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# EFFICACY OF INTRAVENOUS XYLOCAINE IN REDUCTION OF PROPOFOL-INDUCED PAIN

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**Abstract**

***Objectives:*** *To determine if IV Xylocaine helps in reducing propofol-induced pain in patients undergoing short surgical procedures while under GA (general anesthesia).*

***Study Design:*** *Descriptive cross-sectional study*

***Study Setting And Duration:*** *Department of Anesthesia, Ittefaq Hospital Trust Lahore from 01 October 2024 till 31 March 2025.*

***Methodology:*** *150 patients aged 18-60 years were scheduled for a short surgical procedure while under GA using non-probability consecutive sampling. Pain severity was assessed using the Visual Analogue Scale (VAS), with a VAS score of < 3 being considered effective. The analysis of data was accomplished using SPSS 26. Quantitative variables were reported as median (IQR), and qualitative variables were reported as frequency and percentage. Additionally, stratification was done in order to evaluate efficacy.*

***Results:*** *The average age of the participants was 42 years (range: 26-53), and their average BMI was 25.7 kg/m2 (range: 20.2-31.0). The majority of the patients were male (58.7%), and 52.7% were classified as ASA II. Tonsillectomy was the most frequently performed surgical procedure (36.7%) among the participants. The majority of the patients exhibited lower VAS scores than their pre-procedure scores, with the most frequently reported score of 2 being noted by 24.7% of participants. Overall, a total of 76% of participants had a positive response to the intravenous Xylocaine treatment.*

***Conclusion:*** *The results of this study indicate that intravenous Xylocaine is an effective way to reduce the pain associated with propofol during the administration of general anesthesia for short surgical procedures.*

## INTRODUCTION:

The pain from the injection of propofol is quite common as well as highly distressing, with the obstruction to anesthetic induction and procedural sedation occurring in approximately 60–70% of patients in multiple international studies. Recent meta-analyses have reported that about 64% of patients will experience any pain during the administration of propofol, while 38% report high-intensity pain, although there exist few widespread prophylactic measures(1). A 2025, cross-sectional study from a tertiary care facility in Pakistan found that greater than 60% of adult surgical patients reported experiencing pain from a propofol injection and that nearly one-half of these patients rated their pain as moderate-to-

severe in intensity, supporting the discrepancy between the existing clinical guidelines and actual practice(2).

One of the most heavily researched and recommended treatments for eliminating propofol injection pain is intravenous lidocaine (xylocaine). A 2025 descriptive cross-sectional study that was performed at one tertiary care facility in Pakistan found that there were significant variations amongst hospitals' practices to alleviate the pain of propofol administration, with only approximately 30% of hospitals regularly administering intravenous lidocaine pretreatment to patients before administering propofol(3). Recent studies have demonstrated that lidocaine infused intravenously during endoscopic procedures significantly reduces pain at the injection site, lowers propofol dosages, and decreases complications from sedation (e.g., hypotension, desaturation) without producing an increased incidence of thrombophlebitis or any other clinically significant adverse events(4,5).

Despite the strong international evidence regarding the use of intravenous xylocaine during gastrointestinal endoscopy, there is currently limited information regarding local implementation and real-world effectiveness of this technique when it is used in hospitals across Pakistan, particularly in those hospitals with standardized protocols for the administration of anesthetics. Given the strong evidence supporting the use of intravenous lidocaine along with the high acceptance rate within the anesthetic community, this descriptive cross-sectional study will also quantify the effectiveness of intravenous lidocaine in alleviating pain associated with the administration of propofol, establish benchmarks that will help to establish guidelines for hospitals' anesthetic practice, and assist in establishing standards for what constitutes best current evidence.

**Methodology:**

A descriptive cross-sectional study was conducted at the Department of Anesthesia at Ittefaq Hospital Trust Lahore for six months from 01 October 2024 till 31 March 2025 with IRB approval. The study's purpose was to investigate whether intravenous Xylocaine reduces the amount of pain associated with using propofol for general anesthesia during short surgical procedures.

The study required a sample size of 150 patients based on a 95% confidence level, 5% margin of error, and the frequency of pain occurring at a rate of 14% from previous studies(6). Patients were be selected using a non-probability consecutive sampling technique.

Patients were be eligible for inclusion in the study if they are 18-60 years old, of either gender, ASA physical status I or II, and having a short-length surgical procedure under general anesthesia (i.e., appendectomy, laparoscopic cholecystectomy, and tonsillectomy). Patients who meet any one of the following criteria were be excluded from the study: history of hypertension; known allergic reaction to either soya, egg, or other food products; chronic kidney disease; elevated creatinine (>1.2 mg/dl); total bilirubin of > 2.0 mg/dl; second- or third-degree AV block.

Informed consent was to be gathered from all subjects after getting approval from the Ethical Review Committee of the Hospital. Demographics (age, sex, body mass index (BMI), ASA level) was put into a manual where they were to be entered into a document made especially for this study.

An 18 or 20-gauge IV was placed in the dorsal side of the hand and connected to a Lactated Ringer's solution upon patient arrival to the operating room. Patients was monitored with standard ASA monitoring consisting of EKG, NIBP, and SpO2.

A rubber tourniquet was placed approximately 2 inches above the elbow joint to stop venous drainage from that area. 2% intravenous regional Xylocaine was given to the patient before the procedure (40 mg (2 ml) over 5-10 seconds). The tourniquet was released 60 seconds after administration of the Xylocaine. At the same time after the release of the tourniquet, an injection of propofol was given (0.5 mg/kg) over a period of 5 seconds. The patient was asked about the pain level associated with the propofol after this step, and pain was evaluated using a VAS. A VAS score of greater than 3 indicated that Xylocaine was

effective. If the score is less than 3, the Xylocaine was ineffective.

The data collected from this study were entered and analyzed using the Statistical Package for Social Sciences (SPSS) version 26. Quantitative variables, including age and BMI, were reported as median (with Interquartile Range (IQR)) as the data were not normally distributed. Qualitative variables, including gender, ASA status, type of procedure, VAS score, and efficacy of Xylocaine, were reported as frequency (%) within each category. Data were stratified by ASA status and type of procedure to evaluate the efficacy of Xylocaine by group. All results will be presented in the form of tables and figures.

**Results:**

Study participants had a mean age of 42.00 years (Interquartile range 17.25 years), a mean BMI of 25.65 kg/m² (Interquartile range 5.83 kg/m²).

**Table I: Demographic Characteristics of Patients Undergoing General Anesthesia (n = 150)**

| Variable | Median (IQR) |
|---|---|
| Age (Years) | 42.00 (17.25) |
| BMI (kg/m²) | 25.65 (5.83) |

*IQR = Interquartile Range*

Eighty-eight (58.7%) of the 150 patients studied were male; 62 (41.3%) were female. Fifty-two percent (79/150) were classified as ASA class II, while 71 (47.3%) were classified as class I under ASA classification.

The most frequently performed procedures were tonsillectomy (55 patients, 36.7%), followed by appendectomy (54 patients, 36.0%), and laparoscopic cholecystectomy (41 patients, 27.3%). Using the Visual Analogue Scale (VAS), most patients experienced lower pain scores than a VAS score of 2 (n=37; 24.7%). Overall efficacy for IV Xylocaine for decreasing propofol-induced pain was noted in 76.0% of the sample (n=114), while the remaining 24.0% of patients experienced no therapeutic benefit.

**Table II: Categorical Demographic and Clinical Characteristics of Patients Undergoing General Anesthesia (n = 150)**

| Variable | Category | n (%) |
|---|---|---|
| Gender | Female | 62 (41.3) |
| | Male | 88 (58.7) |
| ASA Status | I | 71 (47.3) |
| | II | 79 (52.7) |
| Type of Procedure | Appendectomy | 54 (36.0) |
| | Laparoscopic Cholecystectomy | 41 (27.3) |
| | Tonsillectomy | 55 (36.7) |
| VAS Score | 0 | 26 (17.3) |
| | 1 | 26 (17.3) |
| | 2 | 37 (24.7) |
| | 3 | 25 (16.7) |
| | 4 | 9 (6.0) |
| | 5 | 8 (5.3) |
| | 6 | 8 (5.3) |
| | 7 | 3 (2.0) |
| | 8 | 8 (5.3) |
| Efficacy | Yes | 114 (76.0) |
| | No | 36 (24.0) |

*VAS= Visual Analogue Scale*

Xylocaine's effectiveness was confirmed by observing successful outcomes in 55/71 patients classified as ASA category I, while 16 patients who did not achieve success did exhibit a lack of efficacy. For ASA category II patients, 59/79 subjects demonstrated efficacy with Xylocaine, while 20 patients failed to achieve any clinical success.

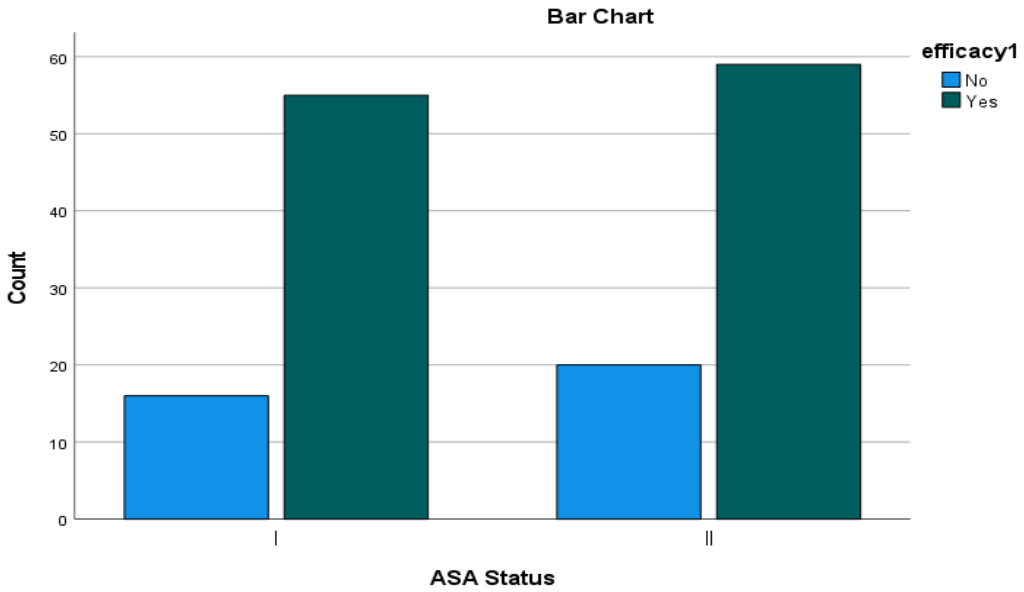


**Figure 1: Efficacy Of Xylocaine Across Different ASA Classes**

The type of surgical procedure performed also shows evidence of efficacy/inefficacy; for example, of the 54 subjects undergoing appendectomy, there were 37 successful and 17 failures; with laparoscopic cholecystectomy, the results were 34/41 successful and 7 not successful; finally, patients undergoing tonsillectomy and treated with Xylocaine resulted in 43/55 successful and 12 unsuccessful outcomes.

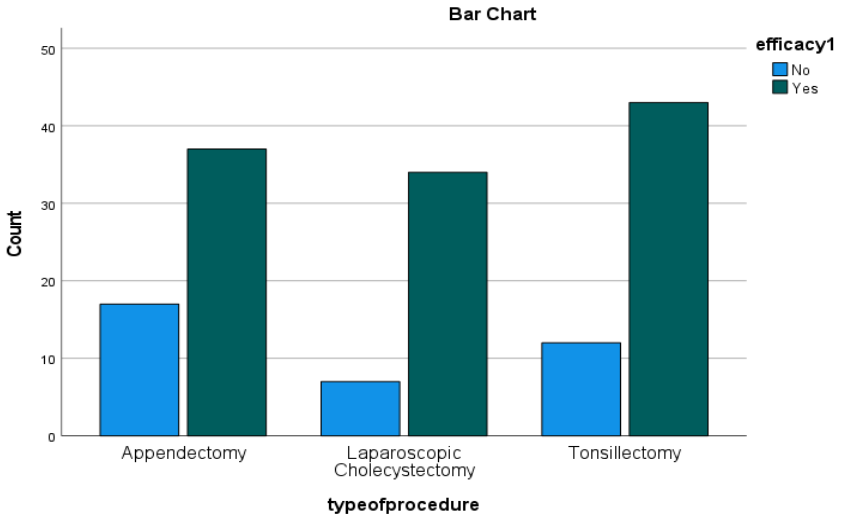


**Figure 2: Efficacy of Xylocaine in Different Procedures**

**Discussion:**

Findings from a current cross-sectional study show that the use of intravenous xylocaine (lidocaine) resulted in lower rates of pain occurring with propofol injections for patients having one of 3 different types of surgical procedures. Overall, 114 out of the 150 (76.0%) patients suffered less pain following propofol injections with intravenous xylocaine. Of the patients, 24.0% did not have a noticeable decrease in their pain. The median age of the participants was 42 years (IQR 17.25), the median body mass index (BMI) was 25.65 kg/m$^2$ (IQR 5.83), and the majority of the patients were male (58.7%). Approximately 50/50 split between ASA I (47.3%) and ASA II (52.7%). The most common procedures in the mixed surgical group were tonsillectomy (36.7%, n=55), appendectomy (36.0%, n=54), and laparoscopic cholecystectomy (27.3%, n=41). The most commonly recorded description of pain at VAS = 2 occurred for 118 of 150 (78.7%) patients and represented evidence that the majority of patients (74 of 83 (89%)) reported fairly mild-to-moderate discomfort immediately after receiving induction of anesthesia.

Intravenous Lidocaine reduces the incidence of propofol-induced pain by about 30-40% compared to placebo according to the findings of high-quality meta-analyses performed from 2024 - 2025, which was correlated with a number needed to

treat (NNT) of approximately three to four to prevent one episode of injection pain(7). A recent meta-analysis focused on endoscopy (total n = 1,700; 17 randomized trials) has demonstrated that pretreatment with intravenous Lidocaine has decreased the overall incidence of pain from approximately sixty-four percent in control subjects to thirty percent in those receiving Lidocaine treatment for an absolute risk reduction of thirty-four percent and relative risk reduction greater than fifty percent(8). Furthermore, the study reports an efficacy rate of seventy-six percent, which would appear to suggest a higher percentage than that which has typically been reported (i.e., approximately sixty percent to seventy percent) in the literature using Lidocaine pretreatment or admixture before intravenous propofol anesthesia(9). This discrepancy may be secondary to a difference in the definition of endpoints (e.g., clinician's subjective global assessment; strict VAS-0 or no-pain thresholds) or in dose/techniques (e.g., site of cannulation; venous occlusion; concentration).

Recent RCTs in adults have demonstrated that IV lidocaine reduced the number of adult patients experiencing moderate to severe pain by 40-60% compared to patients who do not receive lidocaine infusions(10). In one 2020 study, 89.1% of bariatric patients who received lidocaine experienced mild pain post-operatively compared to only 49.1% of control patients(11). In the study, the authors estimated efficacy using the order of pain on the VAS scale from mild to severe, while in the present study, efficacy was defined as the percentage of patients who had a complete resolution in pain (total abolition of pain)(12). Therefore, the absence of a control group and use of a VAS scale for outcome determination in the present study may result in an overestimation of the effects of lidocaine infusions, as 24% (of 52%) of patients in the present study who were classified as “ineffective” may well have had their pain reduced from severe to moderate; however, they were not completely pain free.

Another study demonstrated comparable efficacy of lidocaine for propofol-induced pain between patients in ASA I (55/71; 77.5%) and ASA II (59/79; 74.7%), indicating that being classified as an ASA II patient with mild systemic comorbidity provides little to no effect on the analgesic effect of lidocaine(13). Other ASA-adjustment studies in abdominal and orthopedic surgeries indicate that ASA II patients tend to have slightly higher baseline levels of morbidity than ASA I patients; however, ASA II patients can generally obtain similar perioperative outcomes compared to ASA I patients if their morbidities are well-controlled(14). In relation to our patient population, the primary determinant of efficacy with lidocaine was the nociceptive pathway within the vein wall where lidocaine was administered, rather than due to underlying cardiovascular or metabolic disequilibrium, because there was only

a 2.8% difference in efficacy between ASA I and ASA II(15). Due to the design of the present study being cross-sectional in nature and underpowered for subgroup analysis, further research conducted by means of a prospective randomized trial that stratifies patients based on ASA classification to corroborate the finding of true ASA-invariance is warranted.

In our cohort, the analysis based on the kind of surgery shows high efficacy for tonsillectomy at 78.2% (43 out of 55 procedures), for appendectomy at 68.5% (37 out of 54 procedures), and for laparoscopic cholecystectomy at 82.9% (34 out of 41 procedures). Current studies have found that pain scores during induction using standard formulations of propofol for laparoscopic and open abdominal surgery share similar baseline values on the VAS (visual analogue scale), generally around a pain score of 3 to 5, with not much in terms of a preventive strategy for pain(16,17). There is also recent evidence from various trials showing that patients who received lidocaine before laparoscopic and open abdominal surgery generally achieved VAS scores of 1 to 2, while those who did not receive lidocaine before their procedures typically had VAS scores of 3 to 4; thus, our experience of a VAS measurement of 2 was most likely influenced by this effect(18,19). The lower efficacy of 68.5% compared to the other procedures could perhaps be attributed to methodological differences, particularly if distal dorsal arm/hand veins were utilized more commonly for induction in appendectomies, given that the incidence of severe pain relative to injections cannot be overlooked and would work against lidocaine's analgesic effect when performed at a greater frequency than traditional cephalic/dimensional methods used during both tonsillectomies and laparoscopic cholecystectomies.

**Limitations of the Study:**

This study was designed to provide real-world data and to demonstrate that results could be applied generally to surgical settings and practices by including a wide variety of surgical patients (e.g., different ASA classifications, different venous sites). This also increases the external validity of the findings across the entire general-surgery community. However, because of the study's cross-sectional design, lack of randomized controlled prospective arm, and size limitation (n = 150), there are major limitations to the inferential statistics strengths, particularly when comparing subgroups (i.e., ASA I versus ASA II, and procedure-specific efficacy). Current guidelines suggest that the highest quality evidence regarding the analgesic effect of lidocaine on propofol-induced pain should be obtained from double-blind randomized controlled trials or large meta-analyses rather than from single-cohort observational studies because venous site, inflammatory response, and baseline anxiety can influence pain outcomes for all types of surgeries. In addition, the study used a single post-induction VAS as the only measurement of pain; therefore, it did not account for other commonly used outcome measures in anesthesia trials, such as repeated VAS ratings at set time intervals, the need for additional pain medication, lack of movement (how much did the patient move?), or changes in blood pressure during surgery.

**Conclusion:**

Intravenous administration of Xylocaine showed effectiveness at significantly reducing pain for patients receiving propofol for short-term surgical procedures with general anesthesia. Most of the patients had higher VAS numbers after receiving Xylocaine before their procedure, with efficacy overall noted in 76% of the total population studied. This method was found to be effective across all ASA classifications and procedure types; therefore indicated broad clinical use. Intravenous Xylocaine administration before the procedure is easy to do, cost-effective, and simple to administer, therefore a practical option for use in routine anesthesia practice. Regular use of this method may improve patient comfort and satisfaction during anesthesia induction and effectively decrease procedural distress during the procedure.

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