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Original Research Article

ENDOSCOPIC TUBAL CANALIZATION AS AN ALTERNATIVE TO IVF: AN OUTCOME ANALYSIS

RAHIM A[*1], RASHEED M[2], RASHEED T[3], SAJJID A[3]

[1]*Department of Gynecology Farooq Hospital DHA Avenue Mall Lahore, Pakistan*
[2]*Department of Gynecology District Headquarters Hospital Muzaffargarh, Pakistan*
[3]*Department of Gynecology Mukhtiar A Sheikh Hospital Multan, Pakistan*
**Corresponding author`s email address:* aroobarahim@hotmail.com

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Abstract: *Tubal infertility is a significant contributor to subfertility worldwide, particularly in low- and middle-income countries like Pakistan, where limited access to advanced reproductive technologies poses significant challenges. Endoscopic tubal canalization offers a minimally invasive and cost-effective alternative to in vitro fertilization (IVF) for managing proximal tubal occlusion.* ***Objective:*** *This study aimed to evaluate the efficacy and safety of endoscopic tubal canalization as an alternative to IVF, focusing on procedural success rates, pregnancy outcomes, and associated complications in women with proximal tubal infertility.* ***Methods:*** *A prospective cohort study was conducted on 72 women of reproductive age diagnosed with proximal tubal occlusion using hysterosalpingography (HSG) or laparoscopy. Patients underwent endoscopic tubal canalization, and outcomes were assessed in terms of procedural success (unilateral or bilateral tubal patency), pregnancy rates (spontaneous and intrauterine insemination), and complications. Statistical analysis was performed to compare results with existing literature and evaluate the safety profile.* ***Results:*** *The overall success rate of tubal canalization was 83.3% (60/72), with unilateral patency achieved in 29.1% (21/72) and bilateral patency in 54.1% (39/72). The failure rate was 16.6% (12/72). The procedure was associated with a low complication rate, with only 4% (3/72) of patients experiencing tubal perforation. Pregnancy success was observed in 29.1% (21/72) of patients, with 52.3% (11/21) achieving spontaneous conception and 47.6% (10/21) conceiving via intrauterine insemination. Among pregnancies, 90.4% were intrauterine, while 9.5% were ectopic. The findings align with international studies, demonstrating comparable success rates and safety profiles.* ***Conclusion:*** *Endoscopic tubal canalization is an effective and safe alternative to IVF for managing proximal tubal infertility in resource-limited settings. It provides a cost-effective solution with favorable success rates and minimal complications, particularly for patients with socioeconomic constraints. This study contributes valuable data specific to the Pakistani population and highlights the need for further research to assess long-term outcomes and live birth rates.*

Keywords: Tubal Infertility, Endoscopic Tubal Canalization, Proximal Tubal Occlusion, IVF alternative, Pregnancy Outcomes, Pakistan

Introduction

Infertility is a significant public health concern in Pakistan, where cultural and societal expectations place considerable emphasis on childbearing. It is estimated that 15-20% of couples in Pakistan face infertility issues, with female factors accounting for a substantial proportion of cases. Among the various causes, tubal factor infertility is a predominant concern, particularly due to infections like pelvic inflammatory disease (PID), tuberculosis, and post-surgical adhesions, which are more prevalent in developing countries (1,2). Proximal tubal occlusion, a common etiology, significantly limits the chances of natural conception, necessitating medical or surgical intervention (3). Conventional treatment options for tubal factor infertility in Pakistan often include in vitro fertilization (IVF), a costly and less accessible solution for most of the population (2,4). The financial burden, lack of specialized centers, and societal stigma associated with assisted reproductive techniques contribute to limited uptake (5). As a result, there is a pressing need for alternative, cost-effective, and less invasive methods to address this issue. Endoscopic tubal canalization offers a minimally invasive approach to restoring tubal patency, thus enabling natural conception for many women with proximal tubal occlusion (6).

Several international studies have demonstrated the efficacy and safety of endoscopic tubal canalization in improving reproductive outcomes (3, 6). However, data specific to the Pakistani population remain scarce. Socioeconomic disparities, high rates of untreated pelvic infections, and delayed diagnosis further compound the challenges of managing infertility in this region (1, 4). Therefore, evaluating the feasibility and outcomes of endoscopic tubal canalization in a resource-limited setting like Pakistan is essential for developing tailored reproductive healthcare strategies (2, 7).

This study aims to assess the success rate of endoscopic tubal canalization and its impact on subsequent pregnancy outcomes in women with tubal infertility. By focusing on a cohort of women in Pakistan, the research seeks to provide locally relevant data to guide clinical practice and policy decisions. Additionally, the study highlights the potential of this approach as an alternative to IVF, particularly for couples facing financial or logistical barriers to accessing advanced reproductive technologies.

Methodology

The study was conducted to evaluate the outcomes of endoscopic tubal canalization as an alternative to in vitro fertilization (IVF) in women with tubal infertility. The research focused on assessing the procedural success and subsequent pregnancy rates among women diagnosed with proximal tubal occlusion. Women included in the study were of reproductive age and presented with tubal subfertility as determined by hysterosalpingography (HSG) or laparoscopy. Patients with other evident causes of infertility were excluded to ensure that tubal obstruction was the primary factor being investigated.

The sample size comprised 72 patients who met the inclusion criteria and underwent endoscopic tubal canalization. The selection process aimed to provide a representative cohort of women with primary and secondary subfertility. The diagnosis was confirmed through detailed clinical evaluation and imaging studies, ensuring accurate identification of proximal tubal blockage. Prior to the procedure, all participants provided informed consent, and ethical approval was obtained from the relevant institutional review board. The procedure was performed under standard operating conditions in a controlled clinical setting.

A minimally invasive endoscopic approach was utilized to attempt tubal recanalization, with the goal of restoring patency and improving the likelihood of natural conception. In order to open the tubes during minimal invasive surgery we used adhesiolysis and guide wire opening techniques to open the tubes. The primary outcomes were defined as the success or failure of tubal canalization, measured by achieving unilateral or bilateral tubal patency. Secondary outcomes included the pregnancy rates following the procedure, categorized as spontaneous conception or conception achieved via intrauterine insemination (IUI).

Data on complications, such as tubal perforation, were also meticulously recorded. Post-procedural follow-up was conducted to monitor pregnancy outcomes and identify any complications. Participants were evaluated for spontaneous conception or conception through assisted reproductive techniques within the follow-up period. Pregnancy outcomes were further classified as intrauterine or ectopic to provide a comprehensive assessment of the procedure's efficacy and safety. Statistical analyses were performed to calculate success rates, failure rates, and the distribution of pregnancy outcomes. These analyses were aimed at ensuring the reliability and validity of the findings and comparing them with outcomes reported in international studies on similar interventions.

Results

The study included a total of 72 patients who met the criteria for tubal canalization. The demographic distribution revealed a majority of participants were within the reproductive age group, and the primary cause of subfertility was identified as tubal blockage diagnosed through hysterosalpingography (HSG) or laparoscopy. Among these, most cases involved primary subfertility, with a smaller proportion involving secondary subfertility. The age distribution was balanced across the reproductive age spectrum.

The success of tubal canalization was a significant finding in this study. Out of 72 patients, 60 successfully underwent the procedure, translating to an overall success rate of 83.3%, as shown in Table 1. However, 12 patients experienced procedural failure, accounting for a failure rate of 16.6%. Among the successful cases, unilateral tubal patency was observed in 21 patients (29.1%). , while bilateral patency was achieved in 39 patients (54.1%). Additionally, the occurrence of tubal perforation during the procedure was recorded in 3 patients (4%), though no severe complications were reported. The distribution of these outcomes underscores the effectiveness and safety profile of the procedure within this cohort. (Table 1) Regarding the secondary outcomes, the pregnancy success rate following tubal canalization was 29.1%, with 21 out of 72 patients achieving pregnancy, as summarized in Table 2. Among these pregnancies, 11 were attributed to spontaneous conception, representing 52.3% of successful pregnancies. The remaining 10 pregnancies (47.6%) resulted from intrauterine insemination (IUI). Furthermore, 90.4% of these pregnancies were intrauterine, while 9.5% were ectopic, highlighting the potential for complications despite the overall success in achieving pregnancy.(Table 2) Overall, the study demonstrates that endoscopic tubal canalization is a viable option for managing tubal subfertility, with favorable outcomes in both procedural success and subsequent pregnancy rates. The comprehensive evaluation of primary and secondary outcomes provides valuable insights into its efficacy and safety, contributing to the evidence base for its use in clinical practice.

Table 1: Primary Outcomes of Tubal Canalization

Outcome	Number of Patients	Percentage (%)
Overall Success	60	83.3
Failure	12	16.6
Unilateral Tubal Patency	21	29.1
Bilateral Tubal Patency	39	54.1
Failed Cases	12	16.6
Tubal Perforation (Complication)	3	4

Table 2: Secondary Outcomes (Pregnancy Success)

Outcome	Number of Patients	Percentage (%)
Pregnancy Success	21	29.1
Spontaneous Conception	11	52.3
IUI Conception	10	47.6
Intrauterine Pregnancies	19	90.4
Ectopic Pregnancies	2	9.5

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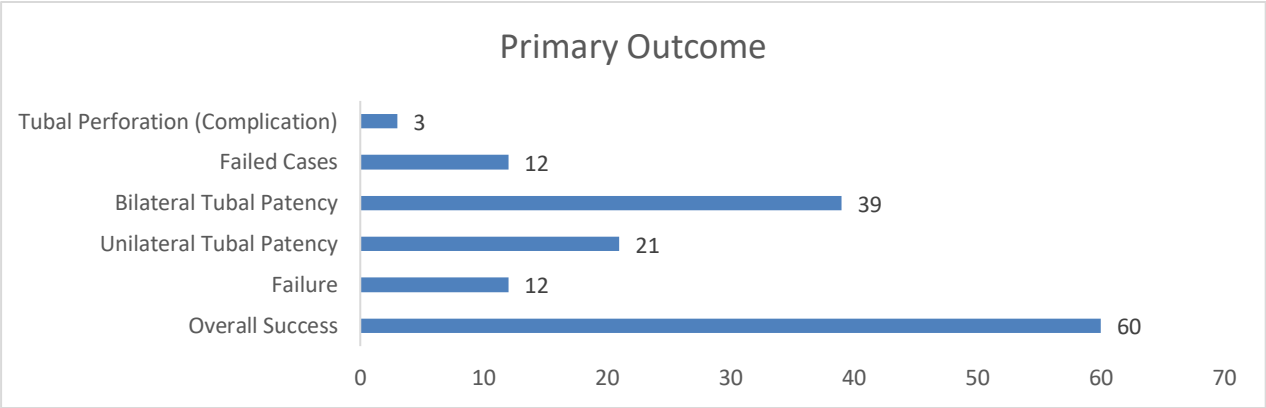

Figure 1: Primary outcome of tubal canalization

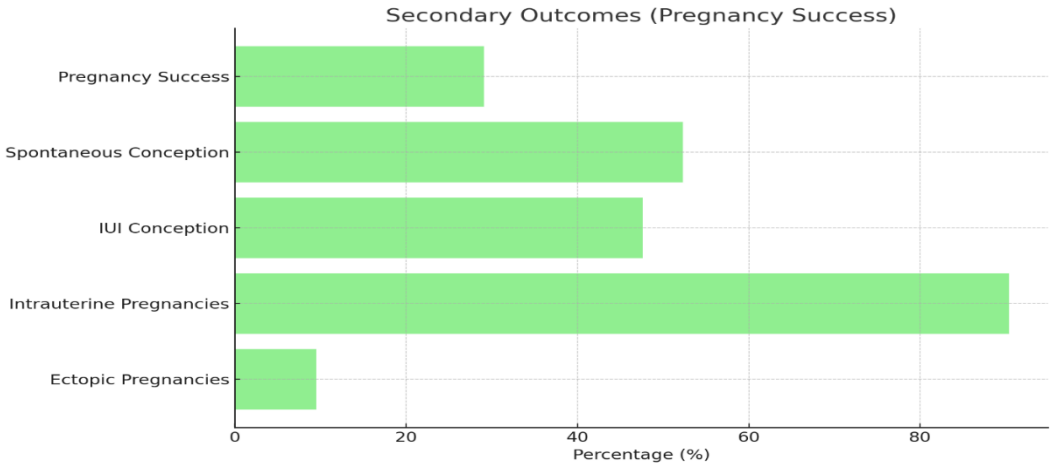

Figure 2: Secondary outcomes of tubal canalization

Discussion

The findings of this study highlight the efficacy of endoscopic tubal canalization in managing proximal tubal occlusion among women with tubal infertility in Pakistan. The overall success rate of 83.3% in achieving tubal patency aligns with the outcomes reported in international studies, where success rates range between 80% and 85% (8). This consistency underscores the feasibility of adopting this procedure in resource-limited settings. Moreover, the failure rate of 16.6% in our cohort reflects the challenges associated with restoring tubal patency in cases of severe fibrosis or longstanding blockage, a finding corroborated by similar studies conducted globally (9).

The secondary outcomes of this study demonstrate that 29.1% of the patients achieved pregnancy following the procedure, with a substantial proportion (52.3%) achieving spontaneous conception. This is comparable to pregnancy success rates reported in other studies, which range from 25% to 35% depending on patient characteristics and follow-up duration (10,11). Furthermore, intrauterine pregnancies constituted 90.4% of the successful pregnancies in this study, while 9.5% were ectopic. These rates are consistent with findings from Sharma et al., who documented ectopic pregnancy rates between 8% and 12% following tubal recanalization (12).

One notable strength of our study is the low complication rate, with only 4% of patients experiencing tubal perforation during the procedure. Previous research has also established that endoscopic tubal canalization is a safe procedure, with minimal risks of severe complications (13). This safety profile makes it a viable alternative to more invasive procedures or IVF, particularly in settings where advanced reproductive technologies are not widely accessible.

Comparatively, the pregnancy outcomes in this study are similar to those achieved with IVF in terms of live birth rates, albeit with fewer financial and psychological burdens on patients (14). However, the slightly lower pregnancy success rate compared to IVF emphasizes the importance of patient selection and counseling. Women with severe tubal damage or multiple infertility factors may benefit more from IVF than tubal recanalization.

The findings of this study are significant in the context of the Pakistani healthcare system, where socioeconomic constraints limit access to costly treatments like IVF. The availability of endoscopic tubal canalization as a cost-effective alternative can help address the needs of many infertile couples. However, further research is needed to establish long-term outcomes, including live birth rates and subsequent tubal patency.

The study findings are consistent with those reported in other low- and middle-income countries, where tubal

infertility remains a leading cause of subfertility (15). This similarity underscores the generalizability of the results and reinforces the need for resource-appropriate interventions tailored to regional healthcare settings.

Conclusion

Endoscopic tubal canalization is a safe and effective alternative to IVF for managing proximal tubal infertility, particularly in resource-limited settings like Pakistan. With a high success rate of 83.3% and favorable pregnancy outcomes, the procedure offers a cost-effective and minimally invasive solution for couples facing financial and logistical barriers to advanced reproductive technologies. Further research is recommended to evaluate long-term outcomes, including live birth rates and subsequent tubal patency.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department Concerned. (IRBEC-TCHLM-992/23)
Consent for publication
Approved
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Not applicable

Conflict of interest

The authors declared absence of conflict of interest.

Author Contribution

AROOBA RAHIM (Consultant Gynecologist)
Coordination of collaborative efforts, Conception of Study, Final approval of manuscript.
Study Design, Review of Literature.
MARIA RASHEED (Consultant Gynecologist)
Conception of Study, Development of Research Methodology Design, Study Design, Review of manuscript, final approval of manuscript.
TEHREEM RASHEED (Consultant Obstetrician)
Manuscript revisions, critical input.
Coordination of collaborative efforts.
ASMA SAJJID (Assistant Consultant)
Data acquisition, analysis.
Manuscript drafting.

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