

Challenges in the Management of Paediatric Surgical Patients in the Midst of COVID-19 Crisis: Our Experience

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Abstract

Introduction: As a result of the coronavirus disease (COVID-19) pandemic, more than 28 million planned surgeries worldwide could be cancelled leading to patients facing long waiting period for their treatment. The outbreak of COVID-19 caused by severe acute respiratory syndrome coronavirus (SARS CoV-2) has spread to more than 220 countries around the world and has almost stopped all routine surgical work. In children, the delay in the management of surgical diseases could result in significant morbidity and mortality. **Material and Method:** Herein, we describe our experience with the management of Paediatric Surgical patients at our centre which is a tertiary level hospital catering to both COVID-19 positive and Non-COVID patients in all specialties. **Observation and Results:** During the COVID-19 pandemic, 69.41% fewer paediatric surgical patients underwent surgery relative to the corresponding period 1 year earlier. However, the number of emergency cases performed increased during the COVID pandemic by 62.12%, mostly involving, urological and gastrointestinal emergencies. **Conclusion:** As we gain experience in effective protocol-based management, which can be revised based on the evolving scientific evidence. It will be appropriate to resume the elective work in selected patients, following the appropriate level of precautions.

Keywords: COVID-19, pandemic, paediatric surgery, protocol

INTRODUCTION

Coronavirus disease (COVID-19) has infected more than 53.76 million people in more than 220 countries worldwide and more than 1,308,975 people have lost their lives till November 16, 2020.^[1] The first severe acute respiratory syndrome coronavirus (SARS-CoV-2) positive case in India was reported in the state of Kerala on January 30th, 2020 and since then 8845127 cases and 130070 deaths have occurred till November 16, 2020.^[2] The children under 19 years of age comprise a small fraction of about 1%–2% of the total cases.^[3,4]

Several guidelines for the management of COVID 19 are available for adult patients. For the paediatric population, there is the paucity of clinical data and scientific evidence.^[5,6] This pandemic has resulted in an unexpected strain on the health-care system, especially on surgical services. India, a low-middle-income country, with its fragile health-care systems is particularly vulnerable to being overwhelmed by this illness. Even after the complete lifting of nationwide lockdown, it is still not clear, how to resume routine operative services

and reschedule the postponed cases. Herein, we share our experience and suggest practical strategies for managing paediatric surgical patients.

EFFECT ON CLINICAL SERVICES

Our institute serves as a tertiary referral hospital for advanced management and diagnostic procedures in central India catering to a population of approximately 3 million.

On March 20, 2020, the COVID 19 preparedness committee of the institute prepared a protocol for the management of the outpatient area. These protocols were prepared to prevent the community spread of the pandemic. All nonemergent therapeutic and diagnostic services on outpatient basis were curtailed. All patients with acute respiratory symptoms (cough, cold and fever) were diverted to a separate building

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designated as COVID 19 screening and holding area. The out-patient area was re-designated as Ambulatory Emergent care (AEC). Non-ambulatory acutely ill patients were managed in the emergency area. All elective surgical procedures were also put on halt sine die.^[7]

The facility for COVID positive and suspect patients was completely segregated from the non-COVID area. A total of 248 beds were assigned to manage COVID patients. The dedicated facility for COVID included acute respiratory infection (ARI) suspect ward, ARI positive ward, ARI suspect

intensive care unit (ICU) and ARI-positive ICU for adult as well as paediatric patients. Because of these guidelines, the delivery of services in the hospital has changed completely, so the paediatric surgical services were also affected and changed accordingly.

Workforce management

According to the guidelines issued by the COVID preparedness committee of the institute and in line with the directives of the Ministry of health and family welfare, Government of India, departmental duty roster was prepared. Two teams

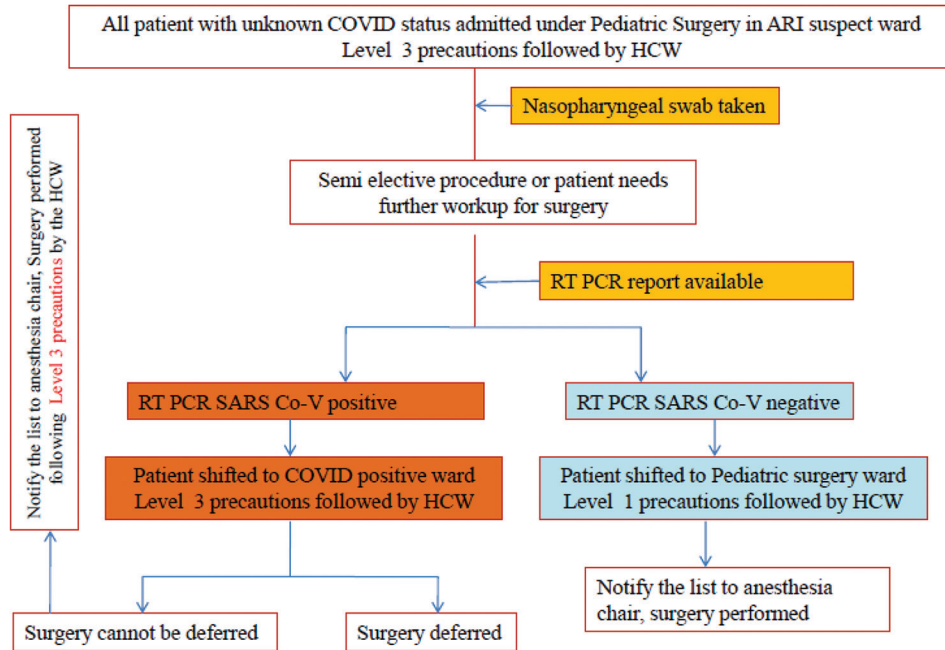


Figure 1: Flow chart showing clinical work flow of pediatric patients with unknown corona virus disease status admitted for semi elective procedures

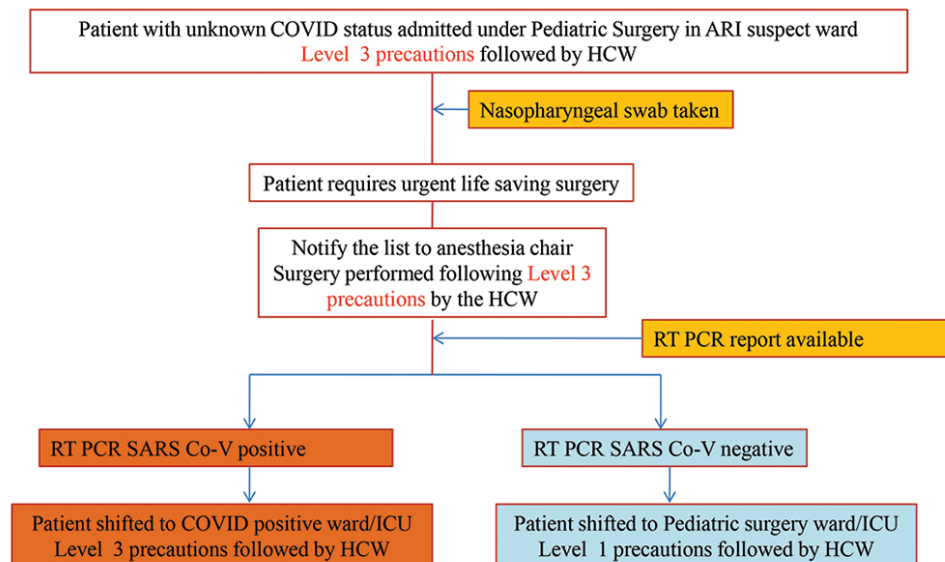


Figure 2: Flow chart showing clinical work flow of pediatric patients with unknown corona virus disease status admitted for emergency procedures

were constituted, one team was active on floor and other team was kept as backup which remained in the hospital premises but was not actively involved in the patient care, on weekly alternate rotation basis.

In our department, five healthcare personnel had accidental high-risk exposure during patient care and were quarantined for 14 days. Although guidelines already in place, level 1 protection were strictly ensured for routine ward rounds and for patient’s consultation in emergency and AEC area of the hospitals.^[8,9]

Departmental protocol and clinical workflow

In our institute, only those patients who needed urgent hospitalisation were admitted. Earlier, all patients admitted under the department of Paediatric surgery were placed in isolation room in the ward irrespective of their COVID status.

Before admission, screening of the patients was done based on the ICMR questionnaire. The section of the form had questions

related to the travel history of the patient from high-risk zone, contact history and flu-like symptoms such as fever, respiratory distress and cough within the 2 weeks.^[10] Every patient admitted for surgery was advised a real-time reverse transcription-polymerase chain reaction (RT-PCR) testing according to the recommended policy. Few patients, who were asymptomatic, with no positive history and risk factors, also came positive for SARS Co-V, leading to high-risk exposure and isolation of workforce. Now, as per the latest guidelines, all patients who need admission under Paediatric Surgery are admitted in ARI suspect ward and nasopharyngeal and throat swab for RT PCR is sent.^[11]

If the patient returns positive, they are shifted to dedicated ARI-positive ward and managed accordingly, otherwise to the paediatric surgery ward where level 1 protection is used while caring for the patients by all health-care workers^[8] [Figure 1].

Table 1: Classification of paediatric surgical procedure

Elective (cases to be delayed/postponed)	Semi-elective (cases to be assessed)	Emergency (cases not to be delayed/postponed)
Phimosis (can be done as semi elective in presence of severe scarring causing dysuria)	Pyeloplasty in UPJO with progressive loss of function	Newborn emergency Volvulus, gastroschisis, oesophageal atresia, TEF, bowel atresia, CDH, anorectal malformations, malrotation
Inguinal hernia (can be classified as emergency and semi elective in case of incarceration or history of incarceration respectively)	Obstructive ureteroceles Obstructed megaureter with progressive loss of differential function Temporary drainage or diversion methods may be considered as a bridge to definitive surgery	Acute gastrointestinal emergencies Perforation peritonitis Intussusception Intestinal obstruction Acute complicated appendicitis Uncomplicated acute appendicitis can be managed with antibiotics alone
Undescended testis	VUR those patient failing continuous antibiotic prophylaxis, subureteric injection or ureteric reimplantation	Testicular/ovarian torsion In neonates it may be decided not to explore testicular torsion, if the torsion is relatively asymptomatic, due to the lower chances of salvage of the testis, very low risk of metachronous contralateral torsion
Hydrocele	Urolithiasis with recurrent febrile infection or obstruction	Trauma with hemodynamic instability Chest Abdomen Head
Hypospadias Reconstructive surgery Exstrophy	PUV Biliary atresia Choledochal cyst with obstructive jaundice or recurrent episodes of pancreatitis	Airway foreign body Abscess Cellulitis/necrotising fasciitis
Gall stone disease Ambiguos genitalia	Tumours Diagnostic biopsy Vascular access	Urosepsis Paraphimosis
Definitive procedure for Hirschsprung’s disease and anorectal malformation Stoma closure Vascular anomalies Neck cysts and sinuses	Multiple biopsy and colostomy for Hirschsprung’s disease Hydrocephalus Bleeding rectal polyp	Ruptured meningomyelocele

VUR: Vesicoureteral reflux, UPJO: Ureteropelvic junction obstruction, CDH: Congenital diaphragmatic hernia, TEF: Tracheoesophageal fistula, PUV: Posterior urethral valve

However, all life and organ threatening emergencies like acute abdomen, trauma or torsion were performed without delay irrespective of COVID status^[12] [Figure 2].

Rapidly progressive diseases like tumours, diseases causing declining CNS, renal or liver functions were managed on priority basis as semi-elective procedures.

Operation theater plan for coronavirus disease and non coronavirus disease patients

An operation theatre (OT) was made fully functional to cater to COVID negative paediatric surgical emergencies and selected semi elective procedures. A separate OT was marked for COVID-positive cases; this OT had laminar airflow ceilings coupled with high-efficiency particulate air filters without air conditioners. No patient for elective surgery was admitted as per institutional policy.^[7] All the patients planned and posted for surgery were notified to the authorities. The listing of the patients for surgery was based on the potential of significant morbidity in case of deferring the care and possible exacerbation of the underlying disease or a downwards trend in the quality of life. The patients were categorised into elective, semi-elective and emergency [Table 1].

All surgeries were performed following the appropriate level of protection including personal protection equipment, N95 masks, proper face and eye shields or goggles.^[8]

In case of surgery on a COVID-19 suspect or positive patient, we take measures to limit the number of theatre staffs present during surgery. Use of ultrasonic scalpels, as well as diathermy, is limited and use of suction while using diathermy is encouraged.^[8,13-15] The evidence regarding the use of laparoscopy is very limited. There is no contraindication to the use of laparoscopy in COVID-19-positive patients, but all studies recognise the risk of aerosolisation of viral particles during CO₂ insufflation.^[15,16]

Discharge and follow-up

The child is discharged from the hospital when he/she is fit for discharge. These patients are usually seen 1-2 weeks after discharge. However, during these pandemic, longer follow-up visits were advised. Alternatively, the use of tele-consultation services was advised and department phone numbers were provided to the parents.

Those admitted patients with semi elective condition, who were deferred because of COVID positive status, were sent for home isolation if they had no symptoms. They were advised to contact in case of deterioration of symptoms or after 4 weeks.

PATIENT AND PARENTAL ANXIETY

The patients and parents are under increased psychological strain which was further aggravated by the practice of admitting asymptomatic patients in quarantine centres and subsequent contact tracing by the health authority. In India, social stigma around the disease has led to people being

labeled and discriminated against. It has forced people to hide illness, avoid tests and delay hospitalisation, often with fatal consequences. Stigma attached to quarantine has meant that people returning from isolation are often treated as outcasts.^[17]

In addition, the fear of risk posed by COVID-19 to their children while visiting hospitals and undergoing surgery makes them hesitant to pursue treatment at the hospital, especially when the same facility is also catering to COVID-19 cases. There are instances in which patient posted for semi-elective procedure requested for postponing it. Therefore, it is important for the healthcare providers to address the queries and issues of parents for effective management of paediatric patients.

RESIDENT EDUCATION AND TRAINING

The reduction in elective surgical cases and clinics, as well as contact between teachers and trainees, has brought challenges in the delivery of surgical education worldwide.^[18,19] Following the onset of the pandemic the clinical work for residents and trainees in paediatric surgery has gone down significantly. The major elective as well as aerosol generating laparoscopic procedures are also not being performed for the fear of transmission and due to relocation of OTs, decreasing the opportunity of learning for residents. The academic program is continuing as earlier using various online platforms.

Many surgery residency programs have been modified to virtual learning in the form of video lectures to maintain learning.^[20] Various published studies recommend the use of online, open access, peer-reviewed operative video libraries or utilising the archived surgery videos from the home institution, followed with the explanation from faculty.^[21]

OUR CLINICAL EXPERIENCE AMIDST CORONA VIRUS DISEASE TIMES

A national tele-consultation service, *e-sanjeevani* OPD, provided by MOHFW has been started in our institute.^[22] This online service has proved useful for follow-up visits as well as identifying the patients for emergency care. We continue to give patient consultations for patients requiring emergent care. Routine post-operative follow-up of the patients have been delayed where possible.

During this time, we operated on many patients with life-threatening emergency as well as semi-emergency. However, during this time we also faced few clinical issues. An infant, aged 5 months and weighing 2000 g was admitted in the severe acute malnutrition unit for nutritional rehabilitation, he was also having bilateral inguinal hernia and was awaiting surgery, the patient suddenly developed right-sided incarceration, hernia was reduced manually and patient was planned for bilateral herniotomy next day. Nasopharyngeal and throat swab was sent for RT-PCR which returned positive. Hence, after discussion with the parents of

the patient, surgery was deferred and the patient was shifted to ARI-positive paediatric ward. The patient is planned for surgery after 4 weeks.

There are instances where the attendants of the patient were reluctant for treatment. Two months old male child weighing 2500 g was admitted with complaints of not passing stool since the last 45 days (*sic*), the parents were not able to take consultation due to the prevailing condition. The baby was born 34 week premature with birth weight of 1800 g; the patient was kept in ICU for 15 days after birth and then discharged on direct breastfeeding. The infant had now developed abdominal distension; on examination, visible peristalsis with palpable bowel loop was present in the lower abdomen. On rectal examination, baby passed thick, sticky, toothpaste like stool. Rectal wash was given to decompress the bowel. We were planning for contrast enema and rectal biopsy to rule out Hirschsprung's disease. The patient was shifted to ARI suspect ward and RT-PCR was sent, which returned positive. Following this, the attendants of the patient were reluctant to stay in the hospital for further workup and requested for home isolation. Two weeks later the baby presented again with severe abdominal distension, contrast enema suggested features of Hirschsprung disease. Exploratory laparotomy and multiple biopsies and colostomy were done.

Effect on the surgery performed during the coronavirus disease 2019 pandemic

During the COVID-19 pandemic, 69.41% fewer paediatric surgical patients underwent surgery relative to the corresponding period 1 year earlier (93 vs 304). However, the number of emergency cases performed increased during the COVID pandemic by 62.12%, mostly involving, urological and gastrointestinal emergencies (41 vs 66). We continued performing surgery for paediatric solid tumour during the COVID pandemic, but many surgeries were delayed because of nationwide lockdown and other reasons.

FUTURE DIRECTIONS AND ROADMAP

Children have been called 'the link in the transmission chain' because of their role in facilitating and amplifying viral transmission.^[23] It is critical to bear in mind that some patients can be highly contagious even when they have mild or no symptoms.^[24] Therefore, it is highly recommended to perform the operations following the appropriate level of protection.^[8] Elective surgeries are best delayed at present to avoid the risk of COVID-19 transmission amongst surgeons and health workers. Preoperative testing and home quarantine for 14 days is recommended for all individuals before undergoing elective surgery to minimise chances of infection before the procedure.^[11] As of now, we do not know the optimum timing of surgery following COVID 19 infection, but the emerging data suggest that surgical procedures should be delayed if possible for 4–6 weeks.^[25]

Clinical departments need to creatively and expeditiously adjust the protocols and workforce to not only serve the patients

but also safeguard healthcare workers. There is no right or wrong management choice, and each institution needs to adopt the strategy believed to be the most appropriate according to their workforce, hospital resources and limitations.

As we gain experience in effective protocol-based management, which can be revised based on the evolving scientific evidence. It will be appropriate to resume the elective work in selected patients, following the appropriate level of precautions.

At present, it is uncertain how long the pandemic may continue and what would be the long-term effects. The impacts of COVID-19 in children may go far beyond health including psychosocial, economical and educational.

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Conflicts of interest

There are no conflicts of interest.

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