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Original Research Article

Khushi technique: a novel approach to tubal delivery in mini-laparotomy sterilization – experience of 1,259 cases

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ABSTRACT

Background: In India, female sterilization by mini-laparotomy is the primary method of permanent contraception. We tested a simple atraumatic technique that involves the use of a single small Langenbeck retractor as a counter-pressure plate and finger pinch over the mesosalpinx fold for tubal delivery.
Methods: This was a prospective observational study conducted at Civil Hospital, Bhiwani, Haryana, India from October 2023 to August 2026. Women who met the inclusion criteria and were undergoing mini-laparotomy sterilization were included. The Khushi technique was done in a standardised way. Data on demographics, operating details and results were collected in real time and analysed using SPSS version 26. Data are expressed as number (%), and mean±SD.
Results: 1259 women underwent mini-laparotomy sterilization using Khushi technique. Mean age was 28.0±4.2 years. In 1206 women (95.8%) the tubal delivery was successful on the first attempt. By the defined study outcome, 1224 women (97.2%) were successfully delivered. The mean tubal delivery time was 3.2±1.1 minutes and the mean time to skin-to-skin time was 10.5±2.8 minutes. There was minor bleeding in 23 women (1.8%) and mesosalpinx tear in 8 women (0.6%). There was no major visceral injury/mortality due to procedures.
Conclusions: Khushi technique was used to safely deliver the tube in mini-laparotomy sterilization, which was fast, safe and reproducible. It promotes advancement of knowledge by demonstrating that an atraumatic retractor, which is universally available, can be used as a counter-pressure plate, a procedure not mentioned in the Government Manual or in standard textbooks.

Keywords: District hospital, Finger pinch, Khushi technique, Langenbeck retractor, Mesosalpinx, Mini-laparotomy, Tubal sterilization

INTRODUCTION

Female sterilization is an important method of permanent contraception and is widely used in India. It is a good choice for women and couples who have had their desired family size and want a permanent contraceptive. Safe identification, delivery, ligation and division of fallopian tube are essential for successful sterilization, which is a major component of the national family planning programme in India.[1,2] A tubal hook can be used for conventional tubal delivery, but may be challenging if the tube is high, mobile, oedematous or if the abdominal wall is thick. Hook delivery can result in tearing of the mesosalpinx, bleeding, pain and multiple deliveries. Hook assisted delivery is described in textbooks and the Government of India Manual, but there is no description of retractor assisted counter pressure.[3,4]

Mini-laparotomy tubectomy is a well-established surgical technique for female sterilization, especially in a setting where laparoscopy is not available. It requires making a small abdominal incision and then occluding or partially

removing the fallopian tube (partial salpingectomy) by a known technique like the modified Pomeroy procedure. Standardized recommendations have been given in the Government of India's reference manual for female sterilization on patient assessment, surgical techniques, operative instruments, prevention of complications and postoperative care, with appropriate patient selection, counselling, anaesthesia and surgical skills.[5]

We report the Khushi technique, a single small Langenbeck retractor as an atraumatic counter-pressure plate, and over the mesosalpinx fold, with finger pinch, to gently deliver the tube under vision and control.

METHODS

This was a prospective observational single arm study carried out at the Civil Hospital, Bhiwani, Haryana, India which is a district hospital in North India from October 2023 to August 2026. There was no control arm and no hook control group were included in this study.

Inclusion criteria

This study involved women aged 20-40 years who were requesting permanent sterilization, medically suitable for mini-laparotomy under local/spinal anaesthetic, gave informed written consent and had no contraindications to tubal ligation.

Exclusion criteria

Pelvic inflammatory disease, previous major surgery of the pelvis/abdomen with dense adhesions, suspected pelvic tuberculosis, pregnancy, severe anaemia, coagulopathy, and refusal of consent. All women who were eligible and consecutive during the study period were included.

Procedure

All surgeries were carried out by the same surgical team under sterile conditions following pre-operative evaluation, counselling, investigations and informed written consent, in accordance with the Government of India guidelines. The mini laparotomy pinch technique as shown in Figure 1.

Step 1: Anaesthesia and positioning: Local / spinal anaesthesia as appropriate. The patient is lying on her back, bladder empty, abdomen painted and draped.

Step 2: Incision: A small transverse mini-laparotomy incision (2.0-2.5 cm) was made 2-3 cm above the pubic symphysis or infra-umbilical as per uterine size and clinical judgement. Layers opened in turn.

Step 3: Entry and identification: Peritoneum opened under vision. Gentle palpation of uterus and round ligament. The fallopian tube was found by tracing from the uterine cornu.

Step 4: Khushi manoeuvre: Langenbeck as counter pressure plate: One small Langenbeck retractor was gently placed under the tube/mesosalpinx as an atraumatic plate. The surgeon used the index finger and thumb to apply even counter-pressure to the mesosalpinx fold over the retractor plate without crushing the tube.

Step 5: Tubal delivery: When the tube was delivered under direct vision, the finger pinch was placed over the mesosalpinx fold and the retractor was used from below to guide the tube smoothly out of the incision without hooking, pulling or blind sweeping.

Step 6: Ligation and division: Pomeroy procedure involves ligation/division of the tube (excluding round ligament/bowel) performed with absorbable suture, haemostasis confirmed. The same procedure was performed on the other side using the same incision.

Step 7: Closure and post-operative care: Peritoneum, fascia and skin closed in layers. Vital signs, bleeding, pain and wound monitored. Patients discharged as per protocol with advice on warning signs and follow up.

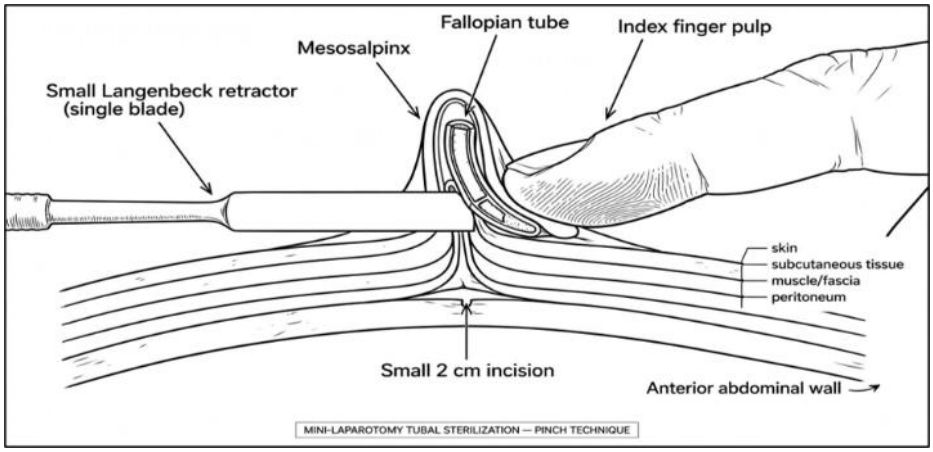


Figure 1: Mini laparotomy pinch technique.

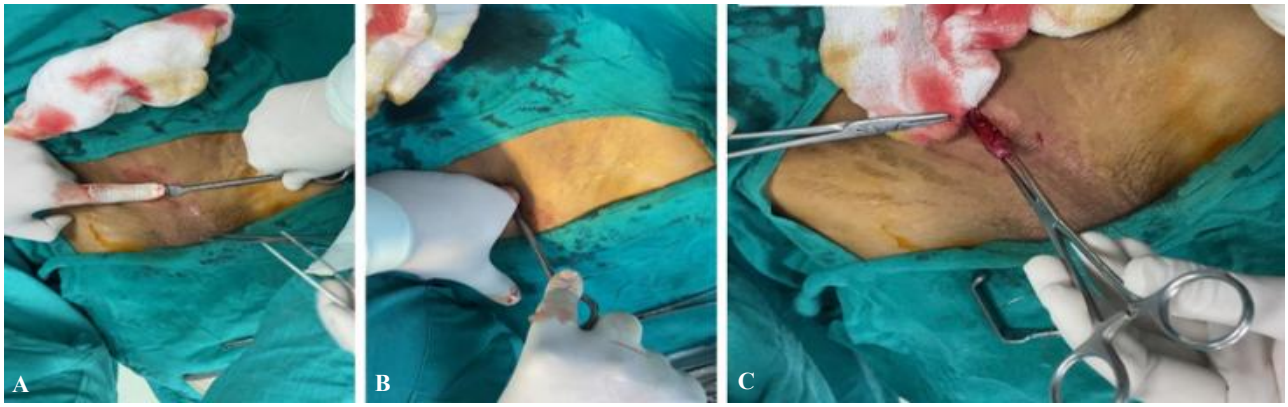


Figure 2: Khushi pinch; (A) Lateral view; (B) Close view finger (Langenbeck over mesosalpinx retractor as counter-pressure plate); (C) Tube delivered through 2cm for Pomeroy.

Figure 2 depicted intraoperative steps of the Khushi pinch technique during mini-laparotomy sterilization. (A) Lateral view demonstrating the application of the Khushi pinch technique for grasping and delivering the fallopian tube; (B) close-up view showing finger placement over the mesosalpinx fold, with a Langenbeck retractor positioned as a counter-pressure plate; and (C) successful delivery of the fallopian tube through the approximately 2-cm mini-laparotomy incision for subsequent Pomeroy tubal ligation. No hook was used in this study (Hook comparison). The figures quoted for the hook were obtained from previous published evidence and are not the study own control data and are shown in Table 4.

Ethical approval

Ethical approval was obtained from the Institutional Ethics Committee, Civil Hospital, Bhiwani (Approval No. CHB/IEC/2026/12). Written informed consent was obtained from every participant. Confidentiality was maintained. The study was conducted in accordance with the Declaration of Helsinki and Government of India family planning guidelines.

Statistical analysis

All data entered into MS Excel and analysed using SPSS version 26.0 (IBM Corp.). Categorical variables are displayed as number and percentage, n (%). The continuous variables are reported as mean±standard deviation (SD). No comparative hypothesis testing was done with a hook arm, because there was no control group. There are no p-values claimed for Khushi vs Hook.

RESULTS

A total of 1259 women underwent mini-laparotomy sterilization with the Khushi technique during October 2023 to August 2026. Year-wise distribution, demographic and clinical features, operative results and description of comparison with the conventional hook technique are described below.

Distribution of cases by year

There was a consistent use of the Khushi technique throughout the study period as shown by the annual distribution of cases. A total of 1,259 procedures were performed, of which 118 (9.4%) were performed from October to December 2023.

The number of procedures increased to 462 (36.7%) in 2024, followed by 438 (34.8%) in 2025. A total of 241 (19.1%) procedures were conducted during January-August 2026. The most procedures were performed in 2024, about one-third of all procedures depicted in Table 1.

Demographic and clinical features

The mean age of the study population was 28.0±4.2 years, with the majority of women (518; 41.1%) belonging to the 25–29-year age group, followed by 312 (24.8%) in the 20–24-year group and 301 (23.9%) in the 30–34-year group. A total of 128 women (10.2%) were aged 35-40 years.

The mean parity was 2.6±0.8, while the mean body mass index (BMI) was 24.1±3.2 kg/m². The majority of women (942; 74.8%) were from rural areas. In 186 (14.8%) women, a history of previous caesarean section or abdominal surgery was documented depicted in Table 2.

Operative outcomes with the Khushi technique

The first attempt was successful in 1206 (95.8%) women and the overall success rate was 1224 (97.2%) after repeat attempts. The mean tubal delivery time was 3.2±1.1 minutes and the mean skin-to-skin operative time was 10.5±2.8 minutes. In 23 (1.8%) cases, minor mesosalpinx bleeding was observed and in 8 (0.6%) cases, mesosalpinx tear was observed. In 19 (1.5%) procedures, further haemostatic suturing was needed depicted in Table 3. No significant viscera injuries or procedure-related deaths were reported during the study period.

Table 1: Year-wise distribution of cases (n=1259).

Years/Periods	N	%
October to December 2023	118	9.4
2024	462	36.7
2025	438	34.8
January to August 2026	241	19.1
Total	1259	100.0

N=number of women undergoing Khushi technique.

Table 2: Demographic and clinical characteristics (n=1259).

Characteristics	N (%)
Age (years), (mean±SD)	28.0±4.2
20-24	312 (24.8%)
25-29	518 (41.1%)
30-34	301 (23.9%)
35-40	128 (10.2%)
Parity, (mean±SD)	2.6±0.8
BMI (kg/m^2), (mean±SD)	24.1±3.2
Rural residence	942 (74.8%)
Previous caesarean/ abdominal surgery	186 (14.8%)

Values are N (%) unless stated as mean±SD.

Table 3: Operative outcomes with Khushi technique (n=1259).

Outcomes	N (%)
Successful tubal delivery at first attempt	1206 (95.8%)
Overall successful delivery, after repeat attempts	1224 (97.2%)
Mean tubal delivery time (min) (mean±SD)	3.2±1.1
Mean skin-to-skin time (min) (mean±SD)	10.5±2.8
Minor bleeding (Mesosalpinx)	23 (1.8%)
Mesosalpinx tear	8 (0.6%)
Need for additional haemostatic suture	19 (1.5%)
Major visceral injury	0 (0.0%)
Procedure-related mortality	0 (0.0%)

DISCUSSION

The present study assessed the clinical performance and the operative results of Khushi technique in a large series of 1259 women during a period of about three years in mini-laparotomy sterilization. The main outcomes were a high success rate of tubal delivery on the first attempt (95.8%), an overall successful tubal delivery rate of 97.2%, a mean tubal delivery time of 3.2±1.1 minutes and a mean skin-to-skin operative time of 10.5±2.8 minutes. Minor mesosalpinx bleeding and mesosalpinx tear were reported in 1.8% and 0.6% of cases, respectively. In 1.5% of cases, further haemostatic suturing was needed. Most importantly, there were no significant visceral injuries or procedure-related deaths. The results of this research indicate that Khushi technique could be a viable technique to assist tubal delivery during mini-laparotomy sterilization with high success rate of Khushi and low incidence of intra-operative complications recorded.

The Government of India Manual (2014) and standard textbooks (Te Linde's Operative Gynaecology, Shaw's Textbook of Gynaecology) describe hook-assisted delivery but do not describe retractor-assisted counter-pressure.[1,3,4] The World Health Organization handbook on family planning likewise describes standard tubal occlusion without a retractor counter-pressure step.[6] The Cochrane review by Kulier et al on sterilization techniques emphasises minimising tissue trauma.[7] The Government Manual and standard textbooks report hook-related bleeding and tear in the ranges quoted in Table 4.[9,10] Our study outcomes of (bleeding 1.8%, tear 0.6%) are within or below the reported hook ranges, but superiority cannot be claimed because our study has no concurrent hook control arm the comparison is descriptive only.

Table 4: Khushi technique (present study) vs Hook technique.

Parameters	Khushi, present study, (n=1259)	Hook cases (literature only, no control arm)
Success, overall	97.2%	~86% (reported range)
Bleeding	1.8%	2-5% (reported range)
Mesosalpinx tear	0.6%	1-2% (reported range)

Songkanha et al assessed a tubal sterilization training programme for 24 first-year obstetrics and gynaecology residents that included a mini-laparotomy technique. Their study showed that residents who were trained using structured simulator-based training had significantly higher scores for overall procedural skill compared to those who were trained using conventional apprenticeship training (median direct observation of procedural skill score: 93 vs. 73; p=0.020). Tubal fishing and tubal sterilization were the areas that showed the most improvement. This study did not compare a new tubal delivery technique, but it does emphasize the need for standardized technical skills and controlled tubal identification in mini-laparotomy sterilization.[9] The high tubal delivery success rate seen in the present study is another clinical indication for further study of a standardized tubal delivery method.

The technique of Khushi involves placing fingers on the mesosalpinx fold and a Langenbeck retractor in place to provide counter-pressure. This is a manoeuvre to make controlled identification and delivery of the fallopian tube

easier through a small abdominal incision. The main steps of this technique are shown in the operative photographs (Figure 2). However, the mechanical benefits, such as better tissue control and less manipulation, that are proposed need to be objectively assessed against other studies.

Descriptive comparison of Khushi and hook techniques

Table 4 shows a descriptive comparison of the operative outcome of the Khushi technique with previously reported outcome of the conventional hook technique. The overall success rate of the Khushi technique in the present study was 97.2% while the hook technique in literature was about 86%. The incidence of bleeding was 1.8% in Khushi technique as compared to the reported range of 2-5% in hook technique. Likewise, the incidence of mesosalpinx tear was described as 0.6% of cases using the Khushi technique, as compared to the reported range of 1-2% with the hook technique. No statistical comparisons were made.

The mean tubal delivery time in the present study was 3.2±1.1 minutes, and the mean skin-to-skin operative time was 10.5±2.8 minutes. These results suggest that the delivery through the fallopian tube was a relatively brief part of the entire process. The length of the operation is a significant measure of the efficiency of a procedure, especially in situations where operating-room capacity or surgical resources are restricted.

In a retrospective cohort of 3,670 women, Byrne et al investigated the relationship between BMI and outcomes after postpartum tubal ligation. The mean operative time was 23 minutes for women with normal BMI and 31 minutes for women with class III obesity ($p<0.001$). In contrast, the overall composite morbidity rate was 1.3% with no significant association between BMI category and composite morbidity in Brown et al who studied 921 women undergoing immediate postpartum tubal ligation, reporting mean operative times of 25, 29 and 33 minutes for non-obese, obese and morbidly obese women, respectively ($p<0.0001$).[11,12]

Non-obese, obese and morbidly obese groups had 5.1%, 6.0% and 16.0% composite operative complication rates, respectively, but this difference was not statistically significant ($p=0.06$) Brown et al. The high rates of wound complications reported in women with higher BMI (0.8%, 1.5% and 5.5% respectively; $p=0.01$) highlight the need to be mindful of patient characteristics when interpreting surgical complication rates.[12]

The lack of significant visceral injury and procedure-related mortality in the current series is reassuring. These observations should not be taken as an indication that such complications do not occur. To determine the relative safety of the Khushi technique, a larger comparative study with standardised definition of complications and sufficient follow-up after surgery would be needed.

In this study, the novelty was the high rate of first-attempt tubal delivery success (95.8%), high rate of overall tubal delivery success (97.2%), mean tubal delivery time of 3.2±1.1 minutes, low incidence of mesosalpinx injury and bleeding, and absence of major visceral injury or procedure-related mortality.

Clinical implications

It was a technique which requires only one small Langenbeck retractor which is present in all operation theatres, does not require any extra cost, is easy to teach and keeps the delivery under vision. It can decrease blind sweeping, repeated attempts and anxiety during mini-laparotomy Sterilization training.

Limitations

There were several limitations to this study. The study was conducted in a single centre, single arm and was an observational study with no concurrent control group, so Khushi vs Hook cannot be compared statistically and superiority cannot be claimed. The data used in Hooks are taken from literature/textbooks but not from the author's own cases. Outcomes may be influenced by surgeon experience and case selection. Limited long-term follow-up for Sterilization failure, ectopic pregnancy and chronic pain. Further studies in the form of a multi-centre randomised controlled trial (RCT) are required to validate these results by comparing Khushi technique with the conventional hook technique.

CONCLUSION

In conclusion, the Khushi technique single small Langenbeck retractor assisted finger pinch over the mesosalpinx fold provided safe, rapid and reproducible tubal delivery in 1259 mini-laparotomy sterilizations in a district hospital, and it advances knowledge and understanding in the field by showing that a universally available atraumatic retractor can be repurposed as a counter-pressure plate for tubal delivery, a step not described in the Government Manual or standard textbooks.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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