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Long-term outcome of parenthood project during IVF and after discontinuation of unsuccessful IVF

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Conflict of interest: none declared

Running title: Long-term outcome of IVF patients

Capsule: 66% of IVF patients may finally succeed in having a child: 40% during IVF treatment and 26% after discontinuing treatment (by adoption or spontaneous pregnancy).

ABSTRACT

Objective: To explore the long-term outcome of patients who began IVF treatment by considering not only treatment outcome in the center but also the parenthood project outcome after discontinuation of unsuccessful IVF.

Design: Retrospective cohort follow-up study.

Setting: Two French IVF centers.

Patient(s): 724 patients who began IVF treatment in 1998.

Intervention(s): Postal and phone contacts with unsuccessful IVF patients.

Main Outcome Measure(s): Long-term outcome of parenthood project.

Result(s). Of the 724 patients, a minimum of 53% and a maximum of 81% finally succeeded in their parenthood project during or after IVF treatment (depending on the hypotheses that the 204 patients not contacted either failed or succeeded in their parenthood project). An intermediate hypothesis gave an estimation of 66% of patients finally succeeding in having a child (40% during IVF treatment in the center and 26% after). Achievement of the parenthood project after IVF discontinuation was mainly due to adoption of a child (46%) or a birth following a spontaneous pregnancy (42%).

Conclusion(s): Unsuccessful patients should not lose hope, as nearly half may subsequently succeed in having a child.

Key Words: in vitro fertilization; follow-up study; treatment outcome; pregnancy; adoption

INTRODUCTION

Infertility is an important public health issue, as 9% of couples in developed countries do not conceive within 12 months of attempting pregnancy and it is estimated that 56% of infertile couples seek medical help (1). In response to infertility, assisted reproductive techniques (ART) have been developing rapidly in the last thirty years. In the European ART report for the year 2003, 15 countries (including Denmark, France, Germany, Norway, Sweden, UK) exhaustively reported their activity, finding a rate of 1,022 ART cycles per million inhabitants (2).

In spite of a clear increase in the number of ART cycles performed worldwide, these treatments remain an emotional and physical burden for the patient and her male partner (3, 4) and drop-out rates are high. In countries where the state subsidizes three IVF cycles, it has been observed that drop-out rates before the third cycle are as high as 62% in the Netherlands (5) and 65% in Sweden (6). In the United Kingdom where IVF treatment is often financed by the couples themselves, it has been observed than 64% of couples discontinued treatment after only one unsuccessful IVF cycle (7). These high drop-out rates raise several questions. The first is the reason for discontinuation. The few papers having addressed this issue highlighted the importance of predictors of failure and the psychological burden of treatment, especially when IVF cycles are state-subsidized (7-10). A second question is to how to take drop-outs into account when estimating the probability that IVF couples will finally have a child. In evaluation of the efficacy of IVF, this issue has been addressed by advancing hypotheses on the couples' probability of success if they had continued IVF treatment (5, 6, 11, 12). Another approach would be to examine the real chance of becoming parents for patients starting IVF, either during

the treatment itself or after drop-out. In particular, it would be of great interest to investigate whether drop-out patients finally succeed in having a child, possibly by transition of their parenthood project toward adoption.

In order to address this issue, we followed patients from the beginning of IVF treatment and examined not only treatment outcome in the center but also the long-term parenthood project outcome after discontinuation of unsuccessful treatment.

MATERIALS AND METHODS

Design and setting

Patients were from two French IVF centers in Paris (Cochin Hospital) and in Clermont-Ferrand, a medium-sized city in central France. All patients who had their first oocyte retrieval in one of these centers in 1998 were included. The study received approval from the French Data Protection Authority (CNIL) in September 2005 (authorization number 05-1334).

In May 2006, a postal questionnaire was sent to women who had discontinued IVF treatment without achieving a live birth. Treatment discontinuation was defined as no oocyte retrieval, no fresh or frozen embryo transfer, and no IVF pregnancy in the inclusion center within two years preceding the mailing. A postal questionnaire was mailed to the address recorded at the time of treatment. If the mail was returned because the patient was not known at that address, we searched for an up-to-date address in the hospital general addresses database and in the French national phone directory. In September 2006, a second postal mail including a refusal form was sent to non-respondents. If we received no answer to the two postal mails, we tried to contact the patient by telephone between November and December 2006 in order to complete a very short phone questionnaire.

Information Collected

Information on IVF attempts in the inclusion center was collected from medical records: infertility diagnosis, successive oocyte retrievals undergone by the patients in the center (conventional IVF or ICSI), outcomes of IVF pregnancies obtained either by fresh or frozen embryo transfers.

The postal questionnaire covered a wide range of topics: sociodemographic characteristics, fertility before 1998, treatments undergone before 1998, patient's feelings about IVF treatment, IVF discontinuation, patient's history since the end of IVF treatment in the inclusion center, in particular IVF attempts in another center, other medical treatments, spontaneous pregnancies, adoption procedures, bringing up other children, opinion on IVF treatment, consequences of IVF treatment. The short phone questionnaire was restricted to patient's profession, success in having a child after the end of IVF treatment in the inclusion center, spontaneous pregnancies, and psychological consequences of IVF treatment.

Statistical Methods

Data were analyzed using SAS software (9.0 version). Chi-square tests or Fisher exact tests were used for comparing percentages. Crude and adjusted odds ratios (OR) and 95% confidence intervals (CI) were estimated by logistic regression.

RESULTS

Of the 724 patients who began IVF treatment in the Cochin or Clermont-Ferrand centers in 1998, 293 (40%) patients obtained a live birth in the inclusion center, 421 (58%) patients stopped treatment in the center without a live birth and 10 (2%) patients were either still treated in the center or had an incomplete medical record which made it impossible to determine their treatment outcome (Table 1).

Of the 421 patients who discontinued IVF treatment, 420 were included in the long-term survey (one patient was deceased). Of these, 231 (55%) patients were treated at Cochin and 189 (45%) at Clermont-Ferrand. One hundred twenty-three (29%) patients completed the postal questionnaire, 93 (22%) patients responded to the brief phone questionnaire and 204 (49%) patients were non-respondents. Most non-respondents (n = 172, 84%) were patients who could not be either traced or contacted by telephone.

In order to investigate potential bias due to non-response, we compared the three categories of women included in the long-term survey (Table 2): women who responded to the postal questionnaire, women who responded to the phone questionnaire and women who did not respond. They did not significantly differ in age and infertility diagnosis. Non-respondents were more frequent in the Cochin center, if less than 4 oocyte retrievals had been performed and if a long time (6 years or more) had elapsed since discontinuation of IVF in the inclusion center. Among respondents, those who had answered the postal questionnaire were compared with those who answered the short phone questionnaire. We found no difference in patient's profession. Self-reported psychological difficulties still persisting after discontinuation

of unsuccessful IVF treatment were nearly twice as high among respondents to the short phone questionnaire (26% versus 14%, p = 0.03). A slightly higher percentage of postal questionnaire respondents than phone questionnaire respondents had achieved their parenthood project (46% versus 41%) or had a spontaneous pregnancy (21% versus 16%). However, the differences were not statistically significant.

Taken as a whole, of the 216 respondents to the postal or phone questionnaire, 95 (44%) declared they had achieved their parenthood project since discontinuing unsuccessful IVF treatment in the inclusion center, including 41 (19%) who had conceived spontaneously. For the 204 patients who did not participate in the long-term survey (non-respondents), various hypotheses can be advanced as to their long-term outcome.

Hypothesis n°1 (the extremely pessimistic hypothesis): none of the 204 patients who did not participate in the long-term survey had achieved her parenthood project. This would mean that only 95 patients achieved their parenthood project, representing 23% of the patients who discontinued unsuccessful IVF treatment and 13% of the initial 724 patients who began IVF treatment in 1998.

Hypothesis n°2 (the intermediate hypothesis): the 204 non-participant patients achieved their parenthood project in the same proportion as respondents to the postal or phone questionnaire (44%). This would give 185 (=95+204x0.44) patients who achieved their parenthood project after discontinuation of unsuccessful IVF treatment, representing 44% of the unsuccessful IVF patients and 26% of the initial patients.

Hypothesis n°3 (the extremely optimistic hypothesis): all the 204 non-participant patients achieved their parenthood project. This would give 299 (=95+204) patients who achieved their parenthood project after discontinuation of unsuccessful IVF treatment, representing 71% of the unsuccessful IVF patients and 41% of the initial patients.

Adding the 40% of patients who had a live birth during IVF treatment, we estimated that the proportion of patients who finally succeeded in their parenthood project during or after IVF treatment was 53% (pessimistic hypothesis), 66% (intermediate hypothesis) and 81% (optimistic hypothesis).

Among respondents to the postal questionnaire (n = 123), we were able to explore long-term outcome in greater depth (Table 3). 46% had achieved their parenthood project, 23% had not but were still trying to have a child and 31% had given up their parenthood project. 17% no longer lived with their male partner of 1998. After discontinuing treatment in their IVF center, patients took different steps to achieve their parenthood project (sometimes with a new male partner): adoption procedure (42%), IVF treatment in another center (20%), or other medical treatment, in particular artificial insemination with husband or donor sperm (7%). Among women who achieved their parenthood project after discontinuing unsuccessful treatment, two types of parenthood project achievement predominated: adoption (46%) and spontaneous pregnancy (42%). Births after medical treatment (including IVF) appeared much less frequent (12%). One woman succeeded in two different ways: she first adopted a child and then had a spontaneous pregnancy.

Factors associated with a successful parenthood project are shown in Table 4. In univariate analysis, six variables were significantly associated with parenthood project achievement. Success was more frequent if the patient was aged less than 35 years at the first oocyte retrieval, if her educational level was medium or high, if she had no child when beginning IVF treatment in the inclusion center in 1998, if duration of infertility in 1998 was less than 5 years, if the decision to discontinue IVF treatment was not voluntary (for example because the treatment was no longer reimbursed) and if in 2006 the patient still lived with the same male partner as in 1998. In multivariate analysis, only three variables remained significant (having no child when beginning IVF treatment, duration of infertility and still living with the same partner).

DISCUSSION

Among 724 patients undergoing a first oocyte retrieval in 1998 in one of the two French IVF centers, we estimated, using an intermediate hypothesis, that 66% of patients finally succeeded in having a child during or after IVF treatment. If we considered extremely pessimistic and optimistic hypotheses (all patients lost to follow-up failed or all succeeded), we concluded that a minimum of 53% and a maximum of 81% of patients finally succeeded in their parenthood project. These percentages could continue to rise as more time elapsed since treatment initiation. Indeed, patients could still be attempting to achieve their parenthood project at the time of the survey (as were 23% of respondents to the postal questionnaire).

According to the intermediate hypothesis (66% of patients finally succeeding in having a child during or after IVF treatment), the parenthood project was achieved by IVF treatment in the inclusion center (40%), by adoption of a child (12%), spontaneous pregnancy leading to a live birth (11%) or other medical treatment or IVF treatment in another center after discontinuation of unsuccessful treatment in the inclusion center (3%).

Our results obtained in a French population exhibited the same trends as those observed recently in a Norwegian population. Analyzing long-term outcome of 108 patients referred to one Norwegian IVF center in 1996 and interviewed 10 years later, Sundby *et al.* found an overall success probability of 77%, including 47% of patients who had a child during IVF treatment, 15% who adopted a child and 15% who had a child following a spontaneous pregnancy (13). In this Norwegian study,

the authors also reported that 13% of patients were bringing up a child (10% as a foster parent and 3% as a stepmother).

In our study, we had information on only half of the patients having discontinued IVF without a live birth in the inclusion center. However this low response rate was not linked to refusal to participate: nearly all patients agreed to respond at least to a very short phone questionnaire and 84% of non-respondents could in fact not be contacted because they had moved since treatment. This is reassuring inasmuch as a high refusal rate often introduces selection bias. Moreover, in our study, non-response was clearly linked with variables that could be associated with a higher risk of a change of address: treatment in the Paris region (Cochin center) where the population is more mobile than in other regions of France (such as Clermont-Ferrand), a longer time elapsing since IVF discontinuation and having less than four oocyte retrievals, which is linked with time elapsed since IVF. The rate of follow-up loss observed in our study (49%) was close to that (42%) observed in a Brazilian study based on phone interviews of 92 couples who had unsuccessfully undergone one or more IVF cycles in an IVF center at least 3 years before the start of the study (14). Such a high rate of follow-up loss in our study was due to the long time elapsing between IVF treatment discontinuation and our survey, more than 6 years for 89% of non-respondents versus 79-82% of respondents (p=0.04). Such a long period was necessary to investigate long-term outcome (especially adoption, a procedure which requires several years). Another methodological approach could be to consider active follow-up of a cohort of patients. However, this approach is very time-consuming and costly and could finally be inefficient. Firstly, the topic of our survey is a very sensitive one for patients and questionnaires repeated over time could be difficult to administer. Secondly, loss of follow-up in a cohort is commonly as

high as 40-50% after 6 years. For example, in a French cohort on contraception, of the 2,863 women who agreed in 2000 to participate in a yearly phone contact, 33% no longer participated only two years later (15) and about 20% of UK families who participated in the first sweep of the Millennium Cohort Study did not respond to the second sweep just two years later (16). When investigating long-term parenthood projects among unsuccessful IVF treatment patients, which is a very sensitive topic for those who have not yet succeeded, one could expect an even higher rate of follow-up loss if carrying out repeated distressing interrogations in a prospective cohort.

A high rate of non-response could lead to selection bias in our study if reasons for moving were related to the patient's probability of achieving her parenthood project. We first considered that the change of residence could be related to separation of the couple, which was a major predictive factor of failure to have a child after IVF treatment discontinuation among respondents. So, non-respondents could have a lower chance of success than respondents. We also considered that, on the contrary, change of residence could be related to the arrival of a child in the family and the need for an additional bedroom (17). In view of these two contradictory assumptions, we were unable to conclude on the direction selection bias would go, whether it would imply over- or under-estimation of the probability of finally having a child. Finally, two methods of interviewing patients were used in the study (postal questionnaire and phone interview). We do not believe that this would induce differential bias in factual information such as the birth or adoption of a child. However, it could have induced differences for less factual information such as psychological well-being. In Table 2, we observed that patients responding to the short phone questionnaire were twice as likely to declare psychological problems

than respondents to the postal questionnaire. Psychological difficulties could be the reason why these patients did not answer the postal questionnaire, but we could not exclude that this partly reflected differences linked to the method of interview (phone or postal questionnaire).

In our multivariate analysis, achievement of the parenthood project after discontinuation of unsuccessful IVF treatment in the inclusion center was positively linked to two initial characteristics of the patient: not having a child at the beginning of IVF treatment and infertility duration of less than 5 years in 1998. Both could reflect patients' motivation and determination to succeed in having a child (even by adoption) and/or better fertility chances leading to spontaneous pregnancies (patients with shorter infertility duration possibly being more fertile and also younger). Two other variables could be interpreted in the same way: young age of the patient at the first oocyte retrieval and the fact that discontinuation of IVF treatment was not a voluntary decision by the couple. However, these two variables were significant only in univariate analysis. Moreover, patients separated from their male partner appeared to have less chance of finally having a child, probably because separation could have put an end to the parenthood project and/or because the patient was then alone. This suggests that the long-term outcome of a parenthood project may vary from one country to another according to the frequency of separations. For example, in France, the divorce rate was 42.4% in 2003, while it was higher (56.1%) in Belgium and very much lower in Spain (14.5%) (18). Similar research on the long-term outcome of parenthood project should be carried out in other countries in order to verify that the observations made in French couples can be generalized.

Our results showed the importance of spontaneous pregnancy and of adoption in achieving the parenthood project after discontinuation of unsuccessful IVF treatment, whereas only a small proportion of patients became parents following another medical treatment. Surprisingly, although 20% of patients followed another IVF program in another center, only 21% of these patients had a child in this way. In our survey, 19% of respondents reported that they had spontaneously conceived since discontinuation of IVF. This proportion is similar to those reported in two studies analyzing spontaneous pregnancy rate among IVF patients who had a live birth after treatment: a Japanese study observed that 18% of 142 patients conceived spontaneously within 5 years after the birth of their IVF child (19) and an Irish study found that 21% of 513 patients conceived spontaneously after an IVF birth (20). In a Belgian study, spontaneous pregnancies were analyzed among 200 patients discontinuing ICSI (21). The authors observed a slightly lower rate of spontaneous pregnancy, 12-13%, but the time since treatment discontinuation was shorter (3 years).

Our long-term survey showed that adoption and spontaneous conception are important issues to consider when dealing with the long-term outcome of parenthood projects among couples beginning an IVF program. It would be very interesting to examine in greater depth which patients finally conceived spontaneously and which patients finally adopted a child. This approach was not possible in our study because the sample size was too small, so more research would be needed on this topic.

In conclusion, we gained new insight for IVF patients by taking a long-term view rather than considering their parenthood project only in the IVF center. While for

40% of patients IVF treatment resulted in a successful pregnancy, unsuccessful patients should not lose hope, as nearly half of them may subsequently have a child.

REFERENCES

1. Boivin J, Bunting L, Collins JA, Nygren KG. International estimates of infertility prevalence and treatment-seeking: potential need and demand for infertility medical care. Hum Reprod 2007;22:1506-12.
2. Nyboe Andersen A, Goossens V, Gianaroli L, Felberbaum R, de Mouzon J, Nygren KG. Assisted reproductive technology in Europe, 2003. Results generated from European registers by ESHRE. Hum Reprod 2007;22:1513-25.
3. Eugster A, Vingerhoets AJ. Psychological aspects of in vitro fertilization: a review. Soc Sci Med 1999;48:575-89.
4. Schmidt L. Psychosocial burden of infertility and assisted reproduction. Lancet 2006;367:379-80.
5. Land JA, Courtar DA, Evers JL. Patient dropout in an assisted reproductive technology program: implications for pregnancy rates. Fertil Steril 1997;68:278-81.
6. Olivius K, Friden B, Lundin K, Bergh C. Cumulative probability of live birth after three in vitro fertilization/intracytoplasmic sperm injection cycles. Fertil Steril 2002;77:505-10.
7. Sharma V, Allgar V, Rajkhowa M. Factors influencing the cumulative conception rate and discontinuation of in vitro fertilization treatment for infertility. Fertil Steril 2002;78:40-6.
8. Domar AD. Impact of psychological factors on dropout rates in insured infertility patients. Fertil Steril 2004;81:271-3.
9. Olivius C, Friden B, Borg G, Bergh C. Why do couples discontinue in vitro fertilization treatment? a cohort study. Fertil Steril 2004;81:258-61.

10. Penzias AS. When and why does the dream die? or does it? Fertil Steril 2004;81:274-5.
11. Soullier N, Bouyer J, Pouly JL, Guibert J, de La Rochebrochard E. Estimating the success of an in vitro fertilization programme using multiple imputation. Hum Reprod 2008;23:187-92.
12. Stolwijk AM, Hamilton CJ, Hollanders JM, Bastiaans LA, Zielhuis GA. A more realistic approach to the cumulative pregnancy rate after in-vitro fertilization. Hum Reprod 1996;11:660-3.
13. Sundby J, Schmidt L, Heldaas K, Bugge S, Tanbo T. Consequences of IVF among women: 10 years post-treatment. J Psychosom Obstet Gynaecol 2007;28:115-20.
14. Filetto JN, Makuch MY. Long-term follow-up of women and men after unsuccessful IVF. Reprod Biomed Online 2005;11:458-63.
15. Razafindratsima N, Kishimba N, COCON Group. Attrition in the COCON cohort between 2000 and 2002. Popul (English) 2004;59:357-85.
16. Plewis I, Ketende S. Millennium Cohort Study: Technical Report on Response. London: Centre for Longitudinal Studies, Institute of Education; 2006.
17. Courgeau D, Lelievre E. Estimation des migrations internes de la période 1990-1999 et comparaison avec celles des périodes antérieures. Popul 2004;59:797-804.
18. Sardon JP. Recent demographic trends in developed countries. Popul (English) 2006;61:197-266.
19. Shimizu Y, Kodama H, Fukuda J, Murata M, Kumagai J, Tanaka T. Spontaneous conception after the birth of infants conceived through in vitro fertilization treatment. Fertil Steril 1999;71:35-9.

20. Hennelly B, Harrison RF, Kelly J, Jacob S, Barrett T. Spontaneous conception after a successful attempt at in vitro fertilization/intracytoplasmic sperm injection. Fertil Steril 2000;73:774-8.

21. Osmanagaoglu K, Collins J, Kolibianakis E, Tournaye H, Camus M, Van Steirteghem A, et al. Spontaneous pregnancies in couples who discontinued intracytoplasmic sperm injection treatment: a 5-year follow-up study. Fertil Steril 2002;78:550-6.

TABLE 1. Treatment outcomes among the 724 patients who began IVF treatment in 1998 in one of the two IVF centers.

	IVF center		
	Cochin	Clermont-Ferrand	Total
	392	***332***	***724***
Live birth in the center n (%)	157 (40)	136 (41)	293 (40)
Discontinuation of unsuccessful IVF n (%)	231 (59)	190 (57)	421 (58)
Still in treatment in the center [a] n (%)	0 (0)	6 (2)	6 (1)
Unknown treatment outcome [b] n (%)	4 (1)	0 (0)	4 (1)

a: We considered that a patient was still in treatment in the inclusion center if she had an oocyte retrieval or a fresh or frozen embryo transfer or an IVF pregnancy in the center in the two years before our mailed questionnaire in May 2006.

b: Outcome of IVF treatment was unknown for 4 patients in the Cochin center because the information was missing from the medical records.

TABLE 2. Characteristics (%) of postal questionnaire respondents, short phone questionnaire respondents, and non-respondents (n = 420 [a] patients included in the long-term survey).

	Postal questionnaire respondents (*n = 123)*	Short phone questionnaire respondents (*n = 93)*	Non-respondents [b] (*n = 204)*	*p* [c]
IVF center				0.01
Cochin	44	60	59	
Clermont-Ferrand	56	40	41	
Patient age in 1998				0.74
< 35 years	59	55	59	
≥ 35 years	41	45	41	
Infertility diagnosis based on medical records				0.70
Female	43	38	33	
Male	27	30	28	
Female and male	17	18	22	
Unexplained	13	14	16	
Number of oocyte retrievals				0.02
< 4	82	73	86	
≥ 4	18	27	14	
Time elapsed in 2006 since IVF discontinuation in the inclusion IVF center [d]				0.04
< 6 years	21	18	11	
≥ 6 years	79	82	89	
Patient with a managerial profession				0.88
No	87	88	NA [e]	
Yes	13	12	NA [e]	
Achievement of parenthood project since IVF discontinuation				0.42
No	54	59	NA [e]	
Yes	46	41	NA [e]	
Spontaneous pregnancy since IVF discontinuation				0.36
No	79	84	NA [e]	
Yes	21	16	NA [e]	
Still psychologically affected by IVF treatment				0.03
No	86	74	NA [e]	
Yes	14	26	NA [e]	

a: Of the 421 patients who discontinued unsuccessful IVF treatment, one was deceased.
b: Non-respondents include patients lost to follow-up (n = 178) and patients refusing to answer (n = 26).
c: *p* value of the chi-squared or Fisher exact test.
d: Time elapsed in 2006 since discontinuation of unsuccessful IVF treatment in the inclusion center was from 3 to 8 years. Six years was the first percentile (median: 7 years, 3rd

percentile: 8 years).

e: NA = not applicable: this information was not available for non-respondents.

TABLE 3. Long-term parenthood project outcome after discontinuation of unsuccessful IVF treatment in the inclusion center among the 123 respondents to the postal questionnaire in the long-term survey.

Long-term outcome of the patient's parenthood project	
Succeeded in her parenthood project	46%
Project continuing	23%
Project abandoned	31%
Situation of the couple since IVF discontinuation	
Still living together	83%
Separated	17%
Steps taken to achieve (successfully or not) the parenthood project [a]	
IVF treatment in another center	20%
Medical treatment other than IVF	7%
Start of adoption procedure	42%
For patients with a successful parenthood project (*n* = 57), method by which it had been achieved [b]	
IVF treatment in another center	7%
Other medical treatment (including AI with donor sperm)	5%
Adoption	46%
Spontaneous pregnancy leading to a live birth	42%

a: One patient may have taken none, one or more than one steps, so the sum of percentages is not 100%.

b: If the patient had more than one child, we only considered the first, so the sum of column percentages is 100%.

TABLE 4. Factors associated with achievement of parenthood project after discontinuation of unsuccessful IVF treatment in the inclusion center among the 123 respondents to the postal questionnaire.

	Patients achieving their parenthood project		Crude OR	Adjusted OR
	n	%	[95% CI]	[95% CI] [a]
IVF center				
Clermont-Ferrand	69	54	1.00	1.00
Cochin	54	37	0.51 [0.25 - 1.05]	0.84 [0.28 - 2.49]
Patient age at first oocyte retrieval				
< 35 years	73	58	1.00	1.00
≥ 35 years	50	30	0.32 [0.15 - 0.68]	0.44 [0.13 - 1.50]
Educational level of the patient [b]				
Low	55	36	1.00	1.00
Medium or high	66	56	2.23 [1.07 - 4.65]	2.05 [0.67 - 6.27]
Patient fertility in 1998 when beginning IVF treatment				
No child	91	59	1.00	1.00
At least one child	29	7	0.05 [0.01 - 0.23]	0.05 [0.01 - 0.26]
Infertility duration in 1998 when beginning IVF treatment				
< 5 years	58	57	1.00	1.00
≥ 5 years	61	38	0.46 [0.22 - 0.95]	0.22 [0.06 - 0.78]
Infertility diagnosis based on medical records				
Female	53	49	1.00	1.00
Male	33	61	1.60 [0.66 - 3.86]	0.80 [0.20 - 3.15]
Female and male	21	29	0.42 [0.14 - 1.23]	0.33 [0.07 - 1.45]
Unexplained	16	31	0.47 [0.14 - 1.55]	0.44 [0.08 - 2.49]
Opinion expressed by the patient in 2006 on the inclusion IVF center				
Satisfied or very satisfied	86	42	1.00	1.00
Unsatisfied or very unsatisfied	36	58	1.94 [0.88 - 4.28]	1.89 [0.50 - 7.10]
Number of oocyte retrieval performed in the inclusion IVF center				
< 4	101	46	1.00	1.00
≥ 4	22	50	1.20 [0.48 - 3.01]	1.01 [0.20 - 5.11]
Time elapsed since discontinuation of IVF treatment				
< 6 years	26	50	1.00	1.00
≥ 6 years	97	45	0.83 [0.35 - 1.97]	2.38 [0.43 - 13.0]
Decision to discontinue IVF treatment				
Couple's decision	76	41	1.00	1.00
Medical staff decision	22	32	0.68 [0.25 - 1.85]	2.33 [0.46 - 11.9]
Not a choice, obligation [c]	22	82	6.53 [2.02 - 21.2]	3.37 [0.65 - 17.5]
Situation of the couple since IVF discontinuation				
Still living together	102	52	1.00	1.00
Separated	21	19	0.22 [0.07 - 0.69]	0.10 [0.02 - 0.53]
Patient's psychological difficulties due to IVF treatment (self-reported in 2006)				
No difficulties	35	43	1.00	1.00
Overcoming difficulties	66	55	1.60 [0.70 - 3.66]	1.09 [0.31 - 3.81]
Still affected	16	38	0.80 [0.24 - 2.69]	0.29 [0.05 - 1.58]

a: n = 107 patients of 123 with complete information for the 12 variables entered in the multivariate model.
b: Low level of education was defined as < baccalauréat; medium-high level was defined as ≥ baccalauréat (completion of secondary education).
c: Main reasons for considering that IVF discontinuation was not a choice but was involuntary were that the treatment was no longer reimbursed or that the patient was too old to be included in an IVF treatment program.