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CLINICAL STUDY OF LAPAROSCOPIC FEMALE STERILIZATION AT A TERTIARY HEALTH CARE CENTRE

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ABSTRACT

Background: Laparoscopic female sterilization is a widely accepted permanent contraceptive method in India. Its safety depends on appropriate client selection, counselling, operative skill, facility preparedness, and adherence to standard guidelines. Present study was aimed to study the sociodemographic profile, clinical characteristics, procedural details, intraoperative difficulties, postoperative complications, and outcomes among women undergoing laparoscopic female sterilization at a tertiary health care centre. **Methods:** This prospective observational study was conducted in the Department of Obstetrics and Gynaecology, Government Medical College, Chh. Sambhajinagar, Maharashtra from April 2024 to March 2026. A total of 159 women undergoing laparoscopic sterilization were included. **Results:** The largest age group was 29–31 years, contributing 51 women (32.08%). Rural women constituted 102 cases (64.15%). Secondary education was reported in 61 women (38.36%), and lower middle socioeconomic class was seen in 58 women (36.48%). Post-abortal sterilization was performed in 84 women (52.83%), while interval sterilization was performed in 75 women (47.17%). Two living children were present in 89 women (55.97%). General anesthesia was used in all cases. Operative time was 15–20 minutes in 82 cases (51.57%). Adhesions were present in 66 cases (41.51%). Intraoperative complications occurred in 4 cases (2.52%), postoperative complications in 11 cases (6.92%), and conversion to minilaparotomy in 2 cases (1.26%). Successful completion was achieved in 157 cases (98.74%). **Conclusion:** Laparoscopic female sterilization is a safe, effective, and acceptable permanent contraceptive method for women who have completed their family size. It showed high procedural success, low complication rates, early recovery, shorter hospital stay, and better patient comfort. With proper counselling, patient selection, trained personnel, and adequate facility preparedness, it should be preferred wherever feasible.

KEYWORDS

Female Sterilization, Laparoscopic Sterilization, Tubal Ligation, Falope Ring, Family Planning, Postoperative Complications.

INTRODUCTION

Family planning is a central component of reproductive health and contributes to reduction of unintended pregnancies, unsafe abortions, maternal morbidity, and maternal mortality. The World Health Organization recognizes contraception as an essential public health intervention that enables women and couples to decide the number and spacing of children.[1] In India, female sterilization continues to dominate the contraceptive method mix. NFHS-5 reported female sterilization as the most commonly used modern contraceptive method among currently married women in India, with prevalence of 37.9%, while Maharashtra reported female sterilization as the leading contraceptive method at approximately 40%.[2,3] This reflects the continued reliance on permanent contraception after completion of desired family size.

Laparoscopic female sterilization is a minimally invasive permanent contraceptive procedure that occludes the fallopian tubes and prevents fertilization. Compared with conventional abdominal tubal ligation, laparoscopy offers smaller incision, shorter hospital stay, early ambulation, reduced postoperative discomfort, better cosmetic outcome, and faster return to routine activities. However, it requires trained personnel, appropriate equipment, anesthesia support, emergency preparedness, and strict aseptic precautions. The Government of India has laid down standards for female sterilization services, emphasizing client eligibility, voluntary informed consent, preoperative evaluation, surgical safety, postoperative observation, documentation, and follow-up.[4] These standards are essential because sterilization is a permanent procedure and can be associated with complications, failure, regret, and medico-legal concerns.

Tertiary care centres play an important role in providing laparoscopic sterilization services, training surgeons, managing difficult cases, and monitoring quality of family planning services. Evaluation of institutional outcomes is therefore necessary to assess the profile of acceptors, technical feasibility, perioperative difficulties, complication rates, and procedural success. The present study was undertaken with the aim of studying the clinical profile, procedural outcomes, and complications of laparoscopic female sterilization performed at a tertiary health care centre.

Materials and Methods

This was a prospective, hospital-based observational study conducted in the Department of Obstetrics and Gynaecology, Government Medical College, Chh. Sambhajinagar, Maharashtra. The study was conducted over a period of 24 months from April 2024 to March 2026. Study was approved by institutional ethical committee.

Inclusion criteria

- Age between 22 and 45 years
- Completed family
- At least one living child
- Willing to undergo permanent contraception
- Provided written informed consent
- Declared medically fit for laparoscopic surgery

Exclusion criteria

- Previous sterilization
- Active pelvic infection
- Severe uncontrolled medical disorder
- Severe anemia or uncorrected systemic illness
- Contraindication to anesthesia or laparoscopic surgery
- Refusal to provide written informed consent

The study population included women attending the outpatient department or admitted to the Department of Obstetrics and Gynaecology for elective laparoscopic female sterilization under the National Family Welfare Programme or institutional family planning services. Preoperative evaluation included detailed demographic, menstrual, obstetric, contraceptive, medical, and surgical history. Clinical examination included general examination, systemic examination, abdominal examination, and pelvic examination where indicated. Hemoglobin estimation, urine pregnancy test, blood group, urine routine examination, random blood sugar, viral markers, and other investigations were performed according to institutional protocol and clinical need. Women with comorbidities or previous abdominal surgery were assessed carefully for operative risk. Anesthesia fitness was obtained before surgery.Counselling was

provided regarding the permanent nature of sterilization, possibility of failure, risk of ectopic pregnancy, alternative contraceptive methods, surgical risks, and need for follow-up. Written informed consent was obtained in the local language. The procedure was performed under general anesthesia. Laparoscopic sterilization was done by the double-port technique. After creation of pneumoperitoneum, pelvic organs were visualized, fallopian tubes were identified, and tubal occlusion was performed using standard technique. Intraoperative findings such as adhesions, non-visualization of tube, mesosalpinx injury, need for conversion, and other complications were documented. Patients were monitored postoperatively for pain, fever, vomiting, bleeding, wound discharge, port-site infection, ambulation time, duration of hospital stay, and final outcome.

Data were entered into a master chart and analyzed using descriptive statistics. Categorical variables were expressed as frequency and percentage.

RESULTS

During study period, total of 159 women underwent laparoscopic female sterilization while 87 women underwent sterilisation by minilaparotomy.

In present study, age group of 29–31 years contributed 51 women (32.08%), followed by 26–28 years with 46 women (28.93%). Rural residence was present in 102 women (64.15%). Secondary education was reported in 61 women (38.36%), and 58 women (36.48%) belonged to the lower middle socioeconomic class.

Table 1. Sociodemographic profile of women undergoing laparoscopic sterilization

Variable	Category	Number	Percentage (%)
Age group	23–25 years	24	15.09
	26–28 years	46	28.93
	29–31 years	51	32.08
	32–34 years	27	16.98
	35–37 years	11	6.92
Residence	Rural	102	64.15
	Urban	57	35.85
Socioeconomic class	Upper	6	3.77
	Upper middle	23	14.47
	Lower middle	58	36.48
	Upper lower	54	33.96
	Lower	18	11.32

Among interval sterilization cases, para 3 women constituted 30 cases (40.00%) and para 2 women constituted 29 cases (38.67%). Two living children were present in 89 women (55.97%), while three living children were present in 50 women (31.45%).

Table 2. Obstetric profile

Variable	Category	Number	Percentage (%)
Gravida status among post-abortal cases	Gravida 3	31/84	36.90
	Gravida 4	20/84	23.81
	Gravida ≥5	33/84	39.29
Parity among interval cases	Para 1	3/75	4.00
	Para 2	29/75	38.67
	Para 3	30/75	40.00
	Para ≥4	13/75	17.33
Number of living children	1	3	1.89
	2	89	55.97
	3	50	31.45
	4 or more	17	10.69
Previous LSCS	Present	68	42.77
Previous abdominal surgery other than LSCS	Present	11	6.92

Post-abortal sterilization was performed in 84 women (52.83%), while interval sterilization was performed in 75 women (47.17%). Completed family was reported as an indication in 148 women (93.1%), and desire for a permanent method was present in 140 women (88.1%).

Table 3. Timing and indications of laparoscopic sterilization

Variable	Category	Number	Percentage (%)
Type of sterilization	Post-abortal	84	52.83
	Interval	75	47.17
Interval from last childbirth/abortion	Immediate post-abortal	84	52.83
	<1 year	3	1.89
	1–3 years	23	14.47
	>3 years	49	30.82
Indication / reason*	Completed family	148	93.1
	Desire for permanent method	140	88.1
	Convenience as one-time procedure	132	83.0
	Doctor's advice / counselling	120	75.5
	Minimally invasive procedure	110	69.2
	Short hospital stay	104	65.4
	Failure/dissatisfaction with temporary methods	82	51.6

*Multiple responses were allowed

Table 4. Previous contraceptive use and source of motivation

Variable	Category	Number	Percentage (%)
Previous contraceptive use	Yes	127	79.87
	No	32	20.13
Method used among previous users	Oral contraceptive pills	42/127	33.07
	Barrier methods	41/127	32.28
	IUCD	32/127	25.20
	Injectable contraception	9/127	7.09
Duration of contraceptive use	<1 year	13/127	10.24
	1–3 years	37/127	29.13
	3–5 years	48/127	37.80
	>5 years	29/127	22.83
Source of motivation*	Doctor / healthcare provider	132	83.0
	ASHA / ANM / health worker	118	74.2
	Husband	96	60.4
	Family members	88	55.3

*Multiple responses were allowed.

Previous contraceptive use was reported in 127 women (79.87%). Oral contraceptive pills were used by 42 women (33.07% of previous users), barrier methods by 41 women (32.28%), and IUCD by 32 women (25.20%). Healthcare providers were the source of motivation in 132 women (83.0%).

Normal BMI was present in 106 women (66.67%), while overweight and obesity were present in 32 women (20.13%) and 12 women (7.55%), respectively. Medical comorbidity was present in 27 women (16.98%). Hemoglobin between 9.1 and 11 g/dL was seen in 89 women (55.97%).

Table 5. Preoperative clinical profile

Variable	Category	Number	Percentage (%)
BMI category	<18.5 kg/m²	9	5.66
	18.5–24.9 kg/m²	106	66.67
	25–29.9 kg/m²	32	20.13
	≥30 kg/m²	12	7.55
Medical comorbidity	Absent	132	83.02
	Present	27	16.98
Specific comorbidity*	Anemia	12	7.55
	Hypertension	8	5.03
	Diabetes mellitus	5	3.14
	Thyroid disorder	4	2.52
Hemoglobin	7–9 g/dL	12	7.55
	9.1–11 g/dL	89	55.97
	>11 g/dL	58	36.48

*More than one comorbidity could be present.

General anesthesia was used in all 159 women (100%). Operative time was 15–20 minutes in 82 women (51.57%), while 38 women (23.90%) required more than 20 minutes. Adhesions were absent in 93 women (58.49%), mild adhesions were present in 45 women (28.30%), and dense adhesions were present in 21 women (13.21%).

Table 6. Operative details and intraoperative findings

Variable	Category	Number	Percentage (%)
Type of anesthesia	General anesthesia	159	100.00
Operative time	<15 minutes	39	24.53
	15–20 minutes	82	51.57
	>20 minutes	38	23.90
Intraoperative finding	No adhesions / easy procedure	93	58.49
	Mild adhesions	45	28.30
	Dense adhesions	21	13.21
Conversion to minilaparotomy	Yes	2	1.26
	No	157	98.74

Intraoperative complications were absent in 155 women (97.48%). Postoperative complications were absent in 148 women (93.08%). Port-site pain was seen in 4 women (2.52%), port-site infection in 2 women (1.26%), and nausea/vomiting in 2 women (1.26%). Successful completion was achieved in 157 women (98.74%).

Table 7. Complications, recovery, and final outcome

Variable	Category	Number	Percentage (%)
Intraoperative complication	None	155	97.48
	Mesosalpinx injury	3	1.89
	Right-sided fallopian tube not visible	1	0.63
Postoperative course	No complication	148	93.08
	Complication present	11	6.92
Type of postoperative complication	Port-site pain	4	2.52
	Port-site infection	2	1.26
	Nausea/vomiting	2	1.26
	Fever	1	0.63
	Intra-abdominal hemorrhage requiring laparotomy	1	0.63
	Shoulder tip pain	1	0.63
Hospital stay	48–72 hours	153	96.23
	>72 hours	6	3.77
Time to ambulation	Within 6 hours	96	60.38
	6–12 hours	47	29.56
	>12 hours	16	10.06
Final outcome	Successful	157	98.74
	Failed	2	1.26

DISCUSSION

The present prospective observational study evaluated 159 women undergoing laparoscopic female sterilization at a tertiary health care centre. The study showed that laparoscopic sterilization was most commonly accepted by women in the late reproductive age group after completion of desired family size. Most women belonged to the 29–31-year age group (32.08%), with a mean age of 29.15 ± 3.37 years. This age profile is comparable with the rural Maharashtra study by Nagapurkar et al.,[5] where the mean age of women undergoing laparoscopic tubal ligation was 26.37 ± 3.82 years. Vaishnav et al.,[9] also reported that most women undergoing single-puncture laparoscopic tubal ligation were in the 21–30-year age group. These findings indicate that women generally choose permanent contraception after reaching reproductive and family-size goals in the late twenties or early thirties.

Rural women constituted 64.15% of the present study population. Nagapurkar et al.,[5] from rural Maharashtra also reported that laparoscopic tubal ligation acceptors were predominantly from rural backgrounds. This finding reflects the major role of public health facilities and tertiary care centres in providing family planning services to rural populations. In the present study, lower middle and upper lower socioeconomic classes together constituted 70.44% of women. This is consistent with Indian contraceptive-use patterns where permanent methods are often more commonly accepted among women from lower and middle socioeconomic strata, particularly after achieving the desired number of children.[2,3]

In the present study, two living children were present in 55.97% of women and three living children in 31.45%. This is similar to Vaishnav et al.,[9] who reported that 98.44% of women had two or more living children before laparoscopic tubal ligation. Nagapurkar et al.,[5] also emphasized that number and sex composition of living children influenced decision-making for laparoscopic tubal ligation in rural Maharashtra. The present study also showed that 56.60% of women had both male and female children, while 25.79% had only male children and 17.61% had only female children. This suggests that completion of desired family size remains the main determinant of sterilization acceptance.

Post-abortal sterilization was performed in 52.83% of women, while interval sterilization was performed in 47.17%. This distribution differs from many conventional sterilization studies where interval sterilization predominates. In the present study, the higher post-abortal proportion may reflect active linkage of post-abortal care with family planning counselling. This is programmatically important because immediate post-abortal sterilization provides an opportunity to prevent repeat unintended pregnancy when the woman has completed her family and has provided valid consent. Government of India guidelines permit post-abortal sterilization after proper counselling, eligibility assessment, and informed consent.[4]

Previous contraceptive use was reported in 79.87% of women, indicating that most acceptors had experience with temporary contraceptive methods before choosing permanent contraception. Oral contraceptive pills, barrier methods, and IUCD were the commonly used previous methods. Completed family was the leading reason for sterilization, reported by 93.1% of women, while desire for a permanent method was reported by 88.1%. Healthcare providers were the major source of motivation (83.0%), followed by ASHA/ANM/health workers (74.2%). These findings demonstrate the importance of counselling by trained health personnel in permanent contraceptive acceptance. However, counselling must remain voluntary and non-coercive, with clear explanation of alternatives, failure risk, and permanence.[4]

General anesthesia was used in all cases in the present study. Operative time was 15–20 minutes in 51.57% of women, and more than 20 minutes in 23.90%. Prasanna et al.,[7] reported shorter mean operative time in laparoscopic sterilization than minilaparotomy, supporting the efficiency of laparoscopy when performed by trained surgeons. In the

present study, adhesions were present in 41.51% of women, including dense adhesions in 13.21%. Previous LSCS was present in 42.77% of women, which may partly explain the adhesions and operative difficulty.

Literature suggests that previous abdominal or pelvic surgery can increase technical difficulty during laparoscopic sterilization due to adhesions and altered pelvic anatomy. Double port surgery offer additional advantages such as good visualisation, proper inspection of pelvis and safe surgeries in cases with previous abdominal surgery. As a tertiary hospital and training hub for residents, double port surgeries prove beneficial for patients as well as gynaecologists.

Intraoperative complications were uncommon in the present study. No intraoperative complication occurred in 97.48% of cases. Mesosalpinx injury occurred in 1.89%, and right-sided fallopian tube non-visualization occurred in 0.63%. Conversion to minilaparotomy was required in 1.26%. Vaishnav et al.,[9] reported uterine perforation, tubal transection, mesosalpinx hematoma, and one laparotomy among 1160 cases. Jeyaprabha,[6] in a comparative study of single-port and double-port laparoscopic sterilization, reported minor complications such as omental prolapse, subcutaneous emphysema, and wound infection, with overall low complication rates. Prasanna et al.,[7] also observed that laparoscopic sterilization was associated with lower postoperative morbidity and shorter hospital stay, although some procedure-related intraoperative complications were seen.

Postoperative complications were seen in 6.92% of women in the present study. Port-site pain was the most common postoperative complaint (2.52%), followed by port-site infection (1.26%) and nausea/vomiting (1.26%). One case of intra-abdominal hemorrhage required laparotomy. Nagapurkar et al.,[5] reported low morbidity in laparoscopic tubal ligation in rural Maharashtra. A hospital-based study of sterilization complications reported that laparoscopic procedures formed a smaller proportion of complication cases compared with minilaparotomy.[10,11] The present study showed successful completion in 98.74% of women, with failure in only 1.26%. Most women ambulated within 6 hours (60.38%), and 96.23% stayed for 48–72 hours. These findings support the safety and feasibility of laparoscopic sterilization in a tertiary care setting. Overall, the present study confirms that laparoscopic female sterilization is an effective, acceptable, and safe permanent contraceptive method when performed with proper client selection, informed consent, preoperative assessment, trained surgeons, and facility preparedness. The findings also highlight that previous LSCS, adhesions, obesity, and altered pelvic anatomy should be anticipated as potential contributors to operative difficulty. Regular audit of complications, adherence to Government of India standards, proper documentation, and counselling regarding alternative contraceptive methods are essential for maintaining quality and safety in sterilization services.

CONCLUSION

Laparoscopic female sterilization is a safe, effective, and acceptable method of permanent contraception among women who have completed their family size. In the present study, it was most commonly accepted by women aged 29–31 years, predominantly from rural and lower socioeconomic backgrounds, and usually after having two living children. Post-abortal sterilization formed a slightly higher proportion than interval sterilization, emphasizing the role of post-abortal family planning counselling.

The procedure was associated with a high success rate, low intraoperative complication rate, minimal need for conversion to minilaparotomy, and predominantly minor postoperative morbidity. Early ambulation, shorter hospital stay, faster recovery, and better patient comfort make laparoscopic sterilization advantageous over abdominal tubal ligation. With appropriate counselling, informed consent, careful patient selection, trained surgical personnel, anesthesia support, and adequate facility preparedness, laparoscopic sterilization should be preferred as a permanent contraceptive method wherever feasible

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