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Original article

COVID-19 and Elective Cardiac Surgery: Our experience!

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ABSTRACT

INTRODUCTION: Ever since WHO declared SARS-COV-2 as a global pandemic and with the ongoing pandemic still continuing to spread, there has been an urgent need to find ways to deliver safe cardiac surgery with limited resources available. With relocation of resources like health staff, PPE kits, hospital beds to the covid patients, it is a challenge to continue with cardiac surgeries. COVID -19 disease already poses a high risk to cardiac patients[1] , also operating with active COVID -19 infection not only adversely affects postoperative outcome but also poses risk to health care workers. We planned this study with aim to follow a protocol in our department to effectively stride a balance between the on-going pandemic crisis and performing routine cardiac surgery procedures.

METHODS: A retrospective study was done in which all patients who were admitted in the Department of Cardiovascular and Thoracic Surgery at Sassoon general hospital, Pune, Maharashtra, India between March 2020 and April 2021 were included.

OBSERVATIONS: A total of 187 patients were admitted during the study period. Out of these 15 patients were diagnosed as COVID-19 positive preoperatively and surgery was deferred. 2 patients were identified as COVID-19 positive postoperatively. However they recovered well. No COVID-19 related mortality were observed in any patients and healthcare personnels.

CONCLUSIONS: Amidst the pandemic performing safe surgery remains a challenge. However, by implementing a protocol it can be performed safely with no added risk to the patients and healthcare workers.

KEYWORDS: Covid – 19 , cardiac surgery , pandemic

INTRODUCTION

The current global pandemic of coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS-COV-2). The virus was first identified in December 2019 in Wuhan, China. The World Health Organization declared it as a pandemic on 11th March 2020. As of 11 th May 2021, India has recorded current cases per million as 16,411. Ever Since the first case in India was reported on 30th January 2020 in the state of Kerala[3] (this was a student who returned from Wuhan and tested positive for COVID-19) there has been an unprecedented rise in active cases. With over burdened health care facilities, limited resources available, elective surgeries being on hold, keeping cardiac surgery functional has been a real challenge

AIM

To perform safe cardiac surgery in this current pandemic with limited resources available and employing simple practical strategies in COVID-19 era.

MATERIALS AND METHOD

MATERIALS

- A retrospective study of 187 cases

- Study period: March 2020- April 2021.

Inclusion criteria:

- All patients requiring elective Cardiovascular and Thoracic Surgery cases operated in CVTS operation theatre
- Preoperative COVID-19 negative patients
- All age groups & both sexes included

Exclusion criteria:

- Preoperative active COVID-19 infection
- Post COVID-19 recovery less than 6 weeks
- Vascular and Thoracic patients who were operated in other surgical operation theatres

METHODS

Following protocol was followed

PATIENT RELATED

1. Patient factor:
    a. Thorough bath of patient at the time of admission followed by hospital clothes
    b. Isolate patient in separate ward awaiting COVID -19 RT-PCR report
    c. Patient given surgical mask and advised strict compliance
2. COVID-19 testing protocol:
    a. Rapid Antigen Testing (RAT) test done at the time of admission. Along with this in RAT negative patients, RT-PCR was sent for double confirmation[9].
    b. If there was history of exposure, symptoms, travel history, chest X Ray findings were suspicious, HRCT was performed.
    c. If surgery was delayed by 72 hours a repeat RT-PCR was performed.
    d. On the morning of surgery RAT was performed.

Shields were used during nasopharyngeal swab collection for RAT and RT-PCR tests. All RAT and RT-PCR tests were done using ICMR approved kits and guidelines. Only patients who were tested COVID-19 negative were operated on.

3. Beds were kept at 50 percent occupancy
4. Attendant :

Only one consistent attendant per patient was allowed. RT-PCR of attendants were not done. However, they were asked to strictly adhere to COVID-19 protocols.

5. Sanitization :
    a. Positive patients were immediately shifted to dedicated COVID-19 isolation ward
    b. sanitization of bed, beddings, monitors & cables followed as per national guidelines[11].
6. Diet :

All patients were given a high protein diet.

HEALTH CARE PROFESSIONALS

1. RT-PCR done of staff nurse and healthcare assistants after completion of their covid rotations
2. N95 masks were worn
3. Intraoperatively surgical team, anesthesiologist and perfusionists wore N95 masks and sterile surgical gowns. COVID -19 PPE kits including shields were not worn[6].

Our study intended to know:

- Number of cardiac surgery cases admitted at our centre during the pandemic
- Covid positivity among patients
- Covid positivity among health care workers
- Mortality & morbidity of operated patients in covid pandemic
- Outcome of patients who tested COVID-19 positive after surgery

OBSERVATIONS:

Table 1- Table showing total number of patients operated in non pandemic and pandemic era

Month and year	Total number of patients operated in	
	Non pandemic era	Pandemic era
March 2018- Feb 2019	194	-
March 2019- Feb 2020	194	-
March 2020- Feb 2021	-	110

Operated patients in COVID-19 pandemic era decreased

Table 2- Table showing types and number of surgeries performed

Type of Surgery	March 2020- June 2020	July 2020- Oct 2020	Nov 2020- Feb 2021	March 2021- April 2021
Coronary artery bypass grafting(CABG)	9	25	15	3
Mitral valve replacement(MVR)	6	2	13	5
Aortic valve replacement(AVR)	2	2	5	-

Double valve replacement(DVR)	1	2	2	-
CABG with AVR	-	-	1	-
Ventricular septal rupture(VSR) repair	-	-	3	-
Atrial septal defect(ASD) repair	1	2	3	1
Patent ductus arteriosus(PDA) ligation	-	-	1	-
Blalock taussig(BT) shunt	-	-	1	1
Sternal rewiring	1	1	3	1
Pneumonectomy	-	-	1	-
Lobectomy	1	-	-	-
Bullectomy	-	-	1	-
Decortication	1	-	-	-
Thymectomy	-	-	1	1
Pericardial window	-	-	-	1
Axillofemoral bypass grafting	-	1	1	-
Femoropopliteal bypass grafting	-	-	1	-
Cervical rib excision	-	-	1	-
Total	22	35	53	13

Maximum number of surgeries performed were of CABG.

Table: 3- Table showing month wise total number of admissions, total number of preoperative COVID-19 positive patients and total number of surgeries performed

Month and Year	Total number of admissions	Number of COVID-19 positive patients	Number of surgeries performed
March 2020	26	nil	10
April 2020	4	nil	4
May 2020	12	nil	2
June 2020	12	1	6
July 2020	14	nil	7
August 2020	9	2	3
September 2020	15	2	13
October 2020	17	1	12
November 2020	9	1	14
December 2020	19	1	16
January 2021	17	nil	13
February 2021	13	nil	10
March 2021	10	5	8
April2021	10	2	5
TOTAL	187	15	123

A total of 15 patients were tested COVID-19 positive preoperatively with maximum being in the month of March 2021.

Table 4- Table showing total number of patients tested COVID-19 positive postoperatively

Post operative COVID -19 test	Number of patients
Positive	2
Negative	121
Total operated	123

A total of 2 patients were tested COVID-19 positive postoperatively.

Table 5- Table showing COVID-19 associated mortality in operated patients

Outcome	Total number of patients
Number of patients operated	123
Number of COVID-19 related deaths	nil

There was no COVID-19 associated mortality in operated patients

DISCUSSION:

The emergence of severe acute respiratory syndrome coronavirus 2 in December 2019, from the city of Wuhan, China, and its subsequent rapid worldwide spread resulted in the World Health Organisation declaring the coronavirus disease 2019 (COVID-19) as pandemic in March 2020. Ever since then COVID-19 disease has significantly impacted the healthcare system globally. Compared to the previous non COVID-19 pandemic year, the COVID-19 pandemic resulted in decline in the number of elective surgeries by 43.29% (Table 1). There were a total of 123 surgeries performed in the study period from March 2020 to April 2021. A wide spectrum of cardiovascular and thoracic surgeries were performed (Table 2). These included long duration surgeries as well. We had a total of 187 admissions out of which 15 patients (8.02%) tested positive preoperatively for COVID-19 and were transferred to covid care wards in our hospital (Table3). Out of the total 123 patients operated during the study period, 2 patients(1.62%) had been tested positive in the postoperative period (Table 4) and had to be transferred to covid care for further medical management. However both these patients recovered well and were subsequently discharged. No COVID-19 related patient deaths were observed during our study period (Table 5). Duration of hospital stay for most of the patients were 5-6 days except for 2 operated patients who developed COVID-19 symptoms and tested positive postoperatively. One cardiac recovery staff nurse tested positive during the study period . However she recovered well. None of the other staff neither in Operation Theatre, recovery nor ward including doctors were affected.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infects host cells through ACE2 receptors, leading to coronavirus disease (COVID-19)-related pneumonia, while also causing acute myocardial injury and chronic damage to the cardiovascular system[1] . In addition, some patients with underlying cardiovascular

diseases (CVDs) might have an increased risk of death [1,2] if infected with COVID-19. With several worldwide bodies addressing guidelines for carrying out triage for surgical care[4] and subsequent recommendations on resuming elective surgery as per local availability of resources and pandemic burden[5] we followed this simple and easily reproducible protocol. Pune , being one of the worst hit in the country by pandemic[10] , it was necessary to channelize the resources for the pandemic patients as well as to keep in mind the safety of patients and healthcare professionals[7].

Diagnostic testing of severe acute respiratory syndrome related coronavirus-2 (SARS CoV-2) remains the cornerstone in containment of COVID-19 pandemic.The identification of viral RNA using reverse transcription polymerase chain reaction (RT-PCR) is the gold standard for identification of an infection caused by SARS CoV-2. However the need for well equipped laboratories, cost and delay in obtaining results led to development of rapid antigen test (RAT). Rapid Antigen testing helped us with immediate screening of positive patients. In view of sensitivity of RAT ranging from 30% to 80% from various studies[12,18], RT-PCR was also sent simultaneously. With RT-PCR test giving false negative result [8,9] in early disease we practised repeated RT-PCR testing if duration of preoperative stay was more than 72 hours and in clinically suspicious cases. In healthcare facilities where testing resources are adequate, liberal use of COVID -19 testing will help judicious allocation of COVID-19 PPE. Also it will enhance surgical decision making, patient selection, surgical outcome in addition to limiting exposure of healthcare workers to COVID-19 infection. Patients with exposure history, suspicious clinical symptoms and X Ray findings who were tested RT-PCR negative , HRCT chest further helped in preoperatively identifying COVID-19 patient[13]. Inspite of our patients being in ward maintaining strict COVID-19 protocols, RAT was performed on the morning of surgery. This helped us to exclude post admission hospital acquired COVID -19 infection, since our hospital is a tertiary care hospital designated as Covid Care centre. Nahson C[14] et al in his review study of surgical outcome of preoperatively asymptomatic untested coronavirus disease 2019 patients had stated an unacceptable high postoperative mortality rate and severe mostly pulmonary complications along with medical staff exposure and transmission. He strongly emphasized the need for knowing the preoperative COVID-19 status before any surgical treatment especially in high prevalence areas. Several other studies have shown that operating a patient in their incubation period of COVID-19, accentuated the disease progression of COVID-19 and made them more susceptible to pneumonia and ARDS[15]. COVID-19 patients typically present with fever, cough, shortness of breath, malaise, sore throat, myalgia, diarrhoea, although majority may be asymptomatic. These asymptomatic patients have potential for disease transmission[16]. Thus preoperative testing of all patients helps to not only contain the pandemic but also improve postoperative outcome without much added cost[17].

Keeping preoperative and postoperative beds at 50 percent occupancy and keeping alternate beds vacant helped to maintain safe distance among patients. Restriction of entry of attendants to the ward was advocated. Importance of restricting the number of the attendants per patient to one & keeping them consistent cannot be emphasised enough. Also, the visiting time period of attendants was restricted.

Due to the pandemic situation our staff nurses and health care assistants assigned to our cardiac theatres and cardiac recovery room were posted for COVID-19 duties. After their duties, they were given 7 days rest and asked to do RT-PCR testing before joining. Only those staff who were RT-PCR negative would join duties.

This ensured them adequate physical and mental wellbeing in addition to breaking the transmission chain and prevention of spread of COVID-19 infection.

All staff wore N95 masks. Limited entry of healthcare personnel to operation theatres was followed. During surgery only sterile gowns with N95 masks were worn by the operating team. COVID- 19 PPE kits were not used . However, shields were only used during nasopharyngeal swab collection for RAT and RT-PCR testing. Our judicious RT-PCR testing helped conserve these limited resources in a public hospital.

CONCLUSION:

With the COVID-19 pandemic continuing to take a toll over the healthcare system, there has been a need to modify and design Institute friendly protocols to continue to serve cardiovascular and thoracic patients. Cardiac surgical patients cannot be postponed for long as postponement of surgery poses a risk to life for most patients. In COVID-19 era routine use of these limited available PPE kits in these long duration surgeries are very uncomfortable for the surgeons, anaesthesiologists, nurses, perfusionists and other operation theatre personnel. Thus while following adequate safety precautions and judicious testing cardiac surgery can be performed safely, along with ensuring safety to the healthcare team.

ABBREVIATIONS:

COVID-19 : corona virus disease 2019

SARS-COV-2 : severe acute respiratory syndrome coronavirus 2

RAT : rapid antigen testing

RT-PCR: real time reverse transcription polymerase chain reaction

PPE: personal protective equipment

Key words - COVID-19, cardiac surgery

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