

# Complications and feasibility analysis of ambulatory surgery for gynecological diseases in China

Li Yan, MD<sup>a</sup>, Fengnian Rong, MD<sup>a</sup>, Mei Gao, MD<sup>b</sup>, Guoqiang Chen, MS<sup>b</sup>, Yanfei Su, BS<sup>b</sup>, Lumen Xing, MS<sup>c</sup>, Min Xu, MS<sup>d,\*</sup> 

## Abstract

The Chinese government is attaching great importance to the development of ambulatory surgery in order to optimize the healthcare system in China. The study aims to examine the complications and quality indicators of patients who underwent gynecological ambulatory surgery at a tertiary hospital in China.

This was a retrospective study of patients who underwent ambulatory surgery between July and September 2019 at the Department of Gynecology of the First Affiliated Hospital of Shandong First Medical University. The patients were followed by phone at 30 days after discharge. The postoperative complications, mortality, unplanned re-operation, delayed discharge, unplanned re-hospitalization, and patient satisfaction were collected. The patients who underwent conventional hysteroscopic resection of uterine lesions during the same period were collected as controls for the economics analysis.

A total of 392 patients who underwent ambulatory gynecological surgery were included. Fifteen patients had postoperative complications, and the total complication rate was 3.8% (15/392). Eight (8/392, 2.0%) patients had delayed discharge. There were no unplanned re-operations and deaths. There were two (2/392, 0.5%) cases of unplanned re-hospitalization. At 30 days after discharge, two patients were dissatisfied, and 390 cases were satisfied, for an overall satisfaction rate of 99.5%. Compared with conventional hysteroscopic resection of uterine lesions, ambulatory hysteroscopic surgery had a shorter hospital stay and lower total costs ( $P < .05$ ) but similar surgery-related costs.

Ambulatory gynecological surgery is feasible in China, with an acceptable complication profile and obvious economic and social benefits. Nevertheless, hospital management shall be reinforced.

**Abbreviations:** ASA = American Society of Anesthesiologists, IAAS = Association for Ambulatory Surgery, IQR = Interquartile ranges.

**Keywords:** ambulatory surgical procedures, China, complications, economics, gynecological surgical procedures, quality of health care

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<sup>a</sup>Department of Obstetrics and Gynecology, <sup>b</sup>Medical Department, <sup>c</sup>Information Department, <sup>d</sup>Administrative Department, The First Affiliated Hospital of Shandong First Medical University, Jinan, China.

\* Correspondence: Min Xu, Administrative Department, The First Affiliated Hospital of Shandong First Medical University, Jinan, China (e-mail: xumin13791120603@163.com).

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## 1. Introduction

Ambulatory surgery refers to the completion of an operation in which the patients are admitted and discharged within 1 day (24 h) according to the initial medical treatment plan, except minor interventions performed at the outpatient department, and in which prolonged hospitalization due to medical conditions for special cases should not exceed 48 h.<sup>[1]</sup> The concept of ambulatory surgery was first proposed by Dr James Nicoll from Glasgow Children's Hospital in Scotland in 1909, and it rapidly developed in European and American countries, especially in Canada, Denmark, Spain, and Sweden, where the proportion of ambulatory surgery reaches 80% to 90%.<sup>[1]</sup>

The main advantage of ambulatory surgery is to facilitate patients' turnover and improves the utilization rates of hospital beds. In addition, the literature showed that ambulatory surgery is as safe or safer than inpatient surgery.<sup>[1,2]</sup> Indeed, ambulatory surgery minimizes the disruption to the patients' lives, reduces the costs of health care, promotes recovery through early ambulation, and decreases the occurrence of nosocomial infections.<sup>[3]</sup> Nevertheless, to ensure safety, proper tools for the decision to discharge a patient must be applied.<sup>[4]</sup> In contrast, postsurgical pain management can be complicated by the fact that some drugs

cannot be used without supervision and that patient-controlled analgesia is not available.<sup>[5–7]</sup>

A large number of gynecological surgical procedures can be performed as ambulatory surgery.<sup>[3,8,9]</sup> Those procedures include surgery for abnormal uterine bleeding, cervical conization, fertility treatments, urogynecology, and early pregnancy/emergency gynecology.<sup>[9,10]</sup>

The Chinese government is currently attaching great importance to the development of ambulatory surgery in order to optimize the healthcare system,<sup>[11]</sup> but the main reasons restricting its development are the claims and reimbursements from social security and doubts about the safety of ambulatory surgery. Therefore, the present study aims to examine the complications, quality indicators, and health economics of patients who underwent gynecological ambulatory surgery at one tertiary hospital in China. The results should provide data about the safety and feasibility of gynecological ambulatory surgery in China.

## 2. Patients and methods

### 2.1. Study design and patients

This was a retrospective study of patients who underwent ambulatory surgery from July to September 2019 at the Department of Gynecology of the First Affiliated Hospital of Shandong First Medical University. The study was approved by the Ethics Committee of the First Affiliated Hospital of Shandong First Medical University. The requirement for individual consent was waived by the committee because of the retrospective nature of the study.

The inclusion criteria were

1. >18 years of age,
2. underwent ambulatory gynecological surgery, and
3. available follow-up.

During the same period, the patients who underwent conventional hysteroscopic resection of uterine lesions were included as controls for the economics analysis. All included patients had clear surgical indications. All appropriate preoperative examinations were completed to exclude eventual surgical contraindications.

### 2.2. Management mode of ambulatory surgery

Decentralized admission and decentralized management are used at the First Affiliated Hospital of Shandong First Medical University. Departments carrying out ambulatory surgery have a fixed number of beds in their respective wards for patients who undergo ambulatory surgery. For the patients included in this study, surgery was performed by the doctors in the gynecological ward. The required preoperative examinations were completed in the outpatient department. The preoperative and postoperative care was performed in the gynecological ward. Surgeries were completed in the inpatient operating room.

### 2.3. The standard procedure of ambulatory surgery

According to the guidelines of ambulatory surgery by the International Association for Ambulatory Surgery (IAAS),<sup>[1]</sup> surgery can only be categorized as ambulatory surgery if the postoperative symptoms can be satisfactorily controlled and if the patients can restore their ability to eat and drink within 24 h after

surgery. A standard procedure for diseases, physicians, and patients was established in our hospital.

The standard procedure of ambulatory surgery enforced at our hospital states that the eligible surgeries have to be low-risk, with fast recovery, and with high safety. The specific criteria are:

1. clear preoperative clinical diagnosis;
2. the surgical procedures have been performed at our hospital for at least 1 year;
3. the operation time is not expected to exceed 2 h;
4. low risk of perioperative bleeding;
5. low risk of airway damage;
6. postoperative pain can be relieved by oral medication;
7. water can be taken once the patient is awake and liquid diet can be taken in the absence of nausea and vomiting;
8. no need for special postoperative care, and the patients can meet the discharge criteria within 24 h after surgery.

Strong competence and strong doctor–patient communication ability are the criteria for the surgeons. The specific criteria include:

1. the attending physician have an experience of at least 3 years, with the operation qualification of the corresponding level;
2. the relevant surgical operating skills are mastered, and a certain number of operations have been completed (it is recommended to be a surgeon who has operated 100 cases or who has assumed the position of the first assistant in more than 200 cases); and
3. good medical ethics and communication skills.

The criteria for the patients include:

1. clearly conscious, no history of mental illness, and accompanied by an adult during the perioperative period;
2. the patients are willing to undergo ambulatory surgery, understand and approve the surgical and anesthesia methods; the patients and their family members understand the perioperative care and are willing and able to complete post-discharge care;
3. non-general anesthesia: American Society of Anesthesiologists (ASA) I-II, ASA III but the general condition is stable for more than 3 months; general anesthesia: ASA classification I-II, below 65 years old; and contact numbers are available and can be reached.

It is suggested that the living place should not be more than 1 hour's drive from the hospital within 72 h after the operation, so as to facilitate follow-up and emergency management.

### 2.4. Follow-up and data collection

The patients were followed by phone at 30 days after discharge. The postoperative complications, mortality, unplanned re-operation, delayed discharge, unplanned re-hospitalization, and patient satisfaction were collected. The complications included any discomforts or other diseases caused by the surgery or anesthesia after surgery. Unplanned re-operation was defined as a re-operation beyond the initial plan due to various reasons during hospitalization. Delayed discharge was defined as discharge being delayed due to postoperative complications or not meeting the discharge criteria during the discharge assessment. The discharge rating scale of ambulatory surgery was applied,<sup>[12]</sup> and the patient with a total discharge score  $\geq 9$  points could be discharged. Unplanned re-hospitalization was defined as the patient being re-hospitalized due to surgery-related factors within 30 days after

discharge. The degree of satisfaction was determined in terms of operation effect, ambulatory surgery mode, service process, and other aspects after the discharge of the patients, divided into satisfied or dissatisfied.

Basic information, medical expenses, and hospital stay were collected. Medical expenses included total hospitalization expenses and surgery-related expenses. Surgery-related expenses included the expenses of surgery, anesthesia, intraoperative treatment, and surgical consumables.

**2.5. Statistical analysis**

The data were processed using SPSS 22 (IBM, Armonk, NY). Continuous data were tested for normal distribution using the Kolmogorov–Smirnov test. Normally distributed data are presented as means ± standard distributions and were analyzed using Student’s *t* test; otherwise, the data are presented as medians (interquartile ranges [IQR]) and were analyzed using the non-parametric Mann–Whitney *U* test. Categorical data are presented as numbers and percentages. Two-sided *P*-values <.05 were considered statistically significant.

**3. Results**

**3.1. Characteristics of the patients**

Finally, 392 patients who underwent ambulatory gynecological surgery from July to September 2019 were included. They were 41.0 ± 11.7 (range, 19–76) years of age. Among them, there were 33 cases of laparoscopic uterine adnexa surgery, including laparoscopic enucleation of ovarian cysts, laparoscopic ovarian salpingectomy, laparoscopic salpingectomy, and laparoscopic hydrotubation. Seven patients underwent laparoscopic myomectomy. There were 267 cases of hysteroscopic surgery, including hysteroscopic resection of uterine lesions, hysteroscopic removal of intrauterine device, hysteroscopic removal of a residual embryo, and hysteroscopic transcervical resection of septum. There were 18 cases of vulvovaginal surgery, including marsupialization of Bartholin gland, vulvar lesion resection, mid-urethral suspension, and vaginal lesion resection. Thirty-eight patients underwent cervix conization. There were 29 cases of birth-control related operation, including insertion and removal of intrauterine device and removal of cesarean scar pregnancy. All patients were followed.

**3.2. Surgical complications**

The ambulatory procedures were successful in all 392 patients, without intraoperative complications. As shown in Table 1, 15 patients presented various postoperative complications, and the

**Table 1**  
Postoperative complications of ambulatory surgery.

Complications	Patients (n=392)
Excessive vaginal bleeding	3 (0.8%)
Fever	3 (0.8%)
Pain	3 (0.8%)
Vaginal secretions with unpleasant odor	2 (0.5%)
Fatigue	2 (0.5%)
Red and swollen incision with exudation	1 (0.3%)
Urgent and frequent urination	1 (0.3%)
Redness and swelling at the site of intravenous injection	1 (0.3%)
Any complication	15 (3.8%)

total complication rate was 3.8% (15/392). Among them, three (3/392, 0.8%) patients had excessive vaginal bleeding, three (3/392, 0.8%) patients had fever, three (3/392, 0.8%) patients had lower abdominal and sacrococcygeal pain, two (2/392, 0.5%) patients had vaginal secretions with an unpleasant odor, two (2/392, 0.5%) patients had fatigue and sweating, one (1/392, 0.3%) patient had red and swollen incision with exudation, one (1/392, 0.3%) patient had urgent and frequent urination, and one (1/392, 0.3%) patient had redness and swelling at the site of intravenous injection. There was neither unplanned re-operation nor deaths.

**3.3. Delayed discharge**

Eight (8/392, 2.0%) patients experienced delayed discharge, all of whom were hospitalized in the gynecological ward. Among them, six patients underwent laparoscopic surgery, one underwent hysteroscopic surgery, and one underwent removal of cesarean scar pregnancy. The patients who underwent laparoscopic surgery included four cases of multiple hysteromyoma, one case of bilateral ovarian chocolate cysts, and one case of ectopic pregnancy. In the patients with delayed discharge after laparoscopic surgery, four cases finally had a surgery lasting >2 h, and two cases were performed after 17:30. One patient with delayed discharge after hysteroscopic surgery was suspected of having endometrial cancer during the operation, which required further treatment after being confirmed by conventional pathology. One patient had delayed discharge due to excessive bleeding during the removal of cesarean scar pregnancy (Table 2 Table 2).

**3.4. Re-hospitalization within 30 days after discharge**

There were two (2/392, 0.5%) cases of unplanned re-hospitalization. The pathological report of one patient after hysteroscopic endometrial polypectomy showed atypical endometrial hyperplasia; the patient had no fertility requirement and needed re-hospitalization for hysterectomy. One patient was diagnosed with early invasive carcinoma of the cervix after conization and needed re-hospitalization for further treatments.

**3.5. Satisfaction degree survey**

All 392 patients who underwent ambulatory surgery were followed at least once. According to the follow-up at 30 days after discharge, two patients were dissatisfied, and 390 were satisfied, for an overall satisfaction rate of 99.5%. All patients were satisfied with the operation effect and ambulatory surgery mode, with a satisfaction rate of 100%. One patient was dissatisfied with the service process due to the tedious procedure of discharge settlement, for a satisfaction rate of 99.7%. One patient was

**Table 2**  
Conditions of delayed discharge after ambulatory surgery.

Surgical methods	Delayed discharge n, (%)
Laparoscopic myomectomy (n=7)	4 (57.1)
Laparoscopic enucleation of ovarian cyst (n=21)	1 (4.8)
Laparoscopic embryo extraction of tubal pregnancy (n=4)	1 (25.0)
Hysteroscopic resection of uterine lesions (n=162)	1 (0.6)
Termination of Cesarean scar pregnancy (n=6)	1 (16.7)

dissatisfied for other reasons (hospitalization expenses were higher than expected).

### 3.6. Comparison of the hospitalization expenses and hospital stay between ambulatory and conventional hysteroscopic resection of uterine lesions

Among the 392 patients, 162 underwent ambulatory surgery for hysteroscopic resection of uterine lesions in our hospital. In the same period, 50 patients were included as controls. The 162 patients who underwent ambulatory hysteroscopic resection of uterine lesions were  $41.7 \pm 11.7$  (range, 21–72) years of age. The clinical diagnoses were cervical polyp ( $n=17$ ), endometrial polyp ( $n=92$ ), submucosal hysteromyoma ( $n=6$ ), abnormal metrorrhagia ( $n=36$ ), and intrauterine adhesion ( $n=11$ ). The hospital stay was 1–4 days, with a median of 1 day. The average hospitalization expenses were  $7155 \pm 1368$  yuan, including 1979  $\pm$  557 yuan of surgery-related expenses.

During the same period, 50 patients underwent conventional hysteroscopic resection of uterine lesions; they were  $46.7 \pm 11.7$  (range, 22–77) years of age. The clinical diagnoses were cervical polyp ( $n=3$ ), endometrial polyp ( $n=27$ ), submucosal hysteromyoma ( $n=6$ ), abnormal metrorrhagia ( $n=10$ ), and intrauterine adhesion ( $n=4$ ). The hospital stay was 1 to 8 days, with a median of 3 days. The average hospitalization expenses were  $8824 \pm 1823$  yuan, including  $2030 \pm 461$  yuan of surgery-related expenses. Compared with conventional surgery, the hospital stay of the patients who underwent ambulatory hysteroscopic resection of uterine lesions was shorter ( $P < .001$ ), and the total hospitalization expenses of ambulatory surgery were significantly lower ( $P < .001$ ), but there were no differences in terms of surgical treatment expenses ( $P = .552$ ) (Table 3 Table 3).

## 4. Discussion

Ambulatory surgery has several advantages, including improving the utilization rates of hospital beds and decreasing patients' costs.<sup>[1–3]</sup> The Chinese government is willing to develop ambulatory surgery in order to optimize the healthcare system.<sup>[11,13]</sup> Therefore, this study aimed to examine the complications, quality indicators, and health economics of patients who underwent gynecological ambulatory surgery at one tertiary hospital in China. The results strongly suggest that gynecological ambulatory surgery is feasible in China, with an acceptable complication profile and obvious economic and social benefits. Nevertheless, hospital management shall be reinforced.

Ambulatory surgery is a surgical model in which patients are hospitalized and undergo surgery on the same day and discharged after a short recovery.<sup>[1–3]</sup> Postoperative rehabilitation and recovery are usually performed at home or in the community. Therefore, the preoperative selection of diseases and patients, postoperative symptom control of patients, and follow-up

measures after discharge are particularly important.<sup>[1–3]</sup> The quality and safety control requirements of ambulatory surgery are higher than those of traditional surgery.<sup>[1,4]</sup> Therefore, measures must be established before carrying out ambulatory surgery to guarantee the safety and quality of ambulatory surgery, and corresponding monitoring and evaluation system must be established.<sup>[4]</sup> The IAAS reported the monitoring results of various quality safety indicators<sup>[1]</sup>: the incidence of common complications such as pain was 11% to 50%, the incidence of postoperative nausea and vomiting was 30%, the delayed discharge rate was 0.28% to 14%, the re-hospitalization rate within 30 days after discharge was 0.28% to 1.5%, and the mortality rate at 30 days after surgery was 1.6/100,000.<sup>[1]</sup>

This study showed that the incidence of complications of ambulatory surgery in our hospital was significantly lower than the monitoring indicators of IAAS<sup>[1]</sup> and a study by Coley et al.<sup>[14]</sup> The reasons might be that a strict standard procedure system was established for ambulatory surgery in our hospital, and the patients are strictly screened according to age and ASA classification. In addition, the evaluation, follow-up, and emergency protocol system of ambulatory surgery is well-established in our hospital. The evaluation system of ambulatory surgery was implemented, including pre-admission evaluation, postoperative evaluation, and discharge evaluation. The emergency protocol for ambulatory surgery includes emergency measures during hospitalization and after discharge. The patients must be followed on the first day after discharge. According to the specific regulations of each disease, each discharged patient had to be followed at least twice in the first week and at least once in the second week. Based on the implementation of this system, ambulatory surgery was carried out with a favorable complication profile, without any serious complications or mortality. Nevertheless, some countries and regions have relaxed the indications of ambulatory surgery, and grades 3 and 4 general anesthesia surgeries with higher risks are gradually being included for ambulatory surgery.<sup>[15,16]</sup> This might be another reason why the IAAS statistics show higher rates of complications than in the present study. In this study, some diseases had higher rates of delayed discharge, and some factors limiting the development of ambulatory surgery were identified. Indeed, the process of ambulatory surgery needs to be optimized. In two patients with delayed discharge, surgeries were performed at night, which was not conducive to rapid discharge. In addition, the postoperative recovery of general anesthesia is slow, and there is a greater chance of delayed discharge.<sup>[17]</sup> The reasons might be related to preoperative fasting and anesthetic use. Therefore, the concept of “enhanced recovery after surgery” will greatly push forward the development of ambulatory surgery.<sup>[18]</sup> Patients who intend to receive laparoscopic myomectomy should be cautious in choosing ambulatory surgery: four out of seven patients who underwent laparoscopic myomectomy had delayed discharges in this study, mainly because of the long operation

**Table 3**

**Comparison of the hospitalization expenses and hospital stay between ambulatory surgery and conventional surgery after hysteroscopic resection of uterine lesions.**

Items	Ambulatory surgery group (n=162)	Conventional surgery group (n=50)	P
Hospital stay (day)	1 (1–2)	3 (2–4)	<.001
Total hospitalization expenses (Yuan)	7155 $\pm$ 1368	8824 $\pm$ 1823	<.001
Surgery-related expenses (Yuan)	1979 $\pm$ 557	2030 $\pm$ 461	.552

time, excessive intraoperative bleeding, slow postoperative recovery of patients, obvious postoperative abdominal pain, abdominal distension, fatigue, and other symptoms. Finally, if the patients are kept away from medical observation outside the hospital, some complications can be difficult to be detected and dealt with in a timely manner. Seamless medical care service between hospitals and the community is the most ideal mode for ambulatory surgery. Postoperative observation and treatment are transferred to community healthcare centers to meet the needs of patients who received ambulatory surgery for continuous medical services, thus better medical safety can be guaranteed.

In this study, a comparative analysis was conducted on hospital stay and hospitalization expenses for hysteroscopic resection of uterine lesions. The average hospital stay for patients who received ambulatory surgery was 1 day, which was 2 days shorter than that of conventional surgery during the same period. The average total hospitalization expenses of patients with ambulatory surgery were also reduced by about 1600 yuan compared with conventional surgery during the same period, but there was no significant difference in terms of surgery-related expenses between the two groups, which is consistent with the literature.<sup>[19–21]</sup> The longer hospital stay of conventional surgery results in additional treatment expenses, drug fees, nursing fees, accommodation expenses, and accompanying expenses. In addition, indirect expenses such as food, accommodation, and transportation for family members of the patients are also higher. It can be concluded that the operation mode of ambulatory surgery for hysteroscopic resection of uterine lesions can significantly shorten hospital stay, reduce the economic burden of the patients, and save medical insurance funds. Similar cost-effectiveness was observed in China for cataract surgery,<sup>[22]</sup> cardiothoracic, and neurological surgery.<sup>[11]</sup>

This study has limitations. Only a single hospital was analyzed and over a short period of time. Therefore, the sample size was small. In addition, the generalizability of the results to all of China might be questionable. In addition, the retrospective nature of the study limited the data that could be analyzed. In addition, we cannot exclude the possibility that some patients consulted at other hospitals after their surgery.

In conclusion, the results strongly suggest that gynecological ambulatory surgery is feasible in China, with an acceptable complication profile and obvious economic and social benefits. Nevertheless, hospital management shall be reinforced. Appropriate standard procedures and criteria for the diseases, physicians, and patients should be established as appropriate. Quality control and evaluation systems should be continuously improved to ensure medical quality and safety. The clinical research on anesthesia, treatment, and nursing of ambulatory surgery is still necessary.

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## Author contributions

**Investigation:** Li Yan, Fengnian Rong, Mei Gao, Guoqiang Chen, Yanfei Su, Lumen Xing, Min Xu.

**Methodology:** Li Yan, Fengnian Rong, Mei Gao, Guoqiang Chen, Yanfei Su, Lumen Xing, Min Xu.

**Writing – original draft:** Li Yan.

**Writing – review & editing:** Min Xu.

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