neutralizing or destroying the novel coronavirus from its route of entry zone. All of we know, COVID negative by RT- PCR test is not always COVID negative. For this, in COVID-19 pandemic routine, even cancer surgeries are discouraged, avoided or postponed for the sake of safety of HCPs. Moreover, in case of surgical emergency there's no way to refuse a patient for not having a report of COVID test. We designed and proposed a novel approach, i.e. 'POLIDON' (POLIDON= Polythene + Povidone Iodine), which can be the ultimate hope or solution for these unfortunate patients as well as surgeons or HCPs of above mentioned specialties. Firstly, Use of Povidone Iodine as mouthwash and nasal spray or irrigation for both patient and HCPs prior to surgery is proposed here. Then, use of simple polythene as barrier drape of patient or operative area for prevention of spread of aerosol in OT during surgery. Thus all these procedures can be done with more safety and confidence.

Keywords: POLIDON; Povidone Iodine (PVP-I); ENT; Skull base; Health care provider (HCP); COVID-19

In March 2020 WHO declared COVID-19 as pandemic. Throughout the world huge number of health care providers (HCP) are infected and died due to COVID-19 [1]. Among them HCP of ENT, Skull base surgery, Dental or maxillofacial surgery, anaesthesia or ICU Department are the more vulnerable and mostly infected; as they have to examine and perform procedures directly in oral cavity, oropharynx, nose, nasopharynx, i.e. the area containing the respiratory epithelium. Coronavirus remains in/ is found plenty in saliva of oral cavity and much more in nasopharynx.

ENT & Skull base surgeons need to do lots of aerosol generating procedures (AGP). Most of the endoscopic and microscopic ENT & skull base surgery, where, micromotor drill and microdebridersare used, are AGP;like- mastoid surgery, sinus surgery, surgery of pituitary, tympanomastoidparaganglioma, temporal bone malignancy etc .

From the pathological point of view- Corona virus enters in human body through nose or mouth mainly via respiratory droplet or aerosol from infected person, stays there for a while, then binds with ACE2 receptor of epithelium, enter into the cell, multiply and manifests. We thought about neutralizing or destroying the novel corona virus from its route of entry zone.

All of we know, COVID negativeby RT- PCR test is not absolutely COVID negative. RT-PCR test is not 100% sensitive or specific; rather it has 30 to 40% false negative report. For this, in COVID-19 pandemic routine, even cancer surgeries are discouraged, avoided or postponed for the sake of safety of HCPs. Sufferings of the patients are unbearable. Moreover, in case of surgical emergency there's no way to refuse a patient for nothaving a report of COVID test.Again, patients are not interested to do a COVID test routinely in several countries, specially in resource constraint countries, where testing is not very easy and expensive in some extent.

We designed and proposed a novel approach, i.e. 'POLIDON' (POLIDON= Polythene + Povidone Iodine), which can be the ultimate hope or solution for these unfortunate patients as well as surgeons or HCPs of above mentioned specialties[2]. Firstly, Use of Povidone Iodine as mouthwash and nasal spray or irrigation for both patient and HCPs prior to surgery is proposed for destruction or elimination of corona virus from nose and mouth for the prevention of transmission of corona virus from one to others. Then, secondly use of simple polythene (or alternatively microscope drape) as barrier drape of patient or operative area for prevention of spread of aerosol in OT during surgery. POLIDON approach is designed for mainly ENT and Skullbase Surgery. HCPs of dental surgery and anaesthesia can be benefitted by this approach also.

Povidone Iodine /PVP-I

PVP-I has been shown to be active in vitro against the coronaviruses that have caused epidemics in the last two decades, namely SARS-CoV

***Corresponding author:** Mostafa Kamal Arefin, MBBS, MCPS, FCPS, Otolaryngologist, Department of ENT & Head Neck Surgery, Dhaka Medical College Hospital, Bangladesh, Tel:8801671748866; E-mail: arefin61dmc@gmail.com

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causing the severe acute respiratory syndrome (SARS) epidemic of 2002–3 and MERS-CoV the agent responsible for causing the Middle East respiratory syndrome (MERS) epidemic of 2012–13. SARS-CoV-2 is highly homologous with SARS-CoV, and as such it is considered a close relative of SARS CoV. In his study Egger et al suggests that, up to 0.23% concentration of PVP-I is virucidal[3]. Kariwa showed that treatment in vitro of SARS-CoV with various preparations of PVP-I for 2 minutes was enough to reduce viral activity to undetectable levels. The lowest concentration used was 0·23%, found in an over the counter throat spray. Recent studies conclude that SARS-CoV-2 should behave similarly[4,5].

Preparation of Povidone Iodine or PVP-I for application prior to surgery

For patients as well as HCPs

A. For gargling and mouth wash

i)For fully conscious patient& HCPs- PVP-I 1% solution (undiluted) 10 ml for 30 sec to 1 minute or 0.5% solution (diluted by mixing same amount of water, i.e. 10 ml PVP-I with 10 ml water) 20 ml for 1-2 minutes. In case of 10% PVP-I solution, 1 ml can be mixed with 19 ml water to get the same concentration.

ii) For patient with altered consciousness - A sponge swab or similar is soaked in 2-5 ml of 1% PVP-I and this is carefully wiped around all oral mucosal surface

B. For nasal application

Nasal spray: 2-3 puff in each nostril with a standard atomizing devise with 0.5% or 0.6% solution of PVP-I or

Nasal irrigation: Irrigate or wash through both nostril with 200-300 ml (100-150 ml in each nostril) of 0.5% PVP-I solution or

Nasal drop: If nasal spray or irrigation facility is not available apply nasal drop 3-4 drops in each nostril.

Preparation of PVP-I mixed irrigating fluid (for mastoidectomy, FESS and skull base surgery)

100 ml of PVP-I 10% solution is to be mixed with 1000ml of Normal saline to make a PVP-I 1% solution.

Polythene: Simple, transparent polythene can act as barrier drape which is an interface between HCP and patient or operative area. Polythene is proved effectivein several studies (as barrier for virus or other particle) in preventing spread of aerosol, produced in these surgeries.

The polythene sheet allows good mobility of the hands of the surgeon's.

We designed a technique to use it like ototent (please see figure) for ear surgery, speciallymastoidectomy and lateral skull base surgery[6] (Figures1-4).

In case of tracheostomy, placing polythene just prior to opening the trachea is vital to prevent aerosol or droplet spread in Operation theatre.

In case of endonasal endoscopic sinus or anterior skull base surgery a stand/ frame can be used to (up)hold the polythene drape for the comfort of the surgeon. Otherwise, covering the patient from head to waist or mid thigh with a polythene is enough.

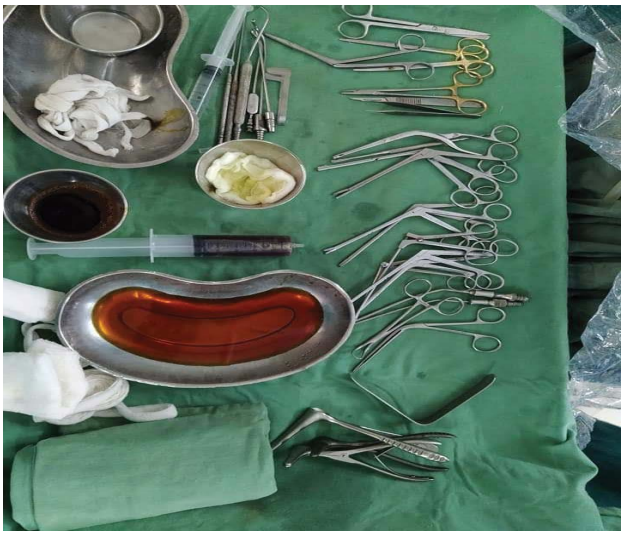

Figure 1: FESS or anterior skull base surgery in POLIDON technique.

Figure 1a: Trolley of FESS

Figure 1b: endoscope, camera, microdebrider etc were kept on patient's body, covered by polythene

Figure 1C: During surgery

Figure 2 (a, b): POLIDON approach in Tracheostomy

Figure 2a: Prior to opening of trachea operative field was covered with polythene sheet

Figure 3: Mastoidectomy or Lateral skull base surgery in POLIDON approach (a, b, c, d, e).

Figure 3a: Ototent made by polythene/ microscope drape.

Figure 2c: Immediately after Emergency Tracheostomy (consent was taken from patient for publishing photo).

Figure 3b: Polythene is fixed with Objective Lens and another point by creating hole in this polythene sheet and fixing it with micropore

Figure 2c : patient is covered with polythene

Figure 3c : Irrigating fluid mixed with Povidone Iodine Solution.

Figure 3d : During surgery.

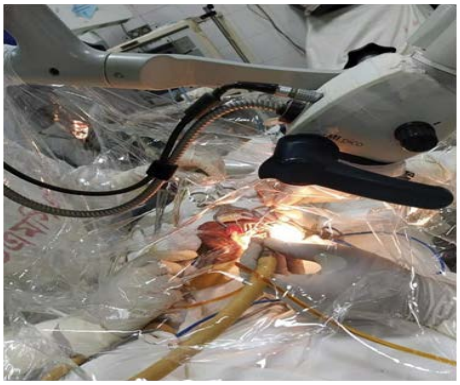

Figure 3e : During surgery (close view) PVP-I mixed irrigating fluid is being used.

Figure 4 : Tonsillectomy in POLIDON technique.

Similarly, covering the patient or certain area of patient with polythene in tonsillectomy, septal surgery, other nasal surgery and laryngeal surgery (according to need) is needed.

In spite of being transparent or translucent, there may have some degree of glare. Limitation of freedom of movement of surgeon and assistant, in some extent, is the main drawback of this approach.

Several modifications can be done. Our focus is on the simplest method. Any positive modification is appreciable.

(Availability of materials, excellent safety profile, and associated low cost- are the main benefits.) Polythene and Povidone Iodine both are readily available, cheap and safe to use.

In several institute, especially in Dhaka Medical College Hospital, we are practising this technique for the last four months (since May). Almost all type of ENT and skull base procedures are being performed with this technique[7, 8]. Two of our patients, underwent emergency tracheostomy, were diagnosed as COVID- positive just following surgery.Three nearby patients as well as two attendants were infected by them within one day of hospital stay (in non-COVID unit)[9]. Interestingly, amongtwelve different health care providers, including doctors, nurses and OT staffs,directly involved and exposed in these twosurgeries, none of them were infected/were not infected.Importantly, 'POLIDON' approach was followed in both the procedures.

Combining these two additional things to the conventional surgery, i.e. our 'POLIDON' approach -all these ENT & skull base surgeries can be done with more safety and less fear[10,11]. Let us do these aerosol generating procedures without hesitation for the betterment of the patientand with more confidence and safety for the health care providers.

Conclusion

ENT & Skull base surgeons need to do lots of aerosol generating procedures (AGP). Most of the endoscopic and microscopic ENT & skull base surgery, where, micromotor drill and microdebridersare used, are AGP;like- mastoid surgery, sinus surgery, surgery of pituitary, tympanomastoidparaganglioma, temporal bone malignancy.

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