Journal of the Bangladesh Society of Anaesthesiologists

This is the **official journal** of the Bangladesh Society of Anaesthesiologists. JBSA starts its publication from1987. It is published biannually in January and July each year and recognized by Bangladesh Medical and Dental Council (BMDC).

The Journal publishes original work in all branches of anaesthesia, intensive/ critical care, palliative care and pain medicine, including the application of basic sciences, clinical practice, equipment and training. In addition, the journal publishes review articles, case reports and special articles of general interest.

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- The Editor-in-Chief will take all final decisions regarding acceptance
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- Articles on clinical investigation should abide by the ethical standards laid down in the 1964 Declaration of Helsinki revised 2000
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Preparation of manuscript:
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b. *Manuscript format:*
The article should be divided in general into the following parts:
- Title page
- Abstract and keywords
- Text
- Acknowledgement
- Table with titles
- References
- Attentively graph with title and illustration with legends
- Each of the sections is to start on a separate page. Pages should be numbered consecutively beginning from the title page.

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The authors are requested to strictly follow the guide lines below for submission of manuscript to JBSA for publication. The following documents with manuscripts are to be submitted for publication.

- A covering letter addressed to the Editor-in-Chief of the journal (Sample given at the end)
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- Authors must submit 2 hard copies of all documents and one copy in electronic form preferably written in a CD-RW with adequate labeling
- In special case, submission through E-mail with file attachment of all documents is welcome

Covering letter:

- All authors must sign after seeing the manuscript with the statement that they are the only authors
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- It should contain a declaration that this manuscript has not been submitted elsewhere or not under consideration in any journal
- It should clearly indicate the publication type (Original/Review/Case report/Letter etc.)
- Should also mention the expected benefit of the medical science from publishing of this article

Title Page:

- The title page should be in a separate sheet which will include apart from the title of the article (concise but informative and self-explanatory), the name of all authors with their designation and institutional affiliation
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- Word count of abstract
- Disclosure of sources of funding or sponsor
- A short running head having not more than 50 letters should also be suggested

Abstract and Keywords: The abstract should state the purposes of the study main findings and the principal conclusion.

- Structured with headings- Background, Objectives, Methods with statistical analysis, Result and Conclusion
- Preferably within about 250 words
- Avoid abbreviations except standard
- A non structured abstract is suggested for review article and case report
- Authors name should not be given
- Below the abstract provide and identify as such upto maximum 7 key words or phrases that will assist indexers in cross indexing. Use terms from the medical subject headings list of Index Medicus.

Text:

- The text of observational and experimental articles is usually but not necessarily should be arranged into following sections with the four main heading; Introduction, Methods, Results and Discussions.
- Other type of articles such as case reports, reviews and editorials are likely to need other formats.

Introduction:

- Provide a context or background for the study that is the nature of the problem and its significance
- Review of the literature directly related to the problem with pertinent reference
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- Approval of the study by ethical review committee
- Mention study type, place, time, selection and exclusion criteria
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Statistics:
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- Described without comment
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During preparation of tables following principle should be followed:
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- Figure number, title of manuscript, name of the corresponding author and arrow indicating top should be written on a sticky label affixed on the back of each or on the back preferably with soft pencil

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The discussion section should reflect:
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- Explore possible mechanism or explanation for the findings
- The discussion should not merely recapitulate the results but compare and contrast the results with other relevant studies
- State the limitations of the study
- Explore the implication of the finding for future research and for clinical practice

Conclusion:
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It is required that each of the papers submitted for printing is accompanied by a list of references at the end.

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The Editor-in-Chief

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Sub: Submission of manuscript

Dear Sir,

We are submitting our manuscript entitled by 1…..................2…..................3…..................…for publication in your journal. This article **has not been published or submitted for publication elsewhere.**

We believe that this article may be of value to medical professionals engaged in Anaesthesiology/surgery. We are submitting 2 copies of manuscript along with an electronic version (CD).

We therefore, hope that you would be kind enough to consider our manuscript for publication in your journal as **Original/Review article/Case Report.**

Thanks and best regards

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Challenge and Role of Anesthesiologists in the COVID-19 Pandemic – Bangladesh Perspective

Introduction:

Since the outbreak of novel coronavirus disease (COVID-19), December '2019, it is challenging for health care provider for early diagnosis, treatment and prevention of spreading with maintaining self protection. Most accepted ideas for controlling the infection are early diagnosis, judicial isolation &quarantine, self-protection with personal protective equipment (PPE), which play an imperative role. Within short time almost the entire world including Bangladesh became infected and dealing with the COVID-19 pandemic condition. Main pathophysiology of this virus is involvement of the respiratory system through ACE receptor and contaminating other with the infection from airway .It has been observed that up to 15% of COVID-19 patients develop severe respiratory complications with ~5% of them requiring mechanical ventilation. Considering this situation the world is grappling with COVID-19 that has taken a toll on humanity and is continuing to affect multiples of health-care workers all over the world in significant numbers. Anesthesiologists are susceptible to increased risk that is speculated thirteen times more than the other health-care professionals by virtue of their involvement in perioperative and intensive care management of Covid-19 infected patients; because most of those patients require invasive airway management. It cannot undermine the contribution of famous "coronavirus intubation team racing against death" in Wuhan that determined the importance of anesthesiologists during this pandemic.

So, Bangladesh Society of Anesthesiologists(BSA) made an effort to compile and present a protocol that provides an insight into the management of patients for the front-line anesthesiologists of the medical war, which is being fought to curb and contain this COVID-19 pandemic. We have tried to maintain safety of operating room and ICU as well as the remote locations where anesthesiologists may be called upon for providing their services. Needless to say, it is of utmost importance to ensure the safety of the patients, as well as of the anesthesiologists who are involved in the patient care at this crucial juncture. The present editorial provides valuable information to anesthesiologists regarding handling the current pandemic in a protocolized and evidence-based manner.

Isolation and quarantine:

Anesthesiologist must know the transmission process of COVID-19 for the safety . Corona virus family can infect both humans and animals, it has been postulated that COVID-19 was initially transmitted to humans by an intermediary animal before human to human and community transmission happened. The incubation period varies from 1 to 14 days with a median of 5 days though as high as 24 days has also been reported. COVID-19 can be transmitted through respiratory and digestive tract, as well as other mucosal surfaces. It has recently been postulated that coronavirus may be transmitted by asymptomatic carriers that may constitute around four-fifth or almost half of the infected cases. Owing to the wide range of incubation periods, transmission is possible during the entire period, though the mechanism is not understood as yet. Asymptomatic carriers may be responsible for the propagation of the outbreak and pose a daunting challenge to physicians for containment as well as resurgence of the disease. So, every anesthesiologist must be maintain protocol of Isolation and quarantine when he or she performed his duties for COVID-19 patient management in ICU or operation theater or accidentally contact with COVID-19 patient .

Special care for senior and whose are suffering from co-morbidity:

The clinical spectrum of disease pertaining to respiratory system varies from mild upper respiratory tract infection/pharyngalgia to severe hypoxic respiratory failure due to development of acute respiratory distress syndrome (ARDS).

Certain patients may exhibit symptoms related to digestive system and may present as diarrhoea only. The available literature also suggests the propensity and higher probability of the elderly patients with concomitant co-morbidities to be more prone to disease and develop ARDS, thereby leading to higher mortality in this age group.

Appropriate uses of standard PPE :

Standard infection control precautions with additional transmission-based precautions are required by anesthesiologists to protect themselves and prevent transmission in the health care setting. It is very much essential for anesthesiologists to improve personnel safety in the ICU, OT and hospital environment through appropriate use of PPE. Every anesthesiologist must have the proper knowledge and information on the selection and use of PPE in their working setting .They should continuously practice how can safely don and remove PPE with supervision.

Work load of anesthesiologist:

There is a tremendous amount of activities going on throughout the country, both in the public as well as the private sector, aimed at establishing more and more Intensive Care Units in this Corona pandemic situation. At present, scarcity of trained and qualified anesthesiologist or critical care specialist is a great problem. So, demand for the trained manpower is going to so high. In government level, there is a shortage of trained anesthesiologists and they are already in over working stage. In this COVID-19 pandemic, work load and professional risk increased. So, more working manpower is essential to proper management of this situation as working anesthesiologists have got a high risk of getting corona infection with increased chance of morbidity and mortality.

Proper rest, diet and hydration:

During this corona pandemic situation all anesthesiologist are working with high mental and physical stress. So proper rest and physical exercise with balanced diet is a part of their duties. All hospital administrators must care about the working hour and their facility related to rest,diet, exercise and hydration of all working health care providers including anesthesiologists.

Special care when doing aerosol generating procedure:

Contact and droplet precautions should be implemented by all health workers caring for patients with COVID-19 at all times. But air-borne precautions should be applied for aerosol-generating procedures and supportive treatments which is usually done by the anesthesiologist . All anesthesiologists must take care and maintain protocol when performing the procedure like open respiratory and airway suctioning, endotracheal intubation, tracheostomy care, sputum induction, bronchoscopy, cardiopulmonary resuscitation, pulmonary function testing, manual ventilation before intubation and treatment modalities like non-invasive ventilation (NIV, Bi-PAP, C-PAP), high-frequency oscillating ventilation, high flow nasal oxygen (HFNO) therapy, nebulization etc.

Research :

COVID-19 is a new disease caused by corona RNA virus family. We have started our activities with a limited knowledge about all aspect of management process .With the course of time, a lot of changes will come in the management protocol. Multiple new instruments and drugs will be introduced and show better outcome. So, patients' management must be based on current available evidences in ICU and anesthetic management of COVID-19 patients should also be evidence based.

Work shifting and remuneration :

In our clinical settings, the role of anesthesiologists is temporarily shifting with the current COVID-19 pandemic. Those changing roles are affecting everything from how anesthesiologists are keeping themselves safe during patient care to how they are coding and get remuneration for their services. This is also supported by the American Society of Anesthesiologists (ASA) along with a panel of experts from the Anesthesia Patient Safety Foundation (APSF) and several ASA committee members offered updates on practice standards for treating patients with COVID-19.

Conclusion:

Anesthesiologist as a front fighter provides a best service to the patient and nation with maintaining self protection adherent to IPC. During COVID-19 patient management, try to follow the national ICU

or anesthesia guideline provided by CDC, Directorate General of Health Services (DGHS) and Bangladesh Society of Anesthesiologists (BSA). For better management of this pandemic situation, need more and more trained anesthesiologists which might be solved only by the Government.

(JBSA 2021; 34(1): 1-4)

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Clinico-demoghraphic Profile and Outcome of Critically Ill COVID 19 Patient Admitted in the ICU of a Tertiary Care Government Hospital in Dhaka, Bangladesh

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Abstract

Background & objectives: First outbreak of corona virus disease (COVID-19) started in Wuhan, China at December 2019and since then, it spread globally but information about critically ill patients with COVID-19 is still limited. The characteristic clinical observations and outcomes of this disease (COVID-19) have been reported from different countries. So, it is important to know the demographic profile and overall outcome of COVID-19 patients. We aimed to describe the clinic-demographic characteristics and outcome of critically ill COVID-19 patients admitted into the intensive care unit of Dhaka Medical College Hospital.

Methods: This prospective observational study was carried out in the COVID non-surgical Intensive Care Unit (ICU) of Dhaka Medical College Hospital, Dhaka, Bangladesh from 2nd May to 31st December2020.Out of 549 suspected cases, 392 patients were found RT-PCR for COVID-19 positive and 157 were diagnosed as COVID patients clinically and from HRCT of chest but RT-PCR negative included in this study. After admission in ICU, all patients had been treated according to ICU protocol. Duration of ICU stay, data collection regarding demographic, clinical and laboratory parameters, management and outcome of COVID-19 patients admitted in the ICU were done. Patient outcomes were recorded as death or survival (transferred or discharged).

Results:A total of 549 patients (male 415, female 134, mean age 57.10 years) with RT-PCR for COVID-19 positive 392 and 199 clinically diagnosed covid-19 but RT-PCR negative were enrolled in this study. Regarding COVI-19 related symptoms, 98.54%(541) respiratory distress, 79.96 % (n=439) cough, 62.84% (n=345) history of fever,10.2 % (n=56) anosmia and 5.28% (n=29), lose motion. Diabetes mellitus (DM) and Hypertension was the most common co-morbidity (64.89%), Hypertension(HTN)56.46% was the second most common co-morbidity..For improvementof oxygenation of COVID patient, we treated 5.46% (n=30) by Non Re-breather Mask, 51.91% (n= 285) by High Flow Nasal Cannula (HFNC),14.20%(n=78)by non invasive mechanical ventilation(BiPAP) and28.41% (n= 156) by Invasive Mechanical Ventilation. Mean duration of ICU stay were 12.33days and range of ICU staywere 1-30 days. Among 549 COVID patient,36.24% (n=199) were transferred to the isolation ward or discharged at home and 63.75 % (n=350) were died.

Conclusion: *This study showed the overall demographic and clinical features of critically ill COVID-19 patients, admitted in the covid non-surgical ICU of Dhaka Medical College Hospital, the largest tertiary care hospital in Bangladesh. As it was a single centered study, we need more study with multi center approach to know the detail demographic profile and outcome of COVID-19 patients.*

Key words: *COVID-19, critically ill, RT-PCR, HRCT,demographic profile,co-morbidity, mechanical ventilation, outcome.*

Introduction:

COVID-19 pandemic caused by the novel coronavirus (SARS-CoV-2), is an emerging rapidly evolving situation. At the end of 2019, a novel coronavirus was identified as the cause of a cluster of pneumonia cases in Wuhan, a city in the Hubei Province of China. The disease is designated as COVID-19, which stands for coronavirus disease 2019.[1]The virus that causes COVID-19 is mentioned severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2); previously, it was referred to as 2019-nCoV.As,this virus spread rapidly across the globe, and the WHO subsequently declared COVID-19 (Coronavirus disease 2019) as a pandemic on March 11, 2020.[2]The virus was confirmed to have spread to Bangladesh in March 2020. The first three known cases were reported on 8th March 2020,that wasconfirmed by the Institute of Epidemiology, Disease Control and Research (IEDCR) at a pressconference.Since then, the pandemic has spread day by day over the whole nation and the number of affected people has been increasing.[3]21 February 2021, there have been 110,749,023 confirmed cases of COVID-19, including 2,455,131 deaths in the world. In Bangladesh, there were 543,351 COVID-19 confirmed by rRTPCR, GeneXpert and Rapid Antigen tests including 8,349 related death supto 22 February 2021 [4].Bangladesh is 33rd most affected country in the world and accounts for 0.49% of the COVID-19 disease burden of the world.[4] During the period of national crisis, Dhaka medical College Hospital started to admit COVID-19 cases in ICU from 2[nd]May, 2020. From 2nd May to 31st December, 2020, a total of 549 suspected COVID 19 cases, were admitted,who were critically ill. Among them total 392 patients were found to be RT-PCR positive and 157 were clinically covid but RT-PCR negative. In this study, the demographic profile and outcome of critically ill COVID-19 patients were evaluated. The clinical presentation and outcome of patients with COVID-19 have been variable in different countries.[5-8] Therefore, it is important to analyze and document the demographic profile and their outcome in our population. In this study we observed 549 COVID-19 patients, admitted to our ICU from this given time period.

Methods:

This prospective observational study was carried out in the non-surgicalCovid Intensive Care Unit (ICU) of Dhaka Medical College Hospital, Dhaka, Bangladesh from 1st May to 31st December, 2020. During this period, a total of 549 critically ill patients were admitted as a suspected case of COVID-19 on the basis of clinical symptoms (Respiratory distress, fever, cough,anosmia and loose motion etc). Patients are selected as confirmed covid 19 (RT-PCR positive) and Clinically covid-19i.e. symptoms of covid 19 infection with X-ray / CT chest showed covid-19 related features but PT-PCR negative. Among them 392 patients were found to be RT-PCR positive and 157 were clinically covid-19 but RT-PCR negative. Both RT-PCR positive and clinically COVID-19 patients were included in this study.Sample were collected from nasopharyngeal swab or blind tracheal aspirate(who were on mechanical ventilation). Data collection included demographics, symptoms on presentation, initial laboratory test, treatment course, length of ICU stay and outcome. The outcome was defined as survival (transferred or discharged) and death at ICU. The co-morbidities included DM, HTN, Asthma, COPD, IHD, CKD, ESRD,Parkinson's disease, SLE, GBS, Cancer, Stroke, Hypothyroidism, Dengue, CLD and obstetric complications.

After admission to ICU, all patients were resuscitated according to ICU protocol. Here patients were treated by Injection Remdesivir, Dexamethasone, Tociluzumab, Low molecular weight heparin and by convalescent plasma. To improve oxygenation, we used Non Rebreather Mask, HFNC (High Flow Nasal Cannula),BiPAP and Mechanical Ventilation.Treatment of pre existing diseases were continued. Patients were discharged or transferred to the wardafter symptomatic, clinical and radiological improvement. Data were recorded in pretested structured data sheet and analyzed by using Statistical Package for Social Sciences (SPSS) software (version 18).

Results:

Total patients: 549
Male: 415(75.59%)
Female: 134(24.40%)
Survive : 199 (36.24%)
Death : 350 (63.75%)

Table I *Sex distribution of patient:*

Sex	Frequency	Percentage(%)	Survive	Percentage(%)	Death	Percentage(%)
Male	415	75.59%	160	38.55%	255	61.44%
Female	134	24.40%	39	29.10%	95	70.00%
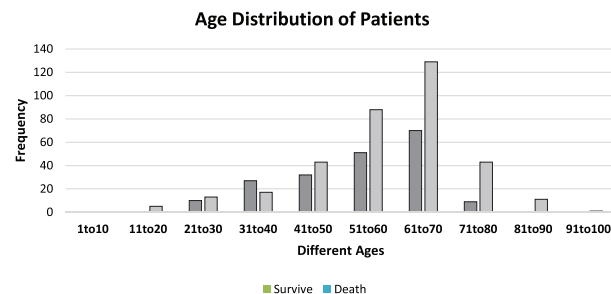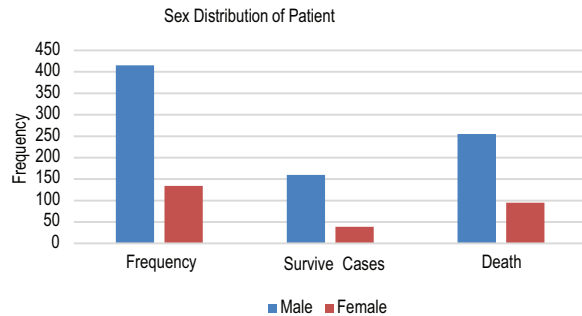
Table II *Age distributions of patients:*

Age (year)	Number of patient	Percentage (%)	Mean Age	Survive	Percentage (%)	Death	Percentage (%)
1 - 10	0			0	0	0	0
11 - 20	5	0.91		0	0	5	100.00
21 - 30	23	4.18		10	43.47	13	56.52
31 - 40	44	8.01		27	61.36	17	38.63
41 - 50	75	13.66	57.10	32	42.66	43	57.33
51 - 60	139	25.31		51	36.69	88	63.30
61 - 70	199	36.24		70	35.17	129	64.82
71 - 80	52	9.47		9	17.30	43	82.69
81 - 90	11	2.00		0	0	11	100.00
91 - 100	1	0.18		0	0	1	100.00

Table III *Catagories of covid patients*

	Frequency	Percentage
Confirmed Covid (RT-PCR positive)	392	71.40 %
Clinically Covid (RT-PCR negative)	157	28.59 %
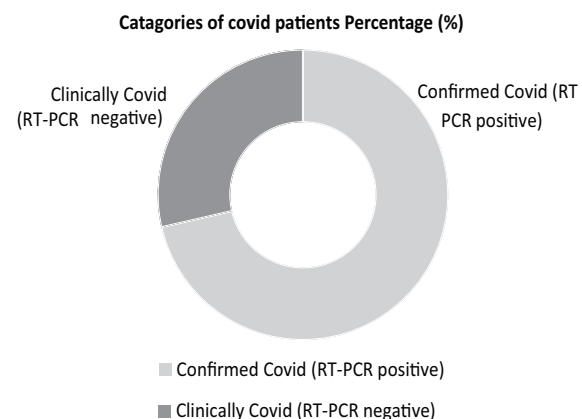
Table IV Covid related symptoms:

Symptoms	Frequency	Percentage (%)
Respiratory distress	541	98.54
Cough	439	79.96
Fever	345	62.84
Anosmia	56	10.20
Loose motion	29	5.28
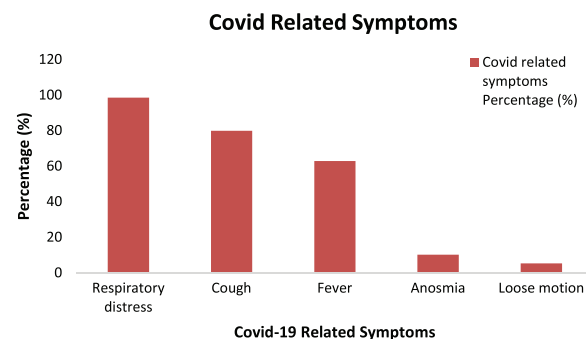
Table V
Co-morbidity of patients

Co morbidity	Frequency	Percentage(%)	Survive	Percentage (%)	Death	Percentage(%)
DM & HTN	255	46.44	60	23.52	195	76.47
DM	101	18.39	47	46.53	54	53.46%
HTN & IHD	35	6.37	27	77.14	8	22.85
HTN	20	3.64	15	75.00	5	20.00
CKD	35	6.37	6	17.14	29	82.85
ESRD	10	1.82	0	0	10	100.00%
COPD	15	2.73	3	20.00	12	80.00
Br Asthma	4	0.72	2	50.00	2	50.00%
Cancer	3	0.54	0	0	3	100.00%
Stroke	6	1.09	0	0	6	100.00%
Parkinson's disease	10	1.82	0	0	10	100.00%
GBS	1	0.18	0	0	1	100.00%
Obstetric Complication	3	0.54	0	0	3	100.00%
Hypothyroidism	2	0.36	0	0	2	100.00%
CLD	2	0.36	1	50.00	1	50.00%
Dengue	1	0.18	0	0	1	100.00%
SLE	1	0.18	0	0	1	100.00%
NO comobidity	45	8.18	38	84.44	7	15.00%

Co-morbidity of Patients
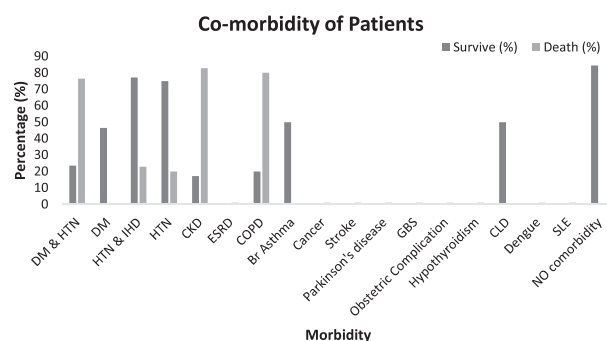
Table VI *Treatment given in ICU*

Treatment	Frequency	Percentage
Inj. Remdesivir	215	39.16
Inj. Tocilizumab	26	4.73
Plasma therapy	41	7.46
Inj. Dexamethason	525	95.62
Low molecular weight heparin	495	90.16

Table VII *Mode of oxygen delivery*

Mode	Frequency	Percentage(%)	Survive	Percentage (%)	Death	Percentage (%)
Non rebreathing Mask	30	5.46	20	66.66	10	33.33
High Flow Nasal Cannula	285	51.91	151	52.98	134	47.01
BiPAP	78	14.20	20	25.64	58	74.35
Invasive Mechanical Ventilation	156	28.41	8	5.12	148	94.87
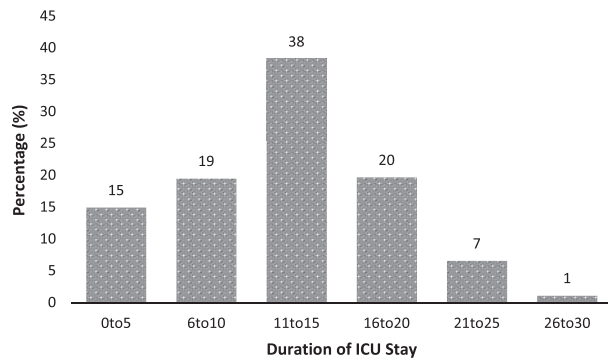
Table VIII *Dialysis required:*

Number of patient	Survive	Percentage (%)	Death	Percentage (%)
54	5	9.25	49	90.74

Table IX *Duration of ICU Stay:*

Days	Frequency	Percentage	Mean duration (Days)
0 - 5	82	14.93	
6 - 10	107	19.48	
11 - 15	210	38.25	12.33
16 - 20	108	19.67	
21 - 25	36	06.55	
26 - 30	6	01.09	

Discussion

In this study a total 392 RT-PCR positive critically ill patients and 157 clinically covid-19 were included. Among them 75.59 % (n=415) were male and 24.40 % (n= 134) were female. In our study there was significant difference in the proportion of male and female patients, which was consistent with the results of a study performed by Gaung et al inChina.Their results showed that males were more likely to be infected than females (58.1% male and 41.9% female).[9] In our study, the mostly affected aage group was 61–70 years (n=199, 36.24 %) and Mean age was 57 year. Shah P et.al shows the median age was 63 years and interquartile range, (50-72 years).[10] Regarding clinical symptoms, in our study 98.54% patientpresented with respiratory distress. In a study in Bangladesh by Ahmed NU et.al showed fever was the dominantsymptoms (n=154, 77%).[11] Fever also a dominant symptom seen by Guan et al,[9] Wang et

al12,Zangh etal.[13]Ahmed N U et.al also showed 35.5% patient presented with cough. [11]In another study Xie J et alshowed the most common presenting symptoms werefever [630 (85.9%)],dry cough [550 (75%)], anddyspnoea [444 (60.7%)].[14] Ahsan ASMA et al , showed respiratory distress96.50% is the most common symptoms [16].A systematic review byRodriguez-Morales et al 25 ofdata on 656 casespublished in January and February2020 reported feverin 88.7%, cough in 57.6%, dyspnoeain 45.6%,diarrhoeain 6.1%.[15]In this study 46.44% had DM& HTN, 18.39% only DM, 6.37% HTN& IHD, 3.64% only HTN,6.37%CKD, 1.82% ESRD, 2.73% COPD, 0.72% Asthma, o.54% Cancer,1.09% Stroke, 1.82% Parkinson's disease,5.34% obstetric complications, 0.36% hypothyroidism, 0.36% CLD, 0.18% SLE,0.18% dengue and8.18% no co-morbidity. Shah P et.al showed in their study, the most common comorbidities were HTN (n=416, 79.7%), obesity(n=347,66.5%) and DM (n=221, 42.3%). Morbidobesity were present in 25.6% of patients.[10] In anotherstudy byXie J et al showed among 733 critically illpatients, 454 had one or more co morbidities, withhypertension (42%) as the most common co morbidity,followed by diabetes (18.8%) and coronary heart disease(12.7%).[14]In this study most patient got oxygen through HFNC(51.91%) and 24.41% patient was on invasive mechanical ventilator . On invasive mechanical ventilator the survival rate was 5.12 % and mortality rate was 94.87%.Richardson, et. al. on the Northwell Health System in New York, showed,1151 patients required IMV and the reported mortality rate for patients requiring IMV is 88.1%[20]. Data from Wuhan, China reported by Zhou and colleagues found that 31 out of 32 patients (96.8%) treated with IMV died [21].Here, the maximum length of stay (LOS) inICU were 11 -15 days (38.25%) and Mean duration of ICUstay was 12.33 days. the length of ICU stay was more for those patient who survived.In a study, Shah P et.al shows Median LOS was 6 days (IQR, 4–11 days.[10]In this study, 36.24% (n=199) patients were transferredto the isolation ward or discharged at home who wereconsidered as survival and 63.75% (n=350) patients weredied, among 549 cases.In these study,100% mortality found those patient who had any of this co-morbidity ESRD,Cancer,Stroke, Parkinson's disease, GBS, Hypothyroidism,

Dengue, SLE, Obstetric complications and patient who had no co-morbidity, death rate was 15%. In this study,Young patient who died, had serous co-morbidity like obstetric complications, GBS, Dengue, SLE. Otherwise death rate increased with age.Xie J et al showed 53.8%mortality in 733 critically ill patients with COVID 19in their study.[14] Inthis study 54 patient needed haemodialysis and death rate was 90.74%.Ng *et al.*describes the experience of a health system in New York at the height of the first COVID-19 surge, noting that among 419 patients receiving maintenance dialysis who were hospitalized with COVID-19, 32% died[22].

Limitation

In this study has certain limitations like any other study.The study was short period of time. Not all laboratorytests were performed in all patients, and we were not able to include biomarkers IL-6 in our analysis. We were unable to report the initial severity of illness of our patients,.This study was limited by small sample size; with a larger sample size was needed to determine. additional associations between patient characteristics and mortalityin patients requiring an ICU admission.

Conclusion

This study described the demographics, co-morbiditiesand outcome of critically ill COVID 19 patients in theICU of a largest tertiary care government hospital, Dhaka, Bangladesh. It showed males weremore likely to be infected than females, age group were199mostly affected in this study, were 61–70 years, DM& HTN was the most common co-morbidities and Mean durationof ICU stay were 10.33 days. The overall mortalityin this study was 63.75%. As, this is a new era ofclinical study, we need more data in multicenterapproach and long term follow up to know the actualoutcome of critically ill COVID 19 patients.

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Clinical Profile and Short-term Outcomes of COVID-19 Patients in a Dedicated Intensive Care Unit of Bangladesh: A Single Centre Experience

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Abstract

Introduction: The COVID-19 pandemic emerged as a major public health crisis and was confirmed to have spread to Bangladesh since March 2020. A large number of hospitalized patients with COVID-19 pneumonia require intensive care for respiratory support due to hypoxic respiratory failure. Bangladesh is greatly facing multiple challenges to combat the surging pandemic due to lack of experiences and insufficient medical resources. Reports describing patients admitted to the ICU with COVID-19 in Bangladesh are very limited. Objective of this study was to determine the clinical characteristics and outcomes of the COVID-19 patients admitted at the dedicated intensive care unit of Kurmitola General Hospital, Dhaka for better characterization of COVID-19 infection in critically ill patients in a resource limited setting.

Materials and Methods: *All the RT-PCR confirmed COVID-19 patients aged >15 years who had been admitted to the dedicated COVID intensive care unit of Kurmitola General Hospital, Dhaka from April 2020 to October 2020 were included in this retrospective cross-sectional study. The protocol was approved by the Ethical and Scientific Committee of the institute. The demographic, clinical and treatment data of all participants were collected and evaluated and mode of treatments were compared between survivor and non-survivor groups. The statistical analysis was carried out using the Statistical Package for Social Sciences version 22.0 for Windows (SPSS Inc., Chicago, Illinois, USA).*

Results: *A total of 294 critically ill COVID-19 patients were admitted to the ICU of Kurmitola general hospital between April, 2020 to October, 2020. The mean (±SD) age of the patients was 57.4 (±13.1) years, male participants were predominant (71.1%), 74.5% patients had positive contact history, common presenting problems were fever (94.5%), cough (83.6%), dyspnoea (80.9%), diarrhoea (60.2%) and chest pain (42.8%). Frequency of different associated co-morbidities like hypertension (49.3%), diabetes mellitus (50.3%), cardiac diseases (34.0%), renal diseases (17.7%), bronchial asthma (33.3%), COPD (40.1%), CVD (24.1%) and obesity (24.1%) were high. The mean (±SD) length of ICU stay of the patients was 7.0 (±4.1) days; 11.6% patients required mechanical ventilation; 63.6% of ICU patients died and 36.4% recovered in the specified time period. HFNC was provided to 62.6% patients in survivor group and 56.1% in non-survivor group, 31% of non-survivor patients required non-invasive ventilator support. Requirement of mechanical ventilation was significantly higher among the non-survivor group (18.7%) than survivor group (p <o.oo1). Use of convalescent plasma therapy was significantly higher in survivor group (29.0%) than the non-survivor group (18.7%) (p=0.043). No significant differences regarding anti-viral, monoclonal antibody and anticoagulant therapy were observed between both groups.*

Conclusion: *This retrospective cross-sectional study represented the clinical characteristics and treatment outcomes of the critically ill COVID-19 patients at ICU of Kurmitola General Hospital, Dhaka, Frequency of positive contact history and presence of co-morbidities were high. Death rate was significantly high among the patients who required mechanical ventilation. Patients of survivor group were significantly benefited from convalescent plasma therapy. Larger, multicenter, prospective studies with extended follow-up should be conducted to verify the study findings.*

Key words: *COVID-19, Clinical feature, outcome, Intensive care unit, Bangladesh*

Introduction:

The COVID-19 was declared as pandemic disease by World Health Organization (WHO) on 11th March, 2020 which is a potentially severe acute respiratory infection caused by a novel evolving severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)[1]. The first human cases of COVID-19 were reported by officials in Wuhan City, China, in December 2019[2] and since then eventually the entire world is working to address this rapidly evolving and emerging situation.

The virus was confirmed to have spread to Bangladesh in March 2020. Since then, the pandemic has spread day by day over the whole nation and the number of affected people has been increasing. Till November 2020, total of 26,65,131 people had been tested for COVID-19. Among them 4, 49, 760 were tested confirmed, 3,64,611 recovered and number of deaths was 6,416[2].

COVID-19 has a seemingly variable clinical presentation and progression, presenting with mild infection to severe disease to fatal illness[3]. Recent reports suggested that approximately 14 to 29% of hospitalized patients with COVID-19 pneumonia require intensive care, primarily for respiratory support in the setting of hypoxic respiratory failure, with acute respiratory distress syndrome (ARDS) developing in 33% of hospitalized patients at a median time from symptom onset of 8 days[4].

Lack of experience in combating such a pandemic and insufficient medical resources have led to a difficult situation in controlling disease transmission to a large extent in Bangladesh. Most of the hospitals in the country are not fully ready to cope with the expected surge in COVID-19 patients[5]. Currently, treatment for COVID-19 is being provided in total 33 Government and non-government hospitals nationwide which includes a total of 4530 general beds, 368 ICU beds and 343 mechanical ventilators and other testing and treatment facilities[1].

A better characterization of COVID-19 infection in critically ill patients is important for appropriate management and allocation of resources in intensive care setting and there is great scarcity of these data in our country. Objective of this study was to determine the clinical characteristics and outcomes of the patients admitted in COVID dedicated intensive care unit of Kurmitola General Hospital, Dhaka hospital to enhance the insight regarding epidemiology and management of critically ill COVID-19 patient in a resource limited setting.

Materials and Methods:

In this retrospective cross-sectional study, a total of 294 RT-PCR confirmed critically ill COVID-19 patients aged >15 years were included who had been admitted to the dedicated COVID intensive care unit of Kurmitola General Hospital, Dhaka from April 2020 to October 2020. Data were collected in structured data collection sheets through consecutive sampling from the ICU patient registrars. The protocol was approved by the Ethical and Scientific Committee of the Kurmitola General Hospital (KGH). The demographic data (age, sex, contact history, etc.), clinical data (symptoms on admission, comorbidities etc.) and treatment data (oxygen delivery methods, medication and adjuvant therapies etc.) were collected from all participants and mode of treatments were compared between survivor and non-survivor groups. The statistical analysis was carried out using the Statistical Package for Social Sciences version 22.0 for Windows (SPSS Inc., Chicago, Illinois, USA). Qualitative variables were expressed as frequency and percentage. Quantitative variables were expressed as mean ± standard deviation. Chi-square test and Fisher's exact test were performed to measure the level of significance in different treatment modalities. A "p" value <0.05 was considered as significant.

Results:

A total of 294 RT-PCR confirmed COVID patients were admitted to the ICU of Kurmitola General Hospital between April, 2020 to October,2020. Table-I showed the distribution of the admitted patients according to age. The mean (±SD) age of the patients was 57.4 (±13.1) years. Maximum (28.6%) patients belonged to 51 to 60 years' age group, followed by 24.5% patients aged between 61 to 70 years, 18.7% patients aged more than 70 years, 17.3% patients belonged to 41-50 years' age group and remaining 10.8% patients aged between 15 to 40 years.

Table I *Distribution of the patients according to age (n=294)*

Age (years)	Frequency	Percent (%)
>15-20	1	0.3%
21-30	8	2.7%
31-40	23	7.8%
41-50	51	17.3%
51-60	84	28.6%
61-70	72	24.5%
>70	55	18.7%
Mean ± SD		57.4 ± 13.1

Male patients were predominant (71.1%) than the female patients (28.9%) in the present study (Figure-1), male-female ratio was 2.5.
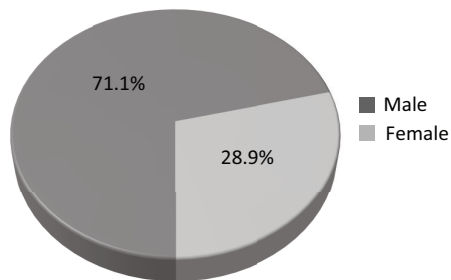
Figure 1 *Distribution of the patients according to sex (n=294)*

Among the study sample, 74.5% patients had positive contact history, 21.8% were not aware of contact and only 3.7% had no history of contact with persons having definite symptoms of Coronavirus infection (Figure-2).

Figure 2 *Distribution of the patients according to history of contact (n=294)*

The presenting problems patients got admitted with are enlisted in Table-II. Fever (94.5%), cough (83.6%), dyspnoea (80.9%), diarrhoea (60.2%) and chest pain (42.8%) were predominant symptoms.

Other less frequent symptoms were vomiting, haemorrhage, anosmia, sore throat, myalgia, rhinitis, nasal congestion, abdominal pain, altered sensorium etc.
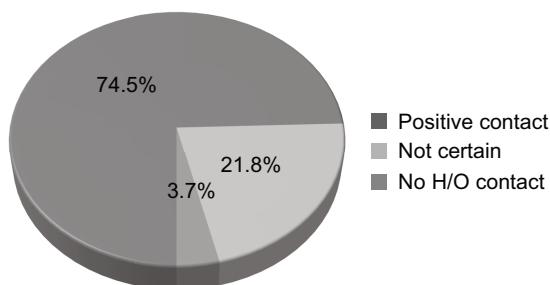
Table II *Distribution of the patients according to presenting symptoms (n=294)*

History of contact	Frequency	Percent (%)
Fever	278	94.5%
Cough	246	83.6%
Dyspnoea	238	80.9%
Diarrhoea	177	60.2%
Chest pain	126	42.8%
Vomiting	95	32.3%
Hemorrhage (e.g. Hemoptysis)	55	18.7%
Anosmia	37	12.6%
Sore throat	35	11.9%
Myalgia	34	11.6%
Rhinitis	33	11.2%
Nasal congestion	32	10.9%
Abdominal pain	23	7.8%
Altered sensorium	7	2.4%

The frequency of different co-morbidities was high among the ICU patients, documented as hypertension (49.3%), diabetes mellitus (50.3%), cardiac diseases (34.0%), renal diseases (17.7%), bronchial asthma (33.3%), COPD (40.1%), CVD (24.1%), obesity (24.1%), liver disease (9.5%) and malignancy (8.2%) (Table-III).

Table III *Distribution of the patients according to co-morbidities (n=294)*

Co-morbidities	Frequency	Percent (%)
Hypertension	145	49.3%
Diabetes mellitus	148	50.3%
Cardiac disease	100	34.0%
Renal disease	52	17.7%
Bronchial asthma	98	33.3%
COPD	118	40.1%
Stroke	71	24.1%
Obesity	71	24.1%
Liver disease	28	9.5%
Pregnancy	0	0.0%
Malignancy	24	8.2%

The length of ICU stay of the participants are summarized in Table-IV. Most of the patients (63.3%) needed ICU support for 1 to 7 days, followed by 32.3% patients needed to stay at ICU for 8 to 15 days and rest (4.1%) patients stayed at ICU for more than 15 days. The mean (±SD) length of ICU stay of the patients was 7.0 (±4.1) days. Among them, mechanical ventilation was required for 11.6% patients and 88.4% did not require it (Table-V).

Table IV *Distribution of the patients according to ICU stay (n=294)*

ICU stay (days)	Frequency	Percent(%)
1-7	187	63.6%
8-15	95	32.3%
>15	12	4.1%
Mean ± SD	7.0 ± 4.1	

Table-V *Distribution of the patients according to use of mechanical ventilation (n=294)*

Mechanical ventilation	Frequency	Percent(%)
Used	34	11.6%
Not used	260	88.4%
Total	294	100.0%

Despite every possible effort, number of deceased patients were higher (187, 63.6%) than the number of patients who recovered (107, 36.4%) among the critically ill COVID patients in our ICU (Table-VI).

Table VI *Distribution of the patients according to disease outcome (n=294)*

Outcome information	Frequency	Percent(%)
Recovered	107	36.4%
Referred	0	0.0%
Death	187	63.6%
Total	294	100.0%

Table-VII showed the comparison of treatment modalities between the ICU survivor and non-survivor group of COVID-19 patients. Prone positioning was applied to 276 patients and was almost equally maintained in both survivor (92.5%) and non-survivor (94.7%) groups. A total of 288 patients required oxygen therapy via non re-breathing (NRB) mask; all patients of the survivor group (100.0%) used it and 96.8% patients of non-survivor group used it. High flow nasal cannula (HFNC) was provided to 172 patients, which was more used in survivor group (62.6%) than the non-survivor group (56.1%). Non-invasive ventilation was required by 81 patients, 21.5% patients of survivor group and 31.0% patients of non-survivor group were provided this. Thirty-five deceased patients (18.7%) required mechanical ventilation, where none of survivor patients required it, which was a significant observation (p <0.001). All admitted patients received systemic steroid and empiric antibiotic therapy. Among 66 recipients, use of convalescent plasma therapy was observed significantly higher in survivor group (29.0%) than the non-survivor group (18.7%) (p=0.043). There was no significant difference regarding anti-viral, monoclonal antibody and anticoagulant therapy observed between both groups.

Table VII *Comparison of treatment modalities between the ICU survivor and non-survivor group of COVID-19 patients*

Mode of treatment	Number of patients receiving the treatment	Survivor n=107(%)	Non-survivor n=187(%)	p value
Prone positioning	276	99 (92.5%)	177 (94.7%)	0.464[a]
Oxygen delivery method				
· NRB	288	107 (100.0%)	181 (96.8%)	0.090[b]
· HFNC	172	67 (62.6%)	105 (56.1%)	0.279[a]
· Non-invasive ventilation	81	23 (21.5%)	58 (31.0%)	0.103[a]
· Mechanical ventilation	35	0 (0.0%)	35 (18.7%)	**<0.001[b]**
Medications and adjuvant therapy				
· Inj. Dexamethasone	294	107 (100.0%)	187 (100.0%)	-
· Inj. Remdesivir	132	53 (49.5%)	79 (42.2%)	0.227[a]
· Convalescent plasma therapy	66	31 (29.0%)	35 (18.7%)	**0.043[a]**
· Tocilizumab	67	25 (23.4%)	42 (22.5%)	0.859[a]
· Empiric antibiotic	294	107 (100.0%)	187 (100.0%)	-
· Anti-coagulant therapy	292	107 (100.0%)	185 (98.9%)	0.535[b]

[a]Chi-square test was done to measure the level of significance. [b]Fisher's Exact test was done to measure the level of significance. Figure within parenthesis indicates in percentage.

Discussion:

The 500 bed Kurmitola General Hospital is one of the leading COVID dedicated hospitals of Bangladesh. Since March 2020, this hospital has been providing treatment services with 275 general beds, 10 ICU beds and 10 mechanical ventilators along with testing and follow-up facilities[1]. In the present study, the clinical profile and short-term treatment outcomes of the COVID-19 patients admitted at Intensive care unit of Kurmitola General Hospital, Dhaka have been evaluated to elicit the importance of understanding the variation of regional presentations of Coronavirus infection.

The risk of severe illness with COVID-19 is believed to be increased with age, with older adults at highest risk[6]. Maximum (28.6%) patients belonged to 51 to 60 years' age group in this study. Mean (±SD) age of the patients was 57.4 (±13.1) years. This result is consistent with a large cohort in Italy (mean age 63 years)[7], but inconsistent with the earlier studies in Bangladesh[8,9,10] and India[11]. Further studies are required to explore the multidimensional presentations of this emerging disease. Reports also showed that men were more at risk for worse outcomes due to COVID-19 independent of age[13]. Male patients were predominant in this study (71.1%) than the female patients (28.9%). Similar results were found in earlier Bangladeshi studies[8,9] and in other studies worldwide[7,11,12].

The present study revealed that 74.5% patients had positive contact history, which is remarkable, though statistically not significant. Earlier in this year, 73% patients had positive contact history among 201 COVID-19 patients in a study done in Dhaka Combined Military ospital[8] and 60% patients had positive contact history in another study at Dhaka Medical College Hospital[9]. In the context of massively populated and lower-middle-income countries like Bangladesh, enforcement of social distancing is tough[5]. But as yet there are no vaccines or antiviral drugs approved for the disease, and hence, non-therapeutic interventions to control the spread of the virus are the most effective measures to control the disease[14].

The SARS-CoV-2 infection may rapidly progress to acute respiratory distress syndrome (ARDS), multi-organ dysfunction syndrome (MODS) and death[11]. Presenting symptoms like fever (94.5%), cough (83.6%), dyspnoea (80.9%), diarrhoea (60.2%) and chest pain (42.8%) were more frequent among our ICU patients. The likelihood of progressing to poorer outcomes was observed high among COVID-19 patients who had associated co-morbidities in previous studies[15,16]. The frequency of different co-morbidities were observed high among the ICU patients; hypertension (49.3%), diabetes mellitus (50.3%), cardiac diseases (34.0%), renal diseases (17.7%), bronchial asthma (33.3%), COPD (40.1%), CVD (24.1%) and obesity (24.1%). This finding suggested that public health preventive measures might have a role in reducing the risk of transmission to this vulnerable population.

The rapid spread of the virus and the high proportion of patients requiring respiratory support have placed unprecedented demand on intensive care unit services worldwide[17]. In this study, the mean (±SD) length of ICU stay of the patients was 7.0 (±4.1) days, which was somehow lesser than a study conducted among ICU patients in China (11.8 days)[18]. 63.6% of the ICU patients died and 36.4% patients recovered in the specified time period. Mortality rate among the patients requiring ICU supports for COVID-19 varied among different studies worldwide. Mortality rate was 37.7% among a large cohort in Wuhan, China[18]. A recent report from New York, USA showed that, 21% patient died among 5700 patients who required ICU support and 24.5% of them required mechanical ventilation[19]. The poor outcomes seen in various studies may be related to the disease process itself, or due to rationing of resources in overwhelmed ICUs.

Due to pandemic pressures on ICU services, there has been widespread use of advanced respiratory supports (high flow nasal cannula, non invasive ventilation, mechanical ventilation) and this may have meant that patients actually admitted to ICU are disproportionately sicker[18]. In response to rapidly progressive hypoxemia, oxygen therapy was provided for all patients in our ICU. A total of 288 patients required oxygen via non re-breathing (NRB) mask; all patients of the survivor group (100.0%) and 96.8% patients of non-survivor group used it. High flow nasal cannula (HFNC) was provided to 172 patients, which was used more by

the survivor group (62.6%) than the non-survivor group (56.1%). Non-invasive ventilation was required by 81 patients, 21.5% patients of survivor group and 31.0% patients of non-survivor group were provided this; 11.6% of ICU admitted patients required mechanical ventilation and 88.4% did not require it. Studies have reported close to 100% mortality amongst patients requiring mechanical ventilation for ARDS due to Coronavirus infection[20]. The requirement of mechanical ventilation was significantly higher among the non-survivor group (18.7%) in this study, where none of the patients from survivor group required it (p <0.oo1). Hypoxic organ damages, including the brain, heart, lung, and kidney due to ARDS; which is characterized by a rapid progression and a severe state of illness, may be a major contributory factor to increased mortality associated with mechanical ventilation[17]. Our findings should alert physicians to pay attention not only to the symptoms of respiratory failure but also to the other organ injuries as well.

Use of convalescent plasma therapy was observed significantly higher in survivor group (29.0%) than the non-survivor group (18.7%) (p=0.043) among total 66 plasma recipients. Recent studies in Bangladesh[21] and other countries[22,23] revealed convalescent plasma therapy as an evolving defensive treatment option for near-fatal cases of COVID-19. The results of analyses among >70,000 COVID-19 patients by FDA, USA and Mayo clinic also suggested that, convalescent plasma with high antibody titers may be beneficial when administered within 72 hours of COVID-19 diagnosis[24]. Although many limitations exist regarding plasma therapy, nevertheless, considering the absence of specific treatments, it remains a viable option for treating COVID-19[25,26,27].

Our study had several limitations. This was a retrospective exploratory study with relatively small sample size. We were unable to collect data on detailed physical examination and standardized laboratory investigations for all cases. Thus, disease severity of the ICU patients could not be assessed. The associations of co-morbidities with mortalities in critically ill COVID-19 patients of this study are also needed to be evaluated in further multicenter prospective studies with larger cohort and extended follow-up.

To the best of our knowledge, this is the largest retrospective cross sectional study among COVID-19 patients undergoing treatment in a dedicated COVID-19 intensive care unit of Bangladesh. There are still so many fields remained unexplored which needs attention in national and institutional level. Researchers must address unanswered questions, including the role of repurposed and experimental therapies which have potentials to offer the best chance of survival for the critically ill COVID-19 patients.

Conclusion:

This retrospective study represented the clinical characteristics and treatment outcomes of the critically ill COVID-19 patients in a dedicated COVID ICU in Bangladesh. High frequency of positive contact history and associated co-morbidities enlightened the importance of public health preventive measures in reducing the risk of transmission and disease severity to this population. Death rate was significantly high among the patients who required mechanical ventilation. Patients of survivor group were significantly benefited from convalescent plasma therapy. Further prospective studies should be conducted to verify the study findings. Collaboration at the local, regional, national, and international level with a focus on high-quality research, evidence-based practice, sharing of data and resources, and ethical integrity in the face of unprecedented challenges will be key to the success of these efforts.

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Outcome of Critically Ill COVID-19 Patients After Getting Convalescent Plasma (CP) in ICU of DMCH

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Abstract:

There are no approved specific antiviral agents or vaccines against COVID-19 till now. In this study, 10 critically ill patients confirmed by real-time viral RNA test were enrolled prospectively. One dose of 200 mL of convalescent plasma (CP) derived from recently recovered donors with the neutralizing antibody titers above 1:160 was transfused to the patients as an addition to maximal supportive care and antiviral agents. The aim of this study is to see the outcome of CP transfusion. It was possible to reduce oxygen support (step down) of 40%(04) patients, 10% (01) patient's parameters was unchanged and 50% (05) patients were need more oxygen support (step up) after getting CP which correlate with incremental response of lymphocyte counts and detrimental response of biochemical parameters of inflammation.70%(07) patients of total who received mechanical ventilation, after treatment with CP, 30%(03) patients were weaned from mechanical ventilation to high-flow nasal cannula, and 10%(01) patient discontinued high-flow nasal cannula to NRM.No severe adverse effects were observed. This study showed CP therapy was well tolerated and could potentially improve the clinical outcomes through neutralizing viremia in critical COVID-19 cases. The optimal dose and time point, as well as the clinical benefit of CP therapy, needs further investigation in larger well-controlled trials.

Keywords: *Critically ill COVID 19, Convalescent plasma (CP), Oxygen therapy*

Introduction:

The epidemic of severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) originating in Wuhan, China, has rapidly spread worldwide 2019 (1–3). This epidemic spread rapidly worldwide within 3 months and was declared as a pandemic by WHO on March 11, 2020. There are no specific antiviral agents or vaccine against this virus(4-5). Although remdesivir has shown antiviral effect in one COVID-19 patient from the United States still randomized controlled trials of this drug are ongoing to determine its safety and efficacy (6). As there are no proven medications to fight against SARS COV 2 virus, it is an urgent need to look for an alternative therapy for COVID-19 treatment, especially among critically ill patients. Convalescent plasma was given as an empirical treatment during outbreaks of Ebola virus in 2014, and a protocol for treatment of Middle East respiratory syndrome coronavirus with convalescent plasma was established in 2015. This approach with other viral infections such as SARS-CoV, H5N1 avian influenza, and H1N1 influenza also suggested that transfusion of convalescent plasma was effective (7-10). As SARS, Middle East Respiratory Syndrome (MERS) and COVID-19 (15) have similar virological and clinical manifestations, CP therapy might be a good hypothetical treatment option for COVID-19 patients (11). Patients who have survived from COVID-19 with a high

neutralizing antibody titer may be a valuable donor source of CP. Risks and benefits of convalescent plasma as treatment in COVID-19 are still unknown.Hence the purpose of this study was to find out the outcome after giving convalescent plasma to critically ill covid-19 patients.

Method and materials:
Patient's selection:
From June 06, 2020 to July 17, 2020, 10 patients admitting in COVID ICU, Dhaka Medical College Hospitalswho were diagnosed as critically ill COVID-19 according to the WHO Interim Guidance (30) and COVID-19 of National guideline (31), confirmed by real-time RT-PCR assay, were included in this study. The enrollment criteria were :1) age ≥18 y; 2) respiratory distress, RR ≥30 beats/ min; 3) oxygen saturation level less than 92 % in resting state; and 4) partial pressure of oxygen (PaO2)/oxygen concentration (FiO2) ≤300 mmHg. The exclusion criteria were as follows: 1) previous allergic history to plasma.2) cases with serious general conditions, such as severe organ dysfunction, who were not suitable for CP transfusion. Written informed consent is obtained from each patient or legal relatives.

Selection of Donors for CP Transfusion:
Donors were selected who recovered from COVID-19 and declared immune to corona virus. The recovery criteria were as follows: 1) normality of body temperature for more than 3 days, 2) resolution of respiratory tract symptoms, 3) two consecutively negative results of sputum SARS-CoV-2 by RT-PCR assay (2-days sampling interval) and4) Antibody titre at least or more than 1:160. The donor's blood was collected after 2 weeks of declared recovered but within 4 weeks of recovery. Written informed consent was obtained from each patient

Preparation of plasma from donors:
Apheresiswasperformed using a Baxter CS 300 cell separator (Baxter). A 200 ml ABO-compatible plasma sample was harvested from each donor depending on age and body weight, aliquots at 4 °C without any detergent or heat treatment. The CP was then treated with methylene blue and light treatment for 30 min in the medical plasma virus inactivation cabinet.

Real-Time RT-PCR Detection of SARS-CoV-2:
The neutralizing activity of plasma was determined by plaque reduction neutralization test using SARS-CoV-2 virus in the high biosafety level (BSL-

3) laboratory of different institute of Bangladesh. Neutralization titer was defined as the highest serum dilution with 50% reduction in the number of plaques, as compared with the number of plaques in wells in the absence of novel coronavirus antibody as blank control. SARS-CoV-2 IgG antibody titer was tested by ELISA. SARS-CoV-2 RNA was detected by RT-PCR assay. Methylene blue residue was detected by the verified UV method.

Treatment:
All patients whowere admitted in ICUreceived antiviral therapy, antibiotic, antifungal, glucocorticoid, other supportive therapy and oxygen therapyby NRM, HFNC, and BiPAP or by MV at the appropriate situation. One dose of 200 mL of inactivated CP with neutralization activity of >1:160 was transfused into the critically ill COVID-19 patients and decided by treating consultantfollowing the WHO blood transfusion protocol.

Data Collection:
Data of thesepatients were collected from patient's records files that include demographic data, duration of illness, presenting symptoms. Bacterial coinfection was identified by a positive culture from respiratory, urinary, or blood culture after 48 h of hospital admission. Complications like acute renal failure, any cardiac events, ARDS, and nosocomial infection, were recorded. The applications of assisted mechanical ventilation, other different methods of oxygen delivery systems including HFNC, BiPAP and medication regimen were recorded. For the purposes of the study relevant data were recorded before giving CP transfusion and at the third day of CP transfusion.

Follow up for outcome assessment:
Follow up information were recorded by attending physicians daily. The blood test and biochemical tests were carried out every 1-2dyas interval. The aim of follow up was to assess the safety of CP transfusion through improvement of clinical symptoms, laboratory and radiological parameters within 3 days of CP transfusion. Clinical symptoms improvement was defined as temperature normalization, relief of dyspnea, oxygen saturation normalization, radiological improvement and normalization of biochemical marker of inflammation.

Result:

Total 10 patients were included in this study.

Table 1 *Information of patients who receive CP (n=10):*

Patient no		Sex	Age	Clinical classification	Days of admission from onset of symptoms	Days of getting CP	Symptoms	Comorbidity
01	Sazzad	M	61	Critical	10	12	Fever, Cough, SOB, Sore throat	DM
02	Mainul	M	34	Critical	5	8	Fever, Cough, SOB	
03	Shahidullah	M	63	Critical	8	10	Fever, Cough, SOB, Sore throat	DM, HTN
04	Jahir	M	59	Critical	7	8	Fever, Cough, SOB	DM, HTN
05	Mueed	M	58	Critical	5	6	Fever, Cough, SOB,	DM, HTN
06	Mostafa	M	69	Critical	10	11	Fever, SOB, Sore throat	DM
07	Hasina	F	57	Critical	7	10	Fever, SOB, Sore throat	DM, BA
08	Shudangshu	M	40	Critical	5	7	Fever, Cough, SOB	
09	Fulmoti	F	50	Critical	5	7	Fever, Cough, SOB, Chest pain	HTN
10	Hafiz	M	60	Critical	8	10	Fever, Cough, SOB	COPD

M=Male, F=Female, DM=Diabetes, HTN= Hypertension, BA= Bronchial asthma, COPD= Chronic obstructive pulmonary disease, SOB= Shortness of breath.

Among 10 patients 80% (8) are male and 20% (2) are female. All of them were critically ill COVID patients and 80% (8) had comorbid condition. All these patient ware admitted in COVID ICU in between 5th to 10th (mean 7th day) of their symptoms onset and they got CP in between 6th to 12th (mean 8.9th days).

Table II *Treatments getting other than CP*

Patient no	Antiviral	Antibiotic and antifungal	Corticosteroid	Heparin	Monoclonal antibody (Tociluzumab)	Oxygen therapy before CP	Oxygen therapy after 3d of CP
01	Sized	Remdesivir	Meropenem Moxifloxacin	MPS	UFH		MVMV but step up
02	Mainul	Favipiravir	Meropenem Moxifloxacin	MPS	LMWH		MVMV but step down
03	Shahidullah	Remdesivir	Ceftriaxone Clindamycin	MPS	LMWH		MVMV but step down
04	Jahir	Remdesivir	Meropenem Moxifloxacin	MPS	UFH	Yes	MVMV but step up
05	Mueed	Remdesivir	Meropenem Moxifloxacin	MPS	LMWH		MVMV but step down
06	Mostafa	Remdesivir	Meropenem Moxifloxacin	MPS	LMWH		MVMV but step up
07	Hasina	Remdesivir	Tazo-piper	DEXA	LMWH	Yes	MVMV but step up
08	Shudangshu	Remdesivir	Meropenem Moxifloxacin	DEXA	LMWH	NRM	NRM, No change
09	Fulmoti	Remdesivir	Meropenem Moxifloxacin	DEXA	LMWH	HFNC	NRM
10	Hafiz	Remdesivir	Cftazidime Clindamycin	DEXA	LMWH	BiPAP	MV

MPS= Methylprednisolone, DEXA= Dexamethasone, LMWH= Low molecular weight heparin , UFH= Unfractionated heparin, MV= Mechanical ventilation , NRM= Non rebreather mask, HFNC= High flow nasal cannula, BiPAP= Bi level positive airway pressure

Table III *Laboratory parameters before and after CP (n=10)*

Lymphocyte %		CRP		S. Ferritin		LDH		ALT		D-Dimer		APTT		PT			
Before getting CP	After getting CP	Before getting CP	After getting CP	Before getting CP	After getting CP	Before getting CP	After getting CP	Before getting CP	After getting CP	Before getting CP	After getting CP	Before getting CP	After getting CP	Before getting CP	After getting CP	Before getting CP	After getting CP
01	2.3%	2%	6	320	1500	1460	638	2516	113	115	8.19	5	34	34	14	14	62	60
02	15%	20%	14	10	355	350	500	480	35	36	1.5	2	31	32	13	14	75	80
03	6%	10%	15	14	488	480	345	440	38	42	2.1	2.2	33	35	14	16	72	83
04	13%	10%	48	48	5236	2000	600	950	50	55	3.69	4.34	37.7	34.9	12	12.2	60	59
05	10%	16%	30	24	542	495	480	450	39	41	2.1	2.4	33	34	14	15	60	80
06	15%	10%	177	152	875	1663	430	1200	28	41	1	4.9	34	38	12	13.1	70	65
07	12%	10%	64	170	2411	1834	883	1133	56	55	0.83	1.11	31	31	12	12.4	64	68
08	20%	18%	32	38	2300	2010	470	510	39	40	2.0	2.3	34	36	14	16	67	62
09	15%	20%	40	33	1820	1530	420	405	41	39	1.5	2.0	35	35	13	14	70	81
10	23%	19%	34	39	920	1020	580	520	40	38	2.9	3.6	36	38	14	18	68	70

Table-IV *ICU events (n=10):*

Patient no and data	Oxygen delivery device		Need of FiO2		Need of PEEP		Need of oxygen flow		Oxygen saturation	
	Before getting CP	After getting CP	Before getting CP	After getting CP	Before getting CP	After getting CP	Before getting CP	After getting CP	Before getting CP	After getting CP
1	MV	MV	80	90	12	14	50	50	92	90
2	MV	HFNC	70	50	10		50	40	92	98
3	MV	HFNC	80	50	14		50	50	92	96
4	MV	MV	100	100	10	14	60	60	94	94
5	MV	HFNC	80	50	12		50	35	90	98
6	MV	MV	100	100	14	16	50	50	88	86
7	MV	MV	80	90	10	12	50	50	90	90
8	NRM	NRM					15	15	88	88
9	HFNC	NRM	80	50			50	15	90	94
10	BiPAP	MV	80	100	10	12			88	82

Table shows that 40% (04) patients were weaned to oxygen supports, 10% (01) patient's parameters were unchanged and 50% (05) patients were need more oxygen support. 70% (07) patients of total who received mechanical ventilation, after treatment with CP, 30%(03) patients were weaned from mechanical ventilation to high-flow nasal cannula, and 10%(01) patient discontinued high-flow nasal cannula to NRM.
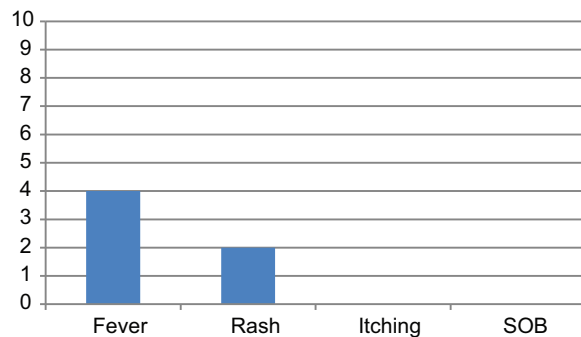

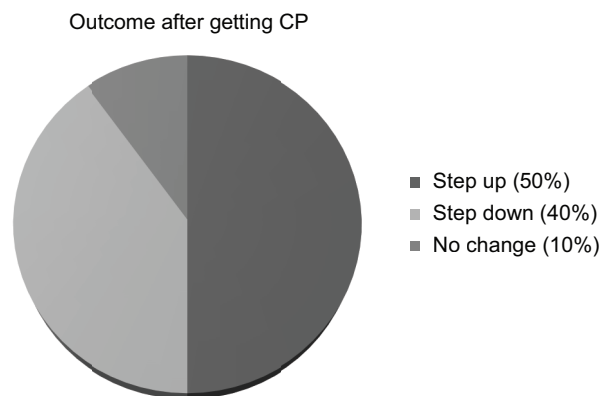**Figure 1** *Showing developments of complications after giving CP (n=10):*

Outcome after getting CP

- Step up (50%)
- Step down (40%)
- No change (10%)

Figure 2 *Pie chart showing outcomes of patients after getting CP (n=10):*

Discussion:

10 criticallyill COVID-19 patients were treated with convalescent plasma. Assessmentwas done from day of treatment with convalescent plasma, and the clinical conditions of these patients were improved, as indicated by normalization of body temperature, improved PAO2/FIO2, chest imaging and biochemical marker of inflammation. Prior to CP treatment, seven patients received mechanical ventilation,one received high-flow nasal cannula oxygenation, one received BiPAP and one received

oxygen therapy through NRM. Here data was taken before giving CP and at the third day of giving CP therapy.Lymphocytopenia, an important index for prognosis in COVID19, tended to be improved after CP transfusion, 40% (04)patients showing an increase of lymphocyte counts (Table. 3). Concerning other laboratory tests, we observed a tendency of decrement biochemical marker of inflammation as compared to the status before CP therapy. These included C-reactive protein (CRP), LDH, serum ferritin level. But liver function tests were not conclusive compared to other parameters (alanine aminotransferaseand aspartate aminotransferase (Table 3). An increase of SpO2, a measurement constantly performed in most patients in our study, was found, which could indicate recovering lung function.It was possible to reduce oxygen support (stepdown) of 40%(04) patients, 10% (01) patient's parameters was unchanged and 50% (05) patients were need more oxygen support (step up)after getting CP which correlate with incremental response of lymphocyte counts and detrimental response of biochemical parameters of inflammation.70%(07) patientsof total who received mechanical ventilation, after treatment with CP, 30%(03) patients were weaned from mechanical ventilation to high-flow nasal cannula, and 10%(01)patient discontinued high-flow nasal cannula to NRM. (Table 2).The results highlight the possibility that antibodies from convalescent plasma may have contributed to the clearance of the virus and also the improvement of symptoms. In the current study, all patients received antiviral agents (Favipiravir or Remdesivir) and Tociluzumab, during and following convalescent plasma treatment, which also may have contributed to the viral clearance. Regarding adverse effect 40% (04) patients showed fever and 10% (01) patients developed rashes. No other serious adverse reactions were recorded after CP transfusion.

Limitations:

This study has several limitations. First, this was a small number of patients that included no controls. Second, it is unclear if these patients would have improved without transfusion ofconvalescent plasma, though oxygen requirement and PAO2 / FIO2 represent encouraging findings. Third, all patients were treated with multiple other agents (including antiviral medications), and it is

not possible to determine whether the improvement observed could have been related to therapies other than convalescent plasma. Fourth, plasma transfusion was administered at 6th to 12th days after admission; whether a different timing of administration would have been associated with different outcomes cannot be determined. Fifth, whether this approach would reduce case-fatality rates is unknown.Sixth, we have no facility to follow up with viral load and HRCT scan of chest.

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Effectiveness of Convalescent Plasma Therapy in Critically Ill COVID-19 Patients: Early Experience from a Dedicated ICU of Bangladesh

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Abstract

Introduction: The management of severe or critical COVID-19 patients in the ICU includes supportive care as well as repurposed drugs and revival of old strategies like human convalescent plasma therapy (CPT) in the absence of specific therapy against SARS-CoV-2 virus. CPT appears to be an attractive treatment option as passive antibody transfer, but efficacy remains controversial.

Objectives: To determine the effectiveness of convalescent plasma therapy in management of critically illCOVID-19 patients admitted at the dedicated intensive care unit of Kurmitola General Hospital, Dhaka.

Study Method: All patients admitted in the ICU of Kurmitola General Hospital, Dhaka from 1st May to 30th September 2020 were included in this retrospective observational cohort study. The protocol wasapproved by the Ethical and Scientific Committee of the hospital. The clinical and treatment data of all participants were collected; and the association of CPT and mortality benefit was observed between the patients who received plasma therapy during ICU stay and who didn't. The statistical analysis was performed using the Windows based statistical software package SPSS version 25.

Results: A total of 228 critically illCOVID-19 patients were admitted to the ICU of Kurmitola General Hospital in the specified time period. Among them, 160 (70%) were male and 68 (30%) females. Mean age was 57.97 (95% CI 56.23-59.70) years. Important co-morbidities were obstructive airway diseases 160 (70.17%), hypertension 117 (51.31%) and diabetes mellitus 103 (45.17%). Only 53 (23.25%) patients received CPT during ICU stay. The median day of receiving CPT from the day of symptom onset was 12 (IQR 10-14) days in the survivor group and 18 (IQR 16-19) days in the non-survivor group (p<0.0001). All-cause ICU mortality was 29 (54.7%) in CPT group vs. 115 (65.7%) in Non-CPT group (p=0.146). The odds ratio of survival in CPT group was 0.757 (95% CI 0.528-1.085).

Conclusion: This retrospective cross-sectional study suggested that the efficacy of use of convalescent plasma in critical or severe COVID-19 patients admitted to ICU is conflicting for mortality benefit.

Key words: COVID-19,Convalescent plasma therapy,Intensive care unit, Bangladesh

Introduction:

The rapidly emerging coronavirus COVID-19 pandemic is the defining global health crisis of our time and the greatest challenge we have faced since World War Two. Since its emergence in Asia in 2019, the virus has spread to every continent and now reached the tragic milestone of more than two million deaths.[1]

COVID-19 has a seemingly variable clinical presentation and progression, presenting with mild infection to severe disease to fatal illness.[2] Reports suggest that among those infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), up to 20 percent develop severe disease requiring hospitalization.[3,4]Approximately 14 to 29% of hospitalized patients with COVID-19

pneumonia require intensive care, primarily for respiratory support in the setting of hypoxic respiratory failure.[5] The othercommon complications of COVID-19-related ARDS include acute kidney injury (AKI), elevated liver enzymes, and cardiac injury including cardiomyopathy, pericarditis, pericardial effusion, arrhythmia, and sudden cardiac death.[6]

Most infected people with SARS-CoV-2 have mild or moderate symptoms and recover without the need for extensive treatment. However, the management of patients suffering from severe or critical illness is challenging as there is no specific effective antiviral treatment currently available.[7]Besides supportive care, healthcare providers across the globe are using repurposed drugs and older strategies to manage the COVID-19 patients admitted in hospital. Revival of convalescent plasma therapy (CPT) is such an old strategy.[8]

CPT has been used since the 1900s in the prevention and management of various infectious diseases.[7]Its use was associated with reduced mortality during the 1918 influenza, 2003 SARS and 2009 influenza H1N1 pandemics.[9]In this context, our national guideline has issued guidance for the administration of human convalescent plasma in severe or life threatening COVID-19.[10]

CPT is a passive immunization strategy. It involves infusing patients with plasma obtained from people who have recovered from COVID-19. Convalescent plasma (CP) contains neutralizing antibodies, anti-inflammatory cytokines, clotting factors, natural antibodies, defensins, pentraxins and other undefined proteins, which help to neutralize the pathogen by potent anti-viral activity. Besides, CPT may cause immunomodulation via amelioration of severe inflammatory response seen in cases of COVID-19 with "Cytokine storm" driven by IL-1â, IL-2, IL-6, IL-17, IL-8 and TNFá. Thereby reducing pulmonary damage and fibrosis.[11]

However, there is conflicting evidence about the efficacy of convalescent plasma for treating COVID-19. Many observational studies have found the association between convalescent plasma and reduced mortality, hospital stay and viral load in patients with COVID-19. But, out of only three randomized controlled trials published till now, neither have shown mortality benefit. So, published systematic review remained undecided

on both safety and effectiveness of CPT as a treatment option in patients admitted to hospital with COVID-19.[8,12]

Our ICU population of Kurmitola General Hospital (KGH), Bangladesh comprises of patients with "Severe" and "Critical" COVID-19. The purpose of this study was to find out the outcome of CPT in our patients with COVID-19 by retrospective analysis of patients' data and to highlight the role of CPT as a therapeutic option in the management of the current global pandemic COVID-19 pandemic in a resource constraint setting like Bangladesh.

Materials and Methods:
This retrospective observational cohort study was conducted in the COVID dedicated ICU of Kurmitola General Hospital, Dhaka from 1st May to 30th September 2020.A total of 228 RT-PCR confirmed critically ill COVID-19 patients who had been admitted in this specified time period were enrolled in this study. The protocol wasapproved by the Ethical and Scientific Committee of KGH. Patients data were collected in a Case Record Form (CRF) by analyzing patients' registrar, patient assessment and treatment sheet and ICU follow up form. The administration of CPT was decided solely by the treating physician. Patients who received convalescent plasma therapy were compared to patients who didn't. The primary outcome was all cause ICU mortality. Categorical variables were reported as count and percentage. Normally distributed continuous data were presented as mean and 95% confidence interval whereas non-normally distributed data as median and interquartile range (IQR). To determine any association between two categorical variables Chi-square test or Fisher's exact test was used. Quantitative data was compared using Mann-Whitney U test. All p-value at or below 0.05 was considered as significant. The statistical analysis was performed using the Windows based statistical software package SPSS version 25.

Results:
A total of 228 RT-PCR confirmed COVID patients were admitted to the ICU of KurmitolaGeneral Hospital between May, 2020 to September,2020.

Figure-1 shows distribution of participants according to sex. Among 228 patients, 160 (70%) were male and 68 (30%) females. Male: Female was 2.35:1.
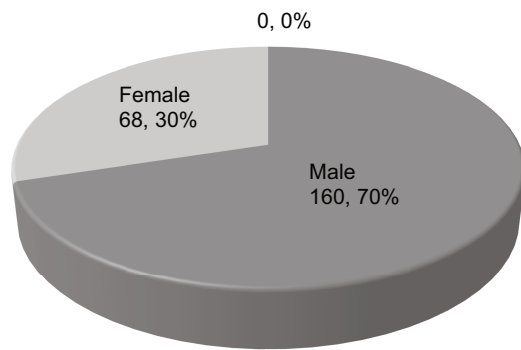
Figure-I *Distribution of patients according to sex (N=228)*

Table-I shows the age distribution of study subjects. Twenty-eight point five one percent patient belonged to 51-60 year age group and 25% patients belonged to 61-70 year age group. Their mean age was 57.97 (95% CI 56.23-59.70) years.

Table-I *Distribution of patients according to age (N=228)*

Age Group	Frequency (n)	Percentage (%)
≤40 years	23	10.09%
41-50 years	40	17.54%
51-60 years	65	28.51%
61-70 years	57	25.00%
≥71 years	43	18.86%
Total	228	100%

Mean (95% CI)57.97 (56.23-59.70)

Figure-II shows distribution of patients receiving CPT stratified by age group. Though highest 65 (28.51%) patients were within the age group of 61-70 years, it was the age group 51-60 years that received the most plasma therapy 18 (47.17%) followed by age group 41-50 years.
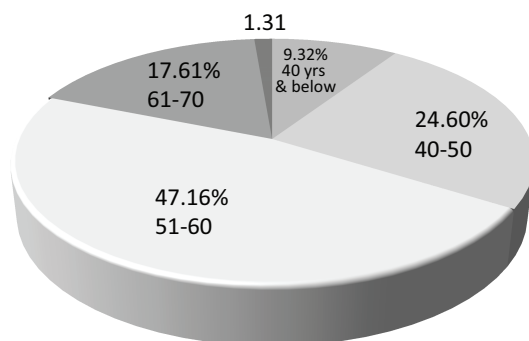

Figure 2 *Distribution of patients receiving CPT stratified by age group*

Table-II shows distribution of co-morbidities stratified by CPT. Important co-morbidities were obstructive airway diseases 160 (70.17%), hypertension 117 (51.31%) and diabetes mellitus 103 (45.17%). All patients received Anticoagulant and Corticosteroid. But, out of 228, only 53 (23.25%) patients received one unit (200 ml) of CPT.

Table-II : *Distribution of co-morbidities stratified by CPT*

Co-morbidities	Convalescent Plasma Therapy		Total (% of total population)
	Yes	No	
Hypertension	36	81	117 (51.31%)
Ischaemic heart disease	17	51	68 (29.82%)
Diabetes mellitus	30	73	103 (45.17%)
Chronic kidney disease	9	31	40 (17.54%)
Obstructive airway disease	41	119	160 (70.17%)
Stroke	2	53	55 (24.12%)
Obesity	8	48	56 (24.56%)
Chronic liver disease	7	20	27 (11.84%)
Malignancy	2	6	8 (3.50%)
No co-morbidities	13	20	33 (14.47%)

Table-III shows that all-cause ICU mortality was 29(54.7%) in CPT group vs. 115(65.7%) in Non-CPT group, but didn't reach statistical significance (p=0.146). The odds ratio of survival in CPT group was 0.757 (95% CI 0.528-1.085).

Table-III *All-cause ICU mortality in relation to CP*

CPT	Mortality	Survived	p-value
	(% with CPT group)		
Yes (n=53)	29 (54.7%)	24 (45.3%)	0.146
No (n=175)	115 (65.7%)	60 (34.4%)	

The median day of receiving CPT from the day of symptom onset was 12 (IQR 10-14) days in the survivor group and 18 (IQR 16-19) days in the non-survivor group (Figure-III), Mann Whitney U test revealed p<0.0001 which was statistically significant.
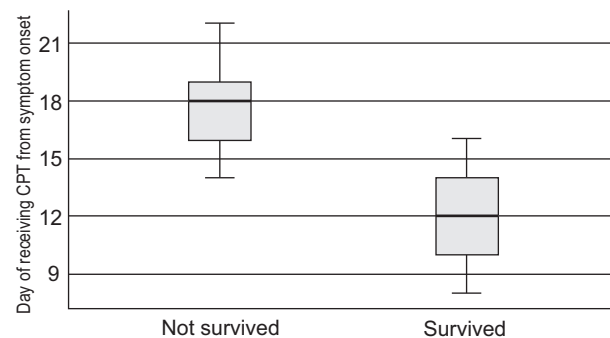
Figure-3 *Day of receiving CPT from symptom onset stratified by survivability (n=53)*

Discussion:

Taking into account the limited data available for the treatment of COVID-19, long-established and traditional interventions have re-emerged as viable options in the regulation of this disease. Nevertheless, convalescent plasma therapy (CPT) has recently become the focus of attention as it has earlier evidence supporting this CPT as a treatment option among COVID-19 patients.[13]

In this retrospective analysis of a cohort of 228 patients admitted in ICU of KGH over a period of five months, male were found to be more than female (M:F=2.35:1) which correlates with other studies.[14,15]Older age group is vulnerable for COVID-19 as well as ICU hospitalization,[10]but it was found in our observation that besides older age (>60 years), a significant proportion of our ICU population was below 50 years of age (27%).

Out of 228 patients, only 33 (14.47%) patients had no past co-morbidities. A history of obstructive airway diseases was found in 160 (70.17%) patients besides hypertension 117 (51.31%) and Diabetes mellitus 103 (45.17%). These are known to be the risk factors for COVID-19 disease progression.[16]

Recent studies in Bangladesh[17]and other countries[18,19]revealed convalescent plasma therapy as an evolving defensive treatment option for near-fatal cases of COVID-19. Convalescent plasma therapy (CPT) is also recommended in our national guideline for severe or critical COVID-19 (11-covid guide). However, only 53 (25.23%) patients received CPT in this present observation. Dose was single unit (200 ml) for all patients. The antibody titerwas unknown. High antibody titer was found to be effective in some studies.[20,21]

Those patients who survived after CPT actually received it earlier than those who didn't survive. The median day of receiving CPT from the day of symptom onset was 12 (IQR 10-14) days in case of survivor group compared to 18 (IQR 16-19) days for non-survivor group which was statistically significant (p < 0.0001). But, when comparison was made against the patients who didn't receive CPT during ICU stay, all-cause mortality was not statistically different between CPT group 29 (54.7%) vs. non-CPT group 115 (65.7%) (p = 0.146). The only available published RCT on CPT on COVID-19 till now, the "PLACID" trial concluded that convalescent plasma was not associated with a reduction of severity or all-cause mortality.[8]This study revealed an odd ratio of survival in CPT group 0.757 (95% CI 0.528-1.085) translating to "low to almost no" association between CPT and patient survival.Future research could explore using only plasma with high levels of neutralizing antibodies, to see if this might be more effective.

Limitations

This observational study was subjected to information bias and confusion bias as all information were collected from record documents. We were unable to collect data on detailed physical examination and standardized laboratory investigations for all cases. Being a retrospective study, attempt to limit the confounders was not possible.The associations of co-morbidities with mortalities in critically ill COVID-19 patients of this study are also needed to be evaluated in further multicenter prospective studies with larger cohort and extended follow-up.

Conclusion:

This retrospective study represented that the efficacy of convalescent plasma in critical or severe COVID-19 patients admitted to ICU is conflicting. The mortality benefit is yet needed to be established by randomized control trial. The antibody concentration of plasma and day of administration since the onset of symptom as well as disease severity status might play role in determining the mortality benefit in COVID-19.Further prospective studies should be conducted to verify the study findings.

Acknowledgement:

the COVID-19 management team consisting of the faculty and all staffs from the Department of Anaesthesia & Intensive Care who helped in setting up of a dedicated facility for COVID-19-positive patients, and their management protocol.

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Evaluation of Ventilator Associated Respiratory Tract Infections (VARTI) by Common Anaerobic and Atypical Bacteria among the Patients of ICU of a Tertiary Care Hospital in Bangladesh

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Abstract

Background and aim of the study:*Ventilator-associated respiratory tract infection (VARTI)*

is theleading cause of higher mortalityand morbidity in ICU compared to non-ICU patients. Thisarticle reveals etiology of VARTI by commonanaerobic and atypical bacteria in ICU of Dhaka Medical College.

Materials and Methodology: *This is a cross-sectionalstudy where 200 endotracheal aspirate (ETA) samples were taken from clinically suspected patients of VARTI. After proper screening,*

bacteria were identified by PCR as because anaerobic and atypical bacteria cannot be easily grown in conventional culture media.

Result: *Sixty three (31.5%) samples were found to have VARTI. Among the common atypicalbacteria causing, M. pneumoniae was found in 4 (6.35%) and L. pneumophila in 2 (3.17%) of the 63 samples. In search of the anaerobic bacteria causing VARTI,Peptostreptococcus was detected in 3 (4.76%) while Fusobacterium nucleatum andPrevotella melaninogenicawere detected in 2 (3.17%) each of the 63 samples.*

Conclusion: *Anaerobic and atypical bacteria are implicated in VARTI in ICU although at a relative low rate.*

Key word: *Intensive care unit (ICU), Ventilator associated respiratory tract infection (VARTI).*

Introduction

Health-care-associated infections(HAIs) are major problems worldwide[1]and is particularly higher in intensive care units (ICUs) due to use of various external devices such as mechanical ventilator[2]. Study revealed that ICUs account for 11.98% of the total nosocomial infection, even though they occupy less than 10% of the total bed capacity in a tertiary hospital.[3] Majority of infections in ICUs are VARTI[4] which occurs in patients receiving mechanical ventilation for more than 48 hours.[5]It includes both ventilator associated pneumonia (VAP) and ventilator associated tracheobronchitis (VAT). In ICU, VARTI appear to double the number of deaths compared to those without VARTI.[6] It results from aspiration of oropharyngeal contents into the lungs followed by colonization of *atypical and anaerobic bacteria. Common a*naerobic bacteria include*Fusobacterium spp, Prevotella spp.* and *Actinomyces spp.* Atypical bacteria,such as *Mycoplasma pneumoniae* and *Legionella pneumophila*are also implicated in VARTI although these pathogens have not been studied systemically and their role is unclear.[7]

Classical microbiological techniques cannot provide a rapid and efficient way to diagnose anaerobic and atypical bacteria because most of them grow either slowly or not at all in conventional culture media, leading to delayed and missed diagnosis.[8]So, this studywasdesigned to determine etiology of VARTI by common anaerobic and atypical bacteria by PCR in ICU of DMCH.

Methodology

This cross-sectional study was conducted in ICU of Dhaka Medical College Hospital (DMCH), during 1st July 2015 to 30th June 2016. Research protocol was approved by the research review committee (RRC) and ethical review committee (ERC). Endotracheal aspirates (ETA) were collected from 200 patients of ICU who fulfilled the clinical definition of VARTI followed by screening through microbiological and radiological definitions.[6] So, samples that fulfilled the clinical,microbiological and radiological definitions of VARTI,[9] were included for the study.Finally, PCR was done to all these samples to detect anaerobic and atypical bacteria causing VARTI in ICU.

Clinical definition of VARTI

Patients using endotracheal tube (ETT) for e" 48 hours plus temperature (>38[0]C) or leukocyte count (>12,000/mm^3, or <4000/mm^3) plus new onset of purulent endotracheal secretions or change in character of sputum or increased respiratory secretions.[9]

Sample collection

In each clinically suspected patient of VARTI, aseptically, a 50 cm 14 Fr sterile suction catheter was introduced through the Endotracheal tube (ETT) for 24-26 cm to obtain ETA by suction without giving saline. Cut tips of the catheters were collected inside the sterile test tubes with cotton plug and sent to the laboratory.[10]

Screening of samples

Microbiological criteria: Gram stained ETA samples, showing polymorphonuclear leukocyte (PMNL) with or without bacteria.[9]

*Radiological criteria:*Chest x ray showing either new or progressive and persistent infiltrate or consolidation or cavitation (VAP) or transient infiltrate or no radiographic change (VAT).[9]

Sample processing

In laboratory, 2 ml sterile normal saline and few glass beads were added in the test tube that contains the cut tips of catheter. The test tube was vortexed well to make a homogenous mixture of the sticky sample[11]After that, the cut tips and the glass beads were removed and the vortexed fluid was taken into an eppendorf tubeand centrifuged at 14000 g for 10 minutes.The supernatantwas discarded by sterile pipette and the deposit waspreserved for further study at -20[0]C as pellet.[12]

DNA extraction

Three hundred microliter distilled water was added with pellet in the eppendorf tube and vortexed. Then it was heated at 100[0]C for 10 minutes in a heat block and was placed in an ice pack for 5 minutes.After that, eppendorf tube was centrifuged at 13000 rpm for 6 minutes at 4[0]C and thesupernatant waspreserved at -20[0]C for PCR.[13]

Diagnostic criteria for VAP and VAT [9]

Variables	VAP	VAT
Clinical signs and symptoms	Temperature (> 30[0]C) or leukocyte count (> 12000/mm^3 or < 4000/mm^3) plus new onset of purulent endotracheal secretion or change of sputum or increased respiratory secretion.	
Radiology: CXR or CT scan	New or progressive and persistent infiltrate or consolidation or cavitation	Transient infiltrate or noradiographic change
Microbiological criteria	Gram stained ETA sample showing PMNLs with or without bacteria	

Primers of this study

For detection of anaerobic bacteria

Bacteria		Primer Sequence (5'-3')	Size (bp)
Prevotella melaninogenica	F	TCATCTTACCGAAAAAAT	141
	R	TGGGACGTTCGTTTGTTT	
Fusobacterium nucleatum	F	*AGAGTT TGATCC TGGCT*	360
	R	*GTCATCGTGCACACAGAT*	
Peptostreptococci	F	AGAGTTTGATCTGGCTCG	553
	R	ACGGGCGGTGTGTC	

For detection of atypical bacteria

Bacteria		Primer Sequence (5'-3')	Size (bp)
Chlamydia pneumoniae	F	GTTGTTCATGAAGGCCTACT	437
	R	TGCATAACCTACGGTGTGTT	
Legionella pneumophila	F	AGGGTTGATAGGTTAAGAG'	386
	R	CCAACAGCTAGTTGACATCG	
Mycoplasma pneumoniae	F	TCAATCTGGCGTGGATCTCT	180
	R	GTCACTGGTTAAACGGACTAC	

Results

The study started with 200 clinically suspected VARTI patients of ICU of DMCH and after proper screening 63 (31.5%)samples were finally selected for this study. This study searched for atypical bacteria such as *Mycoplasma pneumoniae, Legionella pneumophila* and *Chlamydia pneumoniae* and anaerobic bacteria such as *Peptostreptococcus,Fusobacterium nucleatum* and *Prevotella melaninogenica.*As because these bacteria cannot be cultured in routine media,they were detected by PCR. PCR was done to all of the 63 samples for two times, once for atypical bacteria and then for anaerobic bacteria where few samples revealed mixed bacteria.
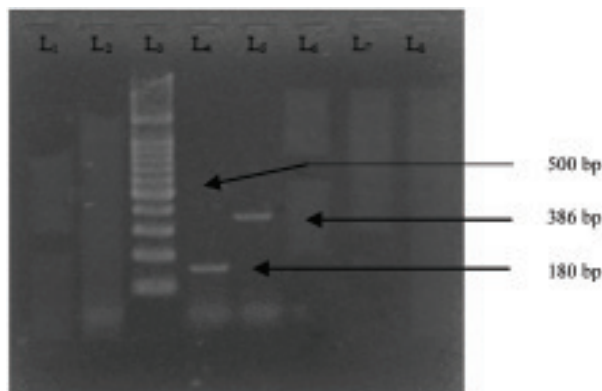

Figure: *Amplified DNA of 180 bp for Mycoplasma pneumoniae gene (lane 4), DNA of 386 bp for Legionella pneumophila (lane 5), 100 base pair DNA ladder (lane 3), negative sample (Lane 6 and 7), negative control E. coli ATCC 25922 (lane 8)*
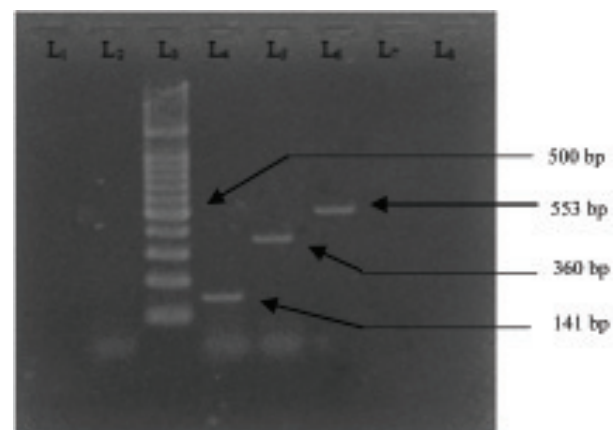

Figure: Amplified DNA of 141 bp for *Prevotella melaninogenica,* gene (Lane 4), DNA of 360 bp for *Fusobacterium nucleatum* gene (Lane 5), DNA of 553 bp for *Peptostreptococci* gene (Lane 6), 100 bp DNA ladder (Lane 3) negative sample (Lane 7) and negative control *E. coli* ATCC 25922(Lane 8).

Table I: *Screening and selection of ETA samples of ICU.*

ETA samples from clinically suspected	Screening of samples				Confirmedcases of VARTI n (%)
	Microbiological criteria N = 200		Radiological criteria N = 120		
VARTI patients	Rejected samples	Selected samples	Excluded samples	Including samples	
200	80	120	57	63	63 (31.5%)

Table II
Detection of atypical bacteria among ETA samples by PCR (N = 63).

Bacteria	Detection by PCR n (%)
Mycoplasma pneumoniae	1+2**+1* (6.35)
Legionella pneumophila	1+1* (3.17)
Chlamydia pneumoniae	0 (00.00)
Total	6 (9.52)

*Indicates mixed infection of *Mycoplasma pneumoniae* and *Legionella pneumophila.*

** Indicates mixed infection of *Mycoplasma pneumoniae* and *Prevotella melaninogenica.*

Table III Detection of anaerobic bacteria among ETA samples by PCR (N = 63).

Bacteria	Detection by PCR n (%)
Fusobacterium nucleatum	2 (3.17)
Peptostreptococcus	3 (4.76)
Prevotella melaninogenica	2** (3.17)
Total	7 (11.11)

*Indicates mixed infection of *Mycoplasma pneumoniae* and *Legionella pneumophila.*

** Indicates mixed infection of *Mycoplasma pneumoniae* and *Prevotella melaninogenica.*

In this study,31.5% VARTI were detected in ICU of DMCH.In search of atypical bacteria causing VAP or VAT, PCR detected *Mycoplasma pneumoniae* in 6.35% and *Legionella pneumophila* in 3.17% of the 63 ETA samples. None of the ETA samples were positive for *Chlamydia pneumoniae*.Among the common anaerobic bacteria *Peptostreptococcus* were detected in 4.76% while *Fusobacterium nucleatum* and *Prevotella melaninogenica* were found in 3.17% each of the 63 samples.

Discussion

Regular surveillance of DAI in any healthcare setting is highly informative not only to clinicians but also to the hospital administration to decide strategies for prevention and control of nosocomial infections. However, due to difficulties in conducting such studies only few information is available on institutional DAI rate. [14]

In the present study, 31.5% VARTI were detected in ICU of DMCH which was similar to El-Din-Hamdy on 2014[15] who reported 34.20% VARTI in his study.In this study,*Mycoplasma pneumoniae* was detected in 6.35% and *Legionella pneumophila* in 3.17% of the 63 ETA samples by PCR.These findings were in accordance with the data reported by Akter on 2014 in DMCH,[12] where *Mycoplasma pneumoniae* was detected in 7.69% and *Legionella pneumophila* in 6.15%. Moreover, another study by Mokhless on 2010[16] reported 8.33% *Mycoplasma pneumonia* and 5% *Legionella pneumophila* in their study which also coincides with the present study.In contrast, Abukhabar on 2017[17] reported 3.33% *Legionella pneumophila* but no*Mycoplasma pneumoniae* in their study. This difference might be due to the fact that most of the patients of this study was of older age and smoker. *Mycoplasma pneumoniae* produces infection mostly in elderly people and shows special predilection to those with preexisting lung diseases.[18]

Data regarding the role of anaerobic bacteria in VARTI are conflicting. A prospective surveillance study reported that 57.70% of VAP patients becamecolonized by anaerobic bacteria.[19]On the other hand, Marik and Careau on 1999[20]reported no anaerobic infection even among 185 VAP patients. This deflection might be due to the fact that ICU patients of the second study were treated with antibiotics which might have prevented anaerobic infections.[21]This study revealed 11.11% anaerobic infections among 63 VARTI patients.

During our study period, we observed that, in ICU of DMCH, there is a discrepancy between the number of patients and the health care providers such as doctors and nurses. So, meticulous cleaning and time to time replacement of ETT was not possible which might be the reason for VARTI by anaerobic bacteria in ICU of DMCH.

Conclusion

VARTI remains a frequent health care associated infection, occurring in 10% to 20% of ICU patients (Jean-Louis). In reality, very few data are available about ICU, particularly VARTI by atypical and anaerobic bacteria. On the other hand, control of nosocomial infections highly depends on proper identification of the bacteria followed by rational use of antibiotics. So, this study will definitely be helpful about detection of atypical and anaerobic bacteria. Further study is urgently required to evaluate the drug sensitivity patterns of these bacteria.

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Bronchial Blocker Provides Hemodynamic stability for One Lung Ventilation in Right Video-Assisted Thoracoscopic Surgery: An Observational Study

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Abstract

Background: *Double lumen endotracheal tubes (DLT) and bronchial Blockers (BB) have been both been used for lung isolation in video-assisted thoracic surgery (VATS) with some inherent demerits.*

Objective: *The aim of this study was to observe the quality of lung deflation of a bronchial blocker for one lung ventilation & the hemodynamic stability in video-assisted thoracic surgery(VATS).*

Materials & methods: *A total forty adult patients have been assigned to observe the effects & hemodynamic stability of BB who undergoing VATS procedure for mediastinal mass surgery. Correct placement of airway was confirmed by fiber optic bronchoscopy. The variables assessed were: 1. Time required for correct placement of device, 2. Time taken for lung collapse, 3. Quality of Lung collapse, 4. Number of times of airway mal-positioned, 5. Changes of blood pressure and heart rate at baseline (T_1) and immediate before (T_2) and after (T_3) intubation and one minute after (T_4) intubation, 6. Number of patients with hypoxemia (Spo_2 <90%) during one lung ventilation, and 7. Post-operative complication like hoarseness of voice, sore throat and lung infection.*

Result: *Results were observed for MAP & HR at T1, T2, T3 &T4. It was shown that HR decreased after induction than the baseline (T1) & came near baseline one min after intubation(T4). Just after intubation at T3, HR increased from the baseline & immediate before induction (T1&T2). MAP was also increased at T3 than T1 & T2. Time taken for right lung collapse with BB was (4.76±0.61) similar and comparable to other studies. Total 36 patients were achieved total collapse of the lung and incidence of device malposition was observed in case of 5 patients. On the other hand, hypoxaemia was observed in case of 1 patient.*

Conclusion: *Result showed that BB could be a better and effective alternative in VATS Procedure considering a longer time to achieve complete lung collapse with minimum hemodynamic changes and with minimum post-operative complications.*

Key words: *Hemodynamic Stability, Bronchial Blocker, VATS, Complications.*

Introduction

Video assisted thoracic surgery (VATS) is a minimally invasive, popular technique increasingly used in thoracic surgery which requires one lung ventilation (OLV). A key to successful VATS surgery is maximizing intra thoracic visualization by optimizing the quality of lung isolation and deflation within the relatively closed thoracic cavity.

Double lumen endotracheal tube (DLT) has generally been considered the gold standard for lung isolation[1,2]. Its large lumen facilitates the suctioning of blood or secretions from bronchi and switch from two lungs to OLV can be achieved easily and reliably. However mal positioning of tube can occur and for its rigidness and wide diameter insertion of DLT can cause perioperative

complications like pronounced intubation reflex, tracheobronchial rupture, hematoma formation in larynx trachea & bronchus, traumatic laryngitis or arytenoids dislocation[1-5]. On the other hand, the bronchial blocker (BB) is inserted through a single lumen endotracheal tube previously placed into trachea. Due to less friction during placement to the trachea bronchus larynx there is minimum hemodynamic alteration with the patients when BB is being used. This is a single blinded randomized prospective clinical trial for OLV by observing the use of BB to evaluate the ease of use effectively, haemodynamic alterations as well as post-operative complications.

Methods

This prospective single blinded observational study was done after getting clearance from ethical committee of Combined Military Hospital Dhaka Cantonment. Forty patients who were scheduled for removal of mediastinal mass under VATS procedure between the periods of January 2017 to December 2018 were approached for the study. The patients were aged between 25-65 years old and of American Society of Anesthesiologist (ASA) physical status I-III. After obtaining informed written consent and prior to induction of anesthesia all patient were assigned to have their airway managed by a BB according to a randomize trial. Patients with anticipated or with previous difficult intubation, severe obstructive pulmonary disease, pleural and/or interstitial pathology, history of psychological or neurologic function impairment and FEV, <50% of predicted value were excluded from the study.

Prior to induction all patients were attached to all standard monitors required for VATS & OLV. Anesthesia was induced with midazolam (0.05 mg/kg), propofol (1.5 mg/kg), fentanyl (1-2 mgm/kg), vecuronium (0.1 mg/kg). After the onset of muscle relaxation single lumen endotracheal tube (SLT) was placed and through the single lumen tube a BB was placed under fiber optic bronchoscopic guidance in the right main bronchus. The balloon of the BB was inflated with 5-8 ml of air to obtain total bronchial blockade.

After confirming correct placement BB all patients were turned into left lateral position. The balloon of BB was deflated prior and during patient positioning. After proper positioning BB was rechecked for correct placement. After proper positioning and surgical drapping OLV were started, for the BB group the lung was deflated prior to inflating the balloon of the blocker by turning the ventilator off and opening the breathing circuit. No further maneuvers were performed to facilitate lung collapse.

During OLV, ventilator setting was adjusted to keep peak airway pressure bellow 25 cm H_2O, lower tidal volume (5-7 ml/kg), higher respiratory rate (18-22 breaths/min). All ventilator parameters were adjusted to maintain the $ETCO_2$ level between 35-45 mm of Hg. Anaesthesia was maintained with halothane 0.2-0.6% muscle relaxation was maintained by incremental dose of vecuronium and analgesia was maintained by continuous epidural anagesia by 0.25 % Bupivacaine plane 1-2 ml/hour and Fentanyl 2.5 micro gm/hour through epidural catheter, titrated according to the hemodynamic response of the patient.

After completion of surgery all patients were extubated and shifted to post anaesthesia case unit (PACU). Post-operative analgesia was maintained by thoracic epidural route. All demographic parameters information, findings, events were compiled in a preformed data sheet and analyzed by appropriate test using SPSS version 22 & P-value <0.05 was considered significant.

Results

Table-1 *Patient demography and operation characteristics:*

Variables	BB (n=40)
Mean Age (Years)	55.42 ± 6.28
Sex (M/F)	28/12
ASA grading (I/II/III)	6/28/6
Duration of surgery (min)	145.84 ± 26.12
Duration of anaesthesia (min)	178.41 ± 30.72

Values are presented as mean ± SD. Analysis was done by Student's 't' test.

Table-II *Haemodynamic parameters during induction of Anaesthesia-HR (Beats / min):*

Variables	BB (n=40) Mean ± SD
T_1	78.52 ± 6.19
T_2	73.18 ± 8.29
T_3	78.56 ± 9.06
T_4	77.26 ± 6.73

Values are presented as mean ± SD. Analysis was done by Student's 't' test.

Table-III *Haemodynamic parameters during induction of anaesthesia-MAP (mm of Hg):*

Variables	BB (n=40) Mean ± SD
T_1	93.24 ± 7.82
T_2	86.68 ± 8.59
T_3	92.15 ± 6.47
T_4	92.04 ± 9.78

Table-IV *Effects of one lung ventilation with perioperative incidence:*

Variables	BB (n=40) Mean ± SD
Time for placement of device in correct position (min)	3.84 ± 1.41
Time for right lung collapse (min)	4.76 ± 0.61
Quality of lung Collapse	
Total –	36
Partial-	04
No collapse-	0
Number of patients with device malposition	5 (12%)
Number of patients with hypoxemia	1 (2.5%)

Table-V *Post-operative complications*

Variables	BB
Hoarseness of voice	0
Sore throat	0
Lung infection	0

Values are presented as mean ± SD. Analysis was done by chi squared test.

Total forty patients were selected for the study and randomly assigned to the BB group. The patient characteristics and operation characteristics were observed in table1. Hemodynamic values are listed in table 2 and 3 (HR and MAP). Blood pressure were measured and recorded during induction and after intubation. Final results are obtained and observed from MAP of different times T1, T2, T3 and T4. Results showing that average HR decreases than base line (T1) after induction (T2) and came near to base line one min after intubation (T4). Just after intubation at T3, HR increases from base line T1, T2 (Table-2). MAP was also increased at T3 than T1& T2 (Table-III)

Time required for correct placement of device shown in Table-4 & it was 3.84+ 1.41). Time for right lung collapse (Table-4) was (4.76+0.61). The quality of lung collapse was described in terms of total & partial, which was 36 & 04 respectively. Number of patients with device malposition was 05 & and hypoxemia was observed in 01 patient.

Post-operative complication has shown in Table-5, among forty patients none has shown this complications. No patient has suffered from lung infection (Table-VI).

Discussion:

Form this study the data demonstrated that the use of BB could achieve similar quality of lung collapse compared with DLT for OLV in VATS procedure in other studies. While the use of BB is associated with longer time required to induce right lung collapse, but with a reduced incidence of hoarseness of voice and sore throat with in first 48 hours after surgery. These results contrast with those of Bussiereset al[6], they found considerably faster lung collapse using BB. However their study cohort was different from those of the current study.

DLTs generally have been considered the gold standard for lung isolation and are proved by many to offer more rapid and better quality of lung collapse for its wide diameter[7,8].

Archibald[9] first introduced BB into clinical practice in 1935. The results from one meta-analysis study showed that DLTs were more effective than BB for lung isolation but were associated with a

significantly greater incidence of airway injury and postoperative hoarseness[10]. However, Bauer et al[11] did not advocate the routine use of BB as a method for providing OLV during thoracoscopy. The possible reason is for its difficulties in placement with requirement of prolong time than do DLT in correct position. Then the author selected cases scheduled for esophageal tumour surgery undergoing VATs procedure and all of them received OLV. Therefore, in this study time required for correct placement of BB are similar to other studies.

Safety as well as efficacy is a prime consideration to put different device for lung isolation. Airway injury such as haematoma of the vocal cords, may cause sore throat and hoarseness of voice as long as two weeks post operatively[12].Bronchial edema was also a reported complication after using DLT[12,13]. Per operative difficulties like mal positioning of device is not very uncommon which can result in hypoxemia and may cause complete airway obstruction leading to even discontinuation of surgery whileproblem is managed[14].

In this study we found that incidence of device displacement and desaturation comparing the device is similar but postoperative complication like hoarseness and sore throat within 48 hrs after surgery can be reduced using BB. Therefore, it is important to select devices for OLV keeping in mind patients safety and for ease of anaesthesiologist and surgeons involved in the procedure.

DLTs have a larger diameter than the regular endo tracheal tube and must be inserted into a major bronchus. The carina and inner wall of trachea are stimulated and induce more severe cardio vascular response than from regular intubation[5]. Consisted with previous studies[5,15] the current result showed that intubation with DLT could significantly increase blood pressure and heart rate, however this phenomenon did not happened in BB group. The use of BB for OLV could have beneficiary effect for those patients with severe cardiovascular disease who require OLV for surgery with a reduced adverse cardiovascular events.

Limitations: There were some limitations of the study, firstly the method of assessing lung collapse by using surgeons rating scale, which was not completely objective. Secondly the study population was restricted to patients presenting good lung recoil as patients with potentially altered lung recoil were excluded from the study. Patients with pulmonary pathology associated with bad recoil correspond to a population in which the BB could be used but rarely with optimum result.

Conclusion:

The result of this study showed that despite requiring a longer period to achieve lung collapse the use of BB can reduce the risk & magnitude of exaggerated haemodynamic responses. BB can also reduce the incidence of post-operative sore throat & hoarseness of voice which magnifies the advantages of VATS procedure.

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Comparison of Haemodynamic Stability of Etomidate versus Propofol for Induction of Anaesthesia in Patients undergoing Coronary Artery Bypass Graft Surgery

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Abstract:

Background: Maintenance of hemodynamic stability during induction and obtundation of intubation stress response are the prime consideration of general anaesthesia.

Aims: The purpose of the study is to compare the hemodynamic effects of etomidate and propofol during induction and intubation in patients undergoing Coronary Artery Bypass Graft Surgery(CABG).

Materials and Methods: This prospective, double-blind randomized clinical trial, total eighty patients were randomly allocated and divided into two groups based on the induction agent used for anaesthesia (etomidate group or E group) and (propofol group or P group). Heart rate(HR), Mean Arteriolar Blood pressure(MAP), Cardiac Output (CO) & Cardiac Index(CI) were recorded at preoperative Baseline(T1), at premedication(T2), at induction(T3), at intubation (T4), 1 min after induction(T5), 3 min after induction(T6), 5 min after induction(T7). The use of vasopressors was also recorded, required for both the groups.

Results: Before induction, there was no significant difference in hemodynamics between the groups (p >.05). At induction, intubation & up to 5 min after induction thereafter all the hemodynamic parameters were significantly different from baseline value in both groups (p < .001). During the comparison between two group, it was noted that, in P group, propofol caused pronounced reduction of HR, MAP, CO & CI in comparison to E group, at induction(T3), at intubation (T4), 1 min after induction(T5), 3 min after induction(T6). The use of vasopressors was also in higher incidences in P group than E group.

Conclusion: This study confirms that Etomidate provides a stable hemodynamic condition in context with propofol during induction, intubation & immediate post induction period and this hemodynamic stability can improve the clinical outcomes in patients undergoing CABG.

Key words: CABG, Hemodynamic stability, Etomidate, Propofol, Induction

Introduction:

Maintenance of hemodynamic stability during induction and obtundation of intubation stress response are the main consideration of general anaesthesia for the patients undergoing CABG[1,2]. Because in case of the Cardiac surgery. patients are critically ill & cardiovascularly compromised [3,14]. Propofol, is widely used as induction agent because of its rapid onset of action, shorter duration action & minimal adverse effects. But it causes profound post-induction & pre-intubation hypotension & bradycardia due to the significant decrease of Systemic Vascular Resistance (SVR)[3] which is completely undesirable and detrimental in the cardiovascularly compromised patients[17]. Etomidate is an alternative induction agent which produces reliable & rapid onset of anaesthesia & is perceived as having a more stable hemodynamic

condition. So etomidate may be better choice for induction for the patients, where hypotension & bradycardia is undesirable. Etomidate may be a good alternative for induction of anaesthesia as it minimally releases histamine[4]. In the most previous studies the hemodynamic effects of both the agents are compared in abdominal, orthopedic and even in neurosurgical cases but not so much in case of cardiac surgery[5,6]. So this study was aimed to compare the hemodynamic effects of etomidate and propofol during induction and intubation in patients undergoing CABG and to test hypothesis that etomidate is superior propofol for induction & obtundation of intubation stress response in relation to hemodynamic stability.

Materials & Methods

This prospective, double-blind, randomized clinical trial was conducted in the department of Cardiac anesthesia of Combined Military Hospital, Dhaka from the period of January,2019 to December 2019. The study protocol was approved by the institutional Ethical Committee and with informed written consent,80 adult patients were selected in this study.

Inclusion Criteria

1. Adult patients age > 30 years
2. ASA grade III &IV
3. Scheduled to undergo elective off pump CABG
4. Patients with LVEF >50%

Exclusion Criteria

1. Patients with known history of allergy to study drugs
2. Patients with low LVEF < 50%
3. CABG with Cardiopulmonary Bypass (CPB)
4. TVCAD with Valvular Heart Disease (VHD)
5. Patients of > 65 years of age

Study Procedure

Randomization was done on basis of computer generated random number list. This randomization schedule facilitated patient disposition into two equal groups -Group P (propofol = 40) and Group E (etomidate = 40). The list was concealed in opaque sealed envelope that was numbered and opened sequentially after obtaining the patient's consent. All patients were advised to restrict solid per mouth at least 6 h before surgery along with tablet

diazepam (5 mg) and ranitidine (150mg) on the night before surgery. On arrival to the operating room, an intravenous (IV) fluid (10 ml/kg) was started. An arterial line was placed into the radial artery and Edward CO sensor in cardiac monitor EV1000 was attached for measuring mean arterial pressure (MAP) and CO. All the preoperative baseline parameters were recorded. Fentanyl 2-4 µg/kg was administered intravenously just before induction. After pre-oxygenation with100% oxygen for 3 minutes, P group received propofol 1.5-2 mg/kg and E group received etomidate 0.2mg /kg. IV over 30-60 sec rocuronium 0.6 mg/kg was administered and the patient was oro-tracheally intubated by the main examiner. The main examiner was unaware about the type of induction agent. After intubation, the patient was mechanically ventilated with a mixture of oxygen and medical air (1:1) with addition of isoflurane which was included into the gas mixture immediately after intubation The tidal volume was 6 ml/kg, the breathing frequency was 10-14 /min and fresh gas flow was 2 litre/min with maintaining end tidal CO2 value 35 - 40 mmHg. No surgical intervention was allowed until 5 minutes after induction. HR, MAP, CO and CI values all were recorded before premedication, immediately before and after induction of anesthesia, at intubation and1, 3, and 5 min after intubation. The study was ended at that point and thereafter all the vitals were monitored throughout the surgery. Data were stored in an IBM-compatible computer. Any adverse effect like bradycardia, hypotension, pain on injection cough, laryngospasm, bronchospasm, apnoea and any involuntary movement was also noted. Injection Vecuronium infusion started to maintain relaxation. All complications were treated after 1 min of their duration. Hypotension (MAP d" 55 mm Hg) was treated with IV bolus dose of phenylephrine and intravenous infusion of Inj. Adrenaline, Noradrenaline and Dobutamine, until the desired clinical effect was achieved. Hypertension (MAP ≥100 mm Hg) was treated with fentanyl 1 µg/ kg up to three times and afterwards with a nitroglycerine infusion (10 - 100 µg/ min). Bradycardia (HR ≤40/min) was treated with atropine 0.3 mg. Tachycardia (HR ≥90/min) was treated with fentanyl 1 µg/kg. Data were analyzed with the IBM SPSS Statistics 22 statistical software. Data were summarized by routine descriptive

statistics namely mean and standard deviation (SD) for numerical variables and counts and percentages for categorical variables. Numerical data were compared between groups by Student's independent t-test as data were normally distributed. The Chi-square test was employed for intergroup comparison of categorical variables. All analysis was two tailed and p < 0.05 were considered statistically significant.

Result

In this study total 80 patients were randomly selected & all the demographic variables like age, sex, height 7 body weight were comparable between two groups (Table 1). Baseline haemodynamic parameters in both groups were also comparable (p<0.05). Each intubation was successful at the first attempt & took < 20 sec. In table 3, it was shown that, P group, immediately after induction MAP was decreased (90.42 ± 6.69) from baseline value (103.63 ± 8.42) up to intubation. Just after intubation, MAP was increased transiently (92.78 ± 6.62) and then it again gradually came down to basal level at the end of study (98.84 ± 3.42). Whereas, in E group after induction MAP was decreased to some extent (96.69 ± 3.93) from baseline value (102.82 ± 3.82), but it was increased

after intubation (101.77 ± 5.04) and remained stable to the end of study period (102.23 ± 4.41). After induction, in both the groups MAP significantly differed from base line value during intragroup comparison. At all-time intervals (p < 0.01), it was shown that, during intubation, MAP did not significantly increase in two groups. During intergroup comparison, MAP was significantly lower in P group than E group at 1, 3 and 5 minutes after intubation (p = 0.000) (Table 3). 4 out of 40 patients in E group required rescue IV fentanyl (2 mcg/kg) and infusion nitroglycerine (10 - 100 mcg/kg/min) to control BP. Similar to MAP, HR, CO and CI all parameters were decreased from their baseline value just after induction in both the groups and increased transiently just after intubation. During intubation, HR, CO and CI was not significantly different between two groups. HR, CO and CI came down to its baseline value in E group at end of study, but in P group their value remained significantly at lower level than baseline value. During intragroup comparison parameters were significantly differ from their baseline values (p < 0.01). During intergroup comparison their values were significantly lower in P group than E group at 1, 3 and 5 min after intubation (p = 0.000) (Table IV-VI).

Table I: *Basic demographic characteristics.*

Parameter	Values in mean (SD). BSA=body surface area.		
	Etomidate (n=40)	Propofol (n=40)	P-value
Age(yrs)	43.62±9.92	42.74±8.84	0.59
Height(cm)	149.199±5.45	150.139±4.58	0.08
Weight(kg)	64.98±2.08	65.62±1.98	0.88
BSA(m^2)	1.63±0.21	1.62±0.118	0.31
Mean EURO score	1.8±1.4	2.4±1.6	0.48
Mean Hematocrit(%)	41.2±4.2	40.8±4.4	0.53
Mean LVEF(%)	58.8±10.80	60.2±11.7	0.32

Table-II: *ASA Physical Status & Co-Morbid Conditions*

Parameters	Etomidate(n=40)	Propofol(n=40)
ASA physical status		
ASA III	28	32
ASAIV	12	08
Co-morbid Conditions		
Hypertension	26	27
IHD	30	24
DM	18	15
Hypothyroidism	06	05

Table III: Comparison of effect of propofol and etomidate on mean arterial pressure (mmHg). Values in mean ±SD.

Mean Arteriolar Pressure(MAP)	Etomidate(n=40)	Propofol(n=40)	P-value
Pre op baseline(T1)	102.80±3.42	103.63±8.42	0.59
Premed(T2)	100.78±4.20	96.78±6.68	0.42
Induction(T3)	96.69±3.93	90.42±6.69	0.35
Intubation(T4)	101.77±5.04	92.78±6.62	0.09
After 1 min(T5)	99.88±4.88	93.88±5.59	0.004
After 3 min(T6)	100.85±3.82	96.64±6.74	0.000
After 5 min(T7)	102.23±4.41	98.84±3.42	0.000

Table IV: *Comparison of effects of propofol and etomidate on heart rate (HR). Values in mean ±SD*

Heart Rate(HR)	Etomidate(n=40)	Propofol(n=40)	P-value
Pre op Baseline(T1)	88.26±8.68	90.20±6.70	0.85
Premed(T2)	86.88±4.85	88.04±5.44	0.45
Induction(T3)	86.24±5.78	82.08±4.50	0.21
Intubation(T4)	92.35±6.04	88.68±8.81	0.15
After 1 min(T5)	90±4.38	87.05±7.78	0.001
After 3 min(T6)	89.89±3.80	84.82±4.75	0.000
After 5 min(T7)	88.78±2.98	85.70±5.50	0.000

Table V: *Comparison of effects of propofol and etomidate on Cardiac Output (CO). Values in mean± SD.*

Cardiac Output(CO)	Etomidate(n=40)	Propofol(n=40)	P-value
Pre op baseline(T1)	5.41±0.04	5.34±0.34	0.07
Premed(T2)	5.38±0.03	5.28±0.25	0.06
at induction(T3)	5.22±0.34	4.38±0.18	0.24
at intubation(T4)	5.20±0.08	4.98±0.20	0.79
after 1min(T5)	5.40±0.18	5.18±0.27	0.52
after 3 min(T6)	5.5±0.24	5.28±0.38	0.000
after 5 min(T7)	5.4±0.25	5.28±0.21	0.001

Table VI: *Comparison of effects of propofol and etomidate on Cardiac Index (CI). Values in mean ±SD.*

Cardiac Index(CI)	Etomidate((n=40)	Propofol(n=40)	P-value
Pre op baseline(T1)	4±0.10	4.1±.08	0.19
Premed(T2)	4.2±0.2	4.0±0.07	0.08
induction(T3)	4.1±0.08	3.7±0.04	0.06
intubation(T4)	4.0±0.06	3.8±0.04	0.08
after 1 min(T5)	4.1±0.10	4.0±0.08	0.004
after 3 min(T6)	4.3±0.05	4.2±0.02	0.002
after 5 min(T7)	4.3±0.15	4.2±0.06	0.001

During the study period, there was no pain on injection, cough, laryngospasm, bronchospasm, apnoea and any involuntary movements in either group of patients without any hypotension or bradycardia.

Discussion

In this study, we compared the haemodynamic effects of propofol and etomidate during induction, intubation and 5 minutes thereafter in patients undergoing CABG under general anaesthesia. It was found that in both group hypertension and tachycardia occurred during induction & intubation, but the degree and duration of haemodynamic alternation (hypertension and tachycardia) were more profound in propofol than etomidate group. It was also shown that, during induction, propofol caused significant hypotension & bradycardia. Anaesthetic induction, is also associated with significant haemodynamic suppression due to peripheral vasodilatation, reduction in preload and venous return and to a lesser extent, decreased myocardial contractility[7]. On the other hand, stress response during laryngoscopy and intubation leads to various haemodynamic changes like hypertension, tachycardia, dysrrhythmia, myocardial infarction and increase in intracranial and intraocular pressure. These changes are due to increase in plasma concentrations of epinephrine, norepinephrine and vasopressin[8]. The undesirable haemodynamic effects of laryngoscopy and tracheal intubation, are not only detrimental for intraoperative safety, but also prudent in post-operative recovery, long term survival and health care costs[9]. Maintaining adequate depth of anaesthesia is essential for stable hemodynamics during induction and intubation. it is a challenging task for anaesthesiologist.

In Cardiac surgery, acute alternation of MAP is detrimental, as sudden hypotension during induction may hamper cardiac perfusion and on the other hand marked hypertension during intubation may lead to irreversible damage to myocardial perfusion due to the imbalance between the O2 demand and supply of which is already severely compromised. So tight control of MAP is prime concern during cardiac surgery[2]. Invasive haemodynamic monitoring, especially beat to beat measurements of arterial blood pressure and cardiac output, are useful for accurate monitoring and management of perioperative haemodynamic changes. Monitoring of Cardiac Output (CO) & Cardiac Index(CI) are also essential to ensure adequate myocardial tissue perfusion in the perioperative period[10]. There was less study in the available literature which compares the haemodynamic of effects propofol and etomidate on cardiac output before and after intubation in cardiac surgery. We decided to use Edward CO sensor in our study because it only requires a standard radial arterial line and we were interested in trends of CO & CI. In our study, it was found that after induction HR, MAP, CO & CI all were decreased from baseline value in both groups, but 1 minute after intubation they were increased. These changes in MAP, HR, CO & CI were more pronounced in P Group. At the end of study period, in E group MAP, HR, CO & CI all the parameters reached to their basal level, but in P group their values decreased in lower level. In one study, Larsen and colleagues compared the haemodynamic effects of propofol and etomidate induction in geriatric patients undergoing major upper abdominal surgery[10]. They found that after induction MAP and HR were decreased in both groups to the same extent, but at intubation the haemodynamic stress response was more prominent in etomidate group. In another study, Kaushal RP., et al. observed the effect of propofol and etomidate induction in patients undergoing CABG or mitral/aortic valve replacement under CPB. They found that after induction decrease in HR from baseline values in P group, but not in E group. After intubation HR raised in both P and E group, but after 5 minutes HR became normal in P group, but in E group it remained at higher level[11]. In another study, Singh and colleagues compared the induction effect of etomidate (0.2 mg/kg) and propofol (1.5/mg kg) in patients with coronary artery disease and left ventricular dysfunction[12]. They found that MAP, cardiac index (CI) and HR were significantly decreased after induction and increased after intubation in comparison with the baseline with no significant differences between the groups. Similar to our study, Haessler and colleagues found that propofol induced severe hypotension predominantly in patients with severe triple-vessel disease. Similarly, McCollum JSC and Dundee JW, when compared

the efficacy of IV boluses propofol and etomidate as induction agent in elective surgeries under GA, they found that hypotension was more with propofol 2.0 and 2.5 mg/kg than etomidate 0.3 mg/kg[13]. In our study, as both the induction agent was administered through bolus doses, no such haemodynamic alternation was occurred in E group.In another study, Bendel and colleagues compared the haemodynamic effects of propofol and etomidate after slow bolus administration(titrating to BIS 60 or less) in patients with aortic stenosis[14]. They found that propofol is more likely to cause hypotension thanetomidate, which is due to aortic stenosis. Shivanna S., et al. in 2015 conducted a study to compare haemodynamic stability of propofol and etomidate in patients undergoing CABG with CPB. They observed that after induction, mean MAP reduced by 30% in group P and 22% in group E[15].

In a another study by Shah SB., et al. in cardiac surgery (2017), they used State and Response Entropy for induction and intubation. The fall in MAP was much sharper for Group-P (24.3% and 28.66%) as compared with Group-E (15.87% and 16.6%)[16]. The above studies were supporting from our study in respect to cardiac compromise patients. In our study on patient undergoing cardiac surgery, the haemodynamic variation was more pronounced and prolonged in P group than E group. In some recent studies also the same haemodynamic variations like our study were noted with etomidate induction[17,18].

Limitations: The study had its limitations. Firstly, it was a single centre study with small sample size. Secondly, serum cortisol level could not be measured in our study. To evaluate the haemodynamic effects of both drugs in higher risk group like in elderly and severely cardiac compromised patients were not included. So, further studies are needed.

Conclusion
From this study it can be showed that though propofol is a popular induction agent, but etomidate induction is more ideal for CABG, as better haemodynamic is maintained with less hypotension and bradycardia at inducton and after intubation. On the other hand, in cardiac Anaesthesia, use of propofol was not associated with stable haemodynamics because of its inability

to prevent a profound decrease in HR and blood pressure at and after induction. We can therefore conclude that, when used for induction of anaesthesia, etomidate provides superior haemodynamic stability to propofol as well as better outcome in patients undergoing CABG.

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Comparison of Subcutaneous Ring Block of the Penis with Caudal Epidural Block for Post Circumcision Analgesia in Children

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Abstract

Background: *Pain is an inevitable consequence of circumcision and a number of methods have now been described to ameliorate this. Local anesthetic techniques have been shown to be more effective than systemic opioids.*

Objective*: This study compared the subcutaneous ring block of the penis with caudal epidural block for post circumcision analgesia in children.*

Materials and method*: This comparative study was done during the period of January 2020 to December 2020 in BIRDEM General Hospital, Dhaka, Bangladesh. A randomized, prospective, blind trial was conducted comparing caudal epidural blockade (caudal block) with subcutaneous ring block of the penis (penile ring block) in forty healthy boys between three to five years of age undergoing elective circumcision.*

Results: *Subjects receiving caudal block had a longer duration of analgesia (p <0.05), and longer to first micturition (p <0.05) but there was no difference in time taken to awaken from anesthesia or spontaneously walk unaided. There were no local or systemic complications related to either block and a very low incidence of vomiting.*

Conclusion: *It is concluded that both techniques are effective. Caudal block is more reliable and provides a longer duration of analgesia but penile ring block is inherently safer and has a lower incidence of adverse effects.*

Key words*: Pediatric anesthesia; infiltration, caudal block, circumcision*

Introduction

Pain is an inevitable consequence of circumcision and a number of methods have now been described to ameliorate this. Local anesthetic techniques have been shown to be more effective than systemic opoids[1] and the two most effective methods in general use are caudal epidural block and dorsal nerve block of penis[2-4]. Unfortunately, these techniques have potential risks and complications[5,6]. A study has shown the comparatively safe and simple method of topical analgesia using lignocaine jelly to be less effective than dorsal nerve block[7] limiting its usefulness. However, Broadman and colleagues described a technique of subcutaneous ring block of penis which they found to be a simple and more effective method of post-circumcision analgesia without complications or delays in discharge[8].

The purpose of this study was to compare the efficacy and incidence of side-effects of this method with the more established and proven technique of single injection caudal epidural block.

Materials and method

Following local Ethics Committee approval, forty boys of ASA I aged between there to five years and scheduled for elective inpatient circumcision were studied following informed parental consent.

Anesthesia was induced by intravenous fentanyl 2.5-3 mg/kg, propofol 2.5-3 mg/kg and maintained with spontaneous breathing of 66% nitrous oxide in oxygen and halothane 0.5 to 2%. Patients were randomized to receive either caudal epidural bupivacaine 0.25%, 0.75 ml/kg or subcutaneous ring block of the penis8. This was performed using a 25-gauge needle to inject 1.0 to 2 ml of 0.5% bupivacaine around the proximal shaft of penis near the root of penis. Circumcision was then carried out by the same surgeon using the same technique in all patients. The foreskin was excised with scalpel after applying a straight clamp and the mucosa trimmed with scissors. Hemostasis was achieved with 4/0 catgut ligatures or use of bipolar diathermy. The mucosa was approximated with skin with interrupted 4/0 catgut.

At the completion of surgery patients were observed by a nurse in the recovery room who noted the time taken for them to wake up and give their own name coherently on questioning (time to self-recognition) and the presence or absence of pain. Pain was identified using a previously described system9 which considers crying, facial expression, verbal complaint and posture of torso and legs to give a score of 0-10

(table 1). Those children with a score of 5 or more when fully awake were deemed to have a failed block, given IV pethidine (1-1.5 mg/kg) and excluded from the rest of the study. Nausea and vomiting also noted before transfer to the ward.

Postoperatively children were assessed at least half-hourly by the nursing staff and the time to onset of pain was noted using the above scoring system. Analgesia was then provided with paracetamol 15 mg/kg given orally. The time at which each boy spontaneously walked unaided, the incidence of nausea or vomiting and the time of first micturition were also recorded. They were allowed to eat or drink as soon as they wished. The following day the penis was examined by the surgeon for signs of hematoma or infection.

Statistical analysis of data was performed using Student's t test or chi square test, where appropriate. PÂ0.05 was taken as statistically significant.

Results
There were twenty children in each group and they were comparable for age, weight and duration of surgery (table II). There were no failed penile or caudal block.

Table I *Modified CHEOPS pain score (0-10)*

Score	0	1	2
Cry	No cry	Crying, moaning	Screaming
Facial	Smiling	Composed	Grimace
Verbal	Verbal	None or other complaint	Pain complaint
Torso	Neutral	Shifting, tense, upright	Restrained
Legs	Neutral	Kick, squirm, drawn-up	Restrained

Table II *Distribution of Patient acordingding to characteristic (n=40)*

	Caudal	Penile	P value*
Age (years)	4.15 ± 0.81 (4)	3.85 ± 0.81 (4)	0.245
Weight (kg)	17.10 ± 1.55 (17)	16.75 ± 1.65 (17)	0.487
Duration of surgery(minutes)	40.50 ± 4.84 (40)	42.00 ± 2.51 (40)	0.529

*Mann-Whitney U test was done to measure the level of significance. Data was expressed as Mean ± SD. Figure within parenthesis indicates in Median.

Table III *Distribution of patients according to Influence of block technique on recovery and postoperative analgesia (n=40)*

	Caudal	Penile	P value*
Time to self- recognition (min)	32.00 ± 2.51 (30)	31.00 ± 2.62 (30)	0.109
Duration of analgesia (hours)	3.75 ± 0.26 (3.75)	1.80 ± 0.25 (2.0)	Â0.001
Time of micturition(hours)	5.80 ± 0.25 (6)	2.80 ± 0.25 (3)	Â0.001
Time of walking(hours)	3.75 ± 0.26 (3.75)	3.85 ± 0.24 (4.0)	0.202

*Mann-Whitney U test was done to measure the level of significance. Data was expressed as Mean ± SD. Figure within parenthesis indicates in Median.

The results of other variables measured are shown in table III. There was no difference between the two groups in time taken to postoperative self-recognition or time to spontaneous unassisted walking. Although both techniques, when successful, provided satisfactory postoperative analgesia, the median duration of analgesia with the caudal block was longer than with penile ring block (p<0.05). It also took significantly longer for boys with a caudal block to pass urine postoperatively (p<0.05).

There were no instances of hypotension, bradycardia, residual paralysis, or toxic reaction to bupivacaine during or after administration of any of the blocks and no evidence of hematoma or infection at the penile injection site when examined the next day.

Discussion

Our technique of penile ring block differs slightly from that originally described using 0.25% bupivacaine 1.5 to 5 ml administered at completion of surgery[8]. We adapted it to a smaller volume and stronger concentration, since in preliminary assessment we found large volumes often made the penile skin appear edematous and interfered with surgery. We also performed the blocks pre-emptively as this reduces intraoperative anesthetic requirements and may have beneficial effects on the quality and duration of postoperative analgesia.An effective local anesthetic nerve block should provide virtually complete pain relief and therefore we used the previously validated modified CHEOPS behavioral scoring system[9] to ascertain whether or not the block had been successful rather than attempting a qualitative analgesic score which is very difficult to accurately determine in children.

Circumcision results in severe pain during the first two hours postoperatively after which analgesic requirement diminish[10]. Both blocks were generally effective during this two- hour period although the median duration of analgesia with the caudal technique was twice as long. Paracetamol provide satisfactory analgesia following the return of sensation all patients.

Previous studies involving caudal block in children have used various dose schedules, with those using higher doses and stronger concentrations producing a 100% success rate but a higher incidence of motor weakness[2]. The dose of caudal bupivacaine we used is slightly larger than that recommended by Armitage[11], as it has been our experience that 0.5 ml/kg of 0.25% bupivacaine does not give reliable analgesia in all patients has a previously reported failure rate of 4%[3]. We found 0.75 ml/kg to be 100% effective for analgesia.

Pediatric circumcisions are often performed as day case and the ability to walk unaided is one of the criteria for postoperative discharge. It is well known that caudal block can adversely affect this[3,12]. However, our subjects were in-patients and not actively encouraged to ambulate, if they were happy playing in bed or sleeping, in order to minimize anxiety and distress. As there was no difference in the time taken for them to walk spontaneously and no assistance was necessary at this time, motor weakness was obviously not a clinical or practical problem for these boys. However, the higher caudal dose might have been expected to have an effect on early if we had been seeking discharge home within four hours following surgery.

The results showing a longer time to micturition in children receiving caudal block. This is to be expected since subcutaneous penile ring block has no effect on autonomic innervation of the bladder. Caudal epidural local anesthesia inhibits the sacral parasympathetic outflow from the spinal cord as well as affecting somatic afferent and efferent conduction and may, therefore, results in disturbances of micturition[3]. However, in our experience, this does not appear to cause any clinical problem and requires no medical intervention.

In our study there was no incidence of nausea and vomiting. The possible contributing factors include the use propofol as an induction agent[13], the preemptive administration of the block leading to a decreased inspired concentration of volatile anesthetic agent, and avoiding active early mobilization postoperatively. Good regional analgesia and a low incidence of postoperative nausea and vomiting are particularly important in day case surgery for children[14].

Conclusion

We have demonstrated that subcutaneous penile ring block is a safe and effective method of providing post-circumcision analgesia. It avoids the potential dangers of dural puncture, sepsis, or intravenous injection of large volume of local anesthetic. Though caudal block is superior in terms of its reliability and duration of action but subcutaneous penile ring block should be considered as a safe and technically easier alternative.

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Challenges and Difficulties of Spinal Anesthesia in a Patient with Traumatic Thoracolumber Scoliosis

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Abstract

We report an interesting and challenging case of traumatic thoracolumber scoliosis presenting with close fracture of right patella planned for open reduction and internal fixation (ORIF) under regional anesthesia. However, spinal anesthesia was not successful even with the use of intra operative fluoroscopy or ultrasound guidance. We have in view to show the importance of proper review of preoperative x-ray of dorsolumber spine scoliosis and careful physical examination of back of the patients by the anesthesiologist to administer an effective and safe spinal anesthesia in such patients in low resource setting for successful & safe spinal anesthesia.

Keywords: *Spinal anesthesia, Traumatic, Thoracolumbar scoliosis.*

Introduction:

Scoliosisis can be defined as a complex deformity of the spine resulting in lateral curvature and rotation of the vertebra.[1] The most common type of scoliosis is adolescent idiopathic scoliosis which accounts for approximately 70% cases.[1] Secondary scoliosis can be caused by neuromascular disorder, Hunters syndrome osteoporosis, tuberculosis, trauma, malignancy and dimorphic syndrome.[2] A diagnosis of scoliosis is often made clinically.

Physiologic and anatomic changes that may be present in scoliosis include- restrictive lung disease, right ventricular hypertrophy, pulmonary hypertension, cardiomyopathy, corpulmonale and altered airway anatomy. Due to these changes providing general anesthesia in a patient with severe scoliosis can be challenging. On the other hand regional anesthesia can also be technically difficult due to abnormal curvature of the spine,[3,4] specially in a low resource setting where ultrasound, fluroscope, CT scan is not available in operation theater.

We report an interesting case of 51 years old male patient of traumatic Thoracolumber scoliosis presenting with close fracture of right patella planned for open reduction and internal fixation (ORIF) under spinal anesthesia.

Case Report

A 51 years old male ASA Grade 2, weight -85kg, obese patient with traumatic Thoracolumber scoliosis presented with a closed fracture of right patella. He was posted for ORIF. On pre operative evaluation the patient gave a history of trauma 40 years back when he was 11 years, log of tree fall down on his back. From that time the changes of his back started gradually and he felt discomfort with his changes during movement of chest & back of chest. He was a diagnosed patient of Ischemic cardiomyopathy. Patient was referred to cardiologist for cardiac evaluation. Cardiac evalution was done and found Ischemic heart disease, right wall motion abnormality but good left ventricular function with ejection fraction-60%. On physical examination all the vitals were stable. Airway assessment showed Mallampati Grade-2. Examination of spine revealed left lateral curvature with a left sided hard swelling along with thoraco-lumber scoliosis. His Xray dorsolumber

spine showed marked Thoracolumber Scoliosis. Full blood count, liver function test, renal function test, coagulation profile were within normal limits. Chest was disproportionate on inspection but pulmonary function test reveals no abnormality. The surgery was planned under spinal anesthesia with all preparation of general anaesthesia. Patient was kept nil per oral for 2 hours for clear water and 6 hours for solid food. Written consent obtained from the patient after explaining anesthetic procedure with possible outcome and complications.

Pic: *X-ray of Traumatic Thoracolumber Scoliosis*

Intraoperative Management

On the day of surgery patient was shifted to the operation theater. Monitors attached and vitals were recorded. Peripheral venous access secured by using 18G I/V cannula on the right forearm under all aseptic precaution. Though we have no fluoroscope or ultrasound facility, we examined the patient's spine clinically and emphasize on his radiograph. Clinically, upper part of the thoracic vertebrae was in the midline but not the lower thoracic and lumber vertebrae and also a hard bony consistent mass in left thoracolumber region was felt. We looked again on radiograph of lumber region to gain idea about position of intervertebral space and choose Lumber 4-5 space to introduce

spinocaine needle. With all aseptic precaution we prepared the area for spinal anesthesia in sitting position. After skin infiltration of 1 ml 2% lidocaine at desired space 25G Quincke needle was introduced by midline approach. But that was failed. Needle could not push forward due to striking of needle to a bone. Then we took second attempt just 1cm lateral to the first site in the same way and this time needle successfully reached sub arachnoid space which was ensured by free flow of CSF. Then 0.5% bupivacaine heavy 12.5 mg & with 25 microgram of fentanyl was given. Just after providing spinal anesthesia patient was in supine position. Level of sensory and motor block was assessed after 5 minutes. After ensuring proper anesthesia surgeons were allowed to start operation. Surgery was completed successfully within 90 minutes without any peri-operative surgical and anesthetic complication.

The patient was shifted to the post operative ward to ensure monitoring. During post operative period regular monitoring of SpO2, heart rate, blood pressure, urine output, temperature was done. In the post operative period the effect of spinal anesthesia lasted for 90 minutes. Analgesia was ensured with intravenous Paracetamol 15mg/kg every 6 hourly and tramadol 2mg/kg 8 hourly.

Discussion

Scoliosis is a complex deformity of the spine which poses a unique challenge for the anesthesiologist to provide general or regional anesthesia. Spinal deformity caused by scoliosis presents with different anatomical and physiological changes that may hamper in planning the anesthesia technique. Due to problems associated with the respiratory system, spinal anesthesia is used widely, though technically difficult.[3] For lower limb surgery subarachnoid block(SAB), spinal anesthesia is popular, being simple to perform, economical & it avoids the complications of general anesthesia.

In our case patient had severe restrictive pattern lung disease with chest deformity & being a lower limb surgery we opted for SAB as our first choice. But providing spinal anesthesia in a patient with scoliosis is also difficult. Difficulty in performing spinal anesthesia may result in neural injury, spinal heamatoma, post-dural puncture headache or infection. Though several successful outcome of spinal anesthesia have been described

previously.[4-6] In addition it may decrease procedure efficiency and increase patient discomfort & dissatisfaction. It has also been shown that anatomic deformity is an independent predictor of difficulty in performing neuroaxial anesthesia. Utilizing ultrasound in patient populations at high risk for difficult needle placement may improve the success rate. Ultrasound can provide enough anatomic detail to ascertain the location, depth and angle needed to successfully pace a spinal or epidural needle. If visualization is not adequate with ultrasound, then fluoroscopy could be used.

There are only a few case reports where fluoroscopy has been used to perform spinal anesthesia in such patients.[7,8] Fluoroscopy may aid in identifying the small accessibility window, thereby facilitating subarachnoid block in those inaccessible by the landmark technique. A case of failed spinal anesthesia in kyphoscoliosis with the use of fluoroscopy has also been reported recently.[9] Unfortunately we do not have any ultrasound or fluoroscopy in our setting. Therefore I had to rely on landmark technique to provide SAB to my patient. Due to lack of ultrasound and fluoroscope facility in my hospital I depended on x-ray. On x-ray my patient showed no dislocated disc or stenosis and I relied on x-ray and physical examination of patients back to find out desired space for needle placement. The cause of first time failure might be due to bone deformity/obstacles itself, inability to detect sclerotic changes or lack of proper placement of needle.[7,8,10] Before second attempt, we carefully reevaluate the lumber x-ray both AP and lateral view and look for more specified space and provided SAB successfully .

In one case a patient severe kyphoscoliosis, an attempt at continuous spinal anesthesia with repeated doses of hyperbaric bupivacaine was unsuccessful and adequate surgical anesthesia was only achieved by adding isobaric bupivacaine solution.[4] Though we have used 0.5% bupivacaine heavy 12.5 mg and with 25 microgram of fentanyl to achieve anesthesia.

This case intends to show the importance of proper review of pre operative x-ray of lumber spine scoliosis and careful examination of the patients back in low resource setting for successful & safe neuroaxial block.

This report is unique in that, in literature there is no report of providing neuroaxial anesthesia in patient with scoliosis without the help of ultrasound or fluoroscope in Bangladesh. I present the possible etiopathogenesis of the difficulty encountered in my case. I also suggest ways to overcome this difficulty in a low resource setting.

Conclusion

The anesthetic options are limited & technically difficult when both airway & spine are involved in the disease process of spine. SAB with proper pre operative evaluation of x-ray & meticulous approach can be useful technique of providing safe and effective anesthesia in patient with lumbar scoliosis in a low resource setup.

Financial support and sponsorship: Nil

Conflict of interest

There are no conflicts of interest

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