



Perioperative management of covid 19 positive surgical patients – a modern and ayurvedic aspect.

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ABSTRACT-

Epidemics or outbreak is a sudden spread of the disease within a short time to a large number of people in a given population. The World Health Organization (WHO) named this pathogenic virus for 2019-nCoV.^[1,2] surgical patients are particularly at risk of infection and negative outcome. To guarantee adequate care to these patients, while minimizing the risk for infection, the early postponing of elective surgery, the creation of COVID-free facilities and the identification of COVID- dedicated operating theaters and teams should be proposed. Meanwhile, because the operating room is a busy environment, it further increases the risk of nosocomial infections of the perioperative team. *Ayurveda* is an ancient system of medicine, clearly mentioned about such diseases causing epidemic under a broad term '*Janapadodhwamsa*'. To assess the

concepts of epidemiology in *Ayurveda* and to compare the same with recent COVID-19 pandemic. When COVID-19 pandemic compares with *Janapadodhwamsa*, it shows similarity in concepts like aetiology, modes of transmission, principles of prevention of outbreaks etc. Also, control measures of COVID-19 can be compared with *Hetu-viparit* and *Vyadhi-viparitchikitsa*. The concepts described in *Ayurveda* regarding *Janapadodhwamsa* are more or like the present modern concept of the pandemic/epidemic. The coronavirus disease 2019 (COVID-19) pandemic has raised several issues regarding the management of surgical patients. The aim of the current study was to clarify the management of surgical patients during the pandemic.

Therefore, development of safe medical practices and infection prevention protocols for the perioperative management of patients with COVID-19 is important.

Keywords- Covid 19, Epidemic surgery, Perioperative management, *Janopdodhwansa, Ayurveda.*

INTRODUCTION-

The Coronavirus disease 2019 (COVID-19) pandemic is an infection caused by SARS-CoV-2.

The pandemic poses many challenges to the healthcare system particularly in infection control and disease treatment.

The 2019-nCoV, as it was initially named, was a novel betacoronavirus belonging to the same family of the pathogens responsible for previous severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) outbreaks.³

On February 11, 2020, the International Committee on Taxonomy of Viruses announced “severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)” as the name of the new virus, and the clinical syndrome caused by SARS-CoV-2 infection was named “COVID-19” by the World Health Organization (WHO).⁴

On March 2020, coronavirus disease 2019 (COVID-19) was declared a pandemic.⁵

The WHO report dated April 5, 2020 attributable to the COVID-19 outbreak worldwide.⁶

Particularly, the management of surgical patients has been burdened by several issues, concerning preoperative and intraoperative management and postoperative care. Relevant issues include the following, among others: the correct timing of elective surgery, the management of cancer patients requiring surgical treatment; the role of routine screening for patients scheduled for surgery, the surgical management of COVID-19 suspected or confirmed cases, the workup of postoperative fever, and the organization of follow-up visits. The role of

endoscopy and the protection of health care workers have been also questioned by surgeons in the affected areas.

We aimed to review the currently available literature to clarify the management of surgical patients, to better define the proper available diagnostic tools, and to infer measures to enhance the safety of health care workers.

DISCUSSION-

Training/Education

- Information on disease transmission and prevention to be relayed to all theatre staff to encourage adherence to infection control protocols, possibly via hospital publications and online tutorials.
- Organise training on proper donning and doffing of personal protective equipment (PPE) including N95 respirator, goggles, face shield, gowns and gloves.
- Familiarise theatre staff with the location of gown up (usually outside isolation room) and gown down PPE protocols to avoid cross contamination.
- Conduct simulations involving surgeons, anaesthesiologists, nurses or assistants to familiarise with modifications in workflow, particularly on induction, extubation, airway crises and cardiopulmonary resuscitation.
- Design cognitive aids to facilitate information consolidation.

Personal protective equipment (PPE)

According to the World Health Organisation (WHO) and CDC recommendations, fit-tested N95 (P2) respirators, eye protection, gown, gloves and caps are necessary for

AGP(13). Powered air purifying respirators (PAPRs) have a higher protective factor compared with N95 respirators, but there is no definitive evidence that PAPRs reduce the likelihood of viral transmission(15). When aerosol generating procedures are not involved, PPE requirements may change according to the situation. Risk assessment of the procedure involved, prevalence of disease in locality and availability of resources should be taken into account.



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Clinical management of surgical patients:

The outbreak of the COVID-19 pandemic has raised several issues in the management of surgical patients.

It is widely recognized that the goal of surgical care during any pandemic should be to guarantee essential care and minimizing the risk of spread and conserving valuable resources.

These strategies and recommendations cover the entire field of surgical care, from preoperative management of positive and suspected cases, to organization of the operating theaters and postoperative patient care.

Preadmission and admission considerations in COVID-19 pandemic

All patients who are eligible for operative intervention need to be categorized into three groups based on the possibility of

having a 2019-nCoV infection (i.e. non-infected people, asymptomatic carriers and symptomatic patients). Preadmission history regarding patient's general condition, presence of active or recent respiratory or gastrointestinal symptoms, anosmia, history of recent travel to an endemic country in the last 14 days or history of contact with a person at risk to have the 2019-nCoV infection should be evaluated properly.

It is recommended that all surgery patients must complete preoperative health screening despite being asymptomatic.^[7] Regardless of patient status of infection; it is recommended that all elective surgeries to be postponed knowing the fact that hospitals are rapidly becoming hot zones for treatment and transmission of this disease^{[8],[9]}

All suspected patients or symptomatic patients need to be evaluated carefully to confirm the diagnosis of COVID-19 disease. If the diagnosis is confirmed, the patient should be quarantined and reported to the national authorities. On the other hand, patients who are non-suspected or proved to be disease-free should be admitted into single rooms to prevent hospitalized patients from incubating in 2019-nCoV infection or asymptomatic 2019-nCoV infection, and prevent the possibility of cross-infection with people in contact.^[8]

Patient Preparation for Emergency Surgeries

In cases of emergent and life-threatening conditions where PCR is not available, all patients should be presumed diseased and approached similarly to infected patients.^[10] All preoperative, intraoperative and postoperative measures should be taken into consideration until the diagnosis is confirmed or the patient is discharged.

Perioperative measures in COVID-19 patients

Preoperative considerations

All medical staff should be performing their clinical tasks wearing gloves, hats, and disposable surgical masks correctly. Whenever a suspected patient or a COVID-19 diseased patient is encountered, extra precautions should be taken to keep protection at a high level. If this the case, all providers should utilize personal protective equipment (PPE) including fit-tested disposable N95 respirator, goggles, face shield, gowns, double-layered gloves, and protective footwear to achieve maximum droplet/contact isolation precautions.^{[8],[9],[10]} Medical staff should complete personal hand hygiene before and after contact with patients and after removing gloves.^{[8],[9],[11]}

As Medical staff has extensive contact with patients and their families as well as other health care providers, they are very likely to cause cross-infection. Because of that, the daily assessment of personnel health status and recording body temperature should be implemented. Any medical staff with an increase in his body temperature should be isolated and investigated for the possibility of acquiring the disease.^[8]

Properly protected anesthetists need to oxygenate patients with 100% O₂ for 3–5 min then to perform rapid sequence induction and intubation to avoid manual ventilation and decrease the possibility of aerosolization of virus from airways.³⁰ Once PPE is removed proper handwashing before touching the surrounding environment. It is recommended to use a high-quality HMEF (Heat and Moisture Exchange Filter) between the facemask and breathing circuit. It is estimated that HMEF can remove

99.97% of airborne particles equal to or greater than 0.3 microns.^{[12],[13]} Anesthetic equipment must be used by one person only as well as the anesthesia machine is strictly disinfected according to requirements after use.^[13]

Intraoperative considerations

If a patient is having COVID-19 disease or even highly suspected, the operation should be performed in a designated negative pressure environment^[9]; it is essential to keep pressure difference between the operating room below - 4.7 Pa.^[4] Medical staff should be reduced as much as possible as well as their temperature needs to be measured before starting the surgery.

Surgeons and adjunct medical staff should be aware of blood and body secretions at the time of surgery, all equipment should be kept clean of these secretions.^[7]

AGPs include and not limited to intubation, extubation, chest tube insertion, bronchoscopy, bag masking, gastrointestinal endoscopy, laparoscopy and the use of energy devices (e.g. electrocautery). When using electrocautery or other energy devices in surgery, adjust to the lowest effective power possible to reduce the amount of surgical smoke, and use a smoking evacuator.^{[8],[7]}

The choice between laparoscopy and laparotomy as a surgical approach needs to be cautious. As the use of laparoscopy was proved to have advantages, patients with good cardiopulmonary function and general condition can be considered for laparoscopic surgery. Careful attention during pneumoperitoneum creation and strict aerosol management must be made even during the operation.^{[7],[8]}

In response to artificial pneumoperitoneum, there will be a reduction in lung volume, increased airway pressure, increase CO₂ retention, and decreased lung compliance. Therefore, the risk of perioperative infection 2019-nCoV is considered high. To minimize the impact of pneumoperitoneum on lung function, circulation and susceptibility for pathogen infection, both intraoperative pneumoperitoneum pressure, and CO₂ ventilation should be at the lowest possible. Surgical smoke and pneumoperitoneum should be evacuated only using a direct suction connected to a vacuum suction unit.^[7]

Postoperative considerations

Postoperatively, specimens should be labeled as 2019-nCoV and handled as infectious specimens for treatment with the pathology department. Disease-free patients can be transferred to the regular surgical ward for their postoperative management. Daily assessment of body temperature as well as respiratory symptoms is mandatory.^[8]

Any patient with new-onset fever or cough should be isolated and investigated thoroughly to rule out 2019-nCoV infection.^[14] Suspected or confirmed patients should be isolated in a single room with a negative pressure, sufficient oxygen supply and nebulization should be considered.

Postoperative rounds, medications and wound management should be performed under personal protection to avoid contact with secretions. In case of suspected COVID-19, all medical staff should be isolated and quarantined for observation until the patient is cleared.

If the diagnosis of COVID-19 is confirmed or was previously identified, the medical

staff involved in the surgery need to be isolated for 14 days after the surgery.^[8]

Endoscopy: General recommendations

Endoscopy is generally considered a high-risk procedure because of the potential contact with pulmonary and gastric secretions. Therefore, its use during the COVID-19 pandemic should be limited to the management of endoscopic emergencies (ie, gastrointestinal bleeding, acute cholangitis, biliary pancreatitis, foreign body retrieval), as well as some suspected or confirmed cancer cases after accurate case-by-case evaluation. The same principles that have been adopted for surgical interventions should be applied when performing high-risk endoscopic procedures, including bronchoscopy, upper gastrointestinal procedures and any procedure performed in suspected or confirmed patients.

In such cases, an adequate space with specific areas for donning and doffing of PPE should be identified, and adequate personal protections should be used (including N95 respirators or equivalent and water-resistant gowns). Adequate sedation should also be carried out to minimize patient retching and aerosolizing of nasopharyngeal secretions.

In Ayurvedic view- Epidemic as Janapadodhwansa-

Ayurveda is an ancient system of medicine, clearly mentioned about such diseases causing epidemic under a broad term '*Janapadodhwamsa*'. The principles were described in piecemeal when compiled, analysed and interpreted the same as a modern theory of Epidemiology. Many of today's medical sciences coincide with some of the basic principles of *Ayurveda*. The ancient *Ayurvedic* treatise *Charaka Samhita* explained these epidemic/Pandemic

diseases as *Janapadodhwamsa*.^[15] The main etiological factors responsible for any epidemic or pandemic diseases are the contamination of *Jala* (water), *Vayu* (air), *Desha* (land) and *Kala* (season) giving rise to infectious diseases which kills mass of people.

According to *Sushruta*, one of the causative factors for fever is *Agantu Karana* or *Para Hetu* (*Jivanu*). *Dalhana* explains this *Para Hetu* as *Bhutabhishanga*. *Jivanu*^[16] (Micro organisms) which develop in the atmosphere due to *Adharma*^[17] (improper behaviour of people of the world) as well as *Mitya Ahara-Vihara* with special reference to *Sleshmaja Krimi*.^[18] As per *Ayurveda Prajnaparadha* is also one of the causes of all miseries as it leads to malfunctioning of *Buddhi* and aggravates *Tridoshas*.^[19]

Sushruta has described the mode of spread of infectious disease as ***Oupasargika* or *Sankramika Roga*** (Communicable disease). *The Agantu Hetu / Para Hetu* vitiates all the three *Doshas* and thereby severely affects *Pranavaha Srotas* and *Rasavaha Srotas* leading to the depletion of *Ojas* resulting in the death of the patient.^[20] *Nidhana-Samprapti*: Aetio-Pathogenesis *Sankramika* or ***Oupasargika Roga Susrutha*** has described the mode of spread of infectious disease as *Oupasargika* or *Sankramika Roga*.^[21]

Most of the infections are spread from one person to other by

- ***Prasanga*** (sexual intercourse),
- ***Gatra Samsparsa*** (body contact),
- ***Niswasa*** (inhalation),
- ***Saha Bojana*** (taking food with diseased),
- ***Saha Sayya*** (sharing the bed),
- ***Vastra*** (clothes),
- ***Maalya*** (Garlands) and

- ***Anulepana*** (cosmetics).

Adharma- *Ahita/Virudha Ahara/Prajnaparadha Prajnaparadha* is loss of restraining oneself from ***Dhee*** (true knowledge), ***Dhruti*** (controlling power which restrains one from harmful activities), ***Smruti*** (ability to recognise basic nature of substances/ recollect matters).^[22]

All the *Tridosas* are aggravated by the affliction of evil spirits or germs. This disease is born from all the three *Doshas* with *Kapha* and *Vata* being the predominant ones. It can be specially classified as *Abhishangaja Jwara* and more particularly as *Bhutabhishangaja* due to the microscopic germs caused due to contact with certain toxins.^[23]

Jwara is accompanied with symptoms of great increase of *Sleshma*, sometimes appearing as epidemic.^[24]

Jivanu is carried through the air, spreads quickly throughout the community from person to person through respiration and enters into the respiratory track and produces fever, sometimes the entry may be through the mouth also.

Lakshana Shlesmaka Jwara- Main symptoms are running nose, headache, malaise, pain in chest, cough, great loss of strength, dyspnoea. If alimentary tract is invaded there will be vomiting, diarrhoea or both.^[25]

Pratisyaya is flow of more watery fluid from the nose in some persons only and not in all. Great loss of body strength within five or six days these two are special symptoms; weakness happens in all the muscles including the heart muscle. Because of weakness of the heart sometimes even death also takes place.

In Pranavaha srotas the organs involved are mainly *Swasapatha* (trachea) and two *Phuppusa* (Lungs). Abnormalities in these organs are *Vranasotha*, *Kaphapurnata* and rarely *Raktasthivana*. *Kapha-Vaata Jwara*-Main Symptoms are fever dyspnoea, cough, choking type of throat afflictions, sore throat and pain in the cardiac region and sides of the chest.^[26]

The Superhuman Causes of Disease Sometimes even without any derangement in the seasons, the population gets extinct by *Adharma*. Further, in the places where *Vayu* (air) is contaminated, people suffer from cough, dyspnoea, common cold, head ache and fever.^[27] *Nidana-Samprapti-Lakshana Adharma* or *Pragnaparadha* or *Mithya Ahara* or *Sleshmaja Krimi* Formation of *Jivanu* (*Aganntuja/Bhutabhisangaja*)

Dosa: Kapha Vata Pradhana Tridosa

Dathu: Rasa, Raktha

Srotas: Rasavaha, Pranavaha Srotho Dusti: Sanga, Vimarga Gamana

Adhistana: Amasaya, Kanta, Talu, Phuppusa,

Nature / Clinical features of Epidemics

As said earlier that etiological factors are common to the population under a particular community, the disease produced due to these factors also has a similar set of symptoms. These factors are different according to habitat, seasons, type of sinful acts etc. therefore, the particular disease is not mentioned in *Ayurveda* as a *Janapadodhwamsavyadhi*. According to *Acharya Sushruta*, all these modes of transmission causes genesis of certain infectious diseases which show the presentation of skin diseases (*Kushta*), Fever (*Jwara*), Pulmonary Tuberculosis

(*Shosha*), Conjunctivitis (*Netrabhishyanda*) etc. Common clinical symptoms include fever (not all), cough, sore throat, headache, exhaustion, anxiety, myalgia, and breathlessness. Conjunctivitis has also been described. Thus, the clinical feature of COVID-19 can be compared with *Jwara*, *Shosha* & *netrabhishyanda*.^[28]

Also, as per *Sushrut Samhita*,

-expired air or inhalation of a droplet from an infected person (*Nishvasat*),

-eating in the same plate with others (*sahabhojanat*),

-sharing beds (*Sahashayyanat*), using clothes,

-garlands & utensils used by an infected person (*vastramalyanulepanat*) can be considered as the mode of transmission of COVID-19 pandemics.^[29]

In contrast, the control & treatment for the recent COVID-19 pandemic can be found as *hetuviparitchikitsa* & *Vyadhiviparitchikitsa* in the ancient *Ayurveda*.^{[30],[31]}

Control & treatment of Epidemics

The treatment of epidemic aims at both preventive & curative measures. Preventive measures help to minimise the occurrence of emerging disease & limit the hazardous effects of causative factors while corrective actions help to treat the condition properly.

For the management of epidemics, specific preventive measures are described in *Ayurveda* are as follows

1. Collection of potent medicinal drugs before the outbreak of an epidemic.

2. Avoid sinful acts & intellectual errors.

3. **Rejuvenation therapy (RasayanaChikitsa)** to enhance the immunity and strength of the body.

4. Truthfulness, compassion for living being, charity, generosity, worshipping god, tranquillity, Codes of conduct, protection of the self by mantras & auspicious rituals help to prevent the disease.

5. Search for the things which are suitable for the person, residence in auspicious localities, discussion of religious scriptures.

6. Avoid pollution of air, water, food or environment.

Ayurveda also described control of epidemics by using treatment opposite of etiological

factors (**Hetuviparitchikitsa**) and treatment opposite of disease (**Vyadhiviparitchikitsa**).

Treatment opposite of etiological factors

Purification of Air (Vayu)

Purification of air is done by fumigation (**Dhoopan**).

For fumigation certain medicinal plants having microbial potential like *Ativisha* (*Aconitum heterophyllum*), *Musta* (*Cyperusrotundus*), *Ushir* (*Vetiveriazizanioides*), *Kushta* (*SaussureaLappa*), *Priyangu* (*Callicarpamacrophylla*), *Tagar* (*Valerianawallichii*) *Neem* (*AzadirachtaIndica*), *Tulsi* (*Ocimum sanctum*), *Haridra* (*Curcuma loga*), *Vacha* (*Acoruscalamus*), *Deodara* (*Cedrusdeodara*), *Vidanga* (*Embelicaribes*) etc. are used.

Fumigation is used to disinfect the clothes, bedsheets, surrounding atmosphere etc. It acts as a disinfectant and helps to prevent infectious diseases.

Purification of Water (Jala)

Use of water contaminated with urine, stool, insects, leaves, decomposed material, ova/eggs, etc., having bad taste & smell is strictly prohibited in *Ayurveda*. Before using such water, it gets purified first. Highly contaminated water is used after boiling. If it is slightly contaminated then, it is purified by quenching hot iron rod or by exposure to sun rays.

Nirmalis recommended as a water purifier in *Ayurveda*. Some wormicidal (*krumighna*) & diuretic (*mutral*) drugs like *Vidang* (*Embelicaribes*), *Musta* (*Cyperusrotundus*), *Dhanyak* (*Coriandrumsativum*) etc. are used to remove the toxins from the body.

Rasayan (Rejuvenation) and Shodhan (detoxification) treatment

Rasayana Chikitsa (Rejuvenation therapy) according to *Ayurveda* nourishes, develops & corrects the vitiated body elements. It is used to improve immunity & build the strength of the body.

While detoxification of the body is done by Panchakarma treatment. It helps to remove toxic and infectious substances from the body without causing any side effects.

Above discussion showed that epidemic or pandemic or outbreaks could be controlled by *hetuviparitchikitsa* & *Vyadhiviparitchikitsa*. When compared with COVID-19 pandemic, the control measures taken consist of the purification of air, places, and things in & around the case of COVID-19 with the help of pure disinfectant like sodium hypochlorite & this

can be compared with the *hetuviparitchikitsa* in ancient *Ayurveda*. Also, the treatment of the COVID-19 consists of symptomatic & supportive treatment. The treatment of the cases is done with the help of drugs like paracetamol, hydroxychloroquine, azithromycin etc. which can be compared with *Vyadhiviparitchikitsa* of the ancient *Ayurveda*.

Again *Ayurveda* had a concept of *Rasayana Chikitsa* which means boosting of the immunity which can be compared with modern immunisation/Vaccination concept to increase the immunity of person towards the particular disease agent. *Amalaki, Hritaki, Ashwagandha, Yashtimadhu, Guduchi, Pippali, Ayush64, Ayushkwath vati, chyavanprash, Sukshma Triphala vati*, these *Ayurvedic* formulations are helpful to use as a *Rasayanakalpa*. Vigorous efforts are going on worldwide for the preparation of the vaccine for recent emerging viral disease COVID-19. In the prevention & control of the COVID-19 pandemic, isolation & quarantine plays an important role where infected persons with or without symptoms are kept away from the non-infected people of the community to halt the spread of infectious viruses to the other part of the community.^[32]

CONCLUSIONS

In the era of COVID-19 pandemic, all health care providers must implement standardized essential perioperative measures including the use of PPEs to control disease transmission, and avoid unwanted complications. In life saving procedures, all patients need to be managed as COVID-19 patients until results are confirmed. Elective procedures are recommended to be postponed and to consider only urgent, lifesaving procedures and oncologic

surgeries that are associated with worse outcome if delayed. The use of laparoscopy is still considered valid option talking in consideration extra precaution during creation of pneumoperitoneum, cardiopulmonary physiology and gas deflation.

The concepts described in *Ayurveda* and contemporary era are more likely corresponding to each other, and we cannot neglect their significance. Modes of transmission of infectious disease-causing epidemic described by *Acharya Sushruta* are very much relevant to as described in modern science. When compared with the recent pandemic of COVID-19, we found that vitiated air (*Vayu*), habitat (*Desha*) and seasons (*Kala*), affliction by attacks of germs (*rakshsas*) are considered as etiological factors for COVID – 19 pandemics. Also, as per *Sushrut Samhita*, expired air or inhalation of a droplet from an infected person (*Nishvasat*), eating in the same plate with others (*sahabhajanat*), sharing beds (*Sahashayyanasanat*), using clothes, garlands & utensils used by an infected person (*vastramalyanulepanat*) can be considered as the mode of transmission of COVID-19 pandemics.

In contrast, the control & treatment for the recent COVID-19 pandemic can be found as *hetuviparitchikitsa* & *Vyadhiviparitchikitsa* in the ancient *Ayurveda*. Thus, we can conclude that in-depth analysis of the concepts of *Ayurveda* can provide light over aetiology, mode of transmission, control, preventive & treatment of many pandemics, epidemic & outbreak modern medical sciences in the present era. Also, scholars from ancient *Ayurveda* medicine had medicinal knowledge far ahead of their time which is still comparable with many relevant concepts of modern medicinal sciences.

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