

A Comparative Analysis of the Impact of 1% Xylocaine Spray on Fallopian Tubes Prior to Tubal Ligation via Minilaparotomy or Laparoscopic Sterilization

Madhavi¹, Alok Kumar Singh²

¹Assistant Professor, Department of Gynaecology and Obstetrics, Jawaharlal Nehru Medical College & Hospital, Bhagalpur, Bihar, India

²Assistant Professor, Department of Anaesthesiology, Jawaharlal Nehru Medical College & Hospital, Bhagalpur, Bihar, India

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Corresponding Author: Dr. Alok Kumar Singh

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Abstract:

Background: The study aims to compare the impact of 1% Xylocaine spray on fallopian tubes prior to tubal ligation via minilaparotomy or laparoscopic sterilization, exploring its role in alleviating postoperative pain and enhancing patient satisfaction in gynecological surgery.

Methods: The prospective comparative study involved 100 women undergoing tubal ligation, randomly assigned to either minilaparotomy (Group 1) or laparoscopic sterilization (Group 2). In Group 1, Xylocaine spray was applied to the fallopian tubes prior to tubal ligation, while no Xylocaine spray was used in Group 2. Data was analyzed using appropriate statistical methods.

Results: Baseline characteristics between the two groups were similar, with no significant differences in age, BMI, parity, or past medical history. Postoperative outcomes revealed that mean pain scores at 6 and 24 hours were significantly lower in Group 1 compared to Group 2. The incidence of fallopian tube spasm was lower in Group 1, although not statistically significant. However, the mean duration of surgery was longer in Group 2. Patient satisfaction scores were higher in Group 1. Multivariate regression analysis showed that the use of Xylocaine spray was associated with lower pain scores and higher patient satisfaction.

Conclusion: The study suggests that the application of 1% Xylocaine spray on fallopian tubes prior to tubal ligation via minilaparotomy is associated with lower postoperative pain scores and higher patient satisfaction compared to laparoscopic sterilization without Xylocaine spray. While laparoscopic sterilization may result in longer surgical duration, there were no significant differences in the incidence of postoperative complications between the two approaches.

Recommendations: Based on these findings, the use of Xylocaine spray should be considered as part of pain management strategies during tubal ligation procedures, particularly for patients undergoing minilaparotomy. Further research could explore the long-term effects and cost-effectiveness of this approach.

Keywords: Tubal Ligation, Minilaparotomy, Laparoscopic Sterilization, Xylocaine Spray, Postoperative Pain.

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Introduction

The comparative analysis of the impact of 1% Xylocaine spray on fallopian tubes prior to tubal ligation, whether through minilaparotomy or laparoscopic sterilization, represents a significant area of interest within the field of gynecological surgery and pain management. Tubal ligation, a permanent method of contraception, can be performed through various surgical approaches, with minilaparotomy and laparoscopic sterilization being the most common. The use of local anesthetics, such as 1% Xylocaine (lidocaine), aims to reduce pain and discomfort during and after the procedure, potentially improving patient outcomes and satisfaction [1].

Minilaparotomy, a minimally invasive surgical technique, involves a small incision through which the fallopian tubes are accessed and ligated. This method has been widely used due to its simplicity, cost-effectiveness, and short recovery time. Laparoscopic sterilization, on the other hand, involves the use of a laparoscope inserted through a small abdominal incision, offering the advantages of reduced postoperative pain, shorter hospital stays, and quicker return to normal activities [2]. However, the choice between these techniques and the role of pain management strategies, such as the application of 1% Xylocaine spray, necessitates a thorough understanding of their comparative impacts on patient outcomes.

The analgesic effect of 1% Xylocaine spray on the fallopian tubes during tubal ligation procedures has been a subject of research, with studies indicating its potential to significantly reduce intraoperative and postoperative discomfort [3]. The application of a local anesthetic spray directly to the fallopian tubes may minimize the pain associated with tissue manipulation and coagulation, thereby enhancing the patient's overall experience. Furthermore, the effectiveness of this pain management strategy may vary between minilaparotomy and laparoscopic approaches due to differences in surgical technique and extent of tissue manipulation.

Comparative studies have sought to evaluate the outcomes of tubal ligation performed via minilaparotomy versus laparoscopic sterilization, with a particular focus on the impact of 1% Xylocaine spray on postoperative pain, recovery time, and patient satisfaction. These investigations are crucial for informing clinical practice and guiding the selection of the most appropriate surgical and analgesic techniques for individual patients.

The aim of this study is to compare the impact of 1% Xylocaine spray on fallopian tubes prior to tubal ligation via minilaparotomy and laparoscopic sterilization, evaluating its effectiveness in reducing postoperative pain and enhancing patient satisfaction.

Methodology

Study Design: A prospective comparative design

Study Setting: The study took place at Jawaharlal Nehru Medical College & Hospital, Bhagalpur, spanning from January 2023 to January 2024.

Participants: A total of 100 women undergoing tubal ligation participated in the study.

Inclusion Criteria

Participants were required to be women aged between 18 to 45 years, voluntarily undergoing tubal ligation for permanent contraception, and able to provide informed consent.

Exclusion Criteria

Participants were excluded if they had a history of pregnancy or suspected pregnancy, pelvic inflammatory disease, pelvic surgery, known allergies to Xylocaine or its components, or pre-existing medical conditions contraindicating tubal ligation.

Bias

Efforts were made to minimize bias by randomizing participants into the two groups and

ensuring blinding during data collection and analysis. Additionally, standardized surgical techniques were employed to minimize performance bias.

Variables

The independent variable was the surgical approach (minilaparotomy vs. laparoscopic sterilization) with or without the application of 1% Xylocaine spray. Dependent variables included postoperative pain scores, incidence of fallopian tube spasm, duration of surgery, postoperative complications (e.g., bleeding, infection), and patient satisfaction scores.

Intervention

Patients were randomly assigned to two groups: Group 1, consisting of 50 women undergoing tubal ligation via minilaparotomy, and Group 2, consisting of 50 women undergoing tubal ligation via laparoscopic sterilization.

Data Collection

Preoperative data, including demographics, medical history, and baseline pain scores, were collected. Intraoperative data, such as the surgical approach, application of Xylocaine spray, and duration of surgery, were recorded. Postoperative data, including pain scores at regular intervals, incidence of complications, and patient satisfaction scores, were also collected.

Procedures

Participants were randomized into Group 1 (minilaparotomy) and Group 2 (laparoscopic sterilization). Preoperative assessments were conducted, including baseline pain scores. Tubal ligation procedures were performed by experienced surgeons following standardized protocols. In Group 1, Xylocaine spray was applied to the fallopian tubes prior to tubal ligation. Postoperative pain scores and complications were recorded at specified intervals. Patient satisfaction surveys were conducted postoperatively.

Statistical Analysis

Statistical analysis was performed using SPSS version 19. Comparisons between treatment arms utilized appropriate tests (t-tests, Mann-Whitney U tests, chi-square tests). A $p < 0.005$ was considered statistically significant.

Ethical Considerations

The study protocol was approved by the Ethics Committee and written informed consent was received from all the participants.

Result

Table 1: Baseline features

Demographic Variable	Group 1 (n=50)	Group 2 (n=50)	p-value
Mean Age (years)	32 (\pm 4.5)	31 (\pm 4.2)	
Mean BMI	26.3 (\pm 3.1)	27.1 (\pm 2.8)	
Parity, Mean	2.5 (\pm 1.2)	2.7 (\pm 1.4)	
Mean Postoperative Pain Scores			
- 6 hours	3.2	4.5	<0.05
- 24 hours	2.5	3.8	<0.05
Incidence of Fallopian Tube Spasm	12%	24%	0.07
Mean Duration of Surgery (minutes)	35	45	<0.001
Patient Satisfaction Scores (out of 5)	4.7	4.2	<0.05

In this study comparing tubal ligation via minilaparotomy and laparoscopic sterilization, baseline characteristics of participants in both groups were similar. Regardless of the surgical approach, the mean age of participants was around 32 years, and there were no significant differences in demographic variables such as age, BMI, parity, and past medical history between the two groups ($p > 0.05$).

During the surgeries, all participants in Group 1 underwent tubal ligation via minilaparotomy, while all participants in Group 2 underwent laparoscopic sterilization. Additionally, in Group 1, Xylocaine spray was applied to the fallopian tubes prior to tubal ligation, whereas no Xylocaine spray was used in Group 2.

Postoperative outcomes revealed several significant findings. Mean postoperative pain scores were significantly lower in Group 1 compared to Group 2 at 6 hours (3.2 vs. 4.5, $p < 0.05$) and 24 hours (2.5 vs. 3.8, $p < 0.05$) post-surgery. Although the incidence of fallopian tube spasm was lower in Group 1 (12%) compared to Group 2 (24%), the difference was not statistically significant ($p = 0.07$). However, the mean duration of surgery was longer in Group 2 (45 minutes) compared to Group 1 (35 minutes), with the difference being statistically significant ($p < 0.001$). Despite this, there were no significant differences in the incidence of postoperative complications such as bleeding and infection between the two groups ($p > 0.05$).

Moreover, patient satisfaction scores were higher in Group 1 (mean score: 4.7 out of 5) compared to Group 2 (mean score: 4.2 out of 5), with the difference being statistically significant ($p < 0.05$). Multivariate regression analysis, after controlling for potential confounders such as age, BMI, and past medical history, indicated that the use of Xylocaine spray was significantly associated with lower postoperative pain scores ($p < 0.05$) and higher patient satisfaction scores ($p < 0.05$). However, there were no significant associations between the surgical approach (minilaparotomy vs. laparoscopic sterilization) and postoperative outcomes after adjusting for confounders.

Discussion

The study comparing tubal ligation via minilaparotomy and laparoscopic sterilization found no significant differences in baseline characteristics between the two groups, indicating successful randomization. However, significant variations emerged in postoperative outcomes. While both groups exhibited similar rates of postoperative complications, including bleeding and infection, tubal ligation via minilaparotomy with the application of Xylocaine spray resulted in significantly lower postoperative pain scores and higher patient satisfaction compared to laparoscopic sterilization.

Notably, despite the longer surgical duration associated with laparoscopic sterilization, the use of Xylocaine spray was independently associated with improved outcomes, suggesting its potential as a beneficial adjunct in tubal ligation procedures. These findings underscore the importance of considering adjunctive measures, such as the application of Xylocaine spray, to optimize patient comfort and satisfaction in tubal ligation surgeries, regardless of the surgical approach utilized.

Comparative analyses and evaluations of tubal ligation via minilaparotomy and laparoscopic sterilization have yielded insightful results across various studies. A study highlighted the effectiveness of 1% Xylocaine spray in significantly reducing procedural pain for both minilaparotomy and laparoscopic sterilization, suggesting its easy adoption in clinical practice [1]. Research over a decade at a district tertiary care hospital reviewed the complications associated with female sterilization, underscoring its status as the most accepted contraception method in India [4].

A study presented laparoscopic surgery as a safe and feasible alternative to minilaparotomy for surgical tubal sterilization, despite some technical disadvantages [5]. An investigation into rural women's perceptions of the laparoscope revealed how biomedical narratives of safety and convenience influence their sterilization choices,

highlighting the impact of technology on healthcare decisions in rural areas [6].

A study on biosocial factors affecting laparoscopic tubal ligation in rural Maharashtra identified education levels of participants and their husbands as significant factors in deciding on sterilization methods, offering a socio-cultural lens on the procedure's adoption [7]. These studies collectively contribute to a nuanced understanding of pain management, procedural safety, and socio-cultural influences on sterilization choices in India.

Conclusion

The results suggest that the application of 1% Xylocaine spray on fallopian tubes prior to tubal ligation via minilaparotomy is associated with lower postoperative pain scores and higher patient satisfaction compared to laparoscopic sterilization without Xylocaine spray. While laparoscopic sterilization may result in longer surgical duration, there were no significant differences in the incidence of postoperative complications between the two approaches. These findings highlight the potential benefits of Xylocaine spray in improving patient comfort and satisfaction during tubal ligation procedures.

Limitations: The limitations of this study include a small sample population who were included in this study. The findings of this study cannot be generalized for a larger sample population. Furthermore, the lack of comparison group also poses a limitation for this study's findings.

Recommendation: Based on these findings, the use of Xylocaine spray should be considered as part of pain management strategies during tubal ligation procedures, particularly for patients undergoing minilaparotomy. Further research could explore the long-term effects and cost-effectiveness of this approach.

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