Surgical treatment for tubal disease in women due to undergo in vitro fertilisation (Review)

Johnson N, van Voorst S, Sowter MC, Strandell A, Mol BWJ

This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2004, Issue 3

http://www.thecochranelibrary.com

WILEY
Surgical treatment for tubal disease in women due to undergo in vitro fertilisation

Neil Johnson¹, Sabine van Voorst², Martin C Sowter³, Annika Strandell⁴, Ben Willem J Mol⁵

¹Department of Obstetrics & Gynaecology, University of Auckland, Auckland, New Zealand. ²Faculty of Medicine, University of Maastricht, Maastricht, Netherlands. ³Fertility Plus, Auckland Hospital, Auckland, New Zealand. ⁴Obstetrics and Gynecology, University of Gothenburg, Kungälv, Sweden. ⁵Obstetrics and Gynecology, Máxima Medical Center, Veldhoven, Netherlands

Contact address: Neil Johnson, Department of Obstetrics & Gynaecology, University of Auckland, PO Box 92019, Auckland, 1003, New Zealand. n.johnson@auckland.ac.nz.

Editorial group: Cochrane Menstrual Disorders and Subfertility Group.
Review content assessed as up-to-date: 16 March 2004.


Copyright © 2009 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

ABSTRACT

Background

Tubal disease, and particularly hydrosalpinx, has a detrimental effect on the outcome of in-vitro fertilisation (IVF). It has been less clear whether surgical intervention for tubal disease prior to IVF is effective in improving the likelihood of successful outcome. Most data are retrospective or poorly controlled. To date no single prospective randomised trial has shown a significant benefit from such surgical treatment prior to IVF.

Objectives

To assess the value of surgical treatment for tubal disease prior to IVF.

Search strategy

We searched the Cochrane Menstrual Disorders and Subfertility Group trials register (10 March 2004), the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library Issue 1, 2004), MEDLINE (January 1966 to February 2004), EMBASE (January 1985 to February 2004), reference lists of articles and contacted researchers in the field.

Selection criteria

All trials comparing a surgical treatment for tubal disease with a control group generated by randomisation were considered for inclusion in the review.

Data collection and analysis

Two reviewers independently assessed trial quality and extracted data. Study authors were contacted for additional information. The studied outcomes were live birth (and ongoing pregnancy), pregnancy, ectopic pregnancy, miscarriage, multiple pregnancy and complications.
Main results

Three randomised controlled trials involving 295 (or couples) were included in this review. The odds of ongoing pregnancy and live birth (Peto odds ratio (OR) 2.13, 95% confidence interval (CI) 1.24 to 3.65) were increased with laparoscopic salpingectomy for hydrosalpinges prior to IVF. The odds of pregnancy were also increased (Peto odds ratio (OR) 1.75, 95% CI 1.07 to 2.86). There was no significant difference in the odds of ectopic pregnancy (Peto OR 0.42, 95% CI 0.08 to 2.14), miscarriage (Peto OR 0.49, 95% CI 0.16 to 1.52) or treatment complications (Peto OR 5.80, 95% CI 0.35 to 96.79). No data were available concerning the odds of multiple pregnancy.

Authors’ conclusions

Laparoscopic salpingectomy should be considered for all women with hydrosalpinges prior to IVF treatment. Currently unilateral salpingectomy for a unilateral hydrosalpinx (bilateral salpingectomy for bilateral hydrosalpinges) should be recommended, although this requires further evaluation. Further randomised trials are required to assess other surgical treatments for hydrosalpinx, such as salpingostomy, tubal occlusion or needle drainage of a hydrosalpinx at oocyte retrieval. The role of surgery for tubal disease in the absence of a hydrosalpinx is unclear and merits further evaluation.

PLAIN LANGUAGE SUMMARY

Removing blocked or diseased fallopian tubes before in vitro fertilisation (IVF) can increase pregnancy rates for women on the IVF program.

Diseases of the fallopian tube, such as hydrosalpinx (watery substances in blocked fallopian tubes resulting either from infection, endometriosis or previous surgery), can severely reduce the chances of pregnancy while on the IVF program because of damage to the fallopian tubes. A salpingectomy (removing the damaged fallopian tube) can be done to remove the blocked part of the tube. The review of trials found laparoscopic salpingectomy prior to IVF treatment increases the odds of pregnancy and live birth. However, the procedure is very delicate. More research is needed to examine this and other treatments.

BACKGROUND

A spectrum of severity of tubal disease is recognised at laparoscopy from peritubal adhesions, through damaged fimbriae or distorted tubal anatomy, tubal blockage, to hydrosalpinx (a fluid-filled distension of the fallopian tube in the presence of distal tubal occlusion - a severe manifestation of tubal disease).

In-vitro fertilisation (IVF) was first developed as a fertility treatment to overcome mechanical obstruction for women without functional fallopian tubes (Steptoe 1978). Recently it has been recognised that tubal pathology is associated with a low embryo implantation rate in IVF compared to the other causes of infertility (Andersen 1994; Englert 1987; Fleming 1996; Strandell 1994). The presence of a hydrosalpinx may also be associated with increased risk for early pregnancy loss (Strandell 1994). The failure of IVF in women with tubal disease may be related to the severity of tubal damage (Csemiczky 1996; Vasquez 1995).

One theory to explain the deleterious effect of a hydrosalpinx on the outcome of IVF is the intermittent bathing of the intrauterine environment with toxic fluid within the hydrosalpinx. The fluid contains bacteriological agents, debris, lymphocytes, cytokines, lymphokines and prostaglandins. Hydrosalpinx fluid may reduce the receptive capabilities of the endometrium (Akman 1996; Fleming 1996; Freeman 1996; Katz 1996; Strandell 1994) possibly by reducing endometrial expression of beta-integrin (Meyer 1997). It may have direct embryo toxicity (Mukherjee 1996) and may also exert a negative influence on oocytes in early follicular recruitment (Freeman 1996).

Studies using historical control groups have suggested that the outcome of IVF may be improved by surgical treatment of hydrosalpinges (Andersen 1996; Meyer 1997; Poe-Ziegler 1995; Puttemans 1996; Shelton 1996; Vandromme 1995). This would need to be confirmed by a robust prospective randomised controlled trial. It is also uncertain whether unilateral or bilateral salpingectomy (removing the damaged fallopian tube) would be necessary to obtain benefit in the case of unilateral hydrosalpinx; whether less invasive surgical interventions could be beneficial, for example ocluding...
the fallopian tube with a hydrosalpinx immediately adjacent to the uterus (thereby preventing uterine spillage of potentially harmful hydrosalpinx fluid), salpingoplasty (where the surgery would allow continuous drainage rather than accumulation of hydrosalpinx fluid) or needle aspiration of hydrosalpinx fluid (which could be performed under ultrasound guidance at the time of IVF egg collection).

Not all studies have demonstrated a negative effect of hydrosalpinx on IVF outcome (Shahara 1996). Many clinicians have been so convinced by the published studies to date that they routinely perform, for example, salpingectomy in women with hydrosalpinx prior to IVF. Such surgery, whether performed at laparotomy or laparoscopy, is not without risk to the woman. It has also been suggested that a salpingectomy may detrimentally affect ovarian function, perhaps by an effect on ovarian blood-flow (Dar 2000; Lass 1998), although other authors have produced reassuring data to suggest that ovarian compromise does not occur after salpingectomy (Strandell 2001). Whilst removal of all but the intramural portion of the fallopian tube has been recommended for women with damaged fallopian tubes intent on IVF (Johnson 1998), a recent case report of spontaneous bilateral cornual uterine desiccation early in the second trimester of an IVF pregnancy after laparoscopic bilateral salpingectomy with an interval of six months to commencing IVF (Inovay 1999) emphasises the need for care with electrosurgery in the cornual region. Such cases appear to be extremely rare as this has been, to date, the only case of spontaneous cornual rupture in such circumstances. Furthermore, for women who have suffered from infertility to the extent that IVF is the planned treatment, it is often a major decision to undergo a surgical procedure which removes any possibility of conceiving spontaneously. Many gynaecologists are aware of women who were deemed to have hopeless tubal infertility who have later conceived spontaneously. It is therefore important to have the best available evidence that these interventions are beneficial.

**OBJECTIVES**

To assess the value of surgical treatment of tubal disease prior to IVF. The following surgical treatments for tubal disease were considered: salpingectomy (both unilateral and bilateral), tubal occlusion (both unilateral and bilateral), salpingoplasty and hydrosalpinx fluid aspiration. The hypothesis that surgical treatment of tubal disease prior to IVF is beneficial by increasing the pregnancy and live birth rate, without substantially increasing complications related to the intervention, was tested.

**METHODS**

**Criteria for considering studies for this review**

**Types of studies**

All randomised controlled trials (RCTs) comparing women undergoing surgical treatment for tubal disease prior to IVF with a control group (which could include another type of surgery, medical treatment or no treatment) were considered eligible for inclusion.

**Types of participants**

Inclusion criteria: women with known tubal disease due to undergo IVF

Exclusion criteria: none

**Types of interventions**

- Bilateral salpingectomy for tubal disease
- Unilateral salpingectomy for unilateral hydrosalpinx
- Bilateral tubal occlusion for tubal disease
- Unilateral tubal occlusion for unilateral hydrosalpinx
- Salpingoplasty for hydrosalpinx
- Aspiration of hydrosalpinx
- Other recognised surgical treatments for tubal disease not mentioned above

Trials assessing one intervention versus another intervention, in addition to trials assessing an intervention versus no intervention, will be eligible for inclusion.

**Types of outcome measures**

The following rates should be defined per woman randomised unless otherwise specified.

**Primary outcome measures:**

1. Live birth rate
2. Pregnancy rate - clinical pregnancy is defined by the demonstration of fetal heart activity on ultrasound scan

**Secondary outcome measures:**

1. Ectopic pregnancy rate
2. Miscarriage rate (per pregnancy)
3. Multiple pregnancy rate (per pregnancy)
4. Complication rate

**Search methods for identification of studies**

**Electronic searches**

We searched the Cochrane Menstrual Disorders and Subfertility Group (MDSG) trials register (searched 10 March 2004), the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library, Issue 1 2004) and the British Library Science and Technology Database (1966 to 2003).
We used the following keywords to search the MDSG trials register and CENTRAL:
in vitro fertil$, IVF, assisted reprod$ technol$ or ART with:
tubal disease, tubal, blocked tubes, fallopian tubes, hydrosalpin$, surg$, salping$, occlusion
The MEDLINE search was performed using the following search strategy:
1. (IVF or (in vitro adj fertil$)).mp.
2. (tubal adj disease).tw.
3. (block$ adj5 tub$).tw.
4. hydrosalpin$.tw.
5. surg$.tw.
6. (salping$ or neosalping$).tw.
7. (aspirat$ adj5 hydrosalpin$).tw.
8. (clip$ adj5 hydrosalpin$).tw.
9. occlusion.tw.
10. or/2-9
11. 1 and 10
12. Controlled study/ or randomized controlled trial/
13. double blind procedure/
14. single blind procedure/
15. crossover procedure/
16. drug comparison/
17. placebo/
18. random$.ti,ab,hw,tn,mf.
19. latin square.ti,ab,hw,tn,mf.
20. crossover.ti,ab,hw,tn,mf.
21. cross-over.ti,ab,hw,tn,mf.
22. placebo§.ti,ab,hw,tn,mf.
23. ((double§ or singl$ or tripl$ or trebl$) adj5 (blind$ or mask$)).ti,ab,hw,tn,mf.
24. (comparative adj5 trial$).ti,ab,hw,tn,mf.
25. (clinical adj5 trial$).ti,ab,hw,tn,mf.
26. or/12-25
27. nonhuman/
28. animal/ not (human/ and animal/)
29. or/27-28
30. 26 not 29
31. 11 and 30

Handsearching
We handsearched relevant conference abstracts (including those for the European Society for Human Reproduction, the British Fertility Society, the Fertility Society of Australia, the American Society of Reproductive Medicine, the World Congress on In Vitro Fertilisation and Human Reproductive Genetics). We also searched citation lists of included trials, eligible studies, conference abstracts and relevant review articles. We contacted the first or corresponding author of trials eligible for inclusion to ascertain if they were aware of any ongoing or unpublished trials.

Data collection and analysis
Selection of trials
Two reviewers (NJ and WM) selected the trials for inclusion in the review was performed by two reviewers (NJ and WM) after employing the search strategy described previously. We would have resolved differences of opinion would have been resolved by consensus after consultation with a third reviewer (MS), although none occurred.
We excluded trials from the review if they made comparisons other than those specified above or if the quality of the trial was inadequate and these were detailed in the table 'Characteristics of excluded trials'.

Quality assessment
Two reviewers (NJ and WM) independently assessed the included studies for the following quality criteria and methodological details. This information is presented in the table 'Characteristics of included trials'.

Copyright © 2009 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.
of studies’ and provided a context for assessing the reliability of results.

(1) Trial characteristics
   (a) Method of randomisation, in order of preference, as follows:
      (i) Third party randomisation, for example by pharmacy, computer or telephone
      (ii) True randomisation by carer, for example by opaque numbered envelope or register
   (b) Study design:
      (i) Blinding
      (ii) Duration of follow-up
      (iii) Type of follow-up
   (c) Size of study:
      (i) Number of women recruited
      (ii) Number of women randomised
      (iii) Number of women excluded
      (iv) Number of women withdrawn and lost to follow-up
      (v) Number of women analysed
   (d) Study setting:
      (i) Single-centre or multicentre
      (ii) Location
      (iii) Timing and duration
      (iv) Source of funding stated or not
   (e) Analyses:
      (i) Whether a power calculation was performed and adhered to
      (ii) Whether ‘intention to treat’ analysis was performed by authors, possible from data but not performed by authors, not possible or uncertain
   (f) Criteria for surgical treatment prior to IVF:
      (i) Tubal disease
      (ii) Hydrosalpinx
      (iii) Either of the above plus previous failed IVF

(2) Characteristics of the study participants
   (a) Baseline characteristics
      (i) Age
      (ii) Primary or secondary infertility
      (iii) Duration of infertility
      (iv) Investigative work-up - baseline follicle-stimulating hormone (FSH), semen analysis, laparoscopy, confirmatory test of ovulation
      (v) Other contributory causes to infertility than tubal disease
      (vi) Previous treatments - IVF and other treatments
      (vii) Exclusion criteria
   (b) Treatment characteristics
      (i) Number of eggs retrieved at IVF
      (ii) Proportion undergoing intracytoplasmic sperm injection (ICSI)
      (iii) Fertilisation rate
      (iv) Number of embryos transferred

(3) Interventions
   (a) Timing of surgical intervention
   (b) Nature of surgical intervention
   (c) Absence of other interventions in treatment and control group

(4) Outcomes
   (a) Primary
      (i) Live birth rate
      (ii) Pregnancy rate (and diagnosis of pregnancy)
   (b) Secondary
      (iii) Ectopic pregnancy rate
      (iv) Miscarriage rate
      (v) Multiple pregnancy rate
      (vi) Complication rate

Data Management

Two reviewers (NJ and WM) independently extracted all data and differences of opinion were resolved by consensus after consultation with a third reviewer (MS). We sort additional information on trial methodology or actual original trial data was sought from the corresponding author of trials which appeared to meet the eligibility criteria, when aspects of methodology were unclear, or where data were in a form unsuitable for meta-analysis. We sent reminder correspondence was sent if a reply was not received within four weeks. To date, responses have been received from the authors of two included trials (Dechaud 1998; Strandell 1999). Both of these trial authors asked to audit their data presented in the review and have been given the opportunity to do so.

Statistical Analysis

Statistical analysis was performed in accordance with the guidelines for statistical analysis developed by the Menstrual Disorders and Subfertility Group. Statistical heterogeneity between the results of different studies was examined by inspecting the scatter in the data points on the graphs and the overlap in their confidence intervals and, more formally, by checking the results of chi-squared tests. The outcomes were pooled statistically where clinical heterogeneity was absent.

Dichotomous data were expressed as a Peto odds ratio (OR) with 95% confidence intervals (CI) and combined for meta-analysis with RevMan software using the Peto-modified Mantel-Haenszel method. An increase in the odds of a particular outcome (which may be beneficial, for example in the case of live birth, or detrimental, for example in the case of ectopic pregnancy) was displayed graphically in the meta-analyses to the right of the centre-line and a decrease in the odds of an outcome was displayed graphically to the left of the centre-line.

It was planned to perform sensitivity analyses to examine the stability of the results in relation to a number of factors including study quality and the source of the data (published or unpublished). This was carried out as planned (see Results, paragraph three).

A search will be conducted for trials every two years and the review updated if new trials are found.

RESULTS
Description of studies

See: Characteristics of included studies; Characteristics of excluded studies; Characteristics of ongoing studies.

Three RCTs with a total of 295 women (or couples) analysed, met the criteria for inclusion in the review (Dechaud 1998; Goldstein 1998; Strandell 1999). We excluded one trial from the review which appeared to meet the criteria - the Mardesic 1999 trial purported to be a prospective randomised study in the abstract title, however the ‘control’ group was historical (the same women prior to their salpingectomy). Furthermore no pregnancies occurred in the historical control group prior to salpingectomy.

There were five other trials found which compared a surgical intervention for tubal disease prior to IVF with a control group which was not randomised but did not have a historical control group selected on the basis of poor outcome (Aboulghar 1990; Savic 1999; Sowter 1997; Stadtmauer 2000, Van Voorhis 1998). These non-randomised studies have not been included in the meta-analysis, but their results and conclusions are described in the relevant sections of this review and summarised in Table 1.

Of the included trials, two assessed the effectiveness of laparoscopic salpingectomy versus no salpingectomy for women with hydrosalpinges prior to IVF (Dechaud 1998; Strandell 1999); one assessed the effectiveness of laparoscopic tubal surgery (selective salpingostomy-salpingectomy, SSS, which consisted of a salpingostomy followed by a proximal isthmic partial salpingectomy in those with proximal tubal blockage) versus medical treatment with progesterone suppositories for women with hydrosalpinges in whom a previous IVF cycle had been unsuccessful (Goldstein 1998).

The included studies and their methodological details are summarised comprehensively in the table ‘Characteristics of included studies’.

Risk of bias in included studies

The overall quality of the included trials was good. Strandell 1999, methodologically the most rigorous of the included trials, received an allocation score A as concealment was adequate owing to the use of sealed opaque envelopes. Strandell 1999 randomised in a 3:2 ratio of treatment:control in blocks of 10 to 30 depending on estimated recruitment ability of the various centres involved. Dechaud 1998 received an allocation score of A after clarification in correspondence that sealed opaque envelopes were used. Goldstein 1998 received an allocation score of B as randomisation was stated, but allocation concealment was uncertain and not clarified in correspondence. Goldstein 1998 had described three groups - their groups two and three were randomised from a historical control group, group one. The data from their historical control group was not considered, but the methodology was such that groups two and three could be considered as randomised from a population who had previously had failed IVF (group one). The timing of randomisation with respect to the pre-IVF intervention was not stated in any trial; the timing of the surgical intervention in relation to the IVF cycles was at least two months before in the Strandell 1999 trial (to allow any effect of hydrosalpinx fluid on the likelihood of implantation to have disappeared), but not stated in the other trials.

Power calculations were mentioned in two trials (Dechaud 1998; Strandell 1999), although neither trial adhered to the power calculation. The Dechaud 1998 trial was a pilot RCT analysing 60 couples and suggested in discussion that 322 couples would need to be randomised to power a future trial adequately. Strandell 1999 powered the trial based on 300 couples, but stopped recruiting after 204 couples had been recruited and randomised, owing to inability to reach the target number within a reasonable time as a result of an apparent decrease in the incidence of hydrosalpinx in Scandinavia during the study period.

The source of funding was stated for only one trial (Strandell 1999). One trial was multi-centre involving nine Nordic IVF centres (Strandell 1999); the other trials were single-centre (Dechaud 1998; Goldstein 1998). The timing and duration of the trial was stated for two trials (Dechaud 1998; Strandell 1999). None of the trials mentioned blinding, indeed by the nature of the pre-IVF surgical interventions, blinding of participants would be difficult. However, Dechaud 1998 could have blinded participants to whether bilateral salpingectomy had been performed at the laparoscopic procedure performed on all participants. All trials could have been single-blind for the investigators assessing outcomes - scope for bias from not blinding includes the possibility of more thorough follow-up by investigators to find outcomes in couples not attending follow-up clinics.

The important prognostic factor of the women’s ages was stated by all trials. The duration of infertility was stated in two trials (Dechaud 1998; Strandell 1999). Only Strandell 1999 specified the proportion of women with primary and secondary infertility. Detail on the investigatory work-up was described only by Dechaud 1998 (a standard fertility investigative work-up was normal in these couples); Goldstein 1998 mentioned only a normal semen analysis. Strandell 1999 included couples with coexistent male factor infertility undergoing ICSI if the unit had an ICSI program with success rates equivalent to conventional IVF for non-male factor causes of infertility. No trials stated previous fertility treatments undertaken other than IVF: Dechaud 1998 and Strandell 1999 included only couples who had not previously undergone IVF; Goldstein 1998 included only couples who had previously failed IVF.

Exclusion criteria prior to randomisation were stated in two trials. Dechaud 1998 excluded women over 40 years old, couples with other causes of infertility, women with tubal disease potentially treatable by other means, severe tubal disease necessitating bilateral salpingectomy for reasons other than fertility and those failing to consent for the trial; Strandell 1999 excluded couples previously treated by IVF and women with uterine fibroids. Withdrawals
after randomisation were mentioned only by Strandell 1999. An intention-to-treat analysis was performed by the authors in one trial (Strandell 1999), but the number of couples analysed was the same as those randomised in the other two trials (Dechaud 1998; Goldstein 1998), meaning that a separate intention-to-treat analysis was not necessary, assuming the cases were analysed as allocated.

The extent of the cause of infertility was defined in all trials. In the Dechaud 1998 trial, tubal infertility was defined by both radiologic and laparoscopic criteria as being severe and unsuitable for tubal repair. The inclusion criteria for this trial were either (1) a hysterosalpingogram showing extensive inflammatory disease in the proximal part of tube with diverticula extending to involve more than two centimetres of the tubal isthmus or hydrosalpinges with poor prognosis because of disturbed mucosal folds or irregular walls; or (2) a laparoscopy revealing the presence of proximal nodes or an inflammatory and thick-walled hydrosalpinx. The Goldstein 1998 trial mentioned only the presence of a hydrosalpinx but not how this diagnosis was made. The inclusion criteria for the Strandell 1999 trial were uni- or bi-lateral hydrosalpinges, defined as a distally occluded or pathologically dilated fallopian tube or one which became so on diagnostic tubal patency testing. A further subdivision into ultrasound sub-categories was undertaken - those whose hydrosalpinges were not visible on ultrasound, those who had one hydrosalpinx and those who had two hydrosalpinges visible on ultrasound, although it is unclear whether this was a pre-specified sub-group analysis.

The intervention of surgery for tubal disease differed in each trial. Dechaud 1998 assessed laparoscopic bilateral salpingectomy regardless of whether tubal disease was uni- or bi-lateral; Goldstein 1998 assessed salpingostomy in addition to a selective proximal partial salpingectomy if proximal tubal disease was present. Strandell 1999 assessed uni- or bi-lateral salpingectomy (depending on whether uni- or bi-lateral hydrosalpinges were present). In fact, of the 116 women randomised to laparoscopic surgery, there were 63 bilateral salpingectomies, 40 unilateral salpingectomies, six proximal ligation with distal fenestrations, one salpingostomy, one adhesiolysis, one no intervention as the fallopian tubes were found to be patent and five women did not undergo surgery - these were all included in the treatment group in an intention to treat analysis. The control groups differed in each trial. The Dechaud 1998 control group underwent laparoscopy and the co-intervention of laparoscopic adhesiolysis was performed in both the intervention and control groups; the Goldstein 1998 control group underwent medical treatment with progesterone suppositories; the Strandell 1999 control group had no intervention. Although the Goldstein 1998 trial control group received medical treatment, there is no evidence that such medical treatment is more effective than placebo or no intervention. It was deemed appropriate to pool the data from these three trials for meta-analysis since they all prospectively evaluated a group of women who underwent laparoscopic surgery on the fallopian tube (salpingectomy in most cases in all three trials) versus a control group who did not have this surgical intervention. The trial results did not show statistical heterogeneity between trials and a sensitivity analysis showed the overall conclusions to be stable whether or not the Goldstein 1998 trial was included (see results section).

The number of pregnancies was reported in all trials. Dechaud 1998 reported the pregnancy rate for the first cycle of IVF after recruitment and for all IVF cycles - the rates per woman could be extracted from these data. Cumulative pregnancy rates were also presented although these could not be used in this meta-analysis owing to assumptions made by the authors about the couples for whom no data were available. Live birth rate (Goldstein 1998), live birth plus ongoing pregnancy rate (Strandell 1999) or ongoing pregnancy rate (Dechaud 1998) were expressed in all trials and these outcomes were pooled for the meta-analysis. The preferable method of reporting success rates in any trial would be time-to-event analyses, followed by rates per woman within a given time period (used by Dechaud 1998). Goldstein 1998 and Strandell 1999 expressed data for only the one planned IVF treatment following the intervention. Ectopic pregnancy rates per woman (the number of women experiencing at least one ectopic pregnancy over the time period defined by the trial) could also be extracted from the data in all trials. Data on miscarriage rates could be extracted from all trials, complication rates from two trials (Goldstein 1998; Strandell 1999). The duration of follow-up was unclear in all trials, but follow-up was reported for up to four IVF cycles for some women by Dechaud 1998 and for only one IVF cycle by Goldstein 1998 and Strandell 1999.

There has been a subsequent publication of the cumulative results from the Nordic multicentre trial in 2001 (Strandell 1999). Results have been reported on an actual treatment received basis (rather than intention to treat in the original publication), justified on the grounds that 24 out of 77 women who were randomised to no surgical intervention, subsequently underwent salpingectomy after one or two failed cycles before proceeding with further IVF, the results of these cycles then being included in the analysis. These results have been excluded from the meta-analysis. The intention-to-treat data, requested from the trial authors, have also been excluded from the meta-analysis owing to a potential for bias from the number of women randomised to no intervention who have now, in fact, received the surgical intervention. The original 1999 data (Strandell 1999) have been maintained in the meta-analysis.

The search strategy yielded five non-randomised trials where the control group was not an ‘own control’ group selected on the basis of poor outcome from treatment (for example by including failed previous IVF cycles in the same individuals analysed in the intervention group). Three trials assessed the intervention of aspiration of hydrosalpinges at the time of oocyte retrieval (Savic 1999; Sowter 1997; Van Voorhis 1998), one trial that used alternating case allocation assessed this intervention performed prior to the stimulation cycle leading to IVF (Aboulghar 1990) and one trial...
assessed the interventions laparoscopic salpingectomy and laparoscopic proximal fallopian tube cauterisation (Stadtmauer 2000). However this was not a systematic review of the non-randomised literature, since the search strategy was geared towards randomised trials.

Effects of interventions

**Meta-analysis of randomised trials**

Surgical treatment for hydrosalpinges versus non-surgical management significantly increased the odds of live birth plus ongoing viable pregnancy (Peto OR 2.13, 95%CI 1.24 to 3.65), and of pregnancy (Peto OR 1.75, 95%CI 1.07 to 2.86). Although no significant differences were seen in the odds of ectopic pregnancy (Peto OR 0.42, 95%CI 0.08 to 2.14), miscarriage per pregnancy (Peto OR 0.49, 95%CI 0.16 to 1.52) or treatment complications (Peto OR 5.80, 95%CI 0.35 to 96.79), there was insufficient power to compare these adverse outcomes. There were no data available concerning the odds of multiple pregnancy. The chisquared results for heterogeneity across trials were not significant for any of the interventions for which data were available, although these tests for heterogeneity had very low power. If the Goldstein 1998 trial results (unpublished study) were excluded from the meta-analysis, the results would not qualitatively differ.

**Non-randomised trials**

The results non-randomised trials where the control group did not include women (or couples) acting as their own controls, are included in the other tables section (Table 1) for descriptive purposes only, but have not been included in the meta-analysis. The results of non-randomised trials must be interpreted cautiously. Two trials concluded a significant increase in the odds of pregnancy from aspiration of hydrosalpinges at the time of egg collection (Savic 1999; Vandromme 1995); one concluded no significant increase in the odds of pregnancy from this intervention (Sowter 1997); one found no significant increase in the odds of pregnancy from aspiration of hydrosalpinges prior to the IVF stimulation cycle (Aboulghar 1990); one found significantly fewer pregnancies in women who did not undergo hydrosalpinx surgery compared to those who underwent laparoscopic salpingectomy or proximal tubal cauterity (Stadtmauer 2000).

The results from the cumulative analysis of the Nordic trial published in 2001, a continuation of the included trial (Strandell 1999), lend further support, in the opinion of the trial authors, to the effectiveness of laparoscopic salpingectomy prior to IVF for increasing live birth rate (Cox regression model hazard ratio 2.1, 95%CI 1.6 to 3.6), although, as mentioned, these results must be interpreted cautiously. The intention to treat analysis showed a similar live birth rate in both groups at 55%, although 31% of the ‘no intervention’ group had in fact undergone laparoscopic salpingectomy.

**Discussion**

Claims have been made by several authors during the last ten years that the likelihood of successful IVF treatment in women with hydrosalpinges can be increased by prior salpingectomy. In many studies, this conclusion was based on non-randomised data and therefore prone to bias. This led to a shift in clinical practice in favour of surgical treatment of hydrosalpinges prior to IVF. Recent insightful publications have highlighted the fact that, whilst it was clear that women with hydrosalpinges had a reduced likelihood of success from IVF, a statistically significant benefit of the surgical treatment of hydrosalpinges had not been demonstrated in randomised trials (Dechaud 2000; Puttemans 2000). Our meta-analysis of randomised trials does show a statistically significant benefit of laparoscopic salpingectomy for hydrosalpinges prior to IVF. A number needed to treat calculation suggests that between seven and eight women (95% confidence interval two to 25; control live birth rate of 16%) would need to have a salpingectomy prior to IVF to gain one additional live birth.

Injudicious conclusions can lead to inappropriate intervention. Laparoscopic salpingectomy, particularly in the context of hydrosalpinx or tubal disease where the fallopian tube may have severe adhesions, is by no means without hazard and should be undertaken only by adequately trained laparoscopic surgeons. Operative laparoscopy carries a small risk of major visceral or vascular injury. A further concern is whether salpingectomy could adversely affect ovarian egg reserve - salpingectomy dissection must be performed very close to the fallopian tube to avoid disrupting the ovarian blood supply. Lass 1998 suggested proximal clamping and distal fenestration of the fallopian tube to avoid the problem of disruption of blood supply, an approach used in the Strandell 1999 trial if extensive adhesions were present. The two complications in the Strandell 1999 trial were, firstly, a conversion from laparoscopic surgery to laparotomy in a woman who subsequently suffered postoperative diarrhoea and, secondly, a woman who had a postoperative infection successfully treated. The intervention can therefore only be justified in the context of clear benefit in terms of the successful outcome of IVF, namely the delivery of a healthy baby. In each case, the benefits and hazards of surgery must be carefully weighed.

Many of the non-randomised studies used historical controls, where the women who underwent surgical treatment for their tubal disease acted as their own controls by considering their IVF cycles prior to the surgical intervention. This is clearly flawed. With a technique such as IVF where success rates have typically improved substantially within a period of a few years, those cycles performed more recently would be expected to have a higher chance of success. Worse still, in many of the studies, the selection for salpingectomy was based on previous IVF failure, yet the data from these failed cycles was still considered within the control group (Mardesic 1999; Poe-Ziegler 1995; Shelton 1996; Vandromme 1995). Randomisation is the only method to min-
imise these types of bias.

The three randomised trials in this review were pooled for the meta-analysis. None of the trials demonstrated statistical significance in their own right. However pooling their data for meta-analysis demonstrated an increased chance of pregnancy and live birth or ongoing pregnancy in women undergoing surgical treatment for hydrosalpinges prior to IVF versus those receiving no surgical treatment.

Was it appropriate to pool the data from these trials, given that the interventions assessed were subtly different in each case? All three trials involved women with at least one hydrosalpinx. Two trials involved the intervention salpingectomy - Dechaud 1998 employed routine bilateral salpingectomy, Strandell 1999 employed uni- or bi-lateral salpingectomy depending on whether the hydrosalpinx was uni- or bi-lateral; one trial involved salpingostomy and selective proximal salpingectomy in those women with proximal tubal blockage (Goldstein 1998). The control group interventions were also subtly different in each trial, but all involved a non-surgical approach to hydrosalpinges. In essence, all three trials compared a group who underwent laparoscopic surgery on a fallopian tube to prevent hydrosalpinx fluid spill into the uterine cavity versus a group who did not have this surgical intervention. There was no statistical heterogeneity for any outcomes across trials, supporting the decision to pool the data. The Goldstein 1998 trial differed from the other two trials as follows: (1) it was the only trial not fully published in a peer-reviewed medical journal; (2) it included only couples with previous failed IVF and had a very low pregnancy rate in the control group; (3) it compared surgical versus medical treatment. If this trial had not been included in the meta-analysis, pooling of the data from the two trials of surgical treatment versus no intervention produced conclusions which did not differ qualitatively for any outcomes, compared to the meta-analysis of all three trials.

The meta-analysis failed to show a significant effect on the odds of miscarriage. Andersen 1994 and Zeyneloglu 1998 suggested that pregnancy loss was more common in women with hydrosalpinges. Shahara 1996 did not show that pregnancy loss was more common in women with hydrosalpinges. There was also no significant effect on the odds of ectopic pregnancy, although there was a total of only five ectopic pregnancies occurring in the entire trial populations, a surprisingly low number in this high-risk group (Johnson 1998). Whilst it is rational to expect a reduction in the likelihood of ectopic pregnancy following salpingectomy for a hydrosalpinx, this meta-analysis was underpowered to demonstrate a significant difference in the odds of ectopic pregnancy.

**What intervention?**

Laparoscopic salpingectomy proved to be the only surgical intervention for which substantive data were available for this review (with a small contribution from laparoscopic selective salpingostomy-salpingectomy in the Goldstein 1998 trial. It is incumbent upon those who promote surgical interventions other than salpingectomy to demonstrate in a randomised trial that the results are as good as for salpingectomy.

(1) Transvaginal needle aspiration of a hydrosalpinx under ultrasound guidance (either before an IVF stimulation cycle or at the time of oocyte retrieval) is the least invasive intervention. Non-randomised trials (Table 1) have conflicted in their conclusions as to the effectiveness of this intervention. However rapid reaccumulation of fluid, demonstrated by Bloecher 1997 to recur within three days of hydrosalpinx aspiration at oocyte retrieval, could compromise the success of this intervention. The authors are aware of one ongoing RCT in Birmingham, UK, evaluating aspiration of hydrosalpinges at the time of oocyte retrieval (Hammadieh), although, to date, no results are available.

(2) Proximal tubal occlusion, by a Filschie clip or electrocautery, might be expected to prevent uterine spill of hydrosalpinx contents. No prospective randomised data is available to support this approach.

(3) Those promoting restorative surgery for the fallopian tube (which should prevent hydrosalpinx fluid accumulation) on the grounds that there may be a few spontaneous pregnancies within this group, also need to produce data that the intervention has equivalent effectiveness to laparoscopic salpingectomy preceding IVF. Andersen 1996 argues that approximately one third of women with hydrosalpinges have a good prognosis for spontaneous pregnancy after reconstructive surgery. However the expertise required to select this population (including assessment by salpingoscopy) is not available to most women. Puttemans 1996 has suggested that salpingostomy should be the first choice surgical intervention if the hydrosalpinx is thin-walled and free from ampullary adhesions. There is a risk of ectopic pregnancy with such an approach and this outcome should be considered in any trial comparing salpingectomy prior to IVF versus restorative surgery.

Laparoscopic salpingectomy followed by IVF is not the only treatment option for women with hydrosalpinges, since there is an argument in favour of IVF and restorative tubal surgery being used as complementary treatment strategies for tubal disease (Gillett 1998). This review did not examine the issue of tubal surgery versus IVF for tubal infertility.

Should routine bilateral salpingectomy be performed for hydrosalpinx whether or not bilateral hydrosalpinges are present (the approach of Dechaud 1998)? There is no evidence from this review that the routine bilateral salpingectomy approach is superior - to the contrary, the results of Strandell 1999. In adopting an approach of removing only fallopian tubes affected by a hydrosalpinx, are at least as good as those of Dechaud 1998. It is rational to adopt the less invasive approach of Strandell 1999. There are cases where unilateral salpingectomy for a hydrosalpinx in the context of lengthy 'tubal infertility' has resulted in spontaneous pregnancy soon after the surgery (Choe 1999).
Should surgical treatment be performed before the first cycle or only after previous unsuccessful IVF treatment owing to embryo non-implantation? The pooled data from Dechaud 1998 and Strandell 1999, both of whom included only women who had not previously undergone IVF, confirm that salpingectomy prior to IVF is an effective intervention for women undergoing their first IVF cycle.

Should diseased fallopian tubes in the absence of hydrosalpinx be treated surgically prior to IVF? The theoretical rationale is that salpingectomy for blocked fallopian tubes or those with such severe disease that they are deemed non-functional, may reduce the likelihood of ectopic pregnancy. Additionally a hydrosalpinx may be an intermittent phenomenon and salpingectomy for a diseased tube removes the possibility that it will develop into a hydrosalpinx. There are currently no data to support this approach. The little evidence available suggests that women with non-hydrosalpinx tubal disease do not have a poorer outcome from IVF than women with no tubal disease (Johnson 2002) Sub-group analysis for the 39 women with bilateral hydrosalpinges visible on ultrasound (Strandell 1999) suggested that this subgroup had the greatest effect from salpingectomy prior to IVF; which was associated with a 2.4-fold increase in the delivery rate, a result which reached statistical significance in its own right within the trial (p=0.019). This finding must be interpreted with caution since it is unclear whether this was a pre-specified subgroup analysis, although it suggests that it may be women with the most severe tubal disease who benefit most from laparoscopic salpingectomy.

AUTHORS’ CONCLUSIONS

Implications for practice

The option of laparoscopic salpingectomy should be considered for all women with hydrosalpinges who are due to undergo IVF. Laparoscopic salpingectomy prior to IVF treatment increases the odds of pregnancy and live birth versus no treatment in the short term.

Implications for research

Other surgical interventions for hydrosalpinges prior to IVF have not been evaluated in RCTs. Less invasive ‘pre-IVF’ interventions such as needle aspiration of hydrosalpinges (performed logically at the time of oocyte retrieval) or proximal tubal occlusion to prevent uterine spill of hydrosalpinx fluid would need to be compared with laparoscopic salpingectomy in a high quality RCT. Such a trial should be of adequate power, with pregnancy outcomes ideally expressed as a continuous time survival analysis. As an example, a sample size of about 600 would give 80% power at the 95% confidence interval to detect differences in pregnancy outcomes of 30% versus 20% in the two groups.

If restorative tubal surgery and specialised diagnostic facilities such as salpingoscopy are available, their appropriate use would be best determined by further RCTs in well-defined populations. Examples of such trials which would support the suggestions of authors mentioned in the discussion section would be:

1. restorative tubal surgery versus laparoscopic salpingectomy and IVF in salpingoscopically-selected women with hydrosalpinges;
2. laparoscopic salpingoscopy versus laparoscopic salpingectomy prior to IVF for women with thin-walled hydrosalpinges which are free from ampullary adhesions.

Other issues worthy of further evaluation in randomised trials would be:

1. routine bilateral salpingectomy versus uni- or bi-lateral salpingectomy (depending on whether a uni- or bi-lateral hydrosalpinx was present) prior to IVF;
2. further clarification of the benefit to women whose hydrosalpinges are not visible on ultrasound;
3. tubal surgery in the context of tubal disease without hydrosalpinx formation;
4. the effect of surgery on ovarian function.

ACKNOWLEDGEMENTS

The authors acknowledge the helpful comments of those who have refereed this review and the authors of included trials who supplied additional information or data, particularly Annika Strandell and Herve Dechaud. We wish to thank Sarah Hetrick and Michelle Proctor, Review Group Coordinators, Sue Furness and Ruth Withers, Trials Search Coordinators, and Sue Hall for secretarial support.
References to studies included in this review

Dechaud 1998 [published data only]

Goldstein 1998 [published data only]

Strandell 1999 [published data only]

References to studies excluded from this review

Mardesic 1999 [published data only]

References to ongoing studies

Hammadieh [published data only (unpublished sought but not used)]
Randomised trial of aspiration of hydrosalpinges at the time of egg collection. Ongoing study Starting date of trial not provided. Contact author for more information.

Additional references


Akman 1996

Andersen 1994

Andersen 1996

Bloecher 1997

Choe 1999

Csemiczky 1996

Dar 2000

Dechaud 2000

Englert 1987

Fleming 1996

Freeman 1996
Freeman MR, Whitchurch CM, Hill GA. Hydrosalpinx reduces in vitro fertilisation / embryo transfer rates and in
Surgical treatment for tubal disease in women due to undergo in vitro fertilisation (Review)

Copyright © 2009 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.
## Characteristics of Studies

**Characteristics of included studies [ordered by study ID]**

**Dechaud 1998**

| Methods | Randomisation method - sealed opaque envelopes.  
|         | No blinding used.  
|         | Follow-up duration 1-5 years.  
|         | 60 women recruited, 60 randomised.  
|         | Number excluded not known.  
|         | No information on withdrawals or losses to follow-up.  
|         | 60 women analysed.  
|         | Single-centre - Department of Obstetrics and Gynaecology at a university hospital (Montpellier, France).  
|         | Source of funding not stated.  
|         | Power calculation performed but not adhered to. 'Intention to treat’ analysis uncertain  
|         | Criteria for surgical treatment prior to IVF - a communicating non-draining hydrosalpinx with salpingitis isthmica nodosa.  
|         | No previous IVF attempts.

| Participants | Age - <40 years (range 27-36).  
|              | Type (primary or secondary) of infertility not stated.  
|              | Duration of infertility, mean months (SD) - treatment group 55.2 (33.3); control group 48.0 (25.4).  
|              | Investigative work-up - baseline FSH, semen analysis, laparoscopy and confirmatory test of ovulation.  
|              | No other contributory causes to infertility than tubal disease.  
|              | No previous IVF.  
|              | Exclusion criteria - age >40 years; additional causes of infertility; tubal pathology suitable for repair by tubal catheterization, laparoscopic surgery, or microsurgical techniques; tubal pathology so severe as to require bilateral salpingectomy; lack of patient consent for salpingectomy or randomization  
|              | Characteristics of IVF treatment -  
|              | Number of IVF ovarian stimulation cycles per woman not stated.  
|              | Mean oocytes retrieved per cycle (SD) treatment group 10.1 (5.0); control group 10.5 (6.0).  
|              | No ICSI. Fertilization rate not stated.  
|              | Mean number of embryos transferred (SD) treatment group 3.3 (1.2); control group 3.4 (1.2); up to 5 embryos were replaced in some cases

| Interventions | Mean interval from surgical intervention to IVF in months (SD) - treatment group 10.1 (7.5); control group 9.5 (7.2)  
|               | Laparoscopic bilateral salpingectomy and adhesiolysis VERSUS laparoscopic adhesiolysis

| Outcomes | PRIMARY OUTCOMES  
|          | Ongoing pregnancy rate per transfer  
|          | Pregnancy rate - per transfer, per oocyte retrieval, per IVF cycle.  
|          | Cumulative pregnancy rate were presented also and obtained with the use of cumulative proportion test (the cumulative probability of becoming pregnant after each IVF attempt according to the number of patients, the number of pregnancies for each IVF attempt and the number of patients who discontinued

---

*Surgical treatment for tubal disease in women due to undergo in vitro fertilisation (Review)*  
Copyright © 2009 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.
Dechaud 1998  (Continued)

<table>
<thead>
<tr>
<th></th>
<th>IVF after each IVF attempt). The investigators hypothesized that the likelihood of becoming pregnant would have been equal for the patients who became pregnant after IVF and for those who discontinued IVF treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SECONDARY OUTCOMES</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implantation rate (diagnosis of implantation not specified). Proportion of IVF cycles resulting in embryo transfer. Ectopic pregnancy, miscarriage, multiple pregnancy and complication rates not stated</td>
</tr>
</tbody>
</table>

Notes  Subsequent publication of the cumulative results from this trial (Strandell 2001) excluded from meta-analysis (not ITT and too many protocol breached when ITT data provided)

<table>
<thead>
<tr>
<th><strong>Risk of bias</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
<td><strong>Authors’ judgement</strong></td>
</tr>
<tr>
<td>Allocation concealment?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Goldstein 1998

<table>
<thead>
<tr>
<th><strong>Methods</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Randomisation method not stated. Originally 3 groups described, group 1 a historical control for the 2 treatment groups - the methodology, although not described as such, presents a randomized trial of group 2 versus group 3</td>
</tr>
<tr>
<td></td>
<td>No blinding used. Follow-up duration up to 1 IVF cycle</td>
</tr>
<tr>
<td></td>
<td>35 women recruited, 31 randomised. No information on exclusions. No information on withdrawals or losses to follow-up.</td>
</tr>
<tr>
<td></td>
<td>31 women analysed. Presumed single-centre - West Park Fertility Center, New York, USA. Timing, duration and source of funding not stated. Power calculation not stated.</td>
</tr>
<tr>
<td></td>
<td>‘Intention to treat’ analysis uncertain. Criteria for surgical treatment prior to IVF - previous failed IVF in the context of a hydrosalpinx</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Participants</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age range 22-38 years. Type (primary or secondary) of infertility not stated. Duration of infertility not stated. Investigative work-up not stated other than normal sperm count Exclusion criteria not stated. Characteristics of IVF treatment - Long course GnRH analog; number of IVF ovarian stimulation cycles per woman, number of oocytes retrieved per cycle, fertilization rate and number of embryos transferred per transfer not stated. No ICSI.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Interventions</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interval from surgical intervention to IVF not stated; medical treatment commenced on Day 20 of cycle and continued for 3-4 weeks during IVF stimulation cycle Laparoscopic selective salpingostomy-salpingectomy (SSS) VERSUS 400mg progesterone suppository daily</td>
</tr>
</tbody>
</table>
### Outcomes

**PRIMARY OUTCOMES**
- Live birth rate
- Pregnancy rate

**SECONDARY OUTCOMES**
- Ectopic pregnancy rate
- Miscarriage rate
- Complication rate
- Multiple pregnancy rate not stated.

### Notes

**Risk of bias**

<table>
<thead>
<tr>
<th>Item</th>
<th>Authors’ judgement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocation concealment?</td>
<td>Unclear</td>
<td>B - Unclear</td>
</tr>
</tbody>
</table>

### Strandell 1999

**Methods**
- True randomisation - sealed opaque envelopes in blocks of 10-30
- No blinding.
- Follow-up duration up to 1 IVF cycle (further follow-up data anticipated)
- 204 women recruited, 204 randomised. Number of exclusions not known. No women withdrew. 204 women were analysed
- Multicentre trial involving 9 Nordic IVF centres.
- Power calculation performed - sample size 300 not adhered to due to decrease in recruitment rate.
- ‘Intention to treat’ analysis performed.
- Criteria for surgical treatment prior to IVF - Uni- or bilateral hydrosalpinges (a distally occluded pathologically dilated tube or one which became pathologically dilated on patency testing by HSG/laparoscopy.
- No previous IVF attempts

**Participants**
- Age <39 years (range 22-38)
- Majority primary infertility (treatment group 73%, control group 63%)
- Duration of infertility not stated.
- Investigative work-up not stated.
- Concomitant male factor requiring ICSI accepted if centre had established successful ICSI programme with results equivalent to conventional IVF.
- Exclusion criteria - previous IVF; uterine fibroids.
- Characteristics of IVF treatment -
  - 1-2 IVF ovarian stimulation cycles per woman.
  - Mean oocytes retrieved at IVF (SD) - treatment group 10.6 (5.9); control group 10.6 (6.1).
  - Proportion undergoing ICSI, treatment group 13.1%; control group 12.6%.
  - Mean no. of fertilized and cleaved oocytes in treatment group 6.8 (4.8); control group 7.0 (4.9).
  - Mean embryos transferred per cycles (SD) - treatment group 2.0 (0.3); control group 2.0 (0.4)
### Interventions

Interval from surgical intervention to IVF - minimum 2 months  
Laparoscopic bilateral or unilateral salpingectomy (or, if technical difficulties eg extensive adhesions, proximal ligation and distal fenestration recommended) VERSUS no surgery

### Outcomes

**PRIMARY OUTCOMES**  
Ongoing pregnancy or delivery rate in first cycle per woman, per started cycle, and per transfer cycle  
Pregnancy rate - per woman, per started cycle and per transfer cycle  
Clinical pregnancy verified by gestational sac on ultrasound  

**SECONDARY OUTCOMES**  
Ectopic pregnancy rate  
Miscarriage rate  
Implantation rate - number of gestational sacs on ultrasound divided by the number of embryos transferred  
Multiple pregnancy rate not stated

### Notes

**Risk of bias**

<table>
<thead>
<tr>
<th>Item</th>
<th>Authors’ judgement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocation concealment?</td>
<td>Yes</td>
<td>A - Adequate</td>
</tr>
</tbody>
</table>

### Characteristics of excluded studies  
[ordered by study ID]

<table>
<thead>
<tr>
<th>Study</th>
<th>Reason for exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mardesic 1999</td>
<td>Not a randomised trial - the 'control' group was historical (the same women prior to their salpingectomy) and biased by the fact that no pregnancies occurred</td>
</tr>
</tbody>
</table>

### Characteristics of ongoing studies  
[ordered by study ID]

**Hammadieh**

<table>
<thead>
<tr>
<th>Trial name or title</th>
<th>Randomised trial of aspiration of hydrosalpinges at the time of egg collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods</td>
<td>Women with hydrosalpinges undergoing IVF</td>
</tr>
<tr>
<td>Interventions</td>
<td>Needle aspiration of hydrosalpinges at the time of egg collection versus no intervention</td>
</tr>
<tr>
<td>Outcomes</td>
<td>To be clarified</td>
</tr>
</tbody>
</table>
### Hammadih (Continued)

<table>
<thead>
<tr>
<th>Starting date</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact information</td>
<td></td>
</tr>
</tbody>
</table>

| Notes | 50 recruits had been attained by September 2001 |
## DATA AND ANALYSES

### Comparison 1. Laparoscopic surgery on the fallopian tube (all types) VERSUS No surgery on the fallopian tube (all types)

<table>
<thead>
<tr>
<th>Outcome or subgroup title</th>
<th>No. of studies</th>
<th>No. of participants</th>
<th>Statistical method</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Live birth rate</td>
<td>3</td>
<td>295</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>2.13 [1.24, 3.65]</td>
</tr>
<tr>
<td>1.1 Laparoscopic bilateral salpingectomy and adhesiolysis versus laparoscopic adhesiolysis</td>
<td>1</td>
<td>60</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>2.89 [0.98, 8.49]</td>
</tr>
<tr>
<td>1.2 Laparoscopic salpingectomy versus no intervention</td>
<td>1</td>
<td>204</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>1.74 [0.90, 3.36]</td>
</tr>
<tr>
<td>1.3 Laparoscopic selective salpingostomy-salpingectomy versus progesterone medical treatment</td>
<td>1</td>
<td>31</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>4.31 [0.65, 28.35]</td>
</tr>
<tr>
<td>2 Total pregnancy rate</td>
<td>3</td>
<td>295</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>1.75 [1.07, 2.86]</td>
</tr>
<tr>
<td>2.1 Laparoscopic bilateral salpingectomy and adhesiolysis versus laparoscopic adhesiolysis</td>
<td>1</td>
<td>60</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>2.33 [0.82, 6.61]</td>
</tr>
<tr>
<td>2.2 Laparoscopic salpingectomy versus no intervention</td>
<td>1</td>
<td>204</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>1.56 [0.86, 2.85]</td>
</tr>
<tr>
<td>2.3 Laparoscopic selective salpingostomy-salpingectomy versus progesterone medical treatment</td>
<td>1</td>
<td>31</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>1.94 [0.44, 8.56]</td>
</tr>
<tr>
<td>3 Ectopic pregnancy rate</td>
<td>3</td>
<td>295</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>0.42 [0.08, 2.14]</td>
</tr>
<tr>
<td>3.1 Laparoscopic bilateral salpingectomy and adhesiolysis versus laparoscopic adhesiolysis</td>
<td>1</td>
<td>60</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>0.14 [0.00, 6.82]</td>
</tr>
<tr>
<td>3.2 Laparoscopic salpingectomy versus no intervention</td>
<td>1</td>
<td>204</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>0.75 [0.10, 5.53]</td>
</tr>
<tr>
<td>3.3 Laparoscopic selective salpingostomy-salpingectomy versus progesterone medical treatment</td>
<td>1</td>
<td>31</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>0.14 [0.00, 7.28]</td>
</tr>
<tr>
<td>4 Miscarriage rate</td>
<td>3</td>
<td>86</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>0.49 [0.16, 1.52]</td>
</tr>
<tr>
<td>4.1 Laparoscopic bilateral salpingectomy and adhesiolysis versus laparoscopic adhesiolysis</td>
<td>1</td>
<td>22</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>0.54 [0.03, 10.31]</td>
</tr>
<tr>
<td>4.2 Laparoscopic salpingectomy versus no intervention</td>
<td>1</td>
<td>55</td>
<td>Peto Odds Ratio (Peto, Fixed, 95% CI)</td>
<td>0.55 [0.14, 2.19]</td>
</tr>
</tbody>
</table>
### 4.3 Laparoscopic selective salpingostomy-salpingectomy versus progesterone medical treatment

<table>
<thead>
<tr>
<th></th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peto</td>
<td>(Peto, Fixed)</td>
</tr>
<tr>
<td><strong>Multiple pregnancy rate</strong></td>
<td>0.30</td>
<td>[0.02, 4.18]</td>
</tr>
<tr>
<td><strong>5.1 Laparoscopic bilateral salpingectomy and adhesiolysis versus laparoscopic adhesiolysis</strong></td>
<td>Not estimable</td>
<td></td>
</tr>
<tr>
<td><strong>5.2 Laparoscopic salpingectomy versus no intervention</strong></td>
<td>Not estimable</td>
<td></td>
</tr>
<tr>
<td><strong>5.3 Laparoscopic selective salpingostomy-salpingectomy versus progesterone medical treatment</strong></td>
<td>Not estimable</td>
<td></td>
</tr>
</tbody>
</table>

### 5 Complication rate

<table>
<thead>
<tr>
<th></th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peto</td>
<td>(Peto, Fixed)</td>
</tr>
<tr>
<td><strong>6.1 Laparoscopic bilateral salpingectomy and adhesiolysis versus laparoscopic adhesiolysis</strong></td>
<td>5.86</td>
<td>[0.35, 96.79]</td>
</tr>
<tr>
<td><strong>6.2 Laparoscopic salpingectomy versus no intervention</strong></td>
<td>Not estimable</td>
<td></td>
</tr>
<tr>
<td><strong>6.3 Laparoscopic selective salpingostomy-salpingectomy versus progesterone medical treatment</strong></td>
<td>Not estimable</td>
<td></td>
</tr>
</tbody>
</table>
**Analysis 1.1. Comparison 1 Laparoscopic surgery on the fallopian tube (all types) VERSUS No surgery on the fallopian tube (all types), Outcome 1 Live birth rate.**

Review: Surgical treatment for tubal disease in women due to undergo in vitro fertilisation

Comparison: 1 Laparoscopic surgery on the fallopian tube (all types) VERSUS No surgery on the fallopian tube (all types)

Outcome: 1 Live birth rate

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment (n/N)</th>
<th>Control (n/N)</th>
<th>Peto Odds Ratio</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Laparoscopic bilateral salpingectomy and adhesiolysis versus laparoscopic adhesiolysis</td>
<td>13/30</td>
<td>6/30</td>
<td></td>
<td>25.1 %</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>30</td>
<td>30</td>
<td></td>
<td>25.1 %</td>
</tr>
<tr>
<td>Total events: 13 (Treatment), 6 (Control)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.93 (P = 0.054)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Laparoscopic salpingectomy versus no intervention</td>
<td>31/116</td>
<td>15/88</td>
<td></td>
<td>66.7 %</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>116</td>
<td>88</td>
<td></td>
<td>66.7 %</td>
</tr>
<tr>
<td>Total events: 31 (Treatment), 15 (Control)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.63 (P = 0.10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Laparoscopic selective salpingostomy-salpingectomy versus progesterone medical treatment</td>
<td>4/15</td>
<td>1/16</td>
<td></td>
<td>8.2 %</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>15</td>
<td>16</td>
<td></td>
<td>8.2 %</td>
</tr>
<tr>
<td>Total events: 4 (Treatment), 1 (Control)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.52 (P = 0.13)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td>161</td>
<td>134</td>
<td></td>
<td>100.0 %</td>
</tr>
<tr>
<td>Total events: 48 (Treatment), 22 (Control)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Chi² = 1.21, df = 2 (P = 0.55); I² =0.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 2.74 (P = 0.0062)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for subgroup differences: Chi² = 1.21, df = 2 (P = 0.55); I² =0.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Surgical treatment for tubal disease in women due to undergo in vitro fertilisation (Review)

Copyright © 2009 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.
Analysis 1.2. Comparison 1 Laparoscopic surgery on the fallopian tube (all types) VERSUS No surgery on the fallopian tube (all types), Outcome 2 Total pregnancy rate.

Review: Surgical treatment for tubal disease in women due to undergo in vitro fertilisation

Comparison: 1 Laparoscopic surgery on the fallopian tube (all types) VERSUS No surgery on the fallopian tube (all types)

Outcome: 2 Total pregnancy rate

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Peto Odds Ratio</th>
<th>Weight</th>
<th>Peto Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Laparoscopic bilateral salpingectomy and adhesiolysis versus laparoscopic adhesiolysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dechaud 1998</td>
<td>14/30</td>
<td>8/30</td>
<td>22.2 %</td>
<td>2.33 [0.82, 6.61]</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td><strong>30</strong></td>
<td><strong>30</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total events: 14 (Treatment), 8 (Control)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.59 (P = 0.11)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Laparoscopic salpingectomy versus no intervention</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strandell 1999</td>
<td>40/116</td>
<td>22/88</td>
<td>66.8 %</td>
<td>1.56 [0.86, 2.85]</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td><strong>116</strong></td>
<td><strong>88</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total events: 40 (Treatment), 22 (Control)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.45 (P = 0.15)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Laparoscopic selective salpingostomy-salpingectomy versus progesterone medical treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goldstein 1998</td>
<td>6/15</td>
<td>4/16</td>
<td>11.0 %</td>
<td>1.94 [0.44, 8.56]</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td><strong>15</strong></td>
<td><strong>16</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total events: 6 (Treatment), 4 (Control)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 0.88 (P = 0.38)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>161</strong></td>
<td><strong>134</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total events: 60 (Treatment), 34 (Control)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Chi² = 0.45, df = 2 (P = 0.80); I² = 0.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 2.23 (P = 0.026)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for subgroup differences: Chi² = 0.45, df = 2 (P = 0.80), I² = 0.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Surgical treatment for tubal disease in women due to undergo in vitro fertilisation (Review)
Copyright © 2009 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.
### Analysis 1.3. Comparison of Laparoscopic surgery on the fallopian tube (all types) VERSUS No surgery on the fallopian tube (all types), Outcome 3 Ectopic pregnancy rate.

**Review:** Surgical treatment for tubal disease in women due to undergo in vitro fertilisation

**Comparison:** 1 Laparoscopic surgery on the fallopian tube (all types) VERSUS No surgery on the fallopian tube (all types)

**Outcome:** 3 Ectopic pregnancy rate

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Peto Odds Ratio</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/N</td>
<td>n/N</td>
<td>Peto,Fixed,95% CI</td>
<td>Peto,Fixed,95% CI</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Laparoscopic bilateral salpingectomy and adhesiolysis versus laparoscopic adhesiolysis</td>
<td>0/30</td>
<td>1/30</td>
<td>17.0 %</td>
</tr>
<tr>
<td>Total events:</td>
<td>0 (Treatment), 1 (Control)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity:</td>
<td>not applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect:</td>
<td>Z = 1.00 (P = 0.32)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Laparoscopic salpingectomy versus no intervention</td>
<td>2/116</td>
<td>2/88</td>
<td>65.9 %</td>
</tr>
<tr>
<td>Total events:</td>
<td>2 (Treatment), 2 (Control)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity:</td>
<td>not applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect:</td>
<td>Z = 0.28 (P = 0.78)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Laparoscopic selective salpingostomy-salpingectomy versus progesterone medical treatment</td>
<td>0/15</td>
<td>1/16</td>
<td>17.0 %</td>
</tr>
<tr>
<td>Total events:</td>
<td>0 (Treatment), 1 (Control)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity:</td>
<td>not applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect:</td>
<td>Z = 0.97 (P = 0.33)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>161</td>
<td>134</td>
<td>100.0 %</td>
<td>0.42 [ 0.08, 2.14 ]</td>
</tr>
</tbody>
</table>

- Heterogeneity: $\chi^2 = 0.94, df = 2 (P = 0.63), I^2 = 0.0%$
- Test for overall effect: Z = 1.04 (P = 0.30)
- Test for subgroup differences: $\chi^2 = 0.94, df = 2 (P = 0.63), I^2 = 0.0%$
### Analysis 1.4. Comparison 1 Laparoscopic surgery on the fallopian tube (all types) VERSUS No surgery on the fallopian tube (all types), Outcome 4 Miscarriage rate.

Review: Surgical treatment for tubal disease in women due to undergo in vitro fertilisation

Comparison: 1 Laparoscopic surgery on the fallopian tube (all types) VERSUS No surgery on the fallopian tube (all types)

Outcome: 4 Miscarriage rate

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Peto Odds Ratio</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td>Peto Fixed, 95% CI</td>
<td></td>
</tr>
<tr>
<td>1 Laparoscopic bilateral salpingectomy and adhesiolysis versus laparoscopic adhesiolysis</td>
<td>1/14</td>
<td>1/8</td>
<td>14.6%</td>
<td>0.54 [0.03, 10.31]</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>14</td>
<td>8</td>
<td>14.6%</td>
<td>0.54 [0.03, 10.31]</td>
</tr>
<tr>
<td>Total events:</td>
<td>1 (Treatment), 1 (Control)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 0.41 (P = 0.68)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Laparoscopic salpingectomy versus no intervention</td>
<td>6/36</td>
<td>5/19</td>
<td>67.0%</td>
<td>0.55 [0.14, 2.19]</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>36</td>
<td>19</td>
<td>67.0%</td>
<td>0.55 [0.14, 2.19]</td>
</tr>
<tr>
<td>Total events:</td>
<td>6 (Treatment), 5 (Control)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 0.84 (P = 0.40)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Laparoscopic selective salpingostomy-salpingectomy versus progesterone medical treatment</td>
<td>2/6</td>
<td>2/3</td>
<td>18.4%</td>
<td>0.30 [0.02, 4.18]</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>6</td>
<td>3</td>
<td>18.4%</td>
<td>0.30 [0.02, 4.18]</td>
</tr>
<tr>
<td>Total events:</td>
<td>2 (Treatment), 2 (Control)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 0.89 (P = 0.37)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>56</td>
<td>30</td>
<td>100.0%</td>
<td>0.49 [0.16, 1.52]</td>
</tr>
<tr>
<td>Total events:</td>
<td>9 (Treatment), 8 (Control)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Chi² = 0.17, df = 2 (P = 0.92); I² = 0.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.23 (P = 0.22)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for subgroup differences: Chi² = 0.17, df = 2 (P = 0.92), I² = 0.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Analysis 1.6. Comparison 1 Laparoscopic surgery on the fallopian tube (all types) VERSUS No surgery on the fallopian tube (all types), Outcome 6 Complication rate.

Review: Surgical treatment for tubal disease in women due to undergo in vitro fertilisation

Comparison: 1 Laparoscopic surgery on the fallopian tube (all types) VERSUS No surgery on the fallopian tube (all types)

Outcome: 6 Complication rate

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Peto Odds Ratio</th>
<th>Weight</th>
<th>Peto Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td>n/N</td>
<td></td>
<td>n/N</td>
</tr>
<tr>
<td>1 Laparoscopic bilateral salpingectomy and adhesiolysis versus laparoscopic adhesiolysis</td>
<td>0/0</td>
<td>0/0</td>
<td>Not estimable</td>
<td>100.0 %</td>
<td>5.86 [0.35, 96.79]</td>
</tr>
<tr>
<td>2 Laparoscopic salpingectomy versus no intervention</td>
<td>21/116</td>
<td>0/88</td>
<td>100.0 %</td>
<td>5.86 [0.35, 96.79]</td>
<td></td>
</tr>
<tr>
<td>3 Laparoscopic selective salpingostomy-salpingectomy versus progesterone medical treatment</td>
<td>0/15</td>
<td>0/16</td>
<td>Not estimable</td>
<td>100.0 %</td>
<td>5.86 [0.35, 96.79]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>131</td>
<td>104</td>
<td>100.0 %</td>
<td>5.86 [0.35, 96.79]</td>
<td></td>
</tr>
</tbody>
</table>

**Additional Tables**

#### Table 1. Non-randomised Comparative Studies

<table>
<thead>
<tr>
<th>Reference</th>
<th>Study design</th>
<th>Participants</th>
<th>Interventions</th>
<th>Results/Conclusions</th>
</tr>
</thead>
</table>
| Aboulghar 1990 | Comparative clinical study, Described by the authors as Women with hydrosalpinges | Aspiration of hydrosalpinx fluid prior to IVF stimulation cycle (n = | No significant difference in pregnancy rates, al-
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Participants</th>
<th>Intervention</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sowter 1997</td>
<td>Retrospective comparative study</td>
<td>Women with hydrosalpinges visible on ultrasound</td>
<td>Drainage of hydrosalpinx at oocyte retrieval (n = 56) versus non-drainage (n = 30)</td>
<td>Live births in 9/56 drainage group; 4/30 non-drainage group</td>
</tr>
<tr>
<td>Van Voorhis 1998</td>
<td>Retrospective comparative study</td>
<td>Women with hydrosalpinges</td>
<td>Aspiration of hydrosalpinx at oocyte retrieval (n = 16 by 1 clinician) versus non-aspiration (n = 18 by 2 other clinicians)</td>
<td>Aspiration group ongoing pregnancies 5/16, implantation rate 8/58; non-aspiration group ongoing pregnancies 0/18, implantation rate 1/71</td>
</tr>
<tr>
<td>Savic 1999</td>
<td>Comparative clinical study</td>
<td>Women with hydrosalpinges</td>
<td>Aspiration of hydrosalpinx fluid at oocyte retrieval (n = 34) versus non-aspiration (n = 55)</td>
<td>No figures given but a significant increase in pregnancy rate, the number of retrieved eggs and the number of embryos attained in the aspiration group, with no significant difference in embryo quality or the miscarriage rate was stated</td>
</tr>
<tr>
<td>Stadtmauer 2000</td>
<td>Comparative clinical study</td>
<td>Women with hydrosalpinges</td>
<td>Laparoscopic salpingectomy (n = 15) versus laparoscopic proximal fallopian tube cauterisation (in cases where severe adhesive disease would have made laparoscopic salpingectomy difficult) (n = 30) versus no surgery</td>
<td>Pregnancies in 9/15 salpingectomy group; 24/30 tubal cauterisation group; 5/15 no surgery group</td>
</tr>
</tbody>
</table>
WHAT'S NEW

Last assessed as up-to-date: 16 March 2004.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 November 2008</td>
<td>Amended</td>
<td>Converted to new review format.</td>
</tr>
</tbody>
</table>

HISTORY

Protocol first published: Issue 2, 2000


<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 March 2004</td>
<td>New citation required and conclusions have changed</td>
<td>Substantive amendment</td>
</tr>
</tbody>
</table>

CONTRIBUTIONS OF AUTHORS

Neil Johnson conceptualised the review, wrote the protocol, carried out the search, selection of trials, quality assessment for trials, data extraction, analysis and wrote the discussion and conclusions.

Winifred Mak proofread the protocol, was involved in independent searching for and selection of trials, quality assessment of trials, data extraction and proofread the discussion and conclusions.

Martin Sowter proofread the protocol, was available to resolve discrepancies for differences of opinion between the other authors and added content expertise to the discussion and conclusions.

DECLARATIONS OF INTEREST

One of the authors (MS) is also the author of a non-randomised study described in Table 1 (Sowter 1997). NJ works as a gynaecologist at Auckland City Hospital (a public hospital) in the National Women's Minimal Access Surgery and Endometriosis Service. NJ is also a private gynaecologist with groups called Endometriosis Auckland and IVF Auckland. Within the last 3 years NJ has received financial support to attend conferences or to arrange research meetings from the following companies: Organon, Serono, Schering and Device Technologies. NJ is an author of the Auckland LUNA Trial and of the Cochrane/systematic review on neuroablation and LUNA.
SOURCES OF SUPPORT

Internal sources
  • University of Auckland, School of Medicine, Auckland, New Zealand.

External sources
  • No sources of support supplied

NOTES
New conflict of interest added

INDEX TERMS

Medical Subject Headings (MeSH)
  *Fertilization in Vitro; Fallopian Tube Diseases [*surgery]; Fallopian Tubes [*surgery]; Pregnancy Outcome; Randomized Controlled Trials as Topic

MeSH check words
  Female; Humans; Pregnancy