

Case Report

Subsequent left distal tubal pregnancy following laparoscopic tubal sterilization: a case report

Chung-Yuan Lee^{1,2,3,†}, Ching-Min Lin^{4,†}, Yi-Sin Tan⁵, Che-Min Chen¹, Hsing-Ju Su¹,
Ling-Yun Cheng¹, Chin-Jung Wang^{6,*}

¹Department of Obstetrics and Gynecology, Chiayi Chang Gung Memorial Hospital, 61363 Chiayi, Taiwan

²Department of Nursing, Chang Gung University of Science and Technology, Chiayi Campus, 61363 Chiayi, Taiwan

³Institute of Medicine, Chung Shan Medical University, 40201 Taichung, Taiwan

⁴Department of Surgery, Changhua Christian Hospital, 500209 Changhua City, Taiwan

⁵Department of Obstetrics and Gynecology, Kaohsiung Chang Gung Memorial Hospital, 88301 Kaohsiung, Taiwan

⁶Department of Obstetrics and Gynecology, Chang Gung Memorial Hospital at Linkou and Chang Gung University College of Medicine, 333 Taoyuan, Taiwan

*Correspondence: wang2260@gmail.com (Chin-Jung Wang)

†These authors contributed equally.

Academic Editor: Michael H. Dahan

Submitted: 18 December 2020 Revised: 23 February 2021 Accepted: 8 March 2021 Published: 7 June 2022

Abstract

Background: Post-sterilization pregnancies are rare and many postulations were made for its mechanism. Abdominal pain in women with retained uterus mandates a pregnancy test, regardless of previous tubal surgery or sterilization surgery to exclude the possibility of ectopic pregnancy. Prevention via surgical approach not only prevents future occurrence but also confer prophylaxis measure against ovarian cancer. **Case:** A 39-year-old woman who had undergone open right salpingectomy due to tubal pregnancy presented with abdominal pain, a positive pregnancy test, and elevated beta-human chorionic gonadotropin (β -hCG) level. Furthermore, an ultrasound exam revealed the absence of a gestational sac in the uterine cavity but the presence of a left adnexal mass; hence ectopic pregnancy was suspected. Laparoscopy revealed a 3 × 4 cm bulging ectopic pregnancy at the left distal end of the remnant stump in the ampulla. The histopathological assessment confirmed ectopic pregnancy in the left distal tubal stump. Post-operation, β -hCG levels decreased. The patient fully recovered postoperatively. **Discussion:** Ectopic pregnancies after tubal sterilization are caused by fistula formation and intraperitoneal sperm transmigration. To avoid this possibility, surgical techniques should be used to obliterate the residual canal, including the precise location and depth of electrocautery to prevent fistula formation. Total salpingectomy is the recommended treatment approach for effective permanent sterilization and a prophylaxis measure against ovarian cancer.

Keywords: Ectopic pregnancy; Fallopian tube pregnancy; Sterilization; Laparoscopic tubal sterilization; Contraceptive method

1. Introduction

In 2019, 23.7 percent of all contraceptive users choose female permanent contraception, that is a total of 219 million women worldwide [1]. Although it is relatively rare, post-sterilization pregnancy occurs. The 10-year cumulative occurrence of pregnancy after all methods of sterilization found by CREST was 18.5 per 1000 women [2]. Common risk factors contributing to ectopic pregnancy include smoking; previous ectopic pregnancies, appendectomy, *Chlamydia trachomatis* infections, infertility, and adnexal surgeries; failure of intrauterine devices; failure of reversible contraceptives; and pregnancy after female sterilization [3]. In women with retained uterus, abdominal pain mandates a pregnancy test, regardless of previous tubal surgery or sterilization surgery, to exclude the possibility of ectopic pregnancy. This report aimed to provide knowledge on the possibility and occurrence of this rare phenomenon of spontaneous left distal tubal pregnancy despite laparoscopic left partial salpingectomy for sterilization and create

awareness of its prevention.

The study was approved by the institutional review board and ethics committee of the Chang Gung Medical Foundation for clinical trials (IRB No.: 201900873B0) (blinded for review) and a waiver of consent was granted.

2. Case presentation

A 39-year-old woman with an obstetric history of gravida 7, para 3 (all normal spontaneous deliveries), two induced abortions, and a right tubal pregnancy was brought to our emergency department due to sudden-onset lower abdominal pain that started one day before her arrival. She reported regular menstrual cycles; the most recent was five weeks and three days earlier. The patient denied having a history of pelvic inflammatory disease. Her past surgical history included one right tubal pregnancy for which she received an open right salpingectomy (11 years and 3 months ago) and laparoscopic left tubal sterilization (6 years and 7 months ago). The initial physical examination



showed stable vital signs. The urine pregnancy test was positive. Laboratory test indicated a serum human chorionic gonadotropin (β -hCG) level of 1022.05 mIU/mL and a hemoglobin level of 12.5 g/dL. A transvaginal ultrasound exam revealed no evidence of intrauterine pregnancy.

Serum β -hCG levels after 2 and 5 days were 2239 and 2303 mIU/mL, respectively. Although there was no evidence of intrauterine pregnancy, a heterogeneous 4.0×2.1 cm left adnexal mass with minimal ascites was visible on transvaginal ultrasound. Based on the clinical, imaging, and laboratory findings, ectopic pregnancy was impressed, and the patient was admitted for surgical management.

Three-dimensional laparoscopy intraoperative finding includes a 3×4 cm bulging ectopic pregnancy at the left distal end of the remnant stump in the ampulla region, 100 mL of internal bleeding, and a 3.5 cm gap at the previous left tubal sterilization site (Fig. 1). Both ovaries appeared normal in shape and size. No endometriotic foci or endometrioma was found. Previous salpingectomy region is every close to right infundibulopelvis ligament, mimicking its appearance as a residual right fallopian tube. Our examination confirmed the absence of right fallopian tube, which is compatible with her right salpingectomy history. Following patient's preference for sterilization, a complete left residual tubal stump excision was done. A histopathological exam confirmed ectopic pregnancy diagnosis in the left distal tubal stump. On postoperative day 1, patient's β -hCG level decreased to 914.96 mIU/mL. The patient fully recovered post-operatively and was discharged.

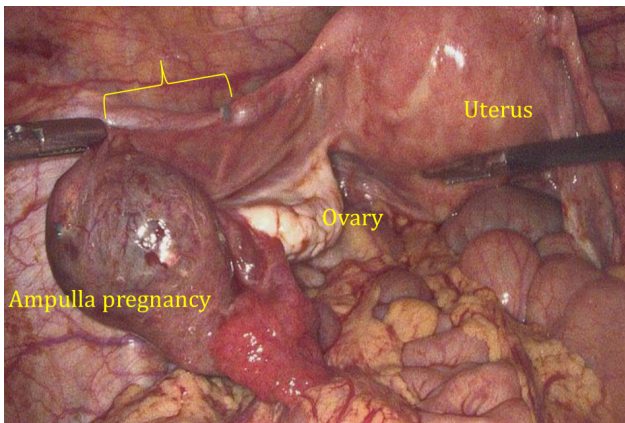


Fig. 1. Three-dimensional laparoscopic surgery showing a 3 cm \times 4 cm bulging mass at the left distal end of the remnant stump in the ampulla region. The curly bracket denotes the site of the previous tubal ligation gap.

3. Discussion

We previously reported a similar case of spontaneous right distal tubal pregnancy post bilateral laparoscopic sterilization, showing that the incidence of pregnancy after

tubal sterilization is extremely rare, and the causative mechanism remains unclear [4]. To have the same medical professionals encounter similar cases in such a short duration is unprecedented at our institution. Hence, we would like to report and discuss the postulated mechanisms.

According to literature, there are three main postulations on the occurrence of ectopic pregnancies at the remnant distal tube after sterilization. All mechanisms center on fistula formation, although they differ with regard to its formation. McCausland found that if the site of laparoscopic coagulation is in close proximity to the endosalpinx of the proximal fallopian tube, the tube may be injured and activate a potential fistula formation. However, if coagulation occurs farther away, only fibrosis ensues [5]. This is of clinical significance because if the surgeon can avoid injuring the proximal isthmic portion of the fallopian tube, the possibility of ectopic pregnancy, endosalpingoblastosis, and fistula formation decreases while the prognosis of laparoscopic tubal sterilization improves. Additionally, Dietl *et al.* and Creinin & Zite [6,7] suggested that as time elapses after sterilization, the proximal segment of the oviduct showed natural histological transformations, such as chronic inflammation, luminal dilatation, or plical attenuation. Zuzarte *et al.* [8] proposed that the endometrial and peritoneal cavities might connect through a persistent lumen in the interstitial portion and distal remnant of the oviduct as a result of insufficient ligation. Because intraperitoneal sperm transmigration exists in almost half of all human pregnancies [2], a residual stump presents a risk for ectopic pregnancy and its reoccurrence. If the distal blunt-ended fallopian tube receives a fertilized ovum but the micro fistula is insufficient in size for the fertilized ovum to pass through, the zygote is unable to reach the uterine cavity for implantation, resulting in an ectopic tubal pregnancy. We can even consider total salpingectomy to prevent ectopic pregnancy. This method has a side bonus to reduce the risk for ovarian cancer. According to studies from Ely *et al.* [9] and Mills *et al.* [10], salpingectomy is as safe and efficacious as tubal ligation for sterilization and may be preferred because bilateral tubal ligation can reduce ovarian cancer risk by 13–41% but a dramatic 42–78% in total salpingectomy. Hence, removing fallopian tubes have shown to be an effective prophylaxis measure against ovarian cancer and can be considered in woman who wish to undergo sterilization procedure.

4. Conclusions

All methods of contraception have a risk of failure. Although rare, an ectopic pregnancy can occur after tubal sterilization. To avoid this possibility, surgical techniques should be used to obliterate the residual canal, including the precise location and depth of electrocautery to prevent fistula formation. Because sperm can migrate transperitoneally, total salpingectomy should be the preferred option for women with no desire to bear children to reduce the

risk of ectopic pregnancies associated with residual stumps and this procedure is also an effective prophylaxis measure against ovarian cancer.

Author contributions

CYL, CML, YST, CMC, HJS, LYC, and CJW contributed to the conception and design of the study. CYL and CML contributed to the writing of the manuscript. CYL, YST, CMC, HJS, LYC, and CJW contributed to the acquisition and interpretation of the data. All authors read and approved the final manuscript.

Ethics approval and consent to participate

The study was approved by the institutional review board and ethics committee of the Chang Gung Medical Foundation for clinical trials (IRB No.: 201900873B0) and a waiver of consent was granted.

Acknowledgment

The authors would like to thank the Chang Gung Medical Foundation Institutional Review Board for approving this case report for publication.

Funding

This research received no external funding.

Conflict of interest

The authors declare no conflict of interest.

References

- [1] United Nations Department of Economic and Social Affairs, Population Division. Contraceptive use by method 2019: data booklet. 2019. Available at: <https://www.un.org/en/development/desa/population/publications/pdf/family/ContraceptiveUseByMethodDataBooklet2019.pdf> (Accessed: 11 October 2020).
- [2] Peterson HB, Xia Z, Hughes JM, Wilcox LS, Tylor LR, Trussell J. The risk of pregnancy after tubal sterilization: findings from the U.S. Collaborative Review of Sterilization. *American Journal of Obstetrics and Gynecology*. 1996; 174: 1161–1170.
- [3] Li C, Zhao WH, Zhu Q, Cao SJ, Ping H, Xi X, *et al.* Risk factors for ectopic pregnancy: a multi-center case-control study. *BMC Pregnancy and Childbirth*. 2015; 15: 187.
- [4] Lin CM, Ku YL, Cheng YT, Giin NY, Ou YC, Lee MC, *et al.* An uncommon spontaneous right distal tubal pregnancy post bilateral laparoscopic sterilization: a case report. *Medicine*. 2019; 98: e14193.
- [5] McCausland A. Endosalpingosis (“endosalpingoblastosis”) following laparoscopic tubal coagulation as an etiologic factor of ectopic pregnancy. *American Journal of Obstetrics and Gynecology*. 1982; 143: 12–24.
- [6] Creinin MD, Zite N. Female tubal sterilization: the time has come to routinely consider removal. *Obstetrics and Gynecology*. 2014; 124: 596–599.
- [7] Dietl J, Wischhusen J, Häusler SFM. The post-reproductive Fallopian tube: better removed? *Human Reproduction*. 2011; 26: 2918–2924.
- [8] Zuzarte R, Khong CC. Recurrent ectopic pregnancy following ipsilateral partial salpingectomy. *Singapore Medical Journal*. 2005; 46: 476–478.
- [9] Ely LK, Truong M. The role of opportunistic bilateral salpingectomy vs tubal occlusion or ligation for ovarian cancer prophylaxis. *Journal of Minimally Invasive Gynecology*. 2017; 24: 371–378.
- [10] Mills K, Marchand G, Sainz K, Azadi A, Ware K, Vallejo J, *et al.* Salpingectomy vs tubal ligation for sterilization: a systematic review and meta-analysis. *American Journal of Obstetrics and Gynecology*. 2021; 224: 258–265.e4.