

ORIGINAL ARTICLE

Cardiac Surgery in Covid Era—an Experience at Our Tertiary Care Center Short Title - Cardiac Surgery in COVID Pandemic

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ABSTRACT

Background: A sudden emergence of global pandemic due to SARS- Cov -2 has changed the scenario of management of non COVID diseases. With very high infectivity rate and stormy course, this disease has made the lives of people miserable so with the health care facilities and treatment. All the medical fraternities are in the state of confusion that how to treat or not to treat the patients of illness other than the corona virus infection.

We are sharing our experience of cardiac surgery at our tertiary center in lockdown and unlockdown period.

Material and Method: This is a retrospective study from April 2020 to November 2020. We have operated upon 232 cases in this duration.

Results: Out of 232 cases – Overall mortality –26 Post covid operated –4

Number of covid positive after surgery – 3 Post covid Mortality – 1

Conclusion: Use of N95 mask, PPE kit or HIV KIT, with regular sanitization of hands have made possible to perform cardiac surgery in this difficult situation on the patients of cardiac illness which usually cannot wait longer.

Key Words: Pandemic, SARS-Cov 2, Cardiac Illness, N95 mask, PPE KIT, HIV KIT, sanitization.

INTRODUCTION

This year 2020 came to our life with challenge of facing global pandemic of SARS-Cov 2 infection. A simple flu- like respiratory infection changes its behavior within few days and becomes a systemic infection causing various symptoms and signs related to lungs,

heart, gastrointestinal tract, nervous system, musculoskeletal system and eye. Although, mortality rate is not very high and infection is curable with available drugs but once it involves lungs or becomes systemic with cytokine storm then there are very high chances of mortality.

Because of very high rate of infection, through aerosols, air droplets, fomite and surface transmission, and uncertainty of clinical outcome of the infection Government of INDIA decided to contain the infection by imposing lockdown.

The Government tried to improve the health care facilities during lockdown by making availability of more medicines, ICU beds, general wards, oxygen, ventilators and other equipments for the coming challenges in future.

But as number of SARS-Cov 2 infected cases increased, our tertiary health care hospital, which is largest government hospital in the western region, was converted into free covid care hospital to provide treatment of all corona virus infected cases. OPDs and all operation theatres were closed for routine surgeries except for emergency procedures. ICUs, all nursing staff, and doctors were posted for care of SARS-Cov 2 infected patients.

But continuing to defer all elective surgeries may lead to a situation where a lot of patients may die of their original condition.

We started routine cardiac surgery once lockdown was relaxed and other government associated hospitals took over the charge of management of covid 19 infected cases making our center available for management of all other diseases.

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With increasing covid cases, question of protecting all health care workers persists, and in such circumstances, it is better if we can formulate broad guidelines for us.

With the available knowledge about corona virus and protection protocols, we started doing routine cardiac cases.

So, we are sharing our experience of last eight months of performing open heart surgery with minimum resources available and with due protection of all health care workers from getting the corona virus infection.

MATERIALS AND METHOD

This is a retrospective study of 232 cases of open heart surgery operated at our center during 8 months from April 2020 to November 2020. Knowing the highly contagious nature of the SARS Corona-2 virus, we established our protocol to decrease the exposure of all doctors, nurses, floor workers, as well as patients.

We reduced the number of cases operated per theatre to one case per table followed by complete sterilization of OT premises daily. As we know that operating on a suspected covid patient was associated with very high chances of infection to all health care workers we developed our protocol to limit the spread of infection. We started to follow the guidelines mentioned below –

1. A separate ward was established to admit the patients before detection of corona infection.
2. The patients were subjected to two covid RT PCR test 72 hours apart and HRCT thorax in all patients regardless of symptoms present or not.
3. Once, a single report comes negative for covid infection, they were shifted to preoperative surgical ward. Any patient, who comes positive, was shifted to covid isolation hospital for further management.
4. RTPCR test was repeated every 72 hourly till the date of surgery.
5. Distance between two beds was kept according to the two meter distance criteria.
6. All the patients, relatives, and health care workers were asked to strictly follow the face mask application guidelines with properly covering the nose and mouth all the time.
7. Only one or two, and the same attendants, who were

covid negative, were allowed to stay with the patient till the time of discharge.

8. Patients were taken for surgery once their report is negative for covid infection day before or the morning of surgery.
9. Patient's face mask was removed only just before endotracheal intubation.
10. PPE kit with face shield and N95 mask were put on by anesthetist, nursing staff, and floor workers. Only, minimum required number of health care workers was allowed to stay inside the OT.
11. Surgeons wore PPE kit or HIV kit with N95 mask covered with another surgical mask and Loop.
12. During sternotomy, the sterna saw was kept covered with wet sponge.
13. Minimum utilization of cautery or use of smoke free cautery.
14. Early extubation in ICU and early discharge.
15. Testing for covid-19 infection in postoperative period and if patient comes positive, then shifted to covid care hospital.
16. Any patient planned for surgery and comes positive after initial negative report, were shifted to covid care hospital and operated after one and half month of becoming covid negative.

RESULTS

Total 232 patients were operated in eight months of corona era from April 2020 to November 2020 in cardiac surgery department of SMS Hospital Jaipur, Rajasthan.

Only 2 cases were operated in LOCKDOWN period of April and May 2020 with one case in each month, one was critical left main disease with ongoing severe angina and other was LA myxoma with pulmonary edema.

Once Lockdown was relaxed our services were resumed to a limited extent. All type of cardiac cases including simple congenital cardiac surgery in pediatric cases were operated.

Out of 232 cases, 92 were female (39.65%) and 140 were male patients (60.34%).

Maximum cases were in age group of 31 – 70 years (153 cases, 65.94%) . 8 cases were more than 70 years of age (3.44%) and 20 cases were in pediatric age group ranging from 2 month of age to 10 years (8.62%).

Valve replacement was the commonest surgery with 96 cases (41.37%) followed by Coronary artery bypass grafting (CABG) with 84 out of 232 cases (36.20%).

In congenital cases, central shunt (1), ASD closure (15), VSD closure (8), AVCD (1), TOF repair (8), and TAPVC repair (3) were the main procedure.

Difficult cases were also operated including DVR with BENTALL procedure (1), CABG with Aortobifemoral bypass grafting (1), CABG with MVR (2), Aortic Aneurysm (1), and Redo DVR (1). 2 cases were of LA Myxoma and one case of RA mass.

Other cases operated were tricuspid repair in Ebstein's anomaly and VSD closure with AVR in RSOV.

Overall Mortality rate was 11.20% (26 out of 232).

4 patients who were covid positive in preoperative period, treated first for covid infection and then operated with good postoperative outcome. In these cases 2 were MVR, 1 was sinus venosus ASD, and one was CABG.

3 patients became covid positive in postoperative period. They were shifted to covid care hospital for the management. Out of 3, 2 patients (VSD closure, CABG) were discharged and one patient died due to covid – 19 pneumonia (ASD closure).

The patient who died of covid – 19 pneumonia was RTPCR negative 3 times for covid infection but her CORAD score was 3 on HRCT thorax. In view of being asymptomatic with good oxygen saturation we took her for surgery but the very next day her RTPCR report came positive and her chest x ray was also showing changes related to covid infection. She was on ventilator and treated for corona virus infection but ultimately she succumbed to the infection.

Overall mortality for corona operated patient was 14.28%.

DISCUSSION

The appearance of global pandemic caused by SARS – Covid – 2 or Covid – 19 virus has dramatically affected cardiac surgery worldwide¹.

Many cardiac surgery centers were converted to covid – 19 care units², while our whole hospital, which is the largest government hospital of our state, was converted to covid center resulting in significant

reduction in all types of surgeries related with different surgical branches. Our CTVS department which was operating more than 1100 cases per year before the Corona era has come down to 232 cases of open heart surgery only. Same status was also noted by Fudula DP et al in their study³ with potential negative impact to the community.

By continuing to defer all elective surgeries, a situation will appear where a lot of patients may die of their original condition. So, departments have tentatively restarted their work once lockdown was relaxed. With increasing covid cases the question still persists about the safety of health care workers. In such circumstances, it is better if we can formulate a broad guideline for us.

There are no firm recommendations available to guide decision making for patients requiring cardiac surgery during this pandemic⁴. Although surgical associations have offered guidelines and recommendations on how to conserve resources and triage patients who need more urgent care⁵ but only limited recommendations are available for cardiac surgery⁶⁻⁸.

Operating on a patient who may be corona positive, is putting the life of all health care workers at risk. But for serious patients, like critical CAD, LMSD, severe angina, valvular heart disease in heart failure, surgery is the only treatment.

Looking into the seriousness of this infection efforts were done to decrease the exposure of surgical patients and health care workers to COVID–19, shifting of the required staff to the emergency department and ICU, rationing of the use of critical supplies, including ventilators, PPE Kit, masks, and blood products along with postponement of all elective surgical cases and procedures throughout the United State by Department of Health and Human Services and the American College of Surgeons⁹. We have done various types of simple and complex cardiac cases during this era as we were doing before also but with some more precautions.

The highest risk procedures are (AGPs), which are at higher risk of droplet dispersion and transmission. These AGPs include - intubation, extubation, tracheostomy, bronchoscopy, endoscopy, laparoscopy, any cardiac or thoracic surgery, intercostal chest tube placement, and bovine cautery use¹⁰.

All the above mentioned procedures were done with PPE kit, N95 mask, and face shield on with universal precautions and no health care workers got infected during these procedures.

The use of a N95 respirator or powered air purifying respirator, eye protection, gloves, and gowns are recommended for these procedures in COVID – 19 suspected or positive patients¹⁰⁻¹² but we took all our patients as covid suspected and followed the same precautions as for covid infected cases.

Although there were case reports suggesting transmission of SARS covid – 19 virus to health care workers even when N95 masks were used properly¹³.

Restriction of personnel in OT to only those critical to patient care eg, during anesthesia – only anesthetist and floor workers were allowed. This strategy also helped in reduction of exposure of the health care workers.

Most modern Operation theaters are positive pressure flow type and achieve at best 15 air changes per hour, which would take 18 minutes for 99% removal and 28 minutes for 99.9% removal¹⁴.

This facility is not available at our center so we opted for traditional method i.e, with laminar flow AC on we kept OT doors open, but the main OT corridor gate was closed, so it will allow air to move outside continuously thereby removing air droplets generated during intubation or cautery use during surgery.

The American College of Surgeons has a comprehensive statement on the perioperative use of PPE for patients with or without covid – 19¹².

Although PPE kit was used by anesthetist and other health care workers but for cardiac surgeons it was difficult to operate with PPE kit on because the magnifying loop cannot be used properly without which cardiac surgery is not possible as well as these are long duration surgeries which make surgeons uncomfortable if they wore PPE kit. Therefore, we used HIV kits, N95 mask with surgical mask, and magnifying loop with glasses to protect ourself.

We have also learned from the one mortality that even if RTPCR test is negative the HRCT thorax is more sensitive for detecting covid – 19 infection and if it shows slightest changes we should take it as corona positive.

Table 1: Gender Distribution

S. No.	Gender	Number	Percentage
1	Male	140	60.34%
2	Female	92	39.65%
Total		232	100%

Table 2: Age distribution

S. No.	Age group (years)	Number	Percentage
1	0 – 1	6	2.58%
2	1 – 5	7	3.01%
3	6 – 10	7	3.01%
4	11 – 20	22	9.48%
5	21 – 30	29	12.50%
6	31 – 40	35	15.08%
7	41 – 50	35	15.08%

S. No.	Age group (years)	Number	Percentage
8	51 – 60	44	18.96%
9	61 – 70	39	16.81%
10	71 – 80	8	3.44%
11	>81	0	0%
Total		232	100%

Table 3: Surgical Procedures

S.No.	Surgical procedure	Number	Percentage
1	CABG	84	36.20
2	MVR	49	21.12
3	AVR	20	8.62
4	DVR	27	11.63
5	CABG + Aortobifemoral bypass grafting	1	0.43
6	CABG + MVR	2	0.86
7	DVR + BENTALL Operation	1	0.43
8	ASD closure	15	6.46
9	VSD closure	8	3.44
10	ASD + VSD closure	3	1.29
11	AVCD repair	1	0.43
12	TOF repair	8	3.44
13	Rerouting of TAPVC	3	1.29
14	Ebstein,s anomaly repair	1	0.43
15	LA Myxoma excision	2	0.86
16	RA mass excision	1	0.43
17	Tricuspid regurgitation repair	1	0.43
18	Redo DVR	1	0.43
19	Central shunt	1	0.43
20	Aortic valve repair	1	0.43
21	VSD closure + AVR in RSOV	1	0.43
22	Aortic aneurysm	1	0.43
Total		232	100

Table 4: Overall mortality

S. No.	Surgical procedure	Number of mortality	Percentage
1	MVR	2	
2	AVR	2	
3	DVR	1	
4	CABG	9	
5	DVR + BENTALL	1	
6	Aortic Aneurysm	2	
7	ASD	3	
8	VSD	3	
9	TOF	1	
10	TAPVC	2	
Total		26	

Table 5: Preoperative covid positive operated after being negative –

S.No.	Surgical procedure	Number
1	MVR	2
2	CABG	1
3	ASD closure	1
Total		4

Table 6: Patient becoming covid positive in postoperative period

S.No.	Surgical procedure	Number	Result
1	CABG	1	Discharged
2	VSD Closure	1	Discharged
3	ASD Closure	1	Mortality
Total		3	

CONCLUSION

This newly faced challenge of Covid-19 infection has put all the gears down not in medical field but in every field. With the scarcity of knowledge about this infection and how to operate in this era, we could able to manage with our own developed guidelines in terms of operating the patients as well as protecting lives of all health care workers.

N95 mask, frequent sanitization of hand, and regular sterilization of OT and ICU helped in decreasing the rate of infection.

Initially, it appeared impossible but now it is possible.

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ABBREVIATIONS

SARS–Cov 2	-	severe acute respiratory syndrome corona virus 2
Covid– 19	-	corona virus disease 2019
PPE kit	-	personal protection equipment kit
HIV kit	-	human immunodeficiency virus kit
ICU	-	intensive care unit
OPD	-	Out patient day
OT	-	Operation theatre
RTPCR	-	Reverse transcription polymerase chain reaction
HRCT	-	High resolution computerized tomography
LA	-	Left atrium
RA	-	Right atrium
CABG	-	Coronary artery bypass grafting
ASD	-	Atrial septal defect
VSD	-	Ventricular septal defect
AVCD	-	Atrioventricular canal defect
TOF	-	Tetrology of Fallot
TAPVC	-	Total anomalous pulmonary venous connection
MVR	-	Mitral valve replacement
DVR	-	Double valve replacement
RSOV	-	Ruptured sinus of valsalva
CO-RAD	-	Corona virus 2019 Reporting and Data System
CTVS	-	Cardiothoracic and vascular surgery
CAD	-	Coronary artery disease
LMSD	-	Left main stem disease
AGP	-	Aerosol generating procedure
AC	-	Air conditioner