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Original Research Article

Reproductive outcomes after laparoscopic surgery in women with tubal infertility – a retrospective study of 136 cases at Pikine National Hospital, Senegal, 2018-2023

Mouhamet Sene*, Khalifa A. Gueye, Abdoul A. Diouf, Mareme Toure, Moussa Diallo,
Hamza D. Moussa, Anna Dia, Youssou Toure, Alassane Diouf

Department of Obstetrics and Gynecology, Pikine National Hospital, Dakar, Senegal

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*Correspondence:

Dr. Mouhamet Sene,

E-mail: senemos10@hotmail.com

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ABSTRACT

Background: Evidence on reproductive outcomes after laparoscopic management of tubal infertility remains limited in West Africa. This study described reproductive outcomes after laparoscopic surgery for tubal infertility at Pikine National Hospital, Senegal.

Methods: A retrospective descriptive and analytical study were conducted from January 2018 to December 2023. Women with documented tubal infertility who underwent laparoscopic management and had assessable reproductive follow-up were included. Women treated for ectopic pregnancy and those with incomplete clinical or follow-up data were excluded. Data were obtained from medical records and standardized telephone interviews. The primary outcome was pregnancy after surgery.

Results: The study included 136 women with a mean age of 38.1 ± 6.1 years. Primary and secondary infertility each accounted for 50.0% of cases. Chromotubation results were available for 99 women: bilateral tubal patency was observed in 41.4%, unilateral patency in 24.2%, and bilateral proximal obstruction in 33.3%. During follow-up, 37 women became pregnant, giving an overall pregnancy rate of 27.2%. Of these pregnancies, 26 (70.3%) were carried to term, six (16.2%) ended in spontaneous abortion, and five (13.5%) were ongoing at study closure. No ectopic pregnancy was recorded. Age was not significantly associated with pregnancy ($p=0.384$).

Conclusions: More than one-quarter of women treated laparoscopically for tubal infertility subsequently achieved pregnancy. Prospective multicentre studies using standardized lesion grading and clearly defined reproductive follow-up are needed.

Keywords: Laparoscopy, Pregnancy, Reproductive outcomes, Senegal, Tubal infertility, Tubal surgery

INTRODUCTION

Infertility is a major global public health issue. According to the World Health Organization (WHO), approximately one in six people will experience infertility during their lifetime, with no major difference between high-income and low- and middle-income countries.¹ In sub-Saharan Africa, infertility prevalence is estimated at 7%-21%, depending on the region and population studied.^{2,3} Beyond its medical implications, infertility has substantial psychological, social and economic consequences,

particularly in societies where motherhood has a central role.

Tubal disease is one of the leading causes of female infertility and accounts for approximately 30-40% of cases in Africa.^{3,4} It mainly results from tuboperitoneal damage secondary to ascending genital infections, sexually transmitted infections, post-abortion or postpartum complications, endometriosis and previous pelvic surgery. In resource-limited settings, pelvic infections remain the predominant cause of tuboperitoneal damage.⁵

Laparoscopy is considered the reference method for diagnosing and managing tubal disease. It enables comprehensive pelvic exploration, assessment of tubal patency by chromotubation, evaluation of tuboperitoneal damage and, during the same procedure, conservative treatment such as adhesiolysis, fimbrioplasty or neosalpingostomy. Reproductive outcomes after tubal surgery vary according to age, the severity and location of tubal damage, associated infertility factors and the surgical procedure performed.⁶⁻⁸

Evidence on reproductive outcomes after laparoscopic management of tubal infertility remains limited in West Africa. This study therefore aimed to describe reproductive outcomes after laparoscopic surgery among women treated for tubal infertility at Pikine National Hospital in Senegal.

METHODS

Study design and setting

We conducted a retrospective descriptive and analytical study at Pikine National Hospital, a referral centre for gynaecological surgery in the Dakar suburbs, Senegal. The study covered the six-year period from 01 January 2018 to 31 December 2023.

Study population

The study included women who underwent laparoscopic surgery for tubal infertility during the study period. Women were eligible when tubal infertility had been documented, laparoscopic management had been performed, the medical record was usable and reproductive outcome could be assessed. Women treated for ectopic pregnancy, those operated on for another gynaecological indication, women with incomplete records and those whose reproductive outcome could not be assessed were excluded. After screening and telephone follow-up, 136 women were included in the final analysis.

Data collection

Data were extracted from electronic medical records managed with FileMaker®. When follow-up information was unavailable in the record, a standardised telephone interview was conducted. Collected variables included age, gravidity, parity, infertility type and duration, medical and surgical history, laparoscopic findings, chromoperturbation results, surgical procedures, perioperative complications, occurrence of pregnancy and pregnancy outcome.

Surgical procedure

All procedures were performed under general anaesthesia using a Karl Storz® laparoscopic system. Pelvic exploration systematically assessed the uterus, fallopian tubes, ovaries and pelvic peritoneum. Tubal patency was

evaluated by methylene-blue chromoperturbation. Surgical management was adapted to the observed lesions, with the aim of preserving or restoring fertility whenever appropriate.

Outcome measure

The primary outcome was the occurrence of pregnancy after laparoscopic surgery. Pregnancy status and outcome were obtained from the medical record or during telephone follow-up. Outcomes were classified as pregnancy carried to term, spontaneous abortion, ongoing pregnancy or ectopic pregnancy.

Statistical analysis

Data were analysed using international business machines (IBM) statistical package for the social sciences (SPSS) statistics version 20. Quantitative variables were summarised as mean $\pm$ standard deviation or median and range, as appropriate. Qualitative variables were reported as counts and percentages. Associations with pregnancy were assessed using the chi-square or Fisher exact test for categorical variables and student's t test or the Mann-Whitney test for quantitative variables, according to the distribution and test assumptions. A two-sided p value <0.05 was considered statistically significant.

Ethical considerations

Medical information was handled confidentially and the analytical dataset was anonymised. Telephone follow-up was conducted after informing participants of the purpose of data collection. The ethics approval or waiver reference should be inserted before submission.

RESULTS

Sociodemographic and clinical characteristics

The final analysis included 136 women. Their mean age was 38.1 ± 6.1 years; the median age was 38 years and the range was 24-57 years. Primary and secondary infertility were equally frequent, each accounting for 68 cases (50.0%).

Operative activity and tubal disease

Between 2018 and 2023, 2,823 women were listed in the gynaecological operating programme and 551 laparoscopic procedures were reported (19.5%). The final study cohort comprised 136 women with tubal infertility whose medical and reproductive follow-up data met the eligibility criteria.

Laparoscopic findings and procedures

The operative reports showed a predominance of tuboperitoneal adhesive disease. Hydrosalpinx, distal tubal obstruction, nodular salpingitis, phimosis and

endometriosis were also described. Because these lesions were recorded mainly as free text, their frequencies should be reported only after completion of a reproducible lesion-coding procedure.

Table 1: Sociodemographic and clinical characteristics of the study population.

Characteristics	Value
Number of women	136
Mean age±SD	38.1±6.1 years
Median age	38 years
Age range	24-57 years
Primary infertility	68 (50.0%)
Secondary infertility	68 (50.0%)

Table 2: Annual gynaecological operating activity and laparoscopic procedures, 2018-2023.

Years	Gynaecological procedures	Laparoscopies
2018	173	22
2019	574	132
2020	415	61
2021	535	109
2022	521	92
2023	605	135
Total	2,823	551

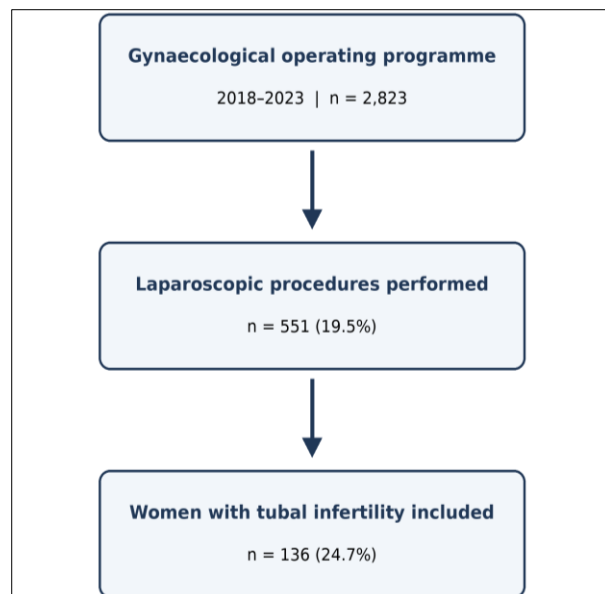


Figure 1: Flow diagram of patient selection.

A structured chromotubation result was available for 99 women. Bilateral tubal patency was documented in 41 (41.4%), unilateral patency with contralateral proximal obstruction in 24 (24.2%), bilateral proximal obstruction in 33 (33.3%) and another result in one woman (1.0%). These figures describe patency observed during the procedure and should not be interpreted as paired.

Table 3: Pregnancy occurrence and outcomes after laparoscopic surgery.

Pregnancy outcomes	N	%
Pregnancy obtained	37/136	27.2
Carried to term	26/37	70.3
Spontaneous abortion	6/37	16.2
Ongoing pregnancy	5/37	13.5
Ectopic pregnancy	0/37	0.0

Table 4: Pregnancy occurrence according to age group.

Age groups (years)	Pregnancies /total	Pregnancy rate (%)
<25	0/1	0.0
25-29	4/9	44.4
30-34	6/28	21.4
35-39	14/40	35.0
40-44	9/32	28.1
≥45	4/26	15.4

Reproductive outcomes

During follow-up, 37 of the 136 women became pregnant, corresponding to an overall pregnancy rate of 27.2%. Among the 37 pregnancies, 26 (70.3%) were carried to term, six (16.2%) ended in spontaneous abortion and five (13.5%) were ongoing at study closure. No ectopic pregnancy was recorded.

Pregnancy according to age group

Pregnancy rates varied across age groups, but there were no monotonic decline and the association between age group and pregnancy was not statistically significant ($p=0.384$). Mean age was also similar among women who became pregnant and those who did not (37.7 ± 5.9 versus 38.3 ± 6.2 years; $p=0.634$).

DISCUSSION

Main findings

In this cohort of 136 women treated laparoscopically for tubal infertility, the overall pregnancy rate was 27.2%. More than two thirds of the pregnancies identified during follow-up were carried to term, while no ectopic pregnancy was reported. Primary and secondary infertility were equally represented. Although pregnancy rates differed between age categories, age was not significantly associated with pregnancy in this sample.

Clinical and laparoscopic characteristics

Tuboperitoneal adhesions and hydrosalpinx were prominent findings in operative reports, consistent with the importance of previous pelvic infection and surgery in

tubal infertility in sub-Saharan Africa.^{7,13,14} Laparoscopy provides both direct assessment of pelvic disease and the opportunity to perform conservative procedures during the same intervention. However, treatment selection should account for the site and severity of tubal damage, ovarian reserve, age, associated infertility factors and access to assisted reproductive technologies.^{6,7}

Anatomical and reproductive outcomes

Among women with a documented chromotubation result, 41.4% had bilateral patency and 24.2% had unilateral patency. These intraoperative findings cannot be interpreted as a causal measure of surgical efficacy in the absence of paired preoperative and postoperative assessment. The observed pregnancy rate of 27.2% falls within the range reported in several series of conservative tubal surgery, although comparisons are limited by differences in lesion severity, case selection, procedures and follow-up.⁶⁻⁸

Age is a well-established determinant of natural fertility, but it was not significantly associated with pregnancy in our study. This may reflect the limited sample size, small numbers in some age groups and the influence of unmeasured factors such as ovarian reserve, semen parameters, tubal mucosal damage and postoperative fertility treatment. The present results therefore do not support identifying a specific age group as having a significantly better prognosis.

Limitations

The retrospective single-centre design exposes the study to information and selection bias. Operative lesions were largely recorded as free text, limiting reproducible quantification. Follow-up information was supplemented by telephone interview and may be affected by recall bias. The dataset did not consistently distinguish spontaneous conception from conception after assisted treatment, and the timing variable requires clarification before time-to-pregnancy analysis. No untreated or alternative-treatment comparison group was available; consequently, the findings describe reproductive outcomes after surgery but do not establish a causal effect of laparoscopy. The modest sample size also limited subgroup and prognostic analyses.

CONCLUSION

In this retrospective cohort from a resource-limited setting, 27.2% of women treated laparoscopically for tubal infertility subsequently reported a pregnancy. Most recorded pregnancies were carried to term, and no ectopic pregnancy was reported. Age was not significantly associated with pregnancy in this sample. These findings support the feasibility of laparoscopic assessment and management of tubal infertility, while emphasising the need for careful patient selection and cautious interpretation of reproductive outcomes. Prospective multicentre studies with standardised lesion grading,

clearly defined follow-up, time-to-pregnancy analysis and comparison with assisted reproductive strategies are needed.

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Conflict of interest: None declared

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

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