

How Does Covid-19 Outbreak Affect Emergent Surgery in Neonates?

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Received date: June 12, 2020; **Accepted date:** June 20, 2020; **Published date:** June 27, 2020

Citation: Rouzrokh M, Chavoshi T, Ebrahimisaraj G, et al. (2020) How Does Covid-19 Outbreak Affect Emergent Surgery in Neonates?. J Med Res Surg. 1(4): pp. 1-4.

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ABSTRACT

Background: Covid-19 virus infection is a pandemic disease. Incidence of COVID-19 infection in children and neonates is less than adults. Neonates may be contaminated by close contact with the infected family members or environment. However, infection via transplacental transmission and breast feeding has not been proved yet. Hospitals face shortages of resources in the outbreaks. This becomes more important in underdeveloped countries.

Methods: We have studied the neonates who underwent surgical interventions in emergent or urgent conditions. No specific protection measures were applied in the operating room and neonatal intensive care unit for patients without symptoms or positive history of contact, in an attempt to save the resources of the hospital. All the neonates and their families were followed up for two weeks.

Results: Forty patients and their families were studied. At admission, our patients neither demonstrated symptoms of the disease nor gave positive history of contact, hence received surgical intervention in the ordinary protection. One patient suffered from respiratory problems in the post-operative period and tested positive for the Covid-19 infection. Six patients and Five family members became symptomatic during the follow-up. All of them tested negative for the diseases and recovered.

Conclusion: Based on the results of our study, surgical interventions for the critical neonates without positive symptoms or history neither should be postponed nor be necessarily dependent on the application of the corona-specific personal protection. This gains most significance in the peak of outbreak especially in underdeveloped countries.

Level of Evidence: Level IV

Keywords:

Covid-19, SARS-COV-2, Corona virus, Pandemic, Neonatal surgery

Introduction

Covid-19 virus infection is a pandemic disease which appeared first in Wuhan, China and spread rapidly around the world. Infection of more than 3,300,000 people has been confirmed till May 2nd, 2020, of which 238775 has died of the disease [1].

Preliminary information shows that the incidence of COVID-19 infection in children and neonates is less than adults with less severity. However, much debate exists about the effects of this disease on the neonates who need special medical care [2-4]. Vertical transmission rarely occurs in the third trimester of pregnancy, if at all [5,6]. However, the neonates may be contaminated by close contact with the infected family members or contaminated environment [2]. Infection with Covid-19 in children presents asymptotically or with non-specific mild symptoms [3,4].

Recent data suggest respiratory droplets, aerosols and person to person contact as the main ways of contamination. However, fecal-oral route should also be considered as SARS-COV-2 nucleic

acid has been found in feces of patients in China and U.S [7].

It seems that the newly found nature of the Covid-19 and the lack of comprehensive data about this disease, especially in neonates, require further investigations in this specific age group. The aim of this study was to evaluate the neonatal surgery outcome for covid-19 infection at our center and aid to reach a balance between application and saving the hospital resources and equipment in the time of Covid-19 outbreak

Material and Methods

Study population

The current investigation is an analytical cross-sectional study on the neonates who needed urgent or emergent surgical intervention from February 21, 2020 to April 11, 2020. Patients were referred to our center (as the busiest neonatal surgery ward in the capital of Iran) from three epidemic provinces including Qom, Guilan and Tehran in a 45-day period, which was the peak of the outbreak in Iran. These three provinces were introduced as high risk by the ministry of health at the time of this study.

Patients without symptoms or history of contact were included in the study. Suspicious or infected patients received their care

with complete precautions regarding the covid-19 disease, hence did not enter the study.

Diagnosis

Infection by the COVID-19 virus was ruled out in all of patients based on lack of symptoms or history of contact.

Evaluated symptoms were fever, cough, tachypnea, leukopenia, lymphopenia and positive CRP (C-reactive protein) in the neonates and myalgia and sore throat in addition to all of above in their parents. History of contact focused on the contact with the suspicious or infected people in the family based on the information collected from the parents.

Due to lack of availability of PCR (Polymerase chain reaction)

tests and the delayed results in the peak of outbreak at our center, these tests were performed merely on symptomatic subjects or the ones with the positive history of contact with infected or suspicious people.

Interventions and Protection

Personal protection equipment (PPE) was not specified for COVID-19 and was of routine process in the operation room, which consisted of surgical masks, surgical gloves and gowns in this study. The conditions of isolation (Incubators) for the neonates were the same as before the outbreak.

Surgical interventions included correction of congenital anomalies and vascular access procedures as table 1.

Table 1: Demographic information of neonates.

Operation	Number	Sex		Age at the time of surgery (days)	Referral zone
		Male	Female		1Ghom 2Guilan 3Tehran
Esophageal atresia	10	7	3	5-Feb	1(3) 2(2) 3(5)
Choanal atresia	3	1	2	4-Jan	1(1) 3(2)
Diaphragmatic hernia	1	1		3	3(1)
Intestinal atresia	2	2		4-Mar	1(1)
Colostomy (Imperfoarte Anus)	6	4	2	2	1(3) 2(1) 3(2)
Anorectoplasty	1	1		2	1(1)
Billiary atresia	1		1	9	3(1)
Incarcerated inguinal hernia	5	3	2	18 - 23	3(5)
Gastroschisis	1	1		1	1(1)
Tracheostomy	3	1	2	15 - 21	1(1) 3(2)
Nephrostomy	1	1		3	3(1)
Rectal biopsy	1	1		18	3(1)
CV line for IV access	19	11	8	25-Oct	1(6) 2(2) 3(11)
Cut down for IV access	3	1	2	25-Oct	2(1) 3(2)
Total	58				1(17) 2(6) 3(33)

Data collection

Demographic and clinical data were collected via designed questionnaires at the time of admission and two weeks after surgical intervention in hospital or at home. Inasmuch as none of patients were positive for the symptoms or history of contact with Covid-19 in birth’s hospitals, protection measures during

the process of transfer and admission to the neonatal intensive care unit and the operating room were of the usual level of protection, not the Covid-19 specific.

Results

Fifty eight surgical interventions were performed on forty patients(24 males and 16 females) during a period of 45 days

from February 2,2020 to April 11,2020. Fever was detected in four patients, for whom PCR tests were done. The results were negative in all of four patients. Three patients died during the study, of which one patient (choanal atresia) had respiratory symptoms and was tested positive for the Covid-19 with nasal PCR. Later comprehensive history showed positive Covid-19 infection in the family (Grandmother).

Two other patients died of underlying diseases. One neonate had fever four days after discharge from the hospital. The PCR test was performed and the result was negative. The mother

of one of the neonates suffered from sore throat two weeks after discharge from hospital. The mother of another patient demonstrated fever on the fourth post-operative day of her child. Fathers of two neonates also showed symptoms of upper respiratory illness.

These four family members received outpatient work-up and follow-up. All of them were tested negative for Covid-19 virus. Fever was detected in a sibling of a patient two days after discharge from the hospital. His test result was also negative for the Covid-19 virus (Table-2).

Table 2: Positive symptoms in suspicious subjects.

Subject	Inpatient	Follow-up	Fever	Cough	Tachypnea	Sore Throat	Elevated CRP	Leukopenia/ Lymphopenia	PCR
Patient.1	*		*				*		Negative
Patient.2	*		*				*		Negative
Patient.3	*		*				*		Negative
Patient.4	*		*						Negative
Patient.5	*				*		*	*	Positive
Patient.6		*							Negative
Parent.1		*	*						Negative
Parent.2		*		*		*			Negative
Parent.3		*	*			*			Negative
Parent.4		*	*						Negative
Sibling.1		*	*						Negative
Total	5	6	8	1	1	2	4	2	1
Percentage of patients% (N=40)	12.5	15	20	2.5	2.5	5	10	5	2.5

Discussion

In the current study, patients were referred and admitted from the areas with high prevalence for COVID-19 infection. All patients needed urgent or emergent interventions. Elective surgeries were cancelled during this period, due to national and international policies. Patients were followed up for two weeks period.

According to many international and national guidelines all patients who need urgent and emergent surgical management should be tested for covid-19 virus before operation and if the test is not possible, the surgeon should consider it as positive case until otherwise prove and do the operation with full personal protection equipment for all available persons in the operating room. However, at the time of this study, most hospitals had faced shortages of resources. With the aim of saving the resources of the hospital, personal protection equipment was used only in the patients with symptoms or history of contact. Patients did not receive PCR tests at admission due to lack of tests and the delayed results at the time of the study.

Only one patient (2.5%) was tested positive for the disease despite not showing symptoms at admission. This is in contrast to the previous assumptions of lower incidence (0.9%) in children younger than 10 years of old (1). However, patient died in the post-operative period. This is not in congruence with the less aggressive behaviour of the disease in children and infants

(1). The comprehensive history taken after the diagnosis makes the history taking skills and guidelines at the time of admission extremely important. The asymptomatic presentation of the expired neonate preoperatively is concordant with the results of recent studies (4). However, greater number of subjects is needed to make more appropriate calculations about the disease behaviour and statistics.

Conclusion

According to our findings, we assume that the risk of urgent or emergent surgical interventions at this time is quite low. It seems not necessary to postpone emergent or urgent surgeries until negative test for COVID-19 is confirmed. The results of this study suggest that the application of the corona-specific personal protection equipment may not be necessary in surgical interventions on neonates without symptoms or suspicious history.

To preserve the highly specified equipment for the suspicious patients is most vital in the peak of outbreak, when the hospitals become overwhelmed by the tsunami of the patients surpassing the potentials of the health care system. This becomes more important in underdeveloped and developing countries. However, we can't generalize the results to the elective surgeries. Further studies with larger populations and more generous application of specific tests are needed to recommend the practical guidelines for the neonatal age group.

Conflict of interest/funding

None (This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors).

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