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Evaluation of Fertility after Laparoscopic Conservative Tubal Surgery at the Gabriel Toure University Hospital

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Abstract **Original Research Article**

Introduction: Tubal infertility is a major cause of female infertility. Laparoscopic surgery, thanks to its diagnostic and therapeutic advantages, plays an important role in its management, particularly through tubal plasty. ***Objective:*** To evaluate the results in terms of fertility after laparoscopic neosalpingostomy in patients operated on for tubal infertility. ***Patients and methods:*** This was a descriptive study conducted over a period of 8 years which included 517 cases of laparoscopic surgery, including 231 laparoscopic -gynecological interventions. ***Results:*** A total of 50 patients underwent neosalpingostomy for tubal obstruction, representing 9.67% of all laparoscopic surgeries and 21.64% of all gynecological laparoscopic procedures. The mean age of the patients was 30.72 years. Housewives accounted for 58% of cases, and the majority of patients (88%) came from Bamako. The most common medical histories were myomectomy (28%) and ectopic pregnancy (14%). Hysterosalpingography revealed distal tubal obstruction in 76% of cases. Pelvic adhesions were found in 56% of patients. Neosalpingostomy was performed bilaterally in 60% of cases, with bilateral postoperative tubal patency achieved in 40%. The length of hospital stay was two days or less in 82% of cases. From a reproductive standpoint, 12 patients, or 24%, achieved pregnancy after the procedure. ***Conclusion:*** Neosalpingostomy under laparoscopy represents an effective therapeutic option in the management of tubal infertility, with low morbidity and encouraging reproductive results.

Keywords: Laparoscopic surgery; Tubal infertility; Tubal plasty.

INTRODUCTION

Tubal infertility remains a major reproductive health problem worldwide, particularly in resource-limited countries where upper genital tract infections, post-pelvic surgery complications, and obstetric complications remain common. Tubal disorders still account for a significant proportion of the causes of female infertility and constitute a major public health problem in several African countries [1] .

The improvement of minimally invasive surgical techniques has profoundly changed the management of these patients thanks to the development of laparoscopic surgery, which now allows tubal reconstructive interventions to be carried out with less tissue trauma, a reduction in postoperative adhesions, rapid recovery and a reduction in the length of hospital stay [2] .

Tubal reconstruction by laparoscopy encompasses a range of techniques designed to restore the patency and functionality of the fallopian tubes. It primarily includes salpingostomy , fimbrioplasty, salpingoneostomy, and laparoscopic tubal anastomosis [3] . These procedures aim to promote spontaneous pregnancy by restoring the physiological conditions for fertilization. Despite significant advances in assisted reproductive technologies, particularly in vitro fertilization, tubal reconstruction surgery remains important, especially in developing countries where assisted reproductive technologies remain inaccessible and financially expensive [4] .

However, reproductive outcomes after tubal surgery depend on several prognostic factors. The patient's age, the quality of the tubal mucosa, the residual tubal length, the type of lesion, the presence of pelvic adhesions, and the duration of infertility strongly influence the chances of postoperative pregnancy [1] .

Furthermore, some recent studies have shown that tubal surgery should be integrated into a comprehensive infertility management strategy, taking into account assisted reproductive technology options and the individual characteristics of the patients [5] .

Thus, the study on fertility after laparoscopic tubal reconstruction at the Gabriel Touré University Hospital is of major scientific and practical importance. It will not only allow for the evaluation of reproductive outcomes after tubal reconstruction surgery, but also for the identification of factors influencing the success of this procedure. The expected results could contribute to improving surgical indications, optimizing postoperative follow-up, and strengthening the management of tubal infertility in Mali.

PATIENTS AND METHODS

The study was conducted in the general surgery department at the Gabriel Touré University Hospital in Bamako. It was a retrospective descriptive and analytical study, which took place over an 8-year period from March 2017 to December 2025.

Included were all patients who underwent surgery for infertility due to tubal obstruction and who had undergone tubal plasty by laparoscopy.

Patients who underwent laparotomy, those who did not have neosalpingostomy, and those with incomplete medical records or who had not given their consent were excluded. The study was exhaustive. All patients meeting the inclusion criteria during the study period were included.

The parameters studied were sociodemographic, clinical, paraclinical (pelvic ultrasound, hysterosalpingography), therapeutic and prognostic data.

Data was collected using individual survey forms based on patient records, hospitalization registers, operative report registers, and anesthesia consultation records.

As part of the study, all patients were contacted using the telephone number on their file to find out: subsequent follow-up by a gynecologist, fertility after laparoscopy, time to conception after laparoscopy, and the progress of pregnancies.

Word processing and spreadsheets were created using Word XP software.

The data analysis was performed using *SPSS Statistics 25.0 software.*

The statistical test used for comparing the data was the chi-square test, considered significant when $p<0.05$. Before each procedure, patients were informed about the surgical diagnosis, the endoscopic procedure, the expected benefits, and the possibility of conversion to conventional surgery. Data were collected respectfully and confidentially.

RESULTS

During the 8 years of study, we collected 517 cases of laparoscopic surgery, 231 cases of laparoscopic gynecological surgery, 50 patients underwent neosalpingostomy under laparoscopy, representing a frequency of 9.67% (50/517) of laparoscopic surgery cases and 21.64% (50/231) of laparoscopic gynecological cases.

The average age of our patients was 30.72 years, with a range of 21 to 40 years (Figure 1). All patients had consulted because they wanted to have children. Secondary infertility was the most common type of infertility, found in 67% of cases (Figure 2).

Among the patients, 28% had a history of myomectomy (14/50), followed by ectopic pregnancy in 14% (7/50). A history of genital infection and contraception were identified in 70% (35/50) and 18% (9/50) of patients, respectively.

Nulligestive women predominated in 34% (17/50) of cases (Table I). The majority of patients had no history of abortion in 60% (30/50), 24% had a history of spontaneous abortion (12/50) and 16% had an induced abortion (8/50).

On ultrasound, the images were in favor of an ovarian cyst in 36% (18/50) followed by uterine fibroid in 34% (17/50) of cases, 4% of cases of endometriosis (2/50) and 26% of the ultrasound results were normal.

On hysterosalpingography, the obstruction was distal in 76% (38/50), proximal in 16% (8/50), and 8% (4/50) was normal. Hydrosalpinx was present in 70% of cases (35/50) (Table II).

Only 10% (5 people) of the partners had a sperm analysis done.

At open laparoscopy, 56% of patients had pelvic adhesions (28/50), and hydrosalpinx in 44% of cases (22/50) (Figure 3).

The methylene blue test was consistent with the hysterosalpingography results in 78% (39/50) of cases. The location of tubal obstruction after the methylene blue test prior to neosalpingostomy was distal in 72% (36/50) of cases (Figure 4), proximal (20% or 10 cases), and mixed in 8% of cases.

The most frequently performed surgical procedure was bilateral neosalpingostomy in 60% (30/50), followed by left and right neosalpingostomy in 20% each (10/50). The methylene blue staining result

(Figure 5) and tubal patency after neosalpingostomy were positive in 40% of cases (20/50) (Table III). Right ovarian cystectomy was the associated surgical procedure in 16% (8/50), followed by left ovarian cystectomy in 8% (4/50). We noted two cases requiring conversion to laparotomy for excessively large uterine fibroids.

The length of stay was 2 days (82% or 41/50).

Of the 50 patients, 12 conceived after tubal plasty (24% of cases), of which 7/12 carried a pregnancy to term (58.33% of cases) and 5/12 had a miscarriage (41.67%). Among the 7 pregnancies, we had 3 boys and 4 girls.

The average time between tubal plasty and pregnancy was 12 to 24 months.

DISCUSSION

During the eight-year study period, neosalpingostomy accounted for 9.67% of all laparoscopic surgical procedures and 21.64% of gynecological laparoscopic procedures. This relatively high frequency reflects the importance of tubal pathology in our context. In Mali, Traoré Y *et al.,* reported in 2021, in a study on the practice of gynecological laparoscopic surgery , that interventions for tubal infertility represented approximately 18% of gynecological laparoscopic procedures [6] . In Cameroon, Kasia JM *et al.,*[7] found a tubal surgery rate of 22% in infertile patients in 2020. These results confirm the high prevalence of tubal lesions in sub-Saharan Africa, where pelvic infections remain frequent.

The average age of our patients was 30.72 years. This result is close to that found by Han H *et al.,* in 2020 in their meta-analysis, where the average age varied between 29 and 34 years depending on the series studied [1] . Norris S *et al.,*[2] in 2020 found an average age of 31 years in patients who underwent tuboplasty. Laparoscopic. In Africa, Belley Priso *et al.,*[8] in 2021 reported an average age of 32 years among infertile women consulting at referral centers. This predominance of young women is explained by the desire for motherhood during the period of peak reproductive activity.

All patients in our series consulted for the desire to have a child, and secondary infertility accounted for 67% of cases. This result is consistent with African data. In Cameroon, Kasia JM *et al.,*[7] reported a 64% rate of secondary infertility in 2020, while Lokossou MSHS *et al.,*[9] in Benin found 61% in 2020. Okonofua FE *et al.,* in 2022 explained this predominance by the high frequency of genital infections acquired after a previous pregnancy, abortion, or complicated delivery [10] . Unlike Western countries where primary infertility predominates, African countries remain marked by postpartum and post-abortion infectious sequelae.

The presence of genital infection in 70% of our patients confirms the major role of pelvic infections in tubal infertility. Cissé CT *et al.,* reported in 2020 that 68% of patients with tubal obstruction had a history of genital infection [11] . Similarly, the WHO in 2023 emphasized that sexually transmitted infections are the leading cause of tubal infertility in low-income countries. Chronic salpingitis leads to anatomical damage resulting in adhesions, hydrosalpinx, and distal tubal obstruction [12] .

The surgical history found in our study, particularly myomectomy in 28% of patients, could explain the high frequency of pelvic adhesions observed intraoperatively. Norris S *et al.,* in 2020 [2] showed that postoperative adhesions significantly reduce the chances of pregnancy after tubal repair. In their series, the pregnancy rate dropped from 52% to 28% in the presence of severe adhesions [2] . Adhesions disrupt tubo-ovarian motility and impair oocyte uptake.

Ectopic pregnancy, found in 14% of patients, is also a significant factor in tubal pathology. Han H *et al.,*[1] in 2020 showed that patients with a history of ectopic pregnancy had an increased risk of bilateral tubal lesions and recurrence after reconstructive surgery. These lesions are often linked to previous inflammatory conditions.

In our series, nulliparous women represented 34% of cases. Kasia JM *et al.,*[7] in 2020 reported a comparable frequency of 37% nulliparous women among infertile patients. The majority of our patients had no history of abortion (60%). However, 16% of patients had a history of induced abortion. According to Okonofua FE *et al.,* In 2022, unsafe abortions are a major risk factor for pelvic infection and tubal obstruction in sub-Saharan Africa [10] .

On ultrasound, ovarian cysts accounted for 36% of abnormalities and uterine fibroids for 34%. These results are close to those of Belley Priso E *et al.,*in 2021, who reported 31% of ovarian cysts and 29% of uterine fibroids in infertile women [8] . Fibroids can compromise fertility through tubal compression or uterine deformation. Endometriosis, found in 4% of patients, was uncommon compared to Western series. Marana R *et al.,* in 2020 [13] reported an 18% frequency of endometriosis associated with distal tubal lesions. This low rate in our study could reflect underdiagnosis due to diagnostic difficulties in our setting.

Hysterosalpingography revealed distal obstruction in 76% of cases and hydrosalpinx in 70%. Han H *et al.,* reported in 2020 that distal lesions accounted for approximately 72% of tubal pathologies treated laparoscopically [1] . Marana R *et al.,* in 2020 [13] found hydrosalpinx in 65% of cases of tubal reconstruction surgery. Distal lesions are particularly

common after chronic salpingitis and represent the best indications for neosalpingostomy. [13] .

Only 10% of partners had undergone a sperm analysis. This low rate reflects socio-cultural realities in Africa, particularly Mali, where infertility is often attributed to the woman. However, the WHO, in Geneva in 2023, estimated that male factors are involved in 30 to 40% of cases of marital infertility [12] . Belley Priso E *et al.,* also reported a low rate of sperm analysis among male partners in 2021, less than 20% [8] .

During open laparoscopy, pelvic adhesions were found in 56% of cases and hydrosalpinx in 44%. These results reflect the age and severity of tubal lesions in our setting. Norris S *et al.,* in 2020 found pelvic adhesions in 48% of cases operated on for tubal infertility [2] . Norris S *et al.,* in 2020 emphasized that the severity of adhesions was inversely proportional to the chances of postoperative pregnancy.

The methylene blue test was concordant with hysterosalpingography (HSG) in 78% of cases. This result confirms the good diagnostic sensitivity of HSG. According to Han H *et al.,* in 2020, the concordance between HSG and chromopertubation varies between 70 and 85% depending on the series [1] .

Neosalpingostomy was the most frequently performed procedure (60%). This high frequency of bilateral lesions was also reported by Lokossou MSHS *et al.,*in Benin in 2020 [9] , who found 58% of patients with tubal obstruction to have bilateral involvement. After tubal repair, tubal patency with methylene blue was achieved in 40% of cases. This rate remains lower than that reported by Marana R *et al.,*in 2020, who obtained postoperative patency in 62% of cases [13] . This difference could be related to the more severe nature of the tubal lesions in our study.

The average hospital stay of two days observed in our series confirms the advantages of laparoscopy. Zhang Y *et al.,* in 2026 reported an average length of stay of 1.8 days after laparoscopic surgery versus 4.6 days after laparotomy [3] . Minimally invasive surgery reduces postoperative pain, the length of hospital stays, and promotes rapid recovery.

Regarding reproductive outcomes, 24% of patients achieved pregnancy after tubal repair. This rate is lower than those reported in some international series. Han H *et al.,* in 2020 [1] found pregnancy rates ranging from 30% to 55% after laparoscopic tubal surgery . Norris S *et al.,*[2] in 2020 reported a pregnancy rate of 42% in patients with moderate tubal lesions. Marana R *et al.,* in 2020 obtained 48% spontaneous pregnancies after neosalpingostomy. Lokossou MSHS *et al.,* in 2020 in Benin reported a pregnancy rate of 26% after tubal surgery, close to that observed in our study [9] . This difference with Western series could be explained by delayed diagnosis, the severity of the lesions, and limited access to early care.

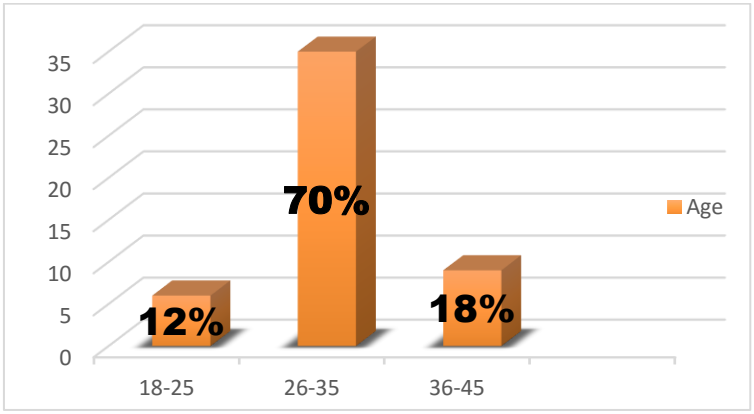
Of the 12 pregnancies achieved in our study, 58.33% went to term, while 41.67% ended in miscarriage. In 2020, Han H *et al.,*[1] reported a live birth rate of 60% after laparoscopic tubal surgery , a result close to ours. Han H *et al.,*[1] emphasized that spontaneous abortions were more frequent in patients with severe tubal damage or associated factors.

The average time to conception of 12 to 24 months observed in our series is comparable to data in the literature. In 2021, Zucha M *et al.,*[4] reported that the majority of pregnancies occurred within the first 18 months after tubal reconstruction surgery. Beyond two years, the chances of conception decrease considerably.

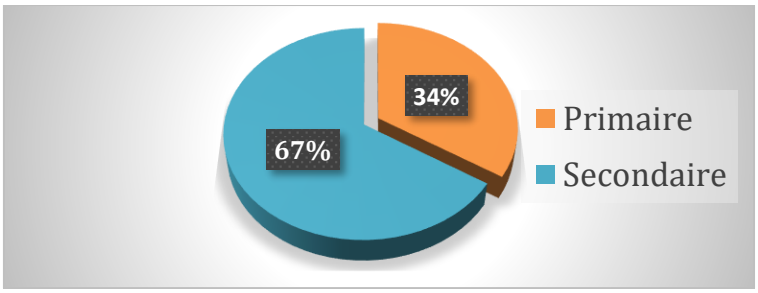
CONCLUSION

This study demonstrates that laparoscopic neosalpingostomy plays a significant role in the management of tubal infertility at Gabriel Touré University Hospital. Tubal lesions were predominantly distal obstructions and hydrosalpinx, mainly related to genital infections. Despite modest reproductive results, with a pregnancy rate of 24%, this technique enabled several patients to achieve spontaneous and ongoing pregnancies. Strengthening infection prevention, improving infertility assessment, and developing laparoscopic surgery could optimize future outcomes in our setting.

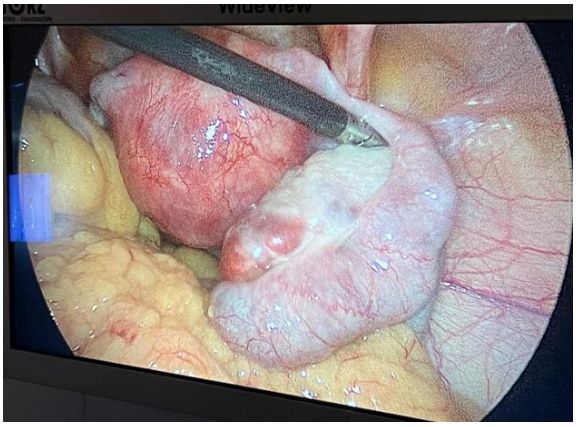
ANNEXES



Picture 1: Distribution of patients according to age group

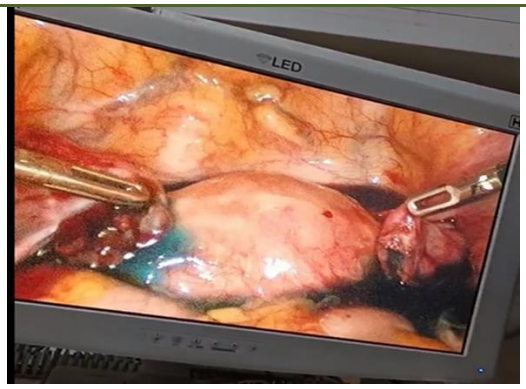


picture 2: Distribution of patients according to the type of infertility



Picture 3: Image of a bilateral hydrosalpinx in the operating room of the general surgery department at Gabriel Touré University Hospital

Picture 4: Image of a bilateral distal tubal obstruction (tubal phimosis) in the operating room of the general surgery department at Gabriel Touré University Hospital



Picture 5: Image of a positive methylene blue test after bilateral neosalpingotomy for bilateral distal tubal obstruction (tubal phimosis) in the operating room of the general surgery department at Gabriel Touré University Hospital

Table I: Distribution of patients according to the concept of gravidity

Gesture	Effective	Percentage
Nulligest	**17**	**34**
Primigest	12	24
Paucigete	**17**	**34**
Multi-gesture	4	8
Total	50	100

Table I: Distribution of patients according to the result of the laparoscopy

Laparoscopy	Effective	Percentage
Adherent ovaries	7	14
Adherent tubes	21	42
Hydrosalpinx	**22**	**44**
Total	50	100

Table III: Distribution of patients according to the result of the Blue Test and tubal patency after Neo salpingotomy

Tubal patency after Neosalpingotomy	Effective	Percentage
Bilateral positive	**20**	**40**
Negative bilateral	10	20
Positive Right	5	10
Negative Right	3	6
Positive Left	12	24
Total	50	100

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