EMERGENCY LAPAROTOMIES: VALIDATING THE ROLE OF SPINAL ANESTHESIA IN HIGH RISK CASES. A RETROSPECTIVE, FACILITY BASED OBSERVATIONAL STUDY IN SRINAGAR, GARHWAL, UTTARAKHAND

Prof.(Dr.) Biant Singh¹, Dr. Manpreet Kour², Dr. Shwetabh Pradhan³ and Prof.(Dr.) Surinder Singh⁴
1. Professor and Head Department of Surgery VCSG Govt. MS&RI Srinagar-Garhwal Uttarakhand 246174.
2. Trainee Observer VCSG Govt. MS&RI Srinagar-Garhwal Uttarakhand 246174.
3. Assistant Professor Department of Surgery VCSG Govt. MS&RI Srinagar-Garhwal Uttarakhand 246174.
4. Professor and Head Department of Anesthesia, VCSG Govt. MS&RI Srinagar-Garhwal Uttarakhand 246174.

Introduction:
Perforation peritonitis is very rampant in hilly areas of Garhwal due to excessive consumption of alcohol, smoking and stresses of life due to difficult terrain and working conditions. Most of the patients with co-morbidities like COPD have higher pulmonary related complications following surgery under G.A. It is a challenge and concern for surgeons and anesthetists to manage and provide optimal care to these patients. The study validates the role of spinal anesthesia in such cases.

Materials And Method:
We reviewed all cases of emergency laparotomies done between Jan 2019 and June 2020. Ninety cases were given spinal anesthesia as sole anesthetic agent out of which sixty cases were ASA IV and thirty cases were ASA III. Outcome in all cases was analyzed and recorded.

Results:
All cases were adequately operated and outcome was successful in all except three cases which required G.A due to prolonged surgeries. None needed mechanical ventilatory support post operatively. Mean hospital stay was seven days and there was no report of major renal or respiratory complications.

Conclusion:
Spinal anesthesia is a safe option and alternate to G.A in high risk emergency laparotomies minimizing the requirement of ventilatory support in rural tertiary care hospitals were critical care facilities are compromised.
intubation with improper mechanical ventilation of already compromised lungs, as well as excessive use of long acting opioids for severe pain control which may further effect the pulmonary functions and leads to dependency on mechanical ventilation besides its effects such as bronchospasm, V/Q mismatch, atelectasis, and residual anesthetic or muscle relaxant effects. Spinal anesthesia may be an attractive and safe alternative to G.A since neuroaxial blockade has minimal respiratory effects even at higher levels. Besides certain retrospective and prospective observational studies have also shown that patients with COPD have better outcome under spinal anesthesia. Utilization of spinal anesthesia for emergency abdominal surgery has been reported with benefits for high risk cases having uncontrolled hyperthyroidism and sever myasthenia gravis.

Collins et al have reported the advantages of S.A with no risk of intubation related airway complications, minimal risk of unrecognized hyperglycemia in a diabetic patient, excellent muscle relaxation, decreased surgical bed oozing and rapid return of bowel functions. Spinal anesthesia does not require the aerosol generating procedure thus minimizing the transmission risk of airborne infections rendering it safe in mildly symptomatic covid 19 patients as reported by SA Lie et al.

Materials And Method:-
We conducted an observational study and reviewed all emergency laparotomies done between Jan 2019 and June 2020. Ninety cases were given spinal anesthesia as sole anesthetic agent. The anesthetic drug used in our hospital was bupivacaine at L2, L3 level. Additional drugs pentazocine, aminophylline and hydrocortisone were required in 10 patients. Most of our laparotomies were performed with a full midline incision. Sixty cases were ASA IV and thirty ASA III. The cases selected for the study were adults with evidence of COPD and co-morbidities. Records of all the patients were reviewed to determine the gender, age, diagnosis, indication of surgery, type of surgery performed, ASA classification, need for ventilator support, need of G.A, length of hospital stay and perioperative complications. Data was collected and analyzed.

Observations And Results:-
Average age of patient was 62 years. Sixty patients were operated for duodenal perforations, twenty for gastric perforations, six patients had ileal perforations and four patients had peritonitis secondary to appendicular perforations. Almost all of our patients had co-morbidities most common being COPD (67.7%), hypertension (38.8%) and Diabetes Mellitis II (22.2%). 11% of the patients had pulmonary tuberculosis under treatment, multiple co morbidities were seen in 20% cases and one of our cases showed kyphoscoliosis with restrictive lung disease.

All the patients had been optimized pre operatively, no cardio respiratory complications were observed. Only three patients needed G.A due to prolonged surgery and were successfully extubated. None of our patients needed mechanical ventilation in post-op period. Four patients needed ionotropic support. Nausea and vomiting were recorded in 36 patients and was treated with ondansetron 4mg. Bradycardia was noted in 20 patients and treated with atropine 0.5 mg. one of our patient developed myocardial infarction on fifth day and was thrombolized and discharged after 15 days. 3% of our patients needed blood transfusion because of anemia. Three patients in our study developed basal pneumonia and were treated with higher antibiotics and discharged after 10 days. None of our patients developed deep vein thrombosis, respiratory depression or renal failure. Overall mortality rate seen was zero.

| Table 1: Patient Demographics. |
|-----------------------------|
| Male patients | 50 (N) |
| Female patients | 40 (N) |
| Mean age (years) | 62 years |
| ASA grade III | 30 |
| ASA grade IV | 60 |
| Duodenal perforation | 60 |
| Gastric perforation | 20 |
| Ileal perforation | 06 (04- tubercular, 02-typhoid) |
| General peritonitis | 04(gangrenous appendicitis with basal perforation) |
### Table 2: Patient variables.

| Variable                                      | N  | (%)   |
|-----------------------------------------------|----|-------|
| **Comorbidity**                               |    |       |
| Hypertension                                  | 35 | 38.8% |
| DM II                                         | 20 | 22.2% |
| Pulmonary cox under treatment                 | 10 | 11.1% |
| COPD                                          | 61 | 67.7% |
| Multiple co-morbidities                       | 18 | 20%   |
| Kyphoscoliosis (dorsal spine with restrictive lung disease) | 01 | 01.1% |
| **Intervertebral level**                      |    |       |
| L1-L2                                         | 60 | 66%   |
| L3-L4                                         | 30 | 33%   |

### Table 3: Case Outcome.

| Case Outcome                                |     |
|---------------------------------------------|-----|
| Nausea and vomiting                         | 36  |
| Bradycardia                                 | 20  |
| Ionotropic support                          | 04  |
| Blood transfusion requirement               | 03  |
| Conversion to G.A                           | 03  |
| Need for mechanical ventilation             | nil |
| Hospital stay mean                          | 07  |

### Complication

| Complication       |     |
|--------------------|-----|
| MI                 | 01  |
| Basal pneumonitis  | 03  |
| DVT                | nil |
| Renal failure      | nil |
| Respiratory depression | nil |
| Mortality          | nil |

**Discussion:**

Our study has demonstrated and confirmed the parameters that spinal anesthesia is safe and cost effective alternative to general anesthesia for emergency laparotomies in high risk cases. Though not being physiologically benign, spinal anesthesia offers advantages of improved diaphragmatic function and chest compliance thus maintaining normal minute volume. It also decreases lung congestion by decreasing preload and afterload. Mortality and serious complications such as DVT, pulmonary embolism, myocardial infarction, transfusion requirement, pneumonias, aerosol generating risks to staff, respiratory depression and renal failure are reduced in cases done under spinal anesthesia.

The benefits of neuroaxial blockade are conferred by multifactorial mechanisms like altered coagulation, painless breathing and reduction in surgical stress response\[^14\]. Risks of pulmonary aspiration in cases of intraoperative vomiting is reduced by intact airway reflexes. Safety and effectiveness of S.A in emergency laparotomies in our study has stronger evidence in favour of its use. Adequate intraoperative analgesia and surgical relaxation is maintained to the satisfaction of surgeon. Invasive airway management and polypharmacy involved in G.A is reduced as well as potential post-op mechanical ventilation and prolonged level 2 and level 3 care required usually in such cases is almost nullified . Considering this and the fact that hard pressed/ lack of ventilatory support at some institutions may be taken care of by using spinal anesthesia for all cases of high risk emergency laparotomies.

**Conclusion:**

Emergency laparotomy carries well recognized significant life threatening intra and post operative risks in patients with co-morbidities like COPD and higher ASA grades. Safety of S.A in such situations is well established and cannot be ignored so far as hospital stay and cost of ICU is concerned. Based on our observations we recommend S.A as suitable alternative to G.A in emergency laparotomies in resource constrained context. Skilled surgeons and
anesthetists can perform emergency laparotomies of high risk cases under S.A in absence of compromised modern ventilatory facilities and intensive critical care settings.

What the study adds to the existing knowledge? In present day Covid-19 scenario spinal anesthesia minimizes the aerosol generation, thus protecting the vulnerable healthcare personnel from any suspected sources, hence making S.A as suitable alternative to G.A in emergency laparotomies.

Funding:
No funding sources

Conflict of interest:
None declared

Ethical Approval:
This study was approved by the Institutional Ethics Committee

References:
1. Roscoe GR, Brown E. Spinal Anesthesia in Abdominal Surgery. Annals of Surgery. 1939 November 5; 110: 863-871.
2. Savas JF, Litwack R, Davis K, Miller TA (2004) Regional anesthesia as an alternative to general anesthesia for abdominal surgery in patients with severe pulmonary impairment. Am J Surg 188: 603-605.
3. Mallon JS, Edelist G (1992) Risk factors of importance-the patient. Probl Anesth 6:193-204.
4. Brocks-Brunn JA (1997) Predictors of postoperative pulmonary complications following abdominal surgery. Chest 111: 564-571.
5. Askrog VF, Smith TC, (ckeenoj je JE (1964) Changes in pulmonary ventilation during spinal anesthesia. Surg Gynecol Obstet 119: 563.
6. Tarhan S, oo=tt EA, Sessler AD, Douglas WW, Taylor WF (1973) Risk of anesthesia and surgery in patients with chronic bronchitis and obstructive pulmonary disease. Surgery 74: 720.
7. Mitchell CK, Smoger SH, Pfeifer MP, Vogel RL, Pandit MK, et al. (1998) Multivariate analysis of factors associated with postoperative pulmonary complications following elective surgery. Arch Surg 133: 194-198.
8. Arozullah AM, Khuri SF, Henderson WG, Daley J, et al. (2001) Development and validation of a multifactorial risk index for predicting postoperative pneumonia in major noncardiac surgery. Ann Intern Med 135: 847-857.
9. Collins LM, Vaghadia H. Regional Anesthesia for Laparoscopy. Anesthesiology Clinics of North America. 2001 March; 19(1): 43-55. DOI: https://doi.org/10.1016/s0889-8537(05)70210-8
10. Kar M, et al. Experience of Laparoscopic Cholecystectomy Under Spinal Anesthesia with Lowpressure Pneumoperitoneum - Prospective Study of 300 Cases. Saudi J Gastroenterol. 2011 MayJune; 17(3): 203-207.
11. Sinha R, et al. Laparoscopic Surgery Using Spinal Anesthesia. JSLS. 2008; 12: 133-138. PMID: 18435884
12. Lie, S. A., et al. Practical considerations for performing regional anesthesia: lessons learned from the COVID-19 pandemic. Can J Anaesth. 2020 Mar 24: 1–8. Advance online publication.
13. Zhong, Qi, et al. Spinal anaesthesia for patients with coronavirus disease 2019 and possible transmission rates in anaesthetists: retrospective, single-centre, observational cohort study. British Journal of Anaesthesia. 2020 Mar 28. Advance Access Publication.
14. Kehlet H (1988) 0odi=ication of responses to surgery by neural blockade: Clinical implications: In: Neural blockade in clinical anesthesia and management of pain (2nd ed.) Philadelphia, JB Lippincott 145-188.