

Intraoperative complications of outpatient interval tubal sterilization at a teaching hospital in Turkey

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ABSTRACT

الأهداف: تقييم مضاعفات التعقيم بربط قناة فالوب لدى مريضات العيادات الخارجية أثناء العمليات الجراحية.

الطريقة: تمت مراجعة بيانات 461 مريضة أجريت لها عملية ربط أنبوبي في عيادة تخطيط الأسرة بمستشفى إتلتيك للولادة وتعليم صحة المرأة ومركز الأبحاث بأنقرة - تركيا، في الفترة ما بين يناير 2002م وديسمبر 2005م، من قاعدة البيانات في الحاسب الآلي. تم تقييم الصفات السكانية وتقنية العملية الجراحية والمضاعفات خلال العملية الجراحية، والمضاعفات المبكرة بعد العملية للمريضات. أجريت عملية فتح البطن البسيطة فقط لأحدى عشرة مريضة من أجل عملية ربط قناة فالوب، تمت علمية ربط القناة باستعمال المنظار والكي القطبي. كما تم تحليل الحالات التي أدخلت إلى المستشفى للعلاج أو التي تعرضت لمضاعفات و/أو التي لم يتقرر لها إجراء عملية فتح البطن.

النتائج: كان العمر الفعلي، والحمل والإنجاب، وعدد الأطفال الأحياء للمرضى (R: 2-6)، 3.1 (R: 2-7)، 3.2 (R: 2-9)، 4.6 (R: 21-51)، 35.1 (R: 2-6) على التوالي. من بين 461 مريضة، هنالك حالتان فقط (0.4%) تعرضتا لمضاعفات متعلقة بالتخدير العام. حالتين (0.4%) تعرضتا لنزيف من موضع العملية، ثلاثة حالات (0.6%) تعرضن لنزيف في منتصف البوق ونزيف في منتصف المبيض، وتعرضت مريضة واحدة فقط (0.2%) لنزيف ثربي، وتعرضت حالة واحدة (0.2%) لنزيف من جدار المهبل، كما كان هنالك حالة واحدة فقط (0.2%) تعرضت لحرق معوي والذي تطلب فتح البطن واستئصال قطعة، عقبها إجراء مفاغرة من الطرف إلى الطرف. لم يكن هنالك وفيات. وتبين وجود مريضات بنسبة 2.1%، وتمت مواجهة عمليتين جراحيتين بالمنظار لحالتين.

خاتمة: تعتبر عملية ربط قناة فالوب لمريضات العيادات الخارجية مريحة وآمنة ويعتبر تطبيق تقنيات الجراحة بالمنظار أمراً ضرورياً لتصحيح المضاعفات.

Objective: To evaluate the intra-operative complications of outpatient interval tubal sterilization at a teaching hospital.

Methods: The data of 461 patients who underwent interval tubal ligation (ITL) at the Family Planning Clinic of Ankara Etlik Maternity and Women's Health Teaching and Research Hospital, Ankara, Turkey between January 2002 and December 2005 were reviewed from a computerized database. The demographic characteristics, operative technique, and intra- and early postoperative complications of patients were evaluated. Only 11 patients had minilaparotomy for ITL. Laparoscopic ITL was performed using bipolar cautery. The cases who were hospitalized or who had a complication and/or an unplanned laparotomy were analyzed.

Results: The mean age of patients was 35.1 (range: 21-51), gravidity was 4.6 (range: 2-9), parity was 3.2 (range: 2-7), and number of living children was 3.1 (range: 2-6). Out of 461 patients, only 2 (0.4%) had complications related with general anesthesia. Two cases (0.4%) had bleeding from the port-site, 3 cases (0.6%) had meso-salpingeal and meso-ovarian bleeding, one had omental bleeding (0.2%) and one case had bleeding (0.2%) from the vaginal wall. There was only one (0.2%) intestinal burn that required a laparotomy and segmental resection followed by end-to-end anastomosis. The mortality was nil, whilst the morbidity was found to be 2.1%, and all the complications were encountered in patients who had laparoscopic surgery.

Conclusion: Outpatient tubal ligation is a convenient and safe procedure, and implementing endoscopic surgical techniques is necessary for correction of the complications.

Saudi Med J 2008; Vol. 29 (5): 692-697

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Received 16th November 2007. Accepted 31st March 2008.

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Worldwide, the most commonly used method of fertility regulation is tubal sterilization.¹ Many healthy women have chosen to have elective tubal sterilizations, so it is important to identify the associated mortality and morbidity of the procedure. In developed countries, sterilization is generally performed via laparoscopy rather than by minilaparotomy, based on the belief that this approach is both safe and effective. More than 190 million couples worldwide use surgical sterilization as a safe and reliable method of permanent contraception. Nevertheless, in developing countries, minilaparotomy is still a common approach.² Electrocoagulation for tubal occlusion is used exclusively with laparoscopic sterilization. Bipolar coagulation is now the most commonly used method in the United States. It results in a more localized injury to the fallopian tube than does the unipolar method that is associated with thermal injury.³ Tubal sterilization is a safe method of contraception. Death from tubal sterilization is a rare event, and overall complication rates are low. Mortality rates in the United States have been estimated as 1-4 deaths per 100,000 procedures.^{4,5} Most deaths have been attributed to hypoventilation and cardiopulmonary arrest during general anaesthesia. A more recent study found no mortality among 9475 women who underwent interval laparoscopic tubal ligation.⁶ Major complications of tubal sterilization are uncommon and vary by study definition, occurring at levels that range from 0.39-3.5%.^{7,8} Unintended laparotomy represented 0.9 per 100 cases. This complication rate did not vary significantly according to the method of occlusion used. Intra-operative complications include visceral (bowel, bladder, uterus) injury, vascular injury, and complications related to the general anaesthesia. The long-term effects of tubal ligation have been investigated by many researchers and no permanent deterioration in the flow of ovarian or uterine arteries, and thus ovarian function has been documented.⁹⁻¹¹ Tubal access for tubal occlusion can be achieved by laparoscopy, minilaparotomy, laparotomy, colpotomy, or transcervically via hysteroscopy. The laparoscopic approach has long been the most widely used method of tubal sterilization. Tubal occlusion at laparoscopy can be achieved by chemical, mechanical, or thermal techniques. The electrocoagulation technique is a widely accepted method around the world. Bipolar current is inherently safer than unipolar current as tissue destruction is essentially confined to the area between and immediately adjacent to the bipolar paddles. Other methods include mechanical techniques such as Fallope (Yoon) ring, Hulka-Clemens clip, and Filshie clip application. Recent studies are focused on accomplishing tubal approach through the cervix and occluding the tubal lumen by using various

substances that cause tubal sclerosis or mechanical occlusion.¹² The objective of this study was to evaluate demographic characteristics, operative technique, and intra-operative and early postoperative complications of 461 consecutive interval tubal sterilizations carried out at our Family Planning Clinic on an outpatient basis between January 2002 and December 2005.

Methods. After local ethics committee's approval, the data of 461 patients who had applied for voluntary surgical sterilization and had interval tubal ligation (ITL) at the Family Planning Clinic of the Ministry of Health Ankara Etilik Maternity and Women's Health Teaching and Research Hospital, Ankara, Turkey between January 2002 and December 2005 were included in the study. Cases with incomplete records were excluded. The records of the patients were reviewed from a computerized database. The demographic characteristics, operative technique and intraoperative and postoperative complications of 461 consecutive patients were evaluated. Only 11 patients had minilaparotomy for interval tubal ligation, whilst the remaining had laparoscopic tubal coagulation via bipolar cauterization. All the procedures were carried out under general anaesthesia. After pneumoperitoneum had been achieved by insertion of the Verres needle at the inferior rim of the umbilicus, a small vertical incision was performed and a 10 mm trocar was inserted through this incision. Then the patient was placed in the Trendelenburg position, and 2 ancillary ports of 5 mm were placed laterally on each side, 2 cm from the antero-superior iliac spine. After identification and positioning of the tubes with the aid of an uterine manipulator, the oviducts were grasped at the mid isthmus region, at least 2.5-3 cm laterally from the uterotubal junction, with the bipolar forceps. The tube was tented up to ensure that the forceps were not in contact with any other neighboring structure (bowel, sidewall) and then coagulation was accomplished. This was repeated 2-3 times on each tube to create a 3 cm contiguous area of desiccation. Cases were followed up for 5 hours and discharged if no complications had occurred. The patients came for a follow-up visit one week after surgery and the operation-site was examined. The cases that were hospitalized or had a complication and/or unplanned laparotomy were analyzed.

The statistical analysis for frequencies distributions and percentages were carried out using SPSS software for windows 11.5.

Results. Four hundred and sixty-one consecutive patients who had interval tubal sterilization were recruited in the study. The mean age of patients was 35.1 ± 7.2 (range: 21-51), gravidity was 4.6 ± 1.3 (range:

2-9), parity was 3.2 ± 0.8 (range: 2-7), and number of living children was 3.1 ± 0.8 (range: 2-6). Two hundred and eighty patients (61%) completed primary school, 107 patients (23%) were illiterate, 38 patients (8%) had secondary school education whilst 36 patients (8%) were high school graduates (**Table 1**). Four hundred and fifty patients (97.6%) had laparoscopic tubal ligation while

11 patients (2.4%) had minilaparotomy performed as outpatient surgery. Tubal ligations were performed by laparoscopic technique successfully for all the patients who applied for surgical sterilization. Laparotomy was not required for completion of sterilization in any of the patients. Only in one case that had an intestinal burn, conversion to laparotomy was required to correct the complication. Of the 461 patients, intraoperative complications were encountered in 10 cases (2.2%). All these 10 cases were patients who had a laparoscopy for ITL (**Table 2**). Two cases had complications related to general anesthesia; one case had bronchospasm during insufflation of the peritoneum, insufflation was ceased and a minilaparotomy was performed for tubal ligation, and the other case recovered consciousness after anaesthesia later than expected, diagnosed to have pseudocholine esterase deficiency. Two cases had bleeding from the port-site that needed to be cauterized, 3 cases had meso-salpingeal and meso-ovarian bleeding that was cauterized. In one case, a minimal omental bleeding was observed but it did not need any further intervention. One patient had bleeding from the vaginal wall due to a laceration that occurred during insertion of the speculum, needed to be sutured. There was only one intestinal injury of the ileum that was detected at the time of laparoscopy. After consultation with a general surgeon, laparotomy was performed and segmental resection followed by end-to-end anastomosis was carried out. There was no visceral organ (bowel, bladder, uterus) perforation, or vascular injury in our study group. There were no early postoperative complications. The mortality was nil whilst the morbidity was found to be 2.2%. The conversion rate to laparotomy was 0.2%. Apart from the patient who had intestinal injury, the complications were handled efficiently using the endoscopic technique.

Table 1 - Demographic characteristics of 461 patients who underwent tubal sterilization in The Ministry of Health Ankara Etlik Maternity and Women's Health Teaching and Research Hospital between 2002 and 2005.

Characteristics	No. of patients (%)	
<i>Age (years)</i>		
21-29	114	(24.7)
30-39	220	(47.7)
40-51	127	(27.6)
<i>Education</i>		
<5 years	107	(23.2)
5-8 years	280	(60.7)
≥8 years	74	(16.1)
<i>Gravidity</i>		
≤2	16	(3.5)
3-4	260	(56.4)
≥5	185	(40.1)
<i>Parity</i>		
2	77	(16.7)
3-4	367	(79.6)
≥5	17	(3.7)
<i>Number of living children</i>		
≤2	82	(17.8)
3-4	368	(79.8)
≥25	111	(2.4)
<i>Previously induced abortions</i>		
0	202	(43.8)
1	84	(18.2)
≥2	175	(38.0)

Table 2 - Intraoperative complications of interval tubal sterilization in 461 women who underwent tubal sterilization in Ankara Etlik Maternity and Women's Health Teaching and Research Hospital: between January 2002- December 2005.

Complications	No. of cases (%)	No. of cases who were hospitalized (%)*	No. of cases who had an unintended laparotomy (%)	Rate per 100 procedures
Complications related to anaesthesia	2 (20)	2 (25)	-	0.4
<i>Bleeding</i>	7 (70)	-	-	1.5
Port-site bleeding	2 (20)	2 (25)	-	0.4
Mesosalpingeal bleeding	2 (20)	2 (25)	-	0.4
Mesoovarian bleeding	1 (10)	-	-	0.2
Omental bleeding	1 (10)	1 (13)	-	0.2
Bleeding from vaginal wall	1 (10)	-	-	0.2
Intestinal injury	1 (10)	1 (13)	1 (100)	0.2
Total	10 (100)	8 (100)	1(100)	

*The rest of the patients were day cases and were sent home the same day, after 5 hours follow-up.

Table 3 - Reported studies of the complications of tubal ligation in the literature.

Investigator	No. of cases	Method of tubal ligation	Total complication rate (%)	Anaesthetic complication (%)	Bleeding	Intestinal injury
Flores Revuelta et al ¹⁶	1003	Miscellaneous	2.0	0.1	0.4	0.1
Jamieson et al ⁶	9475	L/S	1.6	0.01	0.12	0.02
Intaraprasert et al ¹⁷	9041	L/S	0.39	0.01	0.29	0.04
Sugkraroek et al ²⁰	7524	L/S	0.72	0.03	0.29	0.05

L/S - Tubal sterilization via laparoscopy

Discussion. In the 1970s, tubal sterilization emerged as one of the most common methods of contraception for women of reproductive age in the United States. Female sterilization rates increased from 7 per 100,000 women in 1970 to 12.4 per 100,000 by 1980, and appear to have remained stable over the next 2 decades. In 1970, the average number of days a woman stayed in the hospital was 6.5 days for a tubal sterilization. By 1975 this had declined to 3 days, and today, women rarely remain in the hospital overnight.¹³ In our study, all the cases were performed as day cases and were discharged within 5 hours, unless a complication occurred.

Tubal ligation is a recognized method in Turkey. According to the latest demographic health survey (2003) in Turkey, 71% of the women of reproductive age (15-49 years) are using a family planning method.¹⁴ Tubal ligation is used only by 5.7% of the women of reproductive age. Ozalp et al¹⁵ reported the demographic characteristics, educational, and income levels, and previously used contraceptive methods of 8078 women living in Turkey. Most of the women (92.6%) preferred reversible methods such as intrauterine devices (38.1%), combined oral contraceptives (13.9%), condoms (40%), and Norplant (0.6%), whereas 7.4% selected surgical sterilization. Compared to those who preferred the reversible method, the women with surgical sterilization had a higher mean age (33.9 years), mean gravity (3.8), and mean number of children (2.6), similar to our study. Contrary to our study, the women with tubal sterilization were found to have higher school education. Women who choose tubal sterilization were found to be less educated, and to have lower levels of income in an article from the United States.¹ Flores Revuelta et al¹⁶ reported that 57.7% of the 1003 cases had incomplete primary school education, 19.3% had completed primary school, 2.5% had incomplete secondary or technical schooling, and 3% had professional studies. Similarly, in our study 280 women (60.7%) had completed primary

school whereas only 36 women (8%) were high school graduates. According to the demographic health survey (2003) in Turkey, while 6.5% of illiterate women had tubal sterilization, only 4.1% of high school graduates had tubal sterilization. There are few reports on the complication rate for outpatient laparoscopic female sterilization with large surgical series in the literature (**Table 3**). Complications during laparoscopy can occur at any part of the procedure. The complications may occur during surgery, immediately after surgery, or postoperatively. In a study of 9041 cases by Intaraprasert et al,¹⁷ the intraoperative complication rate was reported as 0.39% and adnexal injuries were the most common (57.1%) complication. All cases of adnexal injuries were mesosalpingeal, and meso-ovarian bleeding caused by electrocautery. Trocar injuries, mostly vascular punctures were treated by electrocautery. One out of 4 cases of bowel injuries was recognized 4 days later, and wide resection of the devitalized tissue was required. Three cases of uterine injuries and 2 cases of bladder injuries were reported. There was one case of death from anesthetic complication due to adverse reaction to neuroleptanalgesic drugs. The mortality rate from this study was 11/100,000 procedures. In a prospective, multicenter cohort study of 9475 women who had interval tubal sterilization, the overall complication rate was 0.9 per 100 procedures.⁶ Fourteen unintended laparotomies were carried out to manage the laparoscopic complications (0.1%). Adnexal injuries were also the most common intraoperative complications of laparoscopy. There were 4 bowel injuries, one case was presumed thermal bowel injury, the second case was bowel perforation treated by laparotomy. There was one small bowel perforation and one stomach perforation, both required laparotomy. One case presenting to the emergency room at the postoperative tenth day, which had peritonitis caused by intra-operative thermal bowel injury, unrecognized during surgery and temporary colostomy was required. There was one life-threatening

event, which was anaphylaxis, presumably caused by anesthesia and there were no deaths. In an earlier study of 5027 women undergoing laparoscopic tubal sterilization, 12 women (0.2%) had unintended laparotomy to manage complications.¹⁸ In our study, we had only one unintended laparotomy in order to manage the intestinal injury. In a retrospective study of 948 women who had laparoscopic tubal sterilization in Thailand, minor intraoperative complications were found as 4.6% of cases. The most frequent complications were mesosalpingeal and meso-ovarian bleeding. The mean operation time was 19.3 minutes and outpatient tubal sterilization was implied as a relatively safe procedure.¹⁹ Our results imply that interval laparoscopic tubal sterilization generally is a safe procedure with rates of intraoperative complications of nearly 2 per 100 procedures comparable to other series in the literature. No life-threatening event or death was encountered among the 461 interval tubal sterilization cases. The most common intraoperative complication was bleeding, which accounted for more than half of the complications reported. However, all cases were handled effectively via the laparoscopic technique. There was only one intestinal burn that was detected at the time of laparoscopy and corrected immediately. In most of the other studies, intestinal injuries were diagnosed postoperatively and a second operation was carried out to correct the injury. There was neither visceral organ (bladder, uterus, bowel) perforation nor major vessel injury in our study. Complications related to the anesthesia were seen in 2 cases (0.4%). The ideal method of contraception would be the one which is highly effective, economical, that can be performed on outpatient basis, allowing rapid resumption of normal activity. The surgeon's experience and the woman's preferences should govern the ultimate decision regarding the approach and occlusion method. Level II-2 evidence indicates comparable safety between interval laparoscopy and minilaparotomy, data consistently show that in experienced trained hands, laparoscopic tubal ligation is safe and highly effective regardless of the approach or occlusive method.⁶

In conclusion, rate and severity of complications of laparoscopic female sterilization depends on the skill and experience of the surgeon. Adequate training, surgical skill, and regular practice is the important factors in preventing surgical complications. This study has its limitations due to the relatively low number of patients enrolled and the methodology as it is a retrospective analysis. Although the authors recognize the limitations of the current study, other studies published in the literature with higher number of patients support the findings of this study as they have similar low

complication rates. Our findings imply that outpatient laparoscopic tubal sterilization is a convenient and relatively safe procedure and serious morbidity is rare.

Acknowledgment. *This study was presented on 3-6 May 2006, in Istanbul, Turkey, as a poster in the 9th Congress of the European Society of Contraception (Intraoperative complications of interval tubal sterilization: 4 years experience at a teaching hospital).*

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