



## A Retrospective Pharmacoepidemiological Study of the Utilization Pattern of Anesthetic medications in Surgical Gastroenterology Procedures in a Tertiary Care Hospital in South Kerala

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### Abstract

**Background:** For Surgical Gastroenterology procedures, evidence suggests that optimal management includes, Thoracic epidural analgesia continued for 2 days postoperatively, no long acting benzodiazepines on the day of surgery and use of rapid, short acting opioids, short acting anesthetic medications may be beneficial. We examined retrospectively whether these strategies can be achieved in all patients undergoing surgical gastroenterology procedures irrespective of age, sex, associated comorbidities and duration of procedures.

**Methods:** Data was collected retrospectively from case records of patients who underwent surgical gastroenterology procedures in the Department of surgical gastroenterology during the period January 1,2017 to January 30,2017.

**Results:** Total of 38 case records were analysed. Major indications for surgery were Pancreatectomy (26.3%), Laparoscopic cholecystectomy (21.1%), Abdomino perineal resection (10.5%), Anterior resection (7.9%), Splenectomy (7.9%), and Others (7.9%) which include Fundoplication, Sigmoidectomy, Hepatectomy, Proctocolectomy). Female sex (63.2%) predominated over Male sex (36.8%) Most of the patients were in the age group between 50-70 years (52.6%). All Patients received Midazolam as anxiolytic, Glycopylorate as anticholinergic, Ondansetron as antiemetic. Preoperative opioid used are Pethidine (2.6%), Morphine (5.3%), Fentanyl (92.1%). 50% of patients had no comorbidities, 15.8% had hypertension alone, 5.3% had hypertension and type 2 Diabetes mellitus, 2.6% had hypertension, Diabetes mellitus type 2, 2.6% had hypertension, Type 2 diabetes mellitus and coronary heart disease, 2.6% had coronary heart disease alone. 84.2% patients was induced with Thiopentone sodium and propofol, received thoracic epidural with buprenorphine as post operative analgesia. 7.9% patients was induced with thiopentone sodium and propofol, post operative analgesia was managed with intravenous paracetamol, 7.9% patients was induced with propofol and received thoracic epidural with buprenorphine for post operative analgesia.

**Conclusion:** The administration of thiopentone sodium and propofol as induction agents, Thoracic epidural with buprenorphine for postoperative analgesia is very common (84.2%) Ondansetron, midazolam, and Glycopylorate (>80% patients) as pre-anesthetic medication. Fentanyl is the opioid of choice in most patients (92.1%)

**Keywords:** drug utilization; Anesthetic medications; surgical gastroenterology procedures.

**Introduction**

Drug utilization studies are usually conducted to understand medicine usage patterns in a hospital setting, to facilitate improvements, and to provide an uninterrupted supply of commonly used medicines. The research also helps minimize the risk of adverse events and drug interactions, which can contribute to better therapeutic outcomes<sup>(1)</sup>. Surgical gastroenterology procedures usually lasts longer and the need for better balanced induction agents avoiding hypotension and short acting opioids are necessary for better outcome and early extubation without major complications. Major concerns during surgical gastroenterology procedures include anxiety among patients, post-operative pain and post-operative nausea and vomiting. Pre-anesthetic medicines are generally given to avoid the adverse events associated with general anesthesia, facilitate surgery, and reduce the risk of post-operative complications<sup>(2)</sup>. Surgical gastroenterology procedures requires the use of agents that enable rapid induction, maintenance, and emergence combined with minimal adverse effects. Short-acting opioids demonstrate a safe and rapid onset/offset of effect; that short effect is both predictable and precise. It also ensures easier titration and reduced or rapidly reversed side effects<sup>(3)</sup>. Thoracic epidural analgesia on surgical gastroenterology procedures significantly reduce the postoperative burden of supplying analgesics now and then.<sup>(4)</sup> This study was conducted to understand the prescription and utilization patterns of Anesthetic medications and postoperative analgesic method for different surgical gastroenterology procedures.

**Methods**

In this Retrospective, pharmacoepidemiological, and observational study, patients of both sexes and of age groups between 15-60years receiving anesthetic medication for surgical gastroenterology procedures in routine conditions were included. The prescription and utilization of Anesthetic medicines in all patients undergoing surgeries under general anesthesia for various indications were

recorded during one year period. After recording the patient’s demographic data, the indications of surgery and the details of the Anesthetic medications used were recorded. The study was initiated after receiving approval from the institutional ethics committee.

**Statistical analysis**

Consecutive sampling was done and the data was analysed using SPSS Ver22.

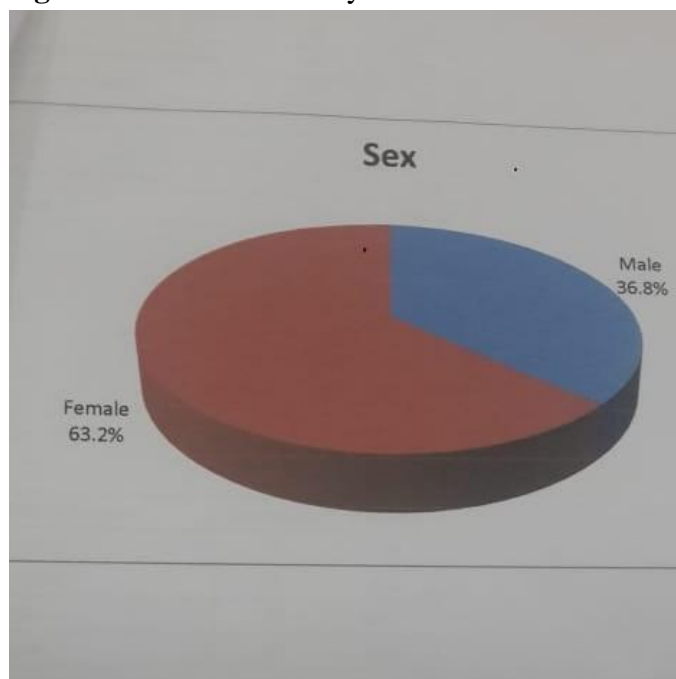
**Results**

A total of 38 case records (63.2% females) were analysed. Figure 1 shows gender variability of patients. The men age of study group was 52.6 years. The minimum age of study participants was 25 years and maximum was 78 years (Table 1) Figure 2.

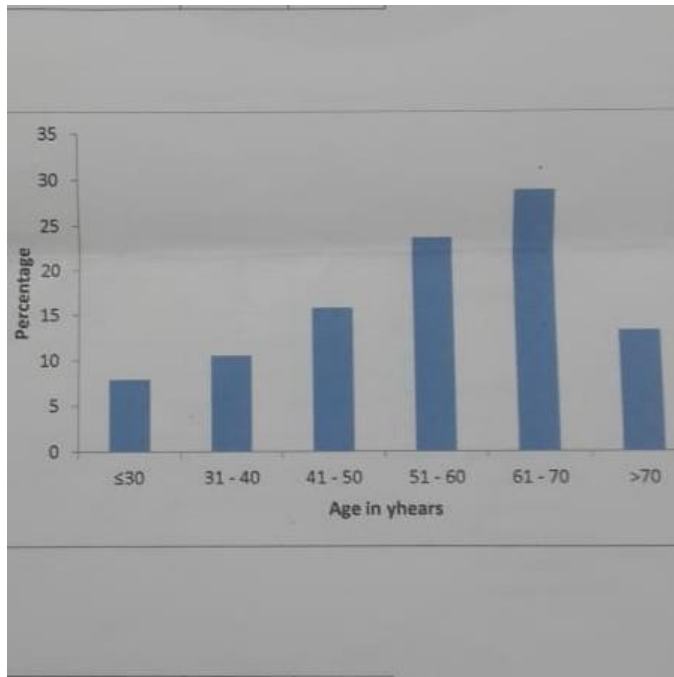
**Table 1** Baseline characteristics

| Age   | Frequency | Percentage |
|-------|-----------|------------|
| <30   | 3         | 7.9        |
| 31-40 | 4         | 10.5       |
| 41-50 | 6         | 15.8       |
| 51-60 | 9         | 23.7       |
| 61-70 | 11        | 28.9       |
| >70   | 5         | 13.2       |
| Total | 38        | 100        |

**Figure 1** Gender variability



**Figure 2** Baseline characteristics of Age



Major indications for surgery were Pancreatectomy (26.3%), Laparoscopic cholecystectomy (21.1%), Abdomino perineal resection (10.5%), Anterior resection (7.9%), Splenectomy (7.9%), and Others (7.9%) which include Fundoplication, Sigmoidectomy, Hepatectomy, Proctocolectomy). The number and percentages of indications for surgeries are shown in table 2.

**Table 2** Indications for surgery

| Indication   | Frequency | Percentage |
|--|-----------|------------|
| Duodenectomy   | 2         | 5.3        |
| Pancreatectomy   | 10        | 26.3       |
| Abdominoperineal resection   | 4         | 10.5       |
| Anterior resection   | 3         | 7.9        |
| Laparoscopic cholecystectomy   | 8         | 21.1       |
| Splenectomy  | 3         | 7.9        |
| Others (fundoplication, sigmoidectomy, Hepatectomy, Proctocolectomy) | 8         | 21.1       |

The following comorbidities were noted. 28 patients had no comorbidities (73.6%), 6 patients had Hypertension (15.8%), 2 patients had Hypertension and Diabetes mellitus Type 2 (5.3%), 1 patient had Hypertension, Diabetes mellitus Type 2 and Coronary heart disease (2.6%), 1 patient had Hypertension and Coronary heart disease (2.6%)

**Table 3:** Comorbidities

| Comorbidities  | Frequency | Percentage |
|--|-----------|------------|
| Nil  | 28        | 73.6       |
| Hypertension   | 6         | 15.8       |
| Hypertension, Diabetes mellitus                          | 2         | 5.3        |
| Hypertension, Diabetes mellitus, Coronary artery disease | 1         | 2.6        |
| Hypertension, Coronary artery disease                    | 1         | 2.6        |
| Total  | 38        | 100        |

Table 4 shows a list of pre-anesthetic medications. All Patients received Midazolam, Glycopylorate and Ondansetron. Fentanyl was used in 35 patients (92.1%) Morphine was used in 2 patients (5.3%). Pethidine was used in 1 patient (2.6%)

**Table 4** Premedication

| Premedication                                    | Frequency | Percent |
|--|-----------|---------|
| Midazolam, Glycopylorate, Ondansetron, Pethidine | 1         | 2.6     |
| Midazolam, Glycopylorate, Ondansetron, Morphine  | 2         | 5.3     |
| Midazolam, Glycopylorate, Ondansetron, Fentanyl  | 35        | 92.1    |
| Total  | 38        | 100     |

Table 5 Shows a list of Induction and postoperative analgesia. 32 patients received Thiopentone sodium and propofol as inducing agents. Thoracic epidural analgesia with buprenorphine was used in these patients (84.2%) 3 patients were induced with thiopentone sodium and propofol, Intravenous paracetamol was used as a postoperative analgesic (7.9%) 3 patients was induced with propofol alone and thoracic epidural analgesia with buprenorphine as postoperative analgesia (7.9%)

**Table 5** Induction agents and post operative analgesia mode

| Induction  | Frequency | Percent |
|--|-----------|---------|
| Thiopentone sodium, Propofol with thoracic epidural analgesia          | 32        | 84.2    |
| Thiopentone sodium, Propofol and intravenous paracetamol for analgesia | 3         | 7.9     |
| Propofol and Thoracic epidural analgesia                               | 3         | 7.9     |
| Total  | 38        | 100     |

**Discussion**

Drug utilization studies helps us understand the appropriate dosages and appropriate drugs according to patient needs, type and duration of

surgeries. As surgical gastroenterology procedures are in long duration and surgery itself is meticulous and any inappropriate dosages in anesthetic drugs will hamper the hours and hours lasted surgery and it will affect the outcome. Drug utilization studies are also helpful for scientific as well as administrative purposes in large hospital setting especially in tertiary care centers. Significant insights into the use of medicines, indications, side effects, and drug interactions can be obtained from such studies. We performed a Retrospective cross-sectional study in a tertiary healthcare setup to help understand the utilization of Anesthetic medications. One of the major concerns in patients undergoing surgical gastroenterology procedures is management of postoperative pain technique. The concern is because of two reasons. One, the use of thoracic epidural in which we can limit the usage of anesthetic drugs intraoperatively. Two, avoidance of thoracic epidural and usage of opioids. In the second case when we use opioids, there was always a confusion between fentanyl, morphine and pethidine as each of these drugs has their own merits and demerits. There was no strict protocol for the usage of these opioids and choice in these drugs. Anesthetists always prefer the choice of opioids according to the type of surgery and duration of surgery. Thus we studied retrospectively, to find out which technique can be best for the management of hour lasting surgical gastroenterology procedures. In our study Most of the patients were females with 63.2%, compared to males who were 36.8%. Most of them were in the age group of 51-70. 73.6% Patients had no comorbidities and fell in ASA-PS1 category hence our results and conclusion can be applied to wide range of patient groups. 92.1% received Midazolam, Glycopylorate, Ondansteron and Fentanyl as a premedication. Retrospective analysis showed fentanyl as a opioid of choice because it is short acting and can be used even in patients with deranged liver function. Benzodiazepines are used to reduce anxiety in patients undergoing surgery. Diazepam was the preferred agent for this purpose for several years. However, today, midazolam is preferred over diazepam because of its higher

potency, faster onset of action, and shorter duration of action. A study has shown that in patients between 60 and 69 years of age, 2 or 3 mg of intramuscular midazolam is an effective pre-anesthetic medication and does not cause severe drowsiness. However, in patients aged 70 years and above, it might cause severe drowsiness. In our Analysis, the most commonly used dose of midazolam was 1 mg. In this dose, midazolam was well-tolerated without significant concerns of drowsiness. Atropine and glycopyrrolate are two well-studied pre-anesthetic anticholinergic agents. Glycopyrrolate is more potent than atropine, and it consequently needs a lower dose. The other advantages of glycopyrrolate include a more-stable response in the cardiovascular system, less risk of bradycardia, and better control of oropharyngeal secretions during reversal<sup>(5)</sup>. Fentanyl is mainly metabolized by the liver and is excreted through the kidneys<sup>(6)</sup>. Moreover, less than 8% of the drug is excreted through the kidneys without being metabolized in the liver. Fentanyl is primarily metabolized by cyp3A4 and is distributed in the muscle and fat immediately after administration. Although the duration of its half-life, dose repetition and single-dose were prolonged, the single-dose pharmacokinetics of intravenous fentanyl in patients with liver failure did not change Transdermal fentanyl is not adequately studied for the treatment of hepatic failure; however, it is assumed that liver failure can alter the permeability of the skin and drug absorption. Most opioids are metabolized in liver through glucuronidation, but fentanyl is cleared by the hydrolysis of ester<sup>(7)</sup>. Some experts recommend fentanyl as a proper opioid for liver failure, but that is an entirely empirical judgment. Studies have shown that Thoracic Epidural Anesthesia provides optimal pain therapy in a wide range of surgical procedures and may reduce perioperative morbidity and mortality after major abdominal and thoracic surgery.<sup>(8)</sup> Out of 38 case records analysed 84.2% used thoracic epidural for intraoperative and postoperative pain management. The need for frequency of muscle relaxants intraoperatively was less when Thoracic epidural

analgesia was used. Thoracic epidural analgesia used postoperatively for relief of pain following upper abdominal surgery, slightly decreases oxygen requirement and benefits cardiovascular function as reflected by a decrease in left ventricular stroke work.<sup>(9)</sup> Thiopentone sodium and Propofol were used in 84.2% as induction agents. Better hemodynamics when propofol is combined with thiopentone sodium than propofol as a sole agent. In our study, the use of midazolam was very common, Anticholinergic agents are routinely prescribed pre-anesthetic medications. Consistent with findings in the literature, glycopyrrolate was the most commonly used anticholinergic agent in our study. The use of glycopyrrolate was almost 10 times more common than that of atropine in the present study. A short-acting opioid, such as fentanyl, is preferred over long-acting opioids during surgical procedures because of the higher risk of postoperative adverse effects, such as respiratory depression, with long-acting agents. Similarly, in a low dose, fentanyl can decrease the hemodynamic response to tracheal intubation. In our study, fentanyl was used in 35 patients. The small sample size, single-center data, and cross-sectional design limit the generalization of our findings to all surgical procedures. With these limitations, we suggest that the findings of our study be carefully extrapolated.

### Conclusion

Our study gives an insight into the current practice pattern of anaesthesia in neuro surgery department of a tertiary care hospital and helps to recognize areas of improvement .

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