

Salpingectomy for tubal sterilization at cesarean section: no extra time and no extra bleeding compared with tubal ligation

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Summary

Purpose: A salpingectomy may reduce the probability of the future occurrence of ovarian cancer, and is now increasingly preferred to the tubal ligation as a method of tubal sterilization. This study aimed to determine whether a salpingectomy at cesarean section (CS) requires more time or involves more bleeding compared with tubal ligation. **Materials and Methods:** This was a historically controlled retrospective observational study. The clinical records of singleton pregnant women who underwent tubal sterilization at CS were examined. Tubal ligation was performed in 45 women in 2013-2014 and a salpingectomy was performed in 22 women in 2015. **Results:** No significant difference was observed between tubal ligation and salpingectomy groups in terms of median operating time (65.0 and 68.5 minutes for the ligation and the salpingectomy groups, respectively; $p = 0.053$) or volume of bleeding (847 and 916 ml for the ligation and the salpingectomy groups, respectively; $p = 0.475$). **Conclusion:** A bilateral salpingectomy at CS did not involve more time or bleeding than tubal ligation, and may therefore be an option for tubal sterilization during CS.

Key words: Cesarean section; Ovarian cancer; Salpingectomy; Tubal ligation; Tubal sterilization.

Introduction

A tubal ligation performed during a cesarean section (CS) is a safe and effective method of permanent birth control [1, 2]. However, recently bilateral salpingectomy was found to be effective in reducing the risk of epithelial ovarian cancer and is now increasingly preferred to the tubal ligation [3-6].

A previous study showed that salpingectomy required significantly more time to perform than tubal ligation in non-pregnant women [7]. At CS, the blood supply to the uterus from the surrounding tissues increases, leading to the perception that the salpingectomy is more difficult to perform at CS than in a non-pregnant state because of the apparently greater amount of time required and the larger volume of bleeding involved [8]. The present authors' surgical experience contradicted this assumption. Here they report a retrospective historically controlled study to determine whether salpingectomy at CS involves more time and bleeding compared with tubal ligation.

Materials and Methods

This study was approved by the institutional ethics committee. The present institute performed tubal ligations until 2014 for patients who opted for permanent sterilization at CS. In 2013 and 2014, the authors performed a salpingectomy at CS for five women who opted for this procedure after obtaining their informed consent. They found that this surgery can be performed

without any difficulty, i.e., without involving more time or bleeding compared to tubal ligation. They therefore made a protocol for performing salpingectomies at CS for all patients opting for permanent sterilization after giving their informed consent. They explained that, although definite data had yet to be demonstrated, future occurrence of ovarian cancer was more likely to be reduced in women after a salpingectomy than after a tubal ligation.

In 2013 and 2014, the authors performed a tubal ligation at CS in 45 women and a salpingectomy in five women. They performed a bilateral salpingectomy at CS in 22 women in 2015. They compared the clinical characteristics and short-term outcomes (time required for CS and volume of bleeding during CS) between women undergoing a tubal ligation ($n=45$, performed 2013-14) and those undergoing a salpingectomy ($n=22$, performed in 2015, with five salpingectomies performed in 2013-14 excluded). The present report is a historically controlled retrospective observational study. All 67 (45+22) women were singleton pregnancies, underwent CS after 33 weeks of gestation without placenta previa, and received no additional surgical procedure.

For tubal ligations the tube was ligated midway along its length with no. 1 silk. The salpingectomy at CS was performed in a similar way to that for non-pregnant women [9]: the mesosalpinx, mainly containing the tubal branch of the ovarian artery and vein, was cut and ligated. A complete salpingectomy was performed in all of the patients, with the cut and ligation usually performed two or three times.

Data were analyzed with the SPSS, Version 23.0. For comparison, the following tests were used: the Shapiro-Wilk test for distribution, Student t -test for normally distributed variables, Mann-Whitney U test for not-normally distributed variables, and the Fisher exact test for categorical variables. A $p < 0.05$ was considered significant.

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Table 1. — *Patient characteristics*

	Tubal ligation		Salpingectomy	p-value
Case	45		22	
Gestational age (median, range)	38 ^{0/7} (36 ^{0/7} -38 ^{5/7})		38 ^{1/7} (34 ^{0/7} -39 ^{3/7})	0.673*
Age, years	33.2 ± 5.1		34.8 ± 4.9	0.249†
Number of previous CS	0	1	0	0.765‡
	1	10	4	
	2	33	17	
	≥ 3	1	1	
Birth weight, grams	2842 ± 303		2730 ± 561	0.388†

CS: cesarean section; *Mann-Whitney *U* test; †Student *t*-test;

‡Fisher exact test.

Table 2. — *Operating time and volume of bleeding for CS.*

	Tubal ligation		Salpingectomy	p-value*
Operating time, minutes, median (range)	65.0 (36-111)		68.5 (54-131)	0.053
Volume of bleeding, ml, median (range)	847 (293-2965)		916 (450-2140)	0.475

CS: cesarean section. *Mann-Whitney *U* test.

Results

As shown in Table 1, the two groups showed no significant difference in their patient characteristics. The CS procedures were fundamentally the same.

As shown in Table 2, the median operating time was 65.0 (range: 36-111) and 68.5 (54-131) minutes for the tubal ligation and salpingectomy groups, respectively. The salpingectomy required 3.5 minutes longer at CS but the difference was not statistically significant ($p = 0.053$). The median volume of bleeding (including amniotic fluid) was 847 (293-2965) and 916 ml (450-2140) for the tubal ligation and the salpingectomy groups, respectively. Although women undergoing a salpingectomy bled approximately 70 ml more the difference was not significant ($p = 0.475$). One woman (2.2%: 1/45) in the tubal ligation group required a blood transfusion and postponement of discharge; the remaining 66 women received no blood transfusion or prolongation of hospitalization. No patient in either group required readmission or experienced any severe complications.

Discussion

To the present authors' knowledge, this study is the first to demonstrate that the operating time required and the volume of bleeding involved in CS were the same, whether a salpingectomy or a tubal ligation was performed, i.e., the salpingectomy did not require more time or cause more bleeding than the tubal ligation.

Recent research has suggested that ovarian cancer, at least some forms of it, may originate in the tube, especially

in its fimbria: serous tubal intraepithelial carcinoma (STIC) has been considered a precursor of ovarian serous carcinoma, and STICs almost always were detected in the fimbria [4, 10]. This suggests that the removal of the tube with the fimbria via a salpingectomy may contribute more to preventing ovarian cancer than the tubal ligation [11]. Thus for non-pregnant women who opt for tubal sterilization, the salpingectomy is increasingly performed instead of the tubal ligation.

This study showed that the salpingectomy could be performed at CS without requiring significantly more time or involving significantly more bleeding. A population-based retrospective cohort study was performed on the opportunistic salpingectomy, comparing it to tubal ligations performed at various times including, but not limited to, the timing of the CS, and showing a statistically significant ten-minute increase in operating room time for the salpingectomy group compared with the tubal ligation group (61.0 ± 25.1 for the ligation group vs. 71.2 ± 23.5 minutes for the salpingectomy group; $p < 0.001$) [7]. No other difference in perioperative outcome was observed. In the present study, the additional operating time required for the salpingectomy was only 3.5 minutes, much shorter than reported in the previous study [7] and within acceptable parameters for clinical situations. In the present authors' experience, the wide opening of the abdomen during CS enabled then to perform the salpingectomy more easily than via a laparoscopy or a mini-laparotomy, which may explain the discrepancy in operating times.

The same previous study [7] showed no additional risk of blood transfusion during the salpingectomy compared with the tubal ligation, but did not address the volume of bleeding. Ovarian vessels are dilated more during pregnancy than in the non-pregnant state, and thus theoretically, vessel injury during a salpingectomy at CS may cause more bleeding than in the non-pregnant state, and can constitute one of the risks during a salpingectomy at CS. However, in the present authors' experience the tubal branches of ovarian vessels were usually not dilated to the extent expected, and the mobility of the ovarian tubes increased at CS, allowing sufficient space for cutting these branches. The authors were able to cut the mesosalpinx easily with little risk of damage to other structures. They have never experienced injuries to the ovarian vessels or any other complications while performing the salpingectomy, leading to their conviction that the salpingectomy at CS is no more difficult than in a non-pregnant state.

Concerns may arise if the salpingectomy adversely affects ovarian function or hormonal levels. Although most studies of ovarian function or hormonal levels in non-pregnant women following a salpingectomy have shown no adverse effects, some reports suggested that it can cause a reduction in follicles, blood flow in the ovaries or an increase in follicle-stimulating hormone [4]. No studies have shown the long-term effects of the salpingectomy per-

formed at CS. A randomized controlled trial addressing this issue is currently being conducted (NCT02377128) with the expectation of producing a conclusive answer.

In conclusion, the salpingectomy during CS did not require more time or involve more bleeding than the tubal ligation, and caused no short-term ill effects. This procedure may be an option for tubal sterilization at CS and may confer the potential benefit of ovarian cancer prevention. This study did not compare the actual times required for each type of procedure, and the small number of cases may have yielded low statistical power for detecting small differences. The long term effects, including any oncological benefits or potential harm to ovarian function, could not be established with certainty. Further study on the long term outcomes in larger populations is needed.

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