Prevalence of unsuspected uterine cavity abnormalities diagnosed by office hysteroscopy prior to in vitro fertilization

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BACKGROUND: Whether implantation occurs after in vitro fertilization (IVF) depends on the embryo, uterine receptivity or a combination of both. The prevalence of minor intrauterine abnormalities identified at hysteroscopy in cases with a normal transvaginal sonography (TVS) has been recorded to be as high as 20–40%. Diagnosing and treating such pathology prior to initiating IVF/intra-cytoplasmic sperm injection (ICSI), has been widely advocated without high-quality evidence of a beneficial effect. The objective of the current study was to assess, by screening office hysteroscopy, the prevalence of unsuspected intrauterine abnormalities in an asymptomatic population of IVF patients, in whom TVS had not revealed any pathology.

METHODS: The prevalence of unsuspected intrauterine abnormalities in patients allocated for a randomized controlled trial was prospectively assessed at two tertiary infertility care units: Academic Hospital at the Dutch-speaking Brussels Free University and University Medical Center Utrecht. A total of 678 unselected, asymptomatic, infertile women with a regular indication for a first IVF/ICSI treatment underwent office hysteroscopy. Only asymptomatic patients, aged ≤42 years, with a normal TVS and no previous hysteroscopy were included. The presence of predefined intrauterine abnormalities was recorded and described in a standardized manner.

RESULTS: Endometrial polyps were identified in 41 (6%) women and submucous myomas in 6 women (1%). Some women were also diagnosed with intrauterine adhesions (2%) or septa (2%). The overall prevalence of any predefined intrauterine abnormality in this IVF/ICSI population was 11%.

CONCLUSIONS: The observed prevalence of unsuspected intrauterine abnormalities in asymptomatic patients indicated for their first IVF/ICSI treatment appeared to be clearly lower than previously reported (11 versus 20–45%). This may have implications for the significance of these abnormalities regarding prospects in IVF/ICSI treatment cycles.

Key words: intrauterine pathology / uterine cavity abnormalities / hysteroscopy / infertility / IVF / ICSI

Introduction

Despite the numerous advances in the field of in vitro fertilization (IVF) and intra-cytoplasmic sperm injection (ICSI), the implantation rate per embryo transferred usually does not exceed 30%, although higher rates with the use of blastocysts have been reported, depending on female age (Andersen et al., 2008; Stillman et al., 2009). Embryo quality, good conditions of the uterine environment, a skillful IVF laboratory and embryo transfer are essential in order to achieve a pregnancy in IVF. Unsuspected uterine cavity abnormalities, such as endometrial polyps, small submucous myomas, adhesions and septa are considered to have a negative impact on the chances to conceive through IVF (Rogers et al., 1986). The prevalence of such unsuspected intrauterine abnormalities, diagnosed by hysteroscopy prior to IVF, has been described to be between 20 and 45% (Balmaceda and Ciuffardi, 1995; La Sala et al., 1998; Hinckley and Milki, 2004). Moreover, diagnosing and treating these abnormalities are advocated in order to optimize the condition of the uterine environment and thereby the outcome of IVF treatment. However, this recommendation is not based on high-quality evidence (Shamma et al., 1992; Oliveira et al., 2003; Demirol and Gurgan, 2004; Rama Raju et al., 2006).
For evaluation of the uterine cavity, the basic work-up consists of transvaginal sonography (TVS) with or without the use of saline or gel as contrast media, possibly followed by either hysterosalpingography (HSG) or hysteroscopy to directly assess the uterine cavity. Both TVS, as well as saline infusion sonography (SIS) and gel infusion sonography (GIS) are inexpensive, non-invasive and have been shown to be excellent diagnostic tools to detect subtle intrauterine abnormalities (Ayida et al., 1997; Fabres et al., 1998; Shalev et al., 2000; Ziegler de, 2009). Office hysteroscopy has increasingly been recommended as an excellent diagnostic tool to detect subtle intrauterine abnormalities (Ayida et al., 1997; Fabres et al., 1998; Shalev et al., 2000; Ziegler de, 2009). Office hysteroscopy has increasingly been recommended as a routine procedure in the infertility work-up (La Sala et al., 1998; Oliveira et al., 2003; Demirol and Gurgan, 2004; Hinckley and Milki, 2004; Doldi et al., 2005; Rama Raju et al., 2006; Lorusso et al., 2008). It has become easy to perform in an outpatient setting without anesthesia. Moreover, it offers direct visualization and enables clinicians to diagnose and treat intrauterine pathology during the same session (Bettocchi et al., 2004).

The aim of this study was to verify the prevalence of unsuspected uterine cavity abnormalities, diagnosed by office hysteroscopy screening in a group of unselected asymptomatic women, indicated for a first IVF cycle.

Materials and Methods

The present study was conducted as a part of the TEA-trial (Treatment Efficacy of uterine Abnormalities, register number ClinicalTrail.gov: nCT00830401), a randomized controlled trial to assess the benefits of diagnosing and treating unsuspected intrauterine abnormalities for subsequent outcome in IVF. The study was approved by the Institutional Review Board of the two participating centers. Informed consent was obtained.

Participants

The screening hysteroscopies for the TEA-trial were conducted in the period from June 2007 until September 2008 at the Academic Hospital at the Dutch-speaking Brussels Free University (AZVUB, Belgium) and the University Medical Center Utrecht (UMCU, The Netherlands). All couples indicated for a first IVF/ICSI treatment underwent the standard infertility work-up, consisting of the medical history, physical examination, TVS, hormone status, chlamydia antibody testing (CAT), and semen analysis. In case of a positive CAT and/or the presence of risk factors for tubal pathology in the medical history, a HSG or diagnostic laparoscopy was performed, to test for tubal patency. In CAT negative cases without risk factors, no further assessment of tubal pathology was carried out. The TVS was performed by an experienced gynecologist, evaluating the uterine cavity for the presence of features suspected for any of the predefined abnormalities (i.e. polyps, submucous myoma, adhesions or septa), by looking at the regularity of the endometrial lining and measuring the double layer of the endometrium both in the sagittal and transversal planes. The findings, corresponding cause of infertility and TVS result were reported in the patient’s record. In case no menorrhagia or metrorrhagia was present and TVS did not show abnormalities, women were considered for a screening hysteroscopy on an outpatient basis. Inclusion into this screening was limited to women under the age of 43 years with no prior hysteroscopy examination nor prior IVF/ICSI attempt to conceive (Belgian statute book, 2003). Women with any of the predefined abnormalities at TVS followed the regular routine and underwent a therapeutic hysteroscopy to resolve the uterine cavity pathology prior to starting the infertility treatment.

Hysteroscopy procedure

The hysteroscopies were scheduled in the follicular phase of the menstrual cycle (Days 3–15), 1–3 months prior to starting the IVF/ICSI treatment. All hysteroscopy examinations were performed by a team of three experienced gynecologists (HF, AT, FB), using a 5-mm outer-diameter continuous flow Bettocchi hysteroscope with 30° direction of view (Karl Storz Endoscopy, Stöpfer Medical Instruments, Utrecht, The Netherlands & Olympus Belgium N.V., Aartselaar, Belgium). Normal saline solution was used for distension of the uterine cavity at the pressure of 20–50 mmHg. The hysteroscopy procedures were performed in an outpatient setting, using the vaginoscopic approach without anesthesia or dilatation. In case, the examination could not be accomplished due to patient intolerance, the procedure was continued under paracervical block, using a lidocaine injection (2 x 2 ml, 2%) (AstraZeneca bv., Zoetermeer, The Netherlands).

Uterine cavity assessment

Also hysteroscopically detected intrauterine abnormalities were defined as endometrial polyps, submucous myomas, intrauterine adhesions or uterine septa. According to the TEA-trial protocol, different routine procedures were possible if any of these predefined abnormalities were identified. In cases where prior informed consent had been obtained, randomization for treatment or no treatment was applied. Without informed consent, most cases with abnormalities adhered to the prior advice of treatment. In three cases, treatment was refused by the patient in view of the specific nature of the abnormality, or could not be accomplished due to patient intolerance. Treatment consisted of removal of polyps, myomas, adhesions or septa using scissors, grasping forceps or Versapoint® (Johnson & Johnson, Dilbeek, Belgium & Hoofddorp, The Netherlands). Interventions were performed in the same outpatient setting without additional anesthesia. After the intervention, a detailed record was completed, concerning information about patient tolerance, diagnostic findings and treatment.

The results of the study were verified in the TEA-trial, a randomized controlled trial to assess the benefits of diagnosing and treating unsuspected intrauterine abnormalities for subsequent outcome in IVF. The study was approved by the Institutional Review Board of the two participating centers. Informed consent was obtained.

Statistical analysis

Chi-square test and Student’s t-test were used to analyze different subgroups. Uni- and multivariate logistic regression were applied in order to identify factors that could predict the presence of unsuspected uterine cavity abnormalities. A P-value of <0.05 was considered statistically significant. All statistical analyses were performed in SPSS version 15.1 (SPSS Inc., Chicago, IL, USA).

Results

From June 2007 until September 2008, a total of 960 women presented with an indication for a first IVF/ICSI treatment cycle at one of the two research hospitals. Owing to limited capacity of the hysteroscopy facilities in the initial phases of the trial, ultimately 684 women were scheduled for hysteroscopy. However, the patients who were scheduled for hysteroscopy were a random sample of all patients indicated for a first IVF/ICSI cycle. No significant differences were found, regarding female age, body mass index (BMI), smoking behavior or race, between the group with and without hysteroscopy.
examination. In the 684 patients who were scheduled for hysteroscopy, TVS did not reveal any of the predefined abnormalities in 678 of the included patients. In the remaining six patients, a cavity deforming myoma was detected. Detailed information on the patient population and selection is shown in Table I and Fig. 1. The most frequent cause of infertility was a poor semen quality, with severe male factor infertility in 26% of all cases (amount of grade A and B motile sperm cells $2.0 \times 10^9$). Female subfertility was present in 14.2% of the couples, mostly due to tubal pathology. Out of all the hysteroscopies, 94% was scheduled in the follicular phase of a cycle (Days 3–15). Most of them were performed on Day 9 of the menstrual cycle, with an overall range of Days 1–59, due to inclusion of women with oligomenorrhoea. Investigation of the uterine cavity could be adequately completed in 670 cases (99%). The main reason for failure of office hysteroscopy was patient intolerance (six cases, 0.9%). Other causes were an unclear view or inability to achieve passage of the internal ostium. Local anesthesia was used during eight of the procedures and resulted in a successful hysteroscopy examination in six cases. An infection after the hysteroscopy occurred in one case and was treated on an outpatient basis with rapid recovery. No other complications occurred.

### Hysteroscopy findings

The frequency of one or more abnormalities per patient was 11% (Fig. 2). Endometrial polyps were identified in 41 cases (6%). Most detected polyps (63%) were smaller than 0.6 cm, in only three cases it concerned a polyp $1.0 \ cm$. Submucous myomas were found in six cases (1%), all with an estimated diameter between 0.5 and 2.0 cm. Also 15 cases with intrauterine adhesions (2%) and 14 cases with a septum (2%) were diagnosed. In two cases more than one abnormality was identified. The overall abnormality rate did not significantly differ between the participating university hospitals: 12% in the AZVUB versus 10% in the UMCU.

### Predictive factors

Female age and BMI were associated with the occurrence of unsuspected intrauterine abnormalities in a univariate analysis (Table I). Multivariate logistic regression analysis, to assess the independency of these two variables as predictors of the presence of intrauterine abnormalities, demonstrated a significant correlation only between female age and abnormalities ($P = 0.002$, OR: 1.09, 95% CI: 1.03–1.16).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group with abnormalities $n = 74$</th>
<th>Group without abnormalities $n = 596$</th>
<th>Significance</th>
<th>Overall $n = 670^{b}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>34.47 ± 4.22</td>
<td>32.58 ± 4.61</td>
<td>$P = 0.00^a$</td>
<td>32.84 ± 4.61</td>
</tr>
<tr>
<td>Duration of subfertility (years)$^c$</td>
<td>3.05 ± 2.55</td>
<td>2.94 ± 2.40</td>
<td>NS$^f$</td>
<td>3.00 ± 2.54</td>
</tr>
<tr>
<td>Body mass index</td>
<td>24.74 ± 4.31</td>
<td>23.65 ± 4.21</td>
<td>$P = 0.04^af$</td>
<td>23.82 ± 4.26</td>
</tr>
<tr>
<td>VCM</td>
<td>82.85 ± 137.93</td>
<td>63.43 ± 82.96</td>
<td>NS$^f$</td>
<td>65.58 ± 90.00</td>
</tr>
<tr>
<td>Cycle day</td>
<td>9.51 ± 3.84</td>
<td>9.46 ± 4.44</td>
<td>NS$^f$</td>
<td>9.45 ± 4.36</td>
</tr>
<tr>
<td>Cause infertility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idiopathic</td>
<td>31 (41.9%)</td>
<td>238 (39.9%)</td>
<td></td>
<td>269 (30.1%)</td>
</tr>
<tr>
<td>Andrologic factor$^d$</td>
<td>32 (43.2%)</td>
<td>274 (46.0%)</td>
<td></td>
<td>306 (45.7%)</td>
</tr>
<tr>
<td>Subfertile female$^e$</td>
<td>11 (14.9%)</td>
<td>84 (14.1%)</td>
<td></td>
<td>95 (14.2%)</td>
</tr>
<tr>
<td>Infertility woman</td>
<td></td>
<td></td>
<td>$P = 0.05^f$</td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>40 (54.1%)</td>
<td>391 (65.6%)</td>
<td></td>
<td>431 (64.3%)</td>
</tr>
<tr>
<td>Secondary</td>
<td>34 (45.9%)</td>
<td>205 (34.4%)</td>
<td></td>
<td>239 (35.7%)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>50 (67.6%)</td>
<td>458 (76.8%)</td>
<td></td>
<td>508 (75.8%)</td>
</tr>
<tr>
<td>African</td>
<td>2 (2.7%)</td>
<td>15 (2.5%)</td>
<td></td>
<td>17 (2.5%)</td>
</tr>
<tr>
<td>Asian</td>
<td>2 (2.7%)</td>
<td>18 (3.0%)</td>
<td></td>
<td>20 (3.0%)</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>18 (24.3%)</td>
<td>100 (16.8%)</td>
<td></td>
<td>118 (17.6%)</td>
</tr>
<tr>
<td>Latin American</td>
<td>2 (2.7%)</td>
<td>4 (0.7%)</td>
<td></td>
<td>6 (0.9%)</td>
</tr>
<tr>
<td>Mix</td>
<td>0 (0.0%)</td>
<td>1 (0.2%)</td>
<td></td>
<td>1 (0.1%)</td>
</tr>
</tbody>
</table>

Values are expressed as mean ± standard deviation. NS, not significant.

$^aP$-value of univariate analysis.

$^bFailed procedures excluded.

$^cDuration of subfertility: duration of attempts to become pregnant, in cases of secondary infertility calculated from the last ongoing pregnancy.

$^dDefined as VCM [sperm volume (ml) × concentration sperm cells ($\times 10^9$)/ml] × grades A and B sperm cell motility (%)] < 200 × 10^6.

$^eDue to tuba pathology (incl. endometriosis grades III and IV), anovulation or cervix factor.

$^fSignificance, Student's t-test.

$^gSignificance, $x^2$.
Discussion

Hysteroscopy is generally considered to be the golden standard in the diagnosis of intrauterine pathology, including endometrial polyps, submucous myomas, intrauterine adhesions and uterine septa (Bozdag et al., 2008). However, there is paucity of data on the impact of unsuspected intrauterine pathology prior to commencing IVF that will duly be discovered by routine hysteroscopy. In the present study, the prevalence of one or more intrauterine abnormalities in asymptomatic women, who underwent office hysteroscopy prior to a first IVF cycle, was found to be only 11%.

The reported results were based on a study which was designed to be a randomized trial. Randomization was applied for instant treatment versus no treatment of unsuspected intrauterine pathology detected by hysteroscopy screening. As all detected abnormalities were not diagnosed by a prior TVS, all hysteroscopy performers knew to expect mainly subtle abnormalities. A standard, detailed scoring form guaranteed reports of all abnormalities, regardless of the size or possibility of performing hysteroscopy intervention in case an abnormality was identified. Thus, even though the data were obtained in the frame of a randomized trial instead of a pure observational study, the reported results are a reliable representative of our daily infertility practice.

Another possible study limitation has been the timing of the hysteroscopy examinations. In the publication by Hinckley and Milkey, all hysteroscopies were performed during the hormonal contraceptive phase prior to controlled ovarian hyperstimulation for IVF (Hinckley and Milki, 2004). In the current study, the hysteroscopies were performed in the follicular phase of a natural cycle, since the use of oral contraceptive pills prior to starting IVF treatment with GnRH antagonist co-treatment is questionable (Kolibianakis et al., 2004). Moreover, the investigators aimed to avoid any bias by the administration of oral contraceptives during the hysteroscopy. As hysteroscopies were performed also in the late follicular phase, when endometrial proliferation may have become abundant, this may have affected the accuracy of diagnosing small abnormalities. It is unlikely that this has been of major influence on the study results though, as additional analysis did not reveal any difference in timing of hysteroscopy between the group with or without abnormalities.
The prevalence of unsuspected intrauterine abnormalities has been recorded to be between 20 and 45% (Shamma et al., 1992; Balmaceda and Ciuﬀardi, 1995; La Sala et al., 1998; Oliveira et al., 2003; Demiroi̇l and Gurgan, 2004; Hinckley and Milki, 2004; Doldi et al., 2005; Rama Raju et al., 2006). Thus, the overall prevalence of abnormalities described by the present study considerably diﬀers from the prevalence reported in previously published articles. This diﬀerence could be explained by factors related to study design, patient inclusion criteria, and methods of intrauterine pathologies included. Unfortunately, most authors solely reported that they investigated women with a normal TVS or HSG, but do not provide a thorough description of patient characteristics. The main differences in patient population that have been recorded are the number of IVF attempts and female age. A number of studies have evaluated hysteroscopy ﬁndings in patients after two or more unsuccessful IVF cycles (Oliveira et al., 2003; Demiroi̇l and Gurgan, 2004; Rama Raju et al., 2006). If the presence of intrauterine abnormalities would have a negative impact on the chance to conceive, the abnormality prevalence is expected to be higher in such patient populations.

In the current study, the chance of detecting unsuspected abnormalities increased with female age. The eﬀect of female age on the presence of intrauterine abnormalities has not been previously described by other studies using a similar setting. Still, studies focusing on the incidence of uterine leiomyoma, did observe an increasing prevalence with age in a pre-menopausal fertile patient population (Marshall et al., 1997). The same was found for the prevalence of endometrial polyps: the prevalence rate was signiﬁcantly lower in the age group 25–35 years and showed a peak in the group 46–55 years (Hileeto et al., 2005). Some investigators studied patient groups with an older mean age than in the current study (Oliveira et al., 2003; Demiroi̇l and Gurgan, 2004; Doldi et al., 2005). This particular diﬀerence in selected patient populations may also be interpreted as an explanation for the variation in overall prevalence of abnormalities.

Finally, not all investigators screened the uterine cavity for the same type of pathology. Some did not include all four of our predeﬁned abnormalities, whereas others added certain abnormalities, like uterine hypoplasia and endometrial hyperplasia (Shamma et al., 1992; Demiroi̇l and Gurgan, 2004; Doldi et al., 2005).

Nevertheless, studies with a set-up comparable to that of the present study also reported a clearly higher prevalence (Hinckley and Milki, 2004). Variation in the interpretation of hysteroscopy ﬁndings may also explain the observed diﬀerences in abnormality prevalence. Research on the inter-observer variation in hysteroscopy visual diagnosis is minimal (Dueholm et al., 2002). As such, the possibility of systematic observer bias cannot be ruled out. Future research on inter-observer agreement would be desirable.

In the current study, the most frequently found abnormality was an endometrial polyp and a submucous myoma were diagnosed. In another case both an endometrial polyp and a septate uterus were diagnosed.

**Figure 2** Findings at ofﬁce hysteroscopy. a In one case both an endometrial polyp and a submucous myoma were diagnosed. In another case both an endometrial polyp and a septate uterus were diagnosed.
between 81 and 100% (Ayida et al., 1997; Shalev et al., 2000). Out of the wide variety of possible intrauterine abnormalities, intrauterine adhesions may be the most difficult to diagnose at TVS. In the present study, the prevalence of intrauterine adhesions was 2%. The question arises whether this prevalence endorses the use of an office hysteroscopy as a routine examination prior to IVF/ICSI treatment. The use of contrast media such as saline with TVS is increasingly used to improve the delineation of uterine cavity abnormalities (Ayida et al., 1997). According to a review of the literature, saline contrast hysterosonography is a very accurate method for evaluation of the uterine cavity in pre- and post-menopausal women with abnormal uterine bleeding (Kroon et al., 2003). The pooled sensitivity and specificity in such patients were 95 and 88%, respectively. Moreover, the rate of correct predictions for the SIS in pre-menopausal women amounted to 95%. Also in infertility patients, SIS has shown to be rather promising. Performing operative hysteroscopy in patients with abnormalities at SIS resulted in an increase in pregnancy rate from 54 to 86% compared with patients with a normal uterine cavity (Gera et al., 2008). Recently, GIS has shown to be a promising alternative for the saline infusion with possibly improved patient comfort (Ziegler de, 2009). These new ultrasound methods might become an easy, safe and well-tolerated alternative to diagnostic hysteroscopy in the initial evaluation of the uterine cavity. Therefore, it would be of great importance to compare the accuracy of hysteroscopy to SIS and GIS as a screening tool to diagnose intracavitary abnormalities, especially in asymptomatic IVF patients.

Prior to implementation of a medical test into daily practice, next to its accuracy and usefulness, also the costs and tolerability of the test and all alternative options need to be reconsidered. Therefore, the following simple scenario analysis was performed. In a patient population with recurrent IVF failure, treatment resulted in a 9–13% increase in pregnancy rate after the subsequent IVF cycle (from 21.6 to 30.4% and from 26.2 to 39.6%) (Demirol and Gurgan, 2004; Rama Raju et al., 2006). Assuming that treatment of unsuspected intrauterine abnormalities would result in a 5% increase in pregnancy rate after a first IVF treatment cycle (from 20 to 25%), an abnormality prevalence of 11% implicates a number needed to screen by hysteroscopy of 184 in order to obtain one additional pregnancy. If screening is not implemented, a total of 28 extra IVF cycles would be needed after the first IVF attempt to obtain the same number of pregnancies after two attempts for a group of 1000 infertile patients, compared with a similar group of patients, who would undergo screening hysteroscopy and be treated for the detected pathology. It needs to be established whether the costs of 28 extra IVF cycles would compensate for the costs raised by routinely performing 1000 hysteroscopies. This scenario analysis would only be complete by implementation of alternative strategies, like performing a SIS prior to the hysteroscopy. GIS is a highly accurate and relatively inexpensive test for diagnosing intrauterine abnormalities and could therefore reduce the number of hysteroscopies needed to be performed and reduce the costs (Gera et al., 2008). Moreover, to assess the ultimate usefulness of hysteroscopy in infertile patients, the strategy in which hysteroscopy is performed after (repeated) IVF failure should also be evaluated. However, such scenario analysis would exceed the available data and aim of the present study. Nevertheless, cost-effectiveness analyses do not account for patients’ tolerance of the procedures of the infertility work-up. Making use of the vaginoscopic approach, hysteroscopy was found to be a patient-friendly technique by both Dutch as well as international investigators (Garbin et al., 2006; van Dongen et al., 2007). IVF itself is accompanied by a psychological and physical burden which naturally increases with every failed IVF treatment cycle (Eugster and Vingerhoets, 1999). Therefore, investment in high-quality evidence on the usefulness of hysteroscopy as a screening tool prior to IVF is essential. A thorough cost-effectiveness analysis should determine the strategy with the best profits on all items. Ultimately, a patients preference study would elucidate the balance between the tolerability of office hysteroscopy and the burdens that accompany IVF/ICSI. Despite the low prevalence of intrauterine pathology detected in patients with a normal TVS and the imaginable accompanying high costs, hysteroscopy still cannot be ruled out as a routine procedure prior to IVF. Recently, renewed initiatives for a randomized trial have been published that may provide the final clues (El-Toukhy et al., 2009).

In conclusion, the observed prevalence of unsuspected intrauterine abnormalities in an asymptomatic infertile population is clearly lower than previously reported. This may have implications for the assessment of the significance of these abnormalities regarding prospects in IVF/ICSI treatment. Further research on the value of hysteroscopy as a routine procedure to evaluate the uterine cavity prior to IVF is urgently needed.

Authors’ roles

Authors H.M.F., F.J.B., B.C.F. and P.D. designed the initial study. H.M.F. and F.J.B. performed most of the procedures, together with A.T. and J.D. J.C.K. coordinated, collected, analyzed and interpreted the data. A.T. and J.D. participated in analyses and interpretation of the data. H.M.F., F.J.B. and J.C.K. wrote the paper. P.D., B.C.F., J.D. and A.T. revised the manuscript. All authors approved the final draft. HF will act as guarantor for the paper.

Conflict of interest: H.M.F, J.C.K, A.T and J.D declare that they have no conflict of interest. Prof. Fauser has received fees and grant support from the following companies (in alphabetic order): Andromed, Ardana, Ferring, Genovum, Glycotope, Merck Serona, Organon, Pantharei Bioscience, Philips, PregLem, Schering, Schering Plough, Serono and Wyeth. Prof. Devroey received fees and grant support from the following companies (in alphabetic order): Aeneova, Besins, Ferring, Merck Serona and Schering-Plough. F.J.B. is a member of the external advisory board for Ferring Pharmaceuticals, Hoofddorp, The Netherlands. He receives no monetary compensation.

References

Intrauterine pathology at hysteroscopy


