นิพนธ์ต้นฉบับ • Original Article

การผ่าตัดแก้หมันโดยวิธีจุลศัลยกรรมในโรงพยาบาลศรีนครินทร์

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Reversal of Sterilization by Microsurgery in Srinagarind Hospital

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วัตถุประสงค์: เพื่อประเมินอัตราความสำเร็จและปัจจัยที่มีผลต่อความสำเร็จในการผ่าตัดแก้หมันในโรงพยาบาลศรีนครินทร์
ชนิดของการวิจัย: การวิจัยเชิงพรรณนา
สถานที่ทำการวิจัย: รพ.ศรีนครินทร์ คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น
กลุ่มตัวอย่างที่ทำการศึกษา: ผู้ป่วยในจำนวน 206 รายที่ได้รับการผ่าตัดแก้หมันที่ รพ.ศรีนครินทร์ ระหว่างวันที่ 1 มกราคม พ.ศ. 2527 ถึง 30 มิถุนายน พ.ศ. 2536
ผลการวิจัย: ผู้ป่วย 206 รายที่เข้าร่วมในการศึกษานี้มีอายุเฉลี่ย 32.0 ปี ส่วนใหญ่มีอาชีพรับราชการและเกษตรกร สาเหตุที่มารับการแก้หมันคือ แต่งงานใหม่ (ร้อยละ 68.0) และบุตรเสียชีวิต (ร้อยละ 17.5) ผู้มารับบริการส่วนใหญ่ได้รับการทำหมันหลังคลอด และมีช่วงเวลาตั้งแต่ทำหมันจนกระทั่งมารับการผ่าตัดแก้หมันประมาณ 5-9 ปี ร้อยละ 83.0 ของผู้ป่วยได้รับการผ่าตัดแก้หมันทั้งสองข้าง โดยพบว่าส่วนใหญ่ของการผ่าตัดเป็นการต่อเชื่อมระหว่างท่อนำไข่ส่วน ampulla กับ ampulla ใช้เวลาในการผ่าตัดโดยเฉลี่ย 135.8 นาที

การศึกษานี้พบว่าภายหลังการผ่าตัดแก้หมันมีอัตราการคลอดทารกมีชีพร้อยละ 58.7 และพบว่ามีอัตราการแท้บุตรและการตั้งครรภ์นอกมดลูกร้อยละ 8.3 และ 6.6 ตามลำดับ การตั้งครรภ์ส่วนใหญ่เกิดขึ้นภายใน 2 ปี หลังการผ่าตัดแก้หมัน โดยพบว่าช่วงเวลาเฉลี่ยตั้งแต่ได้รับการแก้หมันจนมีการตั้งครรภ์เกิดขึ้น21.6 เดือน

ปัจจัยที่มีผลต่อความสำเร็จของการแก้หมัน ได้แก่ อายุของผู้ป่วย ระยะเวลาตั้งแต่ทำหมันถึงการผ่าตัดแก้หมัน ชนิดของการทำหมัน และตำแหน่งของท่อนำไข่ที่ทำการต่อเชื่อม การศึกษานี้พบว่าผู้ป่วยที่มีอายุต่ำกว่า 35 ปี มีการผ่าตัดแก้หมันในเวลาไม่เกิน 5 ปีหลังการทำหมัน มีการทำหมันชนิดหมันแห้ง และมีตำแหน่ง

Objective: To assess the success rate and factors influencing the success rate of sterilization reversal in Srinagarind hospital
Design: A descriptive study
Setting: Srinagarind hospital, Khon Kaen University
Subject: 206 patients who underwent microsurgical sterilization reversal in Srinagarind hospital between January 1, 1984 to June 30, 1993.
Result: Mean age of the patients was 32.0 years, most of them were government officers and farmers. The reasons for reversal were remarriage (68.0 percent) and death of their children (17.5 percent). Most of the patients had postpartum tubal sterilization 5 to 9 years prior the the reversal. Bilateral tubal reanastomosis was performed in 83.0 percent of the patients. Ampulla to ampulla was the most common type of reanastomosis. The mean duration of the operation was 135.8 minutes.

Success rate of the operation as determined by delivery of the liveborn was 58.7 percent while abortion rate and ectopic pregnancy rate were 8.3 and 6.6 percent, respectively. Most of the pregnancies occured in the first two years after the operation with the mean interval between the operation and the commencement of pregnancy of 21.6 months.

Factors that influence the success rate of sterilization reversal were age of the patients, time interval after sterilization, type of sterilization and part of the uterine tubes being reanastomosed. This study revealed that the patients with age under 35 years, operation performed

ของการต่อเชื่อมในบริเวณ isthmus กับ isthmus เป็นปัจจัยที่เกื้อหนุนให้ความสำเร็จในการผ่าตัดแก้หมันมีอัตราสูงขึ้น

สรุป: การผ่าตัดแก้หมันในรพ.ศรีนครินทร์มีผลสำเร็จค่อนข้างดี และปัจจัยที่มีผลต่อความสำเร็จในการผ่าตัดแก้หมัน คือ อายุของผู้ป่วย ระยะเวลาตั้งแต่ทำหมันถึงผ่าตัดแก้หมัน ชนิดของการทำหมัน และตำแหน่งของท่อนำไข่ที่ทำการต่อเชื่อม

within 5 years after sterilization, interval type of sterilization, and isthmic-isthmic reanastomosis were the factors that resulted in the better success rate.

Conclusion: Sterilization reversal in Srinagarind hospital had a good success rate and factors that influenced the success were age of the patients, time interval after sterilization, type of sterilization, and part of the uterine tubes being reanastomosed.

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Introduction

Female sterilization has been the most popular method of contraception being used in Thailand for years. It has been estimated that up to 30% of reproductive-aged women (15-44 years of age) in Thailand selected tubal resection (or female sterilization) as their contraceptive methods.

After being sterilized most couples enjoy their conception-free lives since they normally have enough children. Some couples, however, do change their minds due to several reasons such as remarriage, death of their children, or some others. These situations lead such couples to seek for sterilization reversal in order to regain their conception capabilites.

It has been estimated that the incidence of couples seeking for female sterilization reversal ranges from 1-3 in 1000 upto 1-3 in 100 of the previously sterilized cases. This rather wide range of incidence is mostly affected by the cultural backgrounds of the societies in which couples in developed countries tend to have higher desire for sterilization reversal than those who stay in the developing world.

Like in other parts of Thailand, female sterilization is widely accepted as the contraceptive method in women living in northeastern Thailand. We have seen a considerable amount of couples who requested sterilization reversal. Female sterilization reversal was first established at Srinagarind hospital in 1984. There have been an increasing number of couples who request such procedure as time passes by. However, there is no report concerning the success rate of sterilization reversal and factors affected the success rate from this region of Thailand. We, as a group of medical staffs who provide sterilization reversal in Srinagarind hospital, therefore underwnt the data collection and analysis regarding such issues in the hope that the information revealed by this study will provide us the useful information in order to achieve the better treatment strategies to help those in need.

Materials and Methods

In this study we evalvated 206 cases of sterilization reversal being performed at Srinagarind hospital between 1984-1993.

As a descriptive study, we collected part of the information especially that involved basic data of the couples requested sterilization reversal from the hospital records. Such information was then recorded in the data collection sheet specifically designed for this study. The letters were, then, sent to all the sterilization reversal cases in order to obtain information regarding outcome of the procedure especially the occurence of pregnancy. The second letters would be sent to those who did not reply our first letters, and if there were no responses to the second letters we would take such cases as unreachable.

The information obtained from the replying letters would be transfered to the data collection sheet and when completed the information would then be analysed. The information concerning basic data of the couples requested the procedure and the success rate of the operation were analysed and presented in the form of mean and percentage. The factors possibly associated with the success rate of sterilization reversal were statistically evaluated using Chi Square. When correlations were found between each factor and success rate of the procedure, multiple logistic regression analysis would then be utilized to test whether such factor is independently affected the success rate of sterilization reversal.

Results

Between 1984-1993, there were 206 cases of female sterilization reversal being performed in Srinagarind

hospital. the detailed information regarding such cases and the procedures are listed as follow.

1. Age

Age of the women underwent sterilization reversal at Srinagarind hospital ranges from 21-51 years. The majority of cases were 30-40 years of age (43.2%) at the time that the procedures were performed, followed by the age group of 25-29 years (25.2%). The mean age of overall cases was 32.0 years.

2. The calendar year while the procedure was done

During the ten year period that the data was collected (1984-1993), we found that the procedures were performed most frequently in the year 1991 (37 cases), whereas in both 1984 and 1985 the number of cases performed were least frequent (1 case in each year).

3. Occupation

The majority of women requested sterilization reversal at Srinagarind hospital were government officers (34.5%), followed by farmers (22.8%)

4. Address

The majority of cases lived in Khon Kaen province (38.8%), followed by Kalasin province (13.6%)

5. The reasons for the reversal

Remarriage was the most common reason for sterilization reversal found in this study (68.0%). The other reasons were death of the children, insufficient number of children and sex preference.

6. Number of children prior to tubal resection

Women who requested the reversal had 1-7 children prior to tubal resection. The majority of cases (61.2%) had 2 children. However 17.5% of cases had only 1 child prior to sterilization. The mean number of children prior to tubal resection was 2.0

7. Type of sterilization

The majority of cases (72.8%) had postpartum sterilization while 20.4% of cases had interval sterilization. The rest (6.8%) had tubal resection done while cesarean delivery were performed.

8. Time interval prior to the reversal

The majority of cases (46.6%) requested sterilization reversal 5-9 years after tubal resection. The mean time interval between tubal resection and sterilization reversal was 6.4 years.

9. Semen analysis

Semen analysis was done prior to the reversal in only 33 cases (16.0%) The semen analysis in these cases revealed normal results in 31 cases (93.9%) and oligospermia in two others (6.1%).

10. Pre-operative laparoscopy

Pre-operative laparoscopy was performed in 158 cases (76.7%). The detailed information of laparoscopic findings are demonstrated as follow.

10.1 Characteristics of uterine tubes

The tubal length greater than 5 cm on one side and both sides were found in 92.4% and 72.8% of cases, respectively. This study revealed that 5.7% of cases had both tubal length of less than 5 cm. Bilateral fimbriectomy were found in 0.5% of cases, and in 1.3% of cases both uterine tubes could not be properly visualised.

10.2 Associated pelvic pathologies

Endometriosis was the most common pelvic pathologies seen during preoperative laparoscopy (31.6% of cases). Other pelvic pathologies found were pelvic adhesions (16.5%), hydrosalpinx (1.9%), and myoma uteri (1.9%). Dense pelvic adhesion was found in 1.3% of cases.

11. Types of the reversal

Bilateral tubal reanastomosis was performed in 171 cases (83.0%) while in 25 cases (12.1%) unilateral tubal reanastomosis was done. Unilateral tubal reanastomosis and unilateral fimbrioplasty was undergone in 9 cases (4.4%) whereas bilateral fimbrioplasty was performed in 1 case (0.5%)

12. Operative time

The reversal took about 120-149 minutes in the majority of cases (40.3%) with the overall mean operative time of 135.8 minutes.

13. Part of the uterine tubes being reanastomosed

In the majority of cases (66.0%), the reanastomosis was performed between the ampulla and ampulla parts of uterine tubes. The ampulla to isthmic reanastomosis and isthmic to isthmic reanastomosis were performed in 13.6% and 13.6% of cases, respectively.

14. Tubal length after the reversal

After the reversal 70.4% of cases had tubal length of greater than 5 cm bilaterally. Unilateral tubal length of 5 cm or more were found in 87.4% of cases.

After methylene blue injection transcervically, the dye was found to spill from one side of the uterine tubes in 99.0% of cases. Bilateral spillage was found in 90.3% of cases.

15. Ventrosuspension (Plication of the round ligament)

Ventrosuspension was performed at the time of sterilization reversal in 93.7% of cases.

16. Prophylactic antibiotic

Prophylactic antibiotic was provided in 98.1% of cases.

17. Complications of the reversal

Complications related to the reversal found in this study were febrile morbidity (1.5%), bowel injury (0.5%), bladder injury (0.5%), and partial gut obstruction (0.5%)

18. Results of the reversal

The letters with questionaire concerning the results of sterilization reversal enclosed were sent to all the reversal cases being performed during the study period (206 cases). The data regarding the results of the reversal were obtained from 121 cases (58.7%) and such information was then analysed as presented below.

18.1 Pregnancy rate

Among the 121 sterilization reversal cases of which the information regarding success rate of the reversal was known, 73.6% (89 cases) did get pregnant and ended up with live births in 71 cases (58.7%), spontaneous abortions in 10 cases (8.3%) and ectopic pregnancies in 8 cases (6.6%).

18.2 Time interval between the reversal and delivery

The time interval between sterilization reversal and delivery ranged from 10-59 months, with the mean interval of 21.6 months. The majority of cases delivered within 19-24 months after the reversal. Pregnancies seemed to occur most frequently during the first 2 years after the reversal (85.4% of the pregnant cases).

18.3 The number of child obtained after the reversal

The numbers of child obtained after the reversal ranged from 1-4, with the mean number of 1.2. The majority of the pregnant cases (85.4%) had only one child after the reversal.

19. Other infertility treatments obtained after the reversal

The majority of reversal cases did not receive any kind of infertility treatments after the reversal. Ovulation induction using antiestrogen and GIFT were performed in 18.9% and 0.97% of the reversal cases, respectively.

20. Factors influence the success rate of sterilization

Several factors were evaluated using univariate analysis to determine whether such factors influenced the success rate of the reversal. Among the factors being studied (as shown in table 1), only age of the patients, time interval after sterilization, type of sterilization, and part of the uterine tubes being reanastomosed significantly influenced the success rate of the reversal. These four factors were, then, further analyzed by multiple logistic regression analysis and the results of such analysis revealed that all of four factors independently influenced the success rate of sterilization reversal. This study demonstrated that the patients with age under 35 years, the reversal performed within 5 years after sterilization, interval type of sterilization, and isthmic-isthmic reanastomosis were the factors that resulted in the better success rate.

Table 1. The associations between each factor and success rate of the reversal

Factors	Pregnancies which resulted in live births	No pregnancy occurred	P value
1. Age			0.0060
<35 years	49	17	
≥35 years	12	15	
2. The calendar year while the reversal was done			NS
1986-1989	29	7	
1990-1993	32	20	
3. Reasons for reversal			NS
Remarriage	34	16	
Death of their child	15	8	
Sex preference	7	3	
Require more children	4	3	
4. Type of sterilization			0.0123
Postpartum	43	17	
Interval	13	1	
5. Time interval between sterilization and reversal			0.0032
<5 years	29	4	
≥5 years	35	28	
6. Pre-operative laparoscopy			NS
Don	53	27	
Not done	8	5	
7. Laparoscopic results			NS
Reversal applicable	48	25	
Reversal unapplicable	2	1	
8. Type of reversal			NS
Bilateral tubal reanastomosis	54	20	
Unilateral tubal reanastomosis	4	3	
Fimbrioplasty	0	1	
9. Operators			NS
Surgeon 1	34	24	
Surgeon 2	10	4	
Surgeon 3	5	3	
Surgeon 4	5	1	
10. Operative time			NS
<150 minutes	45	21	
≥150 minutes	16	9	
11. Part of the uterine tubes being reanatomosed			0.000002
Isthmus - isthmus	6	3	
Isthmus - ampulla	13	3	
Ampulla - ampulla	101	108	
12. spillage of thy dye			NS
Both sides	57	25	
One side	4	6	
No spillage	0	1	

Factors	Pregnancies which resulted in live births	No pregnancy occurred	P value
13. Ventrosuspension			NS
Done	56	30	
Not Done	5	2	
14. Prophylactic antibiotics			NS
Given	60	31	
Not given	1	1	
15. Post - operative fever			NS
Present	1	1	
Absent	60	31	
16. Other infertility treatments after the reversal			NS
Ovulation induction	10	8	
None	51	24	

Note: *NS stands for no statistical significant*

Discussion

During the 10-year period of this study, the number of women seeking for sterilization reversal at Srinagarind hospital has been increasing year after year, with the total of 206 reversal cases performed. The mean age of the women, at the time when the reversal performed, was 32.0 years which is rather high in comparision with those reported in other studies[1-2]. The majority of cases were government officers and lived in Khon Kaen province or other places nearby. The reasons for reversal, like in other studies, were mostly due to remarriage[1-4]. In this study, most women had 2 children before being sterilized. The maximum number of existing child prior to sterilization reversal found in this study was 7, and the reason for requesting reversal in such case was due to sex preference (desire to have a male offspring).

The majority of cases (72.8%) in this study had postpartum sterilization which is higher than that reported by Limpaphayom (63.6%)[1]. The time interval between tubal resection and sterilization reversal found in this study was again higher than that reported by the group at Chulalongkorn hospital (77 and 58 months, respectively).[1]

The most common type of sterilization reversal found in this study was bilateral tubal reanastomosis (83.0%). the mean operative time was 135.8 minutes. Ampulla-ampulla were the tubal segments most commonly reanastomosed (66.0%) whereas in other studies done in Thailand isthmus-ampulla reanastomosis was most commonly performed[1,5].

In this study, the majority of cases had tubal length greater than 5 cm after the reversal, obtained prophylactic antibiotics and had ventrosuspension performed. The complications observed in this study were acceptably low.

The conception rate demonstrated in this study was 78.6% while the livebirth rate was 58.7% which is rather low compared to that reported by Limpaphayom who claimed the livebrith rate of 70.9% in her study[1]. The difference in livebirth rate found between these two studies might be attributed to the differences in selection criteria of the women allowed to proceed sterilization reversal in the two centers. At Chulalongkorn hospital only women age 38 years or less would be considered for sterilization reversal whereas at Srinagarind hospital there was no such a strict policy about the cut-off age where the reversal would not be considered. This resulted in the huge difference between the mean age of women underwent sterilization reversal in these two studies (28.84 years at Chulalongkorn hospital and 32.0 years at Srinagarind hospital). Besides the matter of age, the majority of sterilization reversal done at Srinagarind hospital was undergone without the information about the fertility potential of the male partner since semen analysis was not undertaken in most cases. This, again, might give rise to the low success rate of the reversal as a result of inadequate pre-reversal evaluation. Another possibility that may explain the relatively low pregnancy rate found in this study is the rather poor data collection undertaken in this study since only 58.7% of all the reversal cases did return the questionares. In the epidemiological point of view, the information in the non-replying group might distribute differently from that obtained and utilized for analysis in this study. Thus the results presented in this study may not totally represent the true figure of the sterilization reversal at Srinagarind hospital. However, the livebirth rate demonstrated in this study was comparable to those reported by most studies which revealed th livebirth rate of 50.0-80.0%[1-7].

The mean time interval between sterilization reversal and delivery was 24.6 months. The majority of reversal cases delivered within the 19-24 month-period after the reversal. Pregnancy, therefore, seemed to occur most frequently (85.9%) within the first two years after the reversal. This information will provide us a useful tool for an informative counseling prior to the surgery in the future.

This study revealed that there are four factors that independently influenced the success rate (as determined by delivery of the liveborn) of sterilization reversal. These factors included age of the patients, time interval after sterilization, type of sterilization and part of the uterine tubes being reanastomosed. This study demonstrated that when

the patient were 35 years or younger, the result of sterilization reversal would be statistically better than those of the older group. This finding is comparable with the generally held conviction that the female reproductive potential declines with age. Considering the type of sterilization, this study showed that sterilization reversals in women who had interval sterilization would give rise to a better result than those performed in women who underwent postpartum sterilization. However, the number of women undertaken sterilization reversal after interval sterilization was rather small (only 14 cases). A larger scale study, therefore, is required before a more precise correlation between type of sterilization and success rate of the reversal could properly be addressed. This study also pointed out that when the time interval between sterilization and the reversal was less than 5 years the success rate of the reversal would significantly be higher than that of the procedure performed more than 5 years after sterilization. This could simply be explained by the previously shown evidences that the anatomical alterations of the uterine tubes, such as retention of fluid produced from obstructed tubal mucosa which would subsequently give rise to hydrosalpinx and impaired tubal function, are directly correlated with the time period after sterilization. The last factor found in this study to influence the success rate of sterilization reversal was the part of the uterine tubes being reanastomosed. Isthmic-isthmic reanastomosis provided a higher success rate in comparision with other types of reanastomosis. This could be attributed to the fact that isthmic portion of the uterine tube is small with almost the same diameter of the tubal lumen throughout the portion. This resulted in the comparable diameter of both proximal and distal tubal segments which were to be reanastomosed. Besides that, the isthmic part of the uterine tube also has sufficient amount of musculature which enables the anastomosis, and less amount of vasculature which results in the less frequent incidence of peritubal hematoma[8].

Other factors which have been reported to have some potential effects on the success rate of sterilization reversal include tubal length after reanastomosis and the surgical method utilized for sterilization[7-8]. In this study it was not possible to test the correlation between the surgical method utitized for sterilization and the success rate of the reversal since almost all the cases recruited in this study had been sterilized using only the Pomoroy technique.

There were several factors found in this study not to have the influential effects on the success rate of sterilization reversal. These include the calendar year while the reversal performed, reasons for the reversal, pre-operative laparoscopy, laparoscopic results, type of the reversal, the operators, the operative time, spillage of the dye through uterine fimbria, ventrosuspension, administration of prophylactic antibiotics, post-operative fever and other infertility treatments especially ovulation induction. The generalisation of some of the results found in this study cannot be confidently proposed since the number of cases in one category of some factors being studied was very small, such as the number of cases not receiving prophylactic antibiotics or not having ventrosuspension performed. We suggest a larger scale, prospectively designed study before the effects of such factors on the success rate of sterilization reversal could clearly be concluded.

Conclusion

Reversal of sterilization by microsugery at Srinagarind hospital is among the operations which are performed more frequently over the past decade. The success rate of such operation at Srinagarind hospital is acceptably comparable to that reported from other centers in Thailand and worldwide. The factors found to influence success rate of the reversal were age of the patients, time interval after sterilization, type of sterilization and part of the uterine tubes being reanastomosed. The effects of some other factors on success rate of the operation do require a larger scale study.

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