Introduction: The negative influence of hydrosalpinx in relation to in vitro fertilization (IVF) and embryo transfer has been documented in several studies. Salpingectomy is the only suggested method that has been evaluated in randomized controlled trials. A Cochrane systematic review (1) of three included studies demonstrated that the odds of ongoing pregnancy and live birth (odds ratio (OR) 2.13, 95% confidence interval (CI) 1.24 to 3.65) were increased with laparoscopic salpingectomy for hydrosalpinges prior to IVF.

This review was dominated by the Scandinavian multicentre study (2), which could clearly show that the benefit of salpingectomy mainly applied to those patients who demonstrated ultrasound visible hydrosalpinges (relative risk for live birth 2.40, 95% CI 1.09-5.28).

Although there is clear evidence for the benefit of salpingectomy, there are other aspects such as a psychological dilemma to remove the tubes and also economic considerations. Based on the cumulative result of the Scandinavian multicentre study (3), a cost-effectiveness analysis was performed, comparing the two different strategies among hydrosalpinx patients; performing salpingectomy prior to the first IVF-cycle or subsequent to failed cycles.

Methods: A total of 204 patients with hydrosalpinges, diagnosed by either hysterosalpingography, laparoscopy or ultrasound, were randomized in a ratio 3:2, to undergo a laparoscopic salpingectomy or to have no intervention before their first cycle. A cumulative analysis of all subsequent cycles, routinely not more than three transfer cycles per couple and allowing for salpingectomy in the control group was conducted. The main result was that the benefit of salpingectomy was particularly evident in patients with large hydrosalpinges that were visible on ultrasound, a subgroup recognized before the start of the study. Here, the focus is on this group.

In the present analysis, the intervention strategy is defined as salpingectomy preceding the first embryo transfer and the control strategy allowing salpingectomy after one transfer. Thus, six patients from each group are excluded since they never started IVF treatment and six patients are reallocated. Data from the control group shows that 28 of the 86 patients had a salpingectomy performed after a failed first or second cycle. A maximum of three complete treatment cycles (including ovarian stimulation, one fresh and additional frozen embryo transfers) per patient were included. For each patient, the outcomes of treatment have been recorded as number of complete cycles of standard IVF and ICSI, cycles ending after oocyte retrieval, started cycles cancelled before oocyte retrieval, frozen/thawed transfer cycles, and complications during any procedure.

The outcomes of clinical pregnancies have been recorded as spontaneous abortions (gestational week 6-12 or >12 weeks), managed conservatively or surgically by curettage, ectopic pregnancies treated by laparoscopic salpingectomy, termination of pregnancy >12 gestational weeks, stillbirths and live births. Routes of deliveries were recorded as vaginal delivery with/without complications and caesarean section with/without complications.

The costs of treatments and interventions were calculated from standardized hospital charges at the main Swedish center, Sahlgrenska University Hospital. Only direct medical costs, i.e., treatment costs and costs that are related to the outcome, such as costs for spontaneous abortion or delivery, were included. The costs for laparoscopic salpingectomy were based on the charges for utilizing the anesthetic and the surgical facilities and the charges for the post-operative gynecological ward.

The medication costs were calculated as the average cost of drugs given to the patients undergoing IVF, including pituitary down regulation with a gonadotrophin releasing hormone (GnRH)-analogue, gonadotrophins and progesterone for luteal support.

The charge for IVF-treatment set by the hospital, was leveled according to the completeness of each treatment cycle, considering cancellations before and after oocyte retrieval. All follow-up visits were included. Complications, such as ovarian hyperstimulation syndrome (OHSS) and infections acquiring hospitalization were registered as days in hospital and the corresponding costs were calculated.

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Pregnancy-related costs included routine antenatal controls, spontaneous abortions, ectopic pregnancies, termination of pregnancy and delivery. The calculation of delivery-related costs were based on number of children, route of delivery and complications such as intrauterine death and antenatal care due to risk for premature delivery. Neonatal care was accounted for by using the hospital charges, which were set according to birth weight classes.

The effectiveness of the two strategies (salpingectomy prior to IVF vs option to undergo salpingectomy in case of failed cycle) was expressed in terms of live birth rate.

The average cost per patient, was calculated from individual data, with 95% confidence intervals for the difference between groups, and the cost-effectiveness ratios were calculated as the average cost (excluding neonatal costs) per patient divided by the live birth rate. The incremental cost-effectiveness ratio (ICER), was calculated as:

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\text{ICER} = \frac{(\text{CI} - \text{CC})}{(\text{EI} - \text{EC})},
\]

where C stands for cost, E for effectiveness and the indices “I” and “C” denotes intervention group and control group, respectively.

Results: In all, 95 patients were diagnosed with ultrasound visible hydrosalpinges before the start of treatment. Among the 51 patients in the intervention group, 23.5% did not complete a full set of three stimulated cycles. The mean number of started cycles was 2.02 (SD 0.99) and mean number of transfers was 2.27 (SD 1.25). Among the 44 controls 31.8% did not fulfill three stimulated cycles. The mean number of started cycles was 2.16 (SD 1.01) and the mean number of transfers was 2.25 (SD 1.24). Seventeen patients (39%) underwent salpingectomy after a failed cycle. The live birth rates were 60.8% in the intervention group and 40.9% among controls, the difference being 19.9% (95% CI -0.4, 40.1).

The average treatment costs per patient, including surgery and IVF, were € 10 957 in the intervention strategy and € 9 996 among controls, i.e., a difference of € 961 (95% CI -863, 2 787). The average cost per patient, including treatment and pregnancy related costs, in the intervention group was € 13 943 as compared to € 12 091 among controls, a difference of € 1 852 (95% CI 57, 3 646). The cost-effectiveness, expressed as cost per live birth, excluding neonatal costs, was € 22 823 in the intervention group and € 29 517 among controls, a difference of € -6 693 (95% CI -22 575, 2 991). The ICER, was calculated as: \((13 943 – 12 091) / (0.608-0.409) = 1 852/ 0.199 = € 9 306 \) (95% CI -8 653, 60 867). That is, the intervention strategy (among patients with ultrasound visible hydrosalpinges), results in an extra live birth at a cost of € 9 306.

Conclusion: The present analysis demonstrated that the cost per live birth is higher in the strategy where surgery is performed after failed IVF, while the cost per treatment is somewhat lower. Inclusion of neonatal costs in the analysis would skew the results in favour of the intervention strategy, because of the fairly low numbers of births and the skewed distribution of multiple births. The incremental cost to achieve the higher birth rate by adhering to the intervention strategy, i.e., salpingectomy prior to the first IVF cycle, seems quite reasonable in patients with ultrasound visible hydrosalpinges.

References


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