COMPARISON OF EMERGENCY SURGERIES UNDER SPINAL ANESTHESIA IN COVID-19 PANDEMIC WITH PRE-COVID PERIOD IN A TERTIARY CARE HOSPITAL OF A DEVELOPING COUNTRY

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ABSTRACT

Objective: To compare emergency surgeries under spinal anesthesia in COVID-19 pandemic with pre-COVID period in a tertiary care hospital of a developing country.

Study Design: Prospective observational study.

Place and Duration of Study: Main Operation Theatre, Frontier Corps Hospital Quetta, from Mar to May 2020.

Methodology: All emergency surgeries done under Spinal Anesthesia, were compared to emergency cases done in the pre-COVID period. Anesthesia notes were reviewed. Emergency cases done under general anesthesia and personal protective equipment worn were also noted. Ages of the patients were from 18-75 years. Spinal anesthesia was performed by consultant anesthesiologist.

Result: Among total cases, 260 emergency cases were performed in the main operation theatre during the 3 months of pre-COVID period as compared to only 89 cases in the 3 months duration of COVID-19. Spinal anesthesia was used in 154 (59.2%) cases in the pre-COVID study period, while in COVID-19 pandemic 77 (86.5%) emergency cases were performed under spinal anesthesia.

Conclusion: Spinal anesthesia has a significant role in the surgical management of patients in pre-COVID and especially in COVID pandemic. It provides high-quality perioperative care for patients whilst minimizing exposure to staff and utilization of scarce resources of personal protective equipment.

Keywords: COVID-19, Emergency surgery, Regional anesthesia, Spinal anesthesia, Tertiary care hospital.

INTRODUCTION

Regional anesthesia has a pivotal role in surgical interventions as far as safety is concerned e.g. in obstetrics; regional anesthesia is beneficial for both mother and baby[1]. Spinal anesthesia plays an important role in surgical management of suspected or confirmed COVID-19 cases. As far as Regional anesthesia is concerned, it enhances overall recovery after surgery. In perspective of COVID-19, it reduces contamination of operation theatre and related staff, by decreasing potential risky interventions and therefore increases the efficiency of operation theatre. Patients also get safe and effective anesthesia with less post op complication as compare to general anesthesia[2].

General anesthesia involves high risk aerosol-generating interventions e.g. ventilation, tracheal intubation and suctioning, that put operation theatre team at risk[3,4]. It also increases the risk of post operative complications due to limited respiratory reserves of COVID patients. Tracheal intubation has been highlighted as a high-risk aerosol-generating procedure, with an of transmission of 6.6 for SARS-CoV-1 when compared with unexposed healthcare workers[5]. However, the incidence of infection in healthcare workers involved in tracheal intubation of suspected or confirmed COVID-19 is unknown, and it is unclear which elements of the procedure may contribute to increased risk, if any. General anesthesia also involves more baseline personal protective equipment (PPE) use, which causes early depletion due to limited resources[6].

Emergency procedures usually come from obstetrics, general surgery and orthopedics side, both in pre COVID and during COVID-19 pandemic. Despite of significant reduction in elective cases during COVID-19, emergency surgeries have not reduced much and practice changed accordingly[7]. During COVID-19 pandemic, emergency surgical patients usually treated as "COVID-19 suspected"; therefore, for aerosol generating procedures (AGP), PPE (fluid-resistant gown, gloves, visor and FFP3 respirators or PAPR hoods) is used. Aerosol-generating procedures include, tracheal intubation, tracheostomy, broncho-scopy non- invasive ventilation, cardiopulmonary resuscitation, manual ventilation). Health care providers should use eye protection, gloves and gowns and respirators. According to literature, tracheal intubation during general anes-

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thesia is among the high-risk situations where full PPE is required for surgery due to potential COVID-19 exposure and found an absolute risk increase of between 10% (cohort studies) and 15% (case-control studies) for transmission of SARS-CoV-1–associated infection to health care personnel performing intubation[8,9]. For donning and doffing of PPE must follow standard guidelines, especially during emergency procedures, where the risk of getting infection of surgical staff are higher. The possible exposure to SARS-CoV-2 viral particles during aerosol-generating procedures is a potential risk to surgical staff[10]. In the current study, we compared the use of spinal anesthesia for emergency surgeries in pre COVID period versus COVID-19 pandemic.

METHODOLOGY

This prospective observational study was conducted at Anesthesia department of Frontier Corps Hospital Quetta, from March to May 2020. All patients of 18-75 years requiring emergency surgery over the defined study period were included by non-probability consecutive sampling technique, with the exception of pediatric population and compared to emergency cases done in corresponding timeframe in 2019. Anesthesia notes were reviewed in detail to ascertain the perioperative use of spinal anesthesia. Emergency cases done under general anesthesia were also noted. Spinal anesthesia was performed by consultant anesthesiologist. All cases under spinal anesthesia were performed using aseptic technique, with PPE, recommended for AGP, were used. Results were analyzed by using SPSS-16. Percentages and frequencies were calculated for categorical variables like surgical specialty, type of anesthesia and type of emergency procedures. The chi square test was used for comparison of emergency cases according to anesthesia.

RESULTS

A total of 260 emergency cases of three specialties i.e. General Surgery, Gynaecology & Orthopedics were performed in the main operation theatre during the 3 months of pre-COVID period as compare to only 89 cases in the 3 months duration of COVID-19 (table-I).

In the pre-COVID study period, spinal anesthesia was used as an anesthetic technique in 154 (59.2%) cases while general anesthesia was used in 106 (40.7%) while in COVID-19 pandemic 77 (86.5%) emergency cases were performed under spinal anesthesia and 12 (13.4%) under general anesthesia, *p*-value <0.001 (table-II) (figure).

Among different specialties, emergency cases in general surgery, during COVID-19 period were mainly appendectomies 15 (65.2%), in Gynaecology, main emergency cases were lower segment caesarean section 37 (86%) and in orthopedics, main emergency cases were 11 (47.8%) open reduction and internal fixation of femur (table-III).

Table-I: Comparison of surgeries in pre-COVID and COVID pandemic.

Specialty	March-May 2019	March-May 2020
General surgery	180 (69.2%)	23 (25.8%)
Gynaecology	50 (19.2%)	43 (48.3%)
Orthopedics	30 (11.5%)	23 (25.8%)
Total	260	89

Table-II: Comparison of emergency spinal versus general anesthesia cases.

Specialty	Cases: SA/GA-2019	Cases: SA/GA-2020	*p*-value
General surgery	100 (55.5%)/80 (44.4%)	18 (78.2%)/ 5 (21.7%)	0.007
Gynaecology	40 (80%)/10 (20%)	40 (93%)/3 (6.9%)	0.001
Orthopedics	14 (46.6%)/16 (53.3%)	19 (82.6%)/4 (17.3%)	0.002

Table-III: List of emergency cases of different specialties.

Specialty	Emergency Surgical procedures	n (%)
General surgery	Appendectomy	15 (65.2)
	Obstructive hernia repair	2 (8.6)
	hemorrhoidectomy	1 (4.3)
	Ray amputation	1 (4.3)
	Burn debridement	2 (8.6)
	Incision & Drainage Hand	2 (8.6)
Gynaecology	Caesarean section	37 (86)
	Laparotomy	3 (6.9)
	Dilatation & Curettage	3 (6.9)
Orthopedics	Open reduction & Internal fixation (ORIF) femur	11 (47.8)
	Dynamic hip screw (DHS)	3 (13)
	ORIF Ankle	2 (8.6)
	Intramedullary nailing (I/M) Tibia	3 (13)
	ORIF elbow	2 (8.6)
	K-Wire fixation hand	2 (8.6)

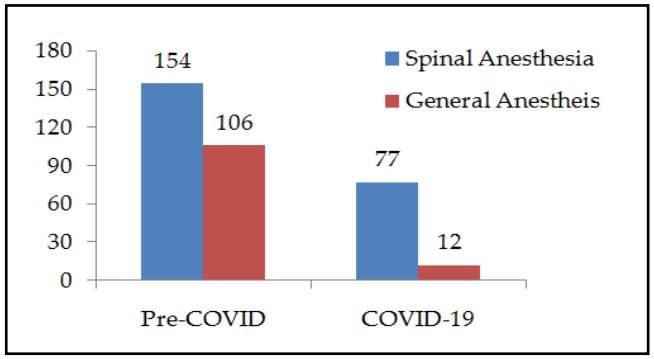

Figure: Comparison of spinal versus general anesthesia cases in pre-COVID and COVID-19 period.

DISCUSSION

Proper planning is essential to prevent from COVID-19 and other infections peri-operatively. Risks are mostly associated with endotracheal procedures. In order to decrease the risks of transmission, intubation requirement must be justified in patients with respiratory failure and on noninvasive ventilation (e.g., CPAP or BiPAP) preference should be given to disposable airway equipment. Operation theatre staff must be equipped with FFP3 filters in all aerosol generating procedures. Negative pressure operation theatres are considered to be ideal to minimize the infection risk. However, operation theatres are normally designed to have positive pressure air circulation. A high air exchange cycle rate (≥25 cycles/h) contributes to effectively reduce the viral load within operation theatres[11].

According to European and American Societies of Regional Anaesthesia, regional anaesthesia should be preferred over general anaesthesia, during COVID-19. The Royal College of Anaesthetists, also recommends local or regional anaesthesia where required, in order to preserve emergency drugs, during the critical care of COVID-19 patients[12]. Other benefits of giving regional anaesthesia during the COVID-19 pandemic may include: more reserve of PPE, better postoperative analgesia and earlier discharge. Advantages such as less postoperative complications, less time in recovery and early discharge are particularly valuable. Avoidance of general anesthesia in COVID-19 patients, undergoing emergency surgery is seems to be beneficial, but mortality rates of patients with undiagnosed COVID-19 who subsequently undergo surgery is higher and therefore significant reduction in cases occurred. According to the data of operation theatres in Italy, 86% decrease of cases of emergency surgery occurred as compared to the corresponding month before the COVID-19[13].

More studies are required to make evidence-based recommendations for the prevention of perioperative COVID-19 infection. However, the safest approach to avoid SARS-CoV-2 transmission may be the one that reduces operation time and is the most familiar to the operation team. Urgent surgical cases are classified into high and low-risk procedures, depending upon the anticipated viral load at the surgical area and the risk that a procedure may cause aerosolization of virus[14]. Regional Anaesthesia is preferred over general anesthesia in emergency cases to reduce the risk of aerosolization, usually related to endotracheal intubation. Guidelines for donning of PPE for AGP should be practiced for emergency surgeries due to the risk of failed regional anesthesia and the consequent conversion to general anaesthesia. The main risk of general anaesthesia in caesarean section is getting infection due to endotracheal intubation in patients with acute respiratory illness. Endotracheal intubation is AGP and the risk of transmission of virus to staff is higher than with non-AGP. Guidelines to reduce the risk must be followed. Checklists, standardized emergency airway trolleys can improve outcomes. Extubation is equally high-risk AGP. By reducing number of staff in the operating room and avoidance of cough at the time of extubation, risk can be minimized[15]. Regional anesthesia is preferred during delivery of COVID-19 patients, because these techniques reduce the cardiopulmonary stress, caused by stress of labor, as according to a case report by Bampoe *et al*, A 29-year-old woman, G2P1 at 37 ± 4 weeks of gestation, COVID-19 positive, symptomatic, received spinal anesthesia for emergency caesarean section and was found successful with early post-operative recovery. Moreover, as spinal anesthesia is not considered as AGP, has benefit over general anesthesia, in maintaining personal protective equipment reserves[16]. Zhong *et al,* found that out of 44, 37 (84.1%) patients were provided regional anaesthesia by using Level 3 PPE, 1 (2.7%) of 37 anaesthetists who used PPE level 3, developed COVID-19 infection as compared to 4/7 (57.1%) anaesthetists who had Level 1 protection in the operating room (relative risk reduction: 95.3% [95% confidence intervals: 63.7-99.4]; $p<0.01$) and COVID-19 infection was subsequently confirmed by PCR in 5/44 (11.4%) anaesthetists[17]. Warren *et al*, demonstrated multivariate regression analysis of the total hip arthroplasty cohort and showed a statistically not significant trend toward increased mortality in GA patients (OR, 1,433; 95% confidence interval [CI], 0.988 to 2.078; $p=0.058$) as compared to SA patients, also found that GA cohort were at higher risk for complications ($p<0.05$) and patients who received GA were at higher risk for nonhome discharge[18]. A total of 338 emergency surgical cases were performed during the COVID-19 pandemic in 2020, compared to 603 cases over the corresponding period in 2019. This showed a 44% decrease in emergency surgical workload. The use of RA as the primary anesthesia technique was noticeably higher than previous UK data (11%), and was prominent in specialties such as general surgery, gynecology and urology, not traditionally completed under RA[19].

Endotracheal intubation is a high-risk procedure, due to the risk of spread of droplets and aerosols. That's why airway management needs special atten-

tion, and endotracheal intubation ideally should be undertaken in an airborne isolation room and all concerned health care provider should be equipped with airborne/droplet prevention PPE. According to one of the study of China, 202 COVID-19 patients in Wuhan, requiring urgent endotracheal intubation, personal protective equipment used as per recommendations for aerosol generating procedures and technique also based on rapid sequence induction (RSI) and videolaryngoscopy, which enabled prompt tracheal intubation and was universally successful[20,21].

LIMITATION OF STUDY

Data from other hospitals should also be gathered but due to risk of spreading of infection due to handling with papers, it wouldn't possible.

CONCLUSION

Spinal anesthesia has a significant role in the surgical management of patients in pre-COVID and especially in COVID pandemic. It provides high-quality perioperative care for patients whilst minimizing exposure to staff and utilization of scarce resources of PPE.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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