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Poststerilization Regret: Findings From the United States Collaborative Review of Sterilization

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***Objective*: To evaluate the cumulative probability of regret after tubal sterilization, and to identify risk factors for regret that are identifiable before sterilization.**

***Methods*: We used a prospective, multicenter cohort study to evaluate the cumulative probability of regret within 14 years after tubal sterilization. Participants included 11,232 women aged 18–44 years who had tubal sterilizations between 1978 and 1987. Actuarial life tables and Cox proportional hazards models were used to identify those groups at greatest risk of experiencing regret.**

***Results*: The cumulative probability of expressing regret during a follow-up interview within 14 years after tubal sterilization was 20.3% for women aged 30 or younger at the time of sterilization and 5.9% for women over age 30 at sterilization (adjusted relative risk [RR] 1.9; 95% confidence interval [CI] 1.6, 2.3). For the former group, the cumulative probability of regret was similar for women sterilized during the postpartum period (after cesarean, 20.3%, 95% CI 14.5, 26.0; after vaginal delivery, 23.7%, 95% CI 17.6, 29.8) and for women sterilized within 1 year after the birth of their youngest child (22.3%, 95% CI 16.4, 28.2). For women aged 30 or younger at sterilization, the cumulative probability of regret decreased as time since the birth of the youngest child increased (2–3 years, 16.2%, 95% CI 11.4, 21.0; 4–7 years, 11.3%, 95% CI 7.8, 14.8; 8 or more years, 8.3%, 95% CI 5.1, 11.4) and was lowest among women who had no previous births (6.3%, 95% CI 3.1, 9.4).**

***Conclusion*: Although most women expressed no regret after tubal sterilization, women 30 years of age and younger at the time of sterilization had an increased probability of expressing regret during follow-up interviews within 14 years after the procedure. (Obstet Gynecol 1999;93:889–95.)**

In the United States, tubal sterilization is the most commonly used form of contraception among women.[1]

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More than 600,000 women choose this procedure each year,[2] and approximately 10 million American women have been sterilized.[3] Although tubal sterilization is considered a permanent form of contraception, many women may regret their decision during the ensuing years.[4] Regret is defined as "distress over a desire unfulfilled or an action performed or not performed" (*Webster's New Riverside University Dictionary*. Boston: Houghton Mifflin, 1988). The human and economic consequences of regret regarding tubal sterilization may be substantial. The impact of curtailed reproductive potential ranges from the intangible costs of reduced quality of life[5] to an increase in the use of expensive procedures with limited success, including reanastomosis and assisted reproductive technologies.

We used data from the largest and longest prospective study of women undergoing tubal sterilization in United States medical centers to identify subgroups who have the highest cumulative probability of regret during the 14 years after tubal sterilization and the strongest risk factors for regret identifiable before sterilization. A preliminary analysis of interim data from this cohort examined the risk of experiencing regret during the first 5 years after tubal sterilization.[6] Information on regret within 14 years might help clinicians and women considering sterilization to reduce the prevalence of poststerilization regret and its consequences.

Table 1. Characteristics of the Study Population

Characteristic	%	(Total n = 11,232)
Age at sterilization (y)		
18–30	50.2	5640
>30	49.8	5592
Race*		
White	53.8	6047
Black	34.0	3816
Other	12.2	1368
Married at time of sterilization*		
No	32.0	3592
Yes	68.0	7637
History of abortion*		
No	77.5	7805
Yes	22.5	2265
Reason for tubal sterilization*		
Medical	3.8	288
Contraceptive	96.2	7272
Time between sterilization and birth of youngest child*		
Postpartum		
After vaginal delivery	11.4	1276
After cesarean	4.6	519
Interval†		
15 d–1 y	25.6	2875
2 y–3 y	13.2	1481
4 y–7 y	15.1	1694
≥8 y	24.7	2770
No previous births	5.4	610

* Sample size is decreased because of missing data.

† Time was coded as follows: 15 d–1 y = 15 d–364 d; 2 y–3 y = 365 d–1094 d; 4 y–7 y = 1095 d–2554 d; ≥8 y = 2555 d or more. Interval group includes 222 women who had tubal sterilization immediately after abortion.

Methods

The methods for the Collaborative Review of Sterilization, a prospective multicenter study, have been described.[6–8] Participating medical centers were located in Baltimore, Maryland; Buffalo, New York; Chapel Hill, North Carolina; Honolulu, Hawaii; Houston, Texas; Memphis, Tennessee; Sacramento, California; St. Louis, Missouri; and San Francisco, California. The study was approved by the institutional review board at each center.

Women were enrolled from 1978 to 1987 and were eligible for inclusion in this analysis if they were 18–44 years of age at the time of sterilization; underwent sterilization during the postpartum period in conjunction with cesarean or vaginal delivery; underwent interval sterilization, ie, while not recently pregnant or immediately after elective abortion; completed at least one-follow interview; and answered the question used to measure poststerilization regret. The question that was asked at each follow-up interview was: "Do you still think tubal sterilization as a permanent method of birth control was a good choice for you?" Possible answers were 'yes,' 'no,' or 'don't know.' Only one woman chose 'don't know' as her response. A total of 11,232 women met these criteria.

At the time of enrollment, trained interviewers used standardized questionnaires to evaluate clinical and demographic characteristics that may have influenced the probability of regret. Because our primary focus was on the occurrence (as opposed to persistence) of regret after tubal sterilization, women who answered 'no' to the aforementioned question at any time during follow-up were defined as having regret. Among women who experienced regret, we used an open-ended question to evaluate the most important reason for it. The occurrence of regret was evaluated at each of the intended follow-up interviews, which occurred yearly for the first 5 years. Women enrolled between 1978 and 1983 had one final follow-up interview between 8 and 14 years after sterilization. We considered the participants at risk for poststerilization regret until the interview date when regret was acknowledged, or, for those who never reported regret, until the date of the last interview. Women who had major health events after

Table 2. Probability of Reporting Poststerilization Regret by Selected Characteristics

Characteristic	Years after sterilization procedure*		
	3	7	14
Overall	3.9 (3.5, 4.2)	7.5 (7.0, 8.1)	12.7 (11.2, 14.3)
Age at sterilization (y)			
18–30	5.1 (4.5, 5.7)	10.5 (9.5, 11.4)	20.3 (17.1, 23.4)
>30	2.6 (2.2, 3.1)	4.8 (4.2, 5.4)	5.9 (5.0, 6.8)
Race			
White	3.5 (3.0, 4.0)	6.0 (5.3, 6.7)	7.4 (6.3, 8.5)
Black	4.3 (3.7, 5.0)	10.2 (8.9, 11.4)	21.7 (17.3, 26.1)
Other	4.3 (3.2, 5.4)	7.9 (6.3, 9.5)	16.0 (10.9, 21.0)
Married at time of sterilization			
No	4.5 (3.8, 5.2)	9.4 (8.2, 10.6)	20.4 (15.7, 25.1)
Yes	3.6 (3.2, 4.0)	6.8 (6.1, 7.4)	10.2 (8.8, 11.6)
History of abortion			
No	3.6 (3.1, 3.9)	7.1 (6.5, 7.7)	12.1 (10.4, 13.9)
Yes	5.0 (4.1, 5.8)	9.1 (7.8, 10.4)	14.9 (11.5, 18.3)
Reason for tubal sterilization			
Medical	4.6 (2.0, 7.1)	6.6 (3.4, 9.8)	7.5 (3.9, 11.1)
Contraceptive	4.6 (4.1, 5.0)	8.1 (7.4, 8.8)	13.7 (11.9, 15.4)
Time between sterilization and birth of youngest child			
Postpartum			
After vaginal delivery	5.6 (4.3, 6.9)	10.2 (8.4, 12.0)	17.8 (13.8, 21.9)
After cesarean	8.8 (6.3, 11.4)	14.0 (10.7, 17.3)	16.1 (12.1, 20.1)
Interval†			
15 d–1 y	3.3 (2.6, 4.0)	8.8 (7.3, 10.0)	17.6 (13.2, 22.0)
2 y–3 y	4.5 (3.4, 5.7)	8.2 (6.6, 9.9)	12.6 (9.3, 15.9)
4 y–7 y	3.4 (2.5, 4.3)	7.0 (5.5, 8.4)	9.5 (7.1, 11.8)
≥8 y	2.8 (2.2, 3.4)	4.7 (3.8, 5.5)	5.1 (4.1, 6.1)
No previous births	3.0 (1.6, 4.4)	5.1 (3.2, 7.0)	5.7 (3.5, 8.0)

* Cumulative probability per 100 procedures (95% confidence interval).
† Time was coded as per Table 1.

tubal sterilization (including hysterectomy, pregnancy, tubal anastomosis, repeat tubal sterilization, or death) were considered at risk for poststerilization regret only until the occurrence of the event because follow-up was discontinued at that time.

We evaluated several characteristics present at the time of sterilization that might have increased the probability of experiencing regret. These included age, race, marital status, history of abortion, reason for sterilization, and time between sterilization and birth of the youngest child. We did not consider the number of living children as a potential risk factor because of incomplete data for those women who had postpartum procedures. Because the number of women who had sterilization after abortion was small (n = 222) and because their cumulative probability of regret was similar to that of women having interval sterilization, they were included in the interval group for all analyses.

We used actuarial life tables, the Kaplan-Meier method for evaluating the proportionality assumption, and unadjusted hazards ratios to examine whether the 3-, 7-, and 14-year cumulative probabilities of regret were increased in any subgroups of participants. To estimate the likelihood of experiencing poststerilization regret, we preferred the life-table approach over the crude-incidence approach because the former adjusts these estimates for the substantial loss to follow-up that is essentially unavoidable in a study of such duration. Cumulative probability is the corresponding frequency measure used to describe the results of life-table analyses at specific time intervals. Previous reports showed that young age at tubal sterilization was the strongest predictor of poststerilization regret,[6,9,10] so we also performed age-stratified analyses to identify subgroups of young women at highest risk. All variables that were significant predictors of regret in unadjusted analyses were included in a multivariate Cox proportional hazards model to identify independent risk factors. Maximum-likelihood ratio χ^2 tests were used to evaluate whether age at sterilization was a significant effect modifier. We also analyzed the reason for regret according to age at sterilization among women who experienced poststerilization regret.

Table 3. Cumulative Probability of Regret by Age at Tubal Sterilization and Years After Sterilization*

Characteristic	Age at tubal sterilization					
	18–30 y			>30 y		
	Years after sterilization			Years after sterilization		
	3	7	14	3	7	14
Race						
White	5.1 (4.2, 5.9)	8.7 (7.4, 9.9)	11.2 (8.8, 13.6)	2.4 (1.9, 2.9)	4.2 (3.4, 4.9)	4.8 (3.9, 5.7)
Black	5.1 (4.1, 6.0)	12.7 (11.0, 14.5)	29.5 (23.2, 35.8)	3.1 (2.1, 4.0)	6.0 (4.6, 7.5)	7.5 (5.6, 9.4)
Other	5.7 (3.8, 7.6)	10.5 (7.9, 13.1)	22.6 (16.1, 29.2)	3.0 (1.8, 4.3)	5.7 (3.9, 7.5)	10.1 (4.1, 16.1)
Married at time of sterilization						
No	6.1 (5.0, 7.2)	13.0 (11.1, 14.9)	31.0 (23.3, 38.7)	2.5 (1.7, 3.2)	5.0 (3.7, 6.3)	6.4 (4.5, 8.3)
Yes	4.6 (3.9, 5.3)	9.2 (8.1, 10.3)	15.6 (12.7, 18.5)	2.7 (2.7, 3.2)	4.7 (4.0, 5.5)	5.8 (4.8, 6.8)
History of abortion						
No	4.6 (3.9, 5.3)	9.8 (8.7, 10.9)	20.1 (16.4, 23.9)	2.6 (2.1, 3.1)	4.7 (4.0, 5.4)	5.5 (4.6, 6.3)
Yes	6.7 (5.3, 8.0)	12.4 (10.3, 14.4)	20.7 (14.8, 26.5)	2.8 (1.8, 3.8)	5.1 (3.7, 6.6)	7.9 (5.1, 10.7)
Reason for sterilization						
Medical	6.5 (1.8, 11.1)	10.5 (4.2, 16.8)	10.5 (4.2, 16.8)	3.2 (0.4, 6.0)	4.1 (0.9, 7.4)	5.5 (1.3, 9.7)
Contraceptive	6.1 (5.3, 6.9)	10.9 (9.8, 12.1)	21.4 (18.4, 24.8)	3.0 (2.4, 3.6)	5.3 (4.5, 6.1)	6.4 (5.4, 7.4)
Time between sterilization and birth of youngest child						
Postpartum						
After vaginal delivery	6.3 (4.5, 8.1)	11.9 (9.3, 14.5)	23.7 (17.6, 29.8)	4.7 (2.8, 6.5)	8.0 (5.5, 10.5)	8.7 (6.1, 11.4)
After cesarean	10.3 (6.8, 13.7)	17.8 (13.8, 22.5)	20.3 (14.5, 26.0)	6.3 (2.7, 9.9)	7.7 (3.7, 11.8)	9.5 (4.2, 14.7)
Interval†						
15 d–1 y	4.1 (3.2, 4.9)	10.6 (8.9, 12.3)	22.3 (16.4, 28.2)	1.3 (0.4, 2.1)	3.9 (2.1, 5.7)	5.2 (2.7, 7.8)
2 y–3 y	5.4 (3.9, 6.9)	10.1 (7.8, 12.4)	16.2 (11.4, 21.0)	3.0 (1.4, 4.5)	4.9 (2.7, 7.1)	5.8 (3.0, 8.5)
4 y–7 y	4.7 (3.2, 6.2)	9.1 (6.6, 11.5)	11.3 (7.8, 14.8)	2.3 (1.3, 3.3)	5.2 (3.5, 7.0)	7.9 (4.7, 11.0)
≥8 y	4.9 (2.7, 7.0)	8.3 (5.1, 11.4)	8.3 (5.1, 11.4)	2.5 (1.8, 3.1)	4.1 (3.2, 5.0)	4.6 (3.6, 5.7)
No previous births	4.7 (2.0, 7.4)	6.3 (3.1, 9.4)	6.3 (3.1, 9.4)	1.8 (0.4, 3.2)	4.3 (2.0, 6.6)	5.4 (2.2, 8.5)

* Data represent cumulative probability per 100 procedures (95% confidence interval).
† Time was coded as per Table 1.

Results

Consideration of demographic and reproductive characteristics showed that the study population was racially diverse and that the majority of participants were married, underwent interval laparoscopic sterilization procedures, and had elected tubal sterilization for contraceptive rather than medical reasons (Table 1). Half of the participants were 30 years or younger at the time of sterilization. The mean follow-up time was 6.5 years. Among the women eligible for interview at 1, 3, 5, and 8–14 years after sterilization, 93.2%, 84.1%, 75.2%, and 57.1%, respectively were interviewed. Women who were 30 years or younger, nonwhite, or married were significantly more likely to be lost to follow-up at 8–14 years than women without these characteristics (data not shown).

During follow-up interviews, 744 women reported having regret within the 14-year study period, and the cumulative probability of regret 14 years after sterilization was 12.7% (Table 2). The cumulative probability of regret increased steadily over the follow-up period. The highest cumulative probabilities of regret at 3 and 7 years were in women whose sterilization procedures were done postpartum (after cesarean, 8.8% and 14.0%, respectively; after vaginal delivery, 5.6% and 10.2%, respectively) or in those who were younger than 30 at the time of sterilization (5.1% and 10.5%, respectively). Among women who had interval procedures, we observed that poststerilization regret at 14 years varied markedly according to the time between sterilization and birth of the youngest child. The overall cumulative probability of regret for the interval group was 10.0%. Similar regret at 14 years was reported by women who had sterilization immediately after abortion (cumulative probability of 10.6% after first-trimester abortion). The cumulative probability of regret at 14 years was higher among women whose sterilizations were done within 1 year of birth of their youngest child (17.6%) or during the postpartum period (16.1–17.8%). The long-term cumulative probability of regret during the 14 years after sterilization was also higher among women who were 30 years or younger (20.3%), black (21.7%), or unmarried (20.4%) at sterilization.

Compared with older women, women aged 30 years

Table 4. Rate Ratios of Regret After Tubal Sterilization According to Characteristics at Sterilization*

Characteristic	Unadjusted rate ratio	95% Confidence interval	Adjusted rate ratio	95% Confidence interval
Age (y)				
18–30	2.3	2.0, 2.7	1.9	1.6, 2.3
>30	Referent			
Race				
Nonwhite	1.7	1.5, 2.0	1.3	1.1, 1.5
White	Referent			
Married at time of sterilization				
No	1.4	1.2, 1.6	1.3	1.1, 1.6
Yes	Referent			
History of abortion				
No	Referent			
Yes	1.3	1.1, 1.5	1.2	1.0,† 1.4
Reason for sterilization				
Contraceptive	1.4	0.65, 2.2		
Medical	Referent			
Time between sterilization and birth of youngest child				
Postpartum				
After vaginal delivery	2.5	2.0, 3.1	1.6	1.2, 2.1
After cesarean	3.0	2.3, 4.1	2.0	1.5, 2.8
Interval§				
15 d–1 y	1.8	1.5, 2.3	1.3	1.0,‡ 1.7
2 y–3 y	1.8	1.4, 2.3	1.4	1.1, 1.8
4 y–7 y	1.5	1.1, 1.9	1.2	0.9, 1.6
≥8 y or no previous birth	Referent			

* Each variable was adjusted simultaneously for all variables that were significant in unadjusted analyses and for cohort of entry (1979, 1980, 1982, 1985, 1986, 1987).
† Lower confidence limit = 0.997.
‡ Lower confidence limit = 1.02.
§ Time was coded as per Table 1.

or younger at sterilization had a higher cumulative probability of regret regardless of subgroup and over all time intervals considered (Table 3). Among women 30 years or younger at sterilization, those who were unmarried (31.0%) or black (29.5%) had the highest cumulative probabilities of regret during the 14 years after sterilization. Among women who were young at sterilization, similarly high cumulative probabilities of regret at 14 years were seen in women who were sterilized during the postpartum period (after cesarean, 20.3%, 95% confidence interval [CI] 14.5, 26.0; after vaginal delivery, 23.7%, 95% CI 17.6, 29.8) or within 1 year of birth of their youngest child (22.3%, 95% CI 16.4, 28.2). As the time since birth of the youngest child increased, the cumulative probability of regret at 14 years decreased (2–3 years, 16.2%, 95% CI 11.4, 21.0; 4–7 years, 11.3%, 95% CI 7.8, 14.8; 8 or more years, 8.3%, 95% CI 5.1, 11.4). The probability was lowest among women who had no previous births (6.3%, 95% CI 3.1, 9.4).

In adjusted analyses using the proportional hazards model, probabilities of regret were significantly increased in women who were 30 years and younger, who had sterilization during the postpartum period or within 3 years of birth of the youngest child, who were non-white, or were unmarried (Table 4). Reasons for regret differed by the age at tubal sterilization (Table 5). Among women aged 30 years or younger, the most commonly reported reason for regret was the desire to have more children (33.1%). Women over age 30 were most apt to report subsequent gynecologic or menstrual changes (28.8%) as their primary reasons for regret. Further analyses showed that among women who experienced poststerilization regret, nearly half (48%) of those aged 30 years or younger at the time of sterilization and nearly one third (30%) of those over age 30 at sterilization requested information about sterilization reversal (data not shown).

Discussion

The cumulative probability of expressing regret during follow-up interviews within 14 years after tubal sterilization was 20% for women who were aged 30 years or younger when sterilized. Young women sterilized within 1 year after the birth of their youngest child were just as likely to experience regret at some point as were women sterilized during the immediate postpartum period. Poststerilization regret decreased as the time since the birth of the youngest child increased. A large number of women who experienced poststerilization

Table 5. Reported Reasons for Poststerilization Regret by Age at Tubal Sterilization

Reason for regret	18–30 y (n = 490*)	>30 y (n = 226*)
Subsequent gynecologic or menstrual problems	19.6 (96)	28.8 (65)
Other complication after sterilization	4.5 (22)	6.2 (14)
Divorce or remarriage	23.9 (117)	8.0 (18)
Death of child	0.8 (4)	0.9 (2)
Decision made without adequate consideration†	4.1 (20)	5.8 (13)
Desire for more children	33.1 (162)	26.1 (59)
Loss of sexuality	1.2 (6)	2.7 (6)
Other	12.9 (63)	21.7 (49)

Data are presented as % (n).
* Data were available for 716 of 744 women who reported regret.
† Includes "too young," "emotionally unstable," or "husband's idea."

regret requested information about sterilization reversal.

Rather than plateauing after short-term follow-up (3 years), the cumulative probability of poststerilization regret increased during the intermediate (7-year) and long-term (14-year) follow-up periods, especially for women who were 30 years old or younger when sterilized. Long-term regret 10 or more years after sterilization ranged from 5% to 21% in two previous cross-sectional studies done in Puerto Rico[9] and Sweden.[11] Our report used a prospective cohort study to describe the long-term cumulative probability of regret among women living in geographically diverse areas of the United States. Although few previous reports have described the long-term probability of poststerilization regret, a number of investigators have identified risk factors for poststerilization regret in general. The one predictor identified by all of these studies, and confirmed by our findings, was young age at the time of sterilization.[4,6,9,11–17] Preliminary reports from the Collaborative Review of Sterilization study also identified postpartum, as opposed to interval, timing of tubal sterilization as an important predictor of regret.[6,12] However, our analysis of data from the completed study found that sterilizations performed within 1 year of childbirth had just as high a risk of regret within 14 years as those done postpartum.

The increased probability of regret within 14 years after tubal sterilization among women who were young at sterilization was usually attributed to changes in the desired family size. Older women specified menstrual or other gynecologic problems occurring after tubal sterilization as the common reasons for regret. However, evidence to date does not support a biologic explanation for any association between tubal sterilization and subsequent menstrual or other gynecologic disorders.[18–21] Women who were sterilized at older ages may have believed that normal changes attributable to aging were instead abnormal consequences of sterilization.

Potential limitations may have influenced our findings. Because regret is an attitudinal measure for which there is no standardized definition,[10] the use of self-report to assess the occurrence of regret in our study, as in previous studies, may have led to some misclassifications. Although the selective attrition of women who were young or nonwhite may have caused us to underestimate the long-term cumulative probability of regret in our cohort, the preferential loss of married women should have had the opposite effect. We also assumed that our findings were not selectively biased by loss to follow-up, for the following reasons: 1) It is unlikely that it would have been easier to reach by telephone those who regretted rather than those who did not regret their decisions; and 2) only 2% of all participants contacted for follow-up actually refused further participation (data not shown). Another limitation of our study may have been the lack of information about additional risk factors that may influence the risk of regret, such as satisfaction with presterilization counseling and identification of the person who had the greatest influence on the woman's sterilization decision.[9,13,22]

A number of women who had poststerilization regret ultimately requested information about sterilization reversal, which is associated with high costs and limited success. Among sterilized women who participated in the 1982 National Survey of Family Growth, 11% reported that they would reverse their sterilization if it were safe to do so.[4] In our cohort, one of five women aged 30 years or younger at sterilization regretted their decisions at some point afterward. Our findings cannot be directly extrapolated to the entire United States because our cohort was not specifically selected to represent the entire population of women undergoing sterilization in this country (eg, our cohort included a higher percentage of black women than in the U.S. population of women who undergo tubal sterilization).

Although most women had no regret after tubal sterilization, our findings suggested strongly that a surprisingly high percentage of women sterilized at a young age in the United States will regret their decision at some point. Regret after tubal sterilization cannot be considered in isolation. Some young women who contemplate sterilization but choose a form of temporary contraception may regret not having been sterilized, either because of unintended pregnancy or side effects of temporary methods. Ideally, presterilization counseling can be used to highlight those groups of women who are most likely to experience poststerilization regret and to reassure those who do choose tubal sterilization that most sterilized women do not regret their decisions.

References

1. Centers for Disease Control and Prevention. Fertility, family planning, and women's health: New data from the 1995 National Survey of Family Growth. (DHHS publication no. PHS 97-1995.) Vital Health Stat 1997:23.
2. Schwartz DB, Wingo PA, Antarsh L, Smith JC. Female sterilization in the United States, 1987. Fam Plann Perspect 1989;21:209–12.
3. Mosher WD, Pratt WF. Contraceptive use in the United States 1973–1988. (DHHS publication no. PHS 90-1250.) Adv Data 1990: 182.
4. Henshaw SK, Singh S. Sterilization regret among U.S. couples. Fam Plann Perspect 1986;18:238–40.
5. Torrence GW, Feeny D. Health utilities index classification system.

In: Patrick DL, Erickson P, eds. Health status and health policy. New York: Oxford University Press, 1993:381–4.
6. Wilcox LS, Chu SY, Eaker ED, Zeger SL, Peterson HB. Risk factors for regret after tubal sterilization: 5 years of follow-up in a prospective study. Fertil Steril 1991;55:927–33.
7. Peterson HB, Xia Z, Hughes JM, Wilcox LS, Tylor LR, Trussell J, for the U.S. Collaborative Review of Sterilization Working Group. The risk of pregnancy after tubal sterilization: Findings from the U.S. Collaborative Review of Sterilization. Am J Obstet Gynecol 1996; 174:1161–70.
8. Hillis SD, Marchbanks PA, Tylor LR, Peterson HB. Tubal sterilization and long-term risk of hysterectomy: Findings from the U.S. Collaborative Review of Sterilization. The U.S. Collaborative Review of Sterilization Working Group. Obstet Gynecol 1997;89:609–14.
9. Boring CC, Rochat RW, Becerra J. Sterilization regret among Puerto Rican women. Fertil Steril 1988;49:973–81.
10. Chi IC, Jones DB. Incidence, risk factors, and prevention of poststerilization regret in women: An updated international review from an epidemiological perspective. Obstet Gynecol Surv 1994;49:722–32.
11. Platz-Christensen JJ, Tronstad SE, Johansson O, Carlsson SA. Evaluation of regret after tubal sterilization. Int J Gynaecol Obstet 1992;38:223–6.
12. Grubb GG, Petterson HB, Layde PM, Rubin GL. Regret after decision to have a tubal sterilization. Fertil Steril 1985;44:248–53.
13. Allyn DP, Leton DA, Westcott NA, Hale RW. Presterilization counseling and women's regret about having been sterilized. J Reprod Med 1986;31:1027–32.
14. Marcil-Gratton N. Sterilization regret among women in metropolitan Montreal. Fam Plann Perspect 1988;20:222–7.
15. Warren CW, Monteith RS, Johnson JT, Oberle MW. Tubal sterilization: Questioning the decision. Popul Studies 1988;42:407–18.
16. Wright AF. How women felt about their sterilization—a follow-up study of 368 patients in a general practice. J R Coll Gen Pract 1981;31:598–604.
17. Hardy E, Bahamondes L, Osis MJ, Costa RG, Faudes A. Risk factors for tubal sterilization regret detectable before surgery. Contraception 1996;54:159–62.
18. Stergachis A, Shy KK, Grothaus C, Wagner EH, Hecht JA, Anderson G, et al. Tubal sterilization and the long-term risk of hysterectomy. JAMA 1990;264:2893–8.
19. Rulin MC, Davidson AR, Philliber SG, Graves WL, Cushman LF. Changes in menstrual symptoms among sterilized and comparison women: A prospective study. Obstet Gynecol 1989;74:149–54.
20. Wilcox LS, Martinez-Schell B, Peterson HB, Ware JH, Hughes JM. Menstrual function after tubal sterilization. Am J Epidemiol 1992; 135:1368–81.
21. DeStefano F, Perlman JA, Peterson HB, Diamond EL. Long-term risk of menstrual disturbances after tubal sterilization. Am J Obstet Gynecol 1985;152:835–41.
22. Philliber SG, Philliber WW. Social and psychological perspectives on voluntary sterilization: A review. Stud Fam Plann 1985;16:1–29.

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