Development of Magnetic Resonance Hysterosalpingography for Assessment of Infertility

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Introduction

Magnetic Resonance Hysterosalpingography (MR-HSG) has been poorly developed because the tortuosity and narrow dimensions of the normal Fallopian tubes together with artefact from fluid in neighbouring bowel, bladder and free fluid in the pelvis has made difficult demonstration of tubal patency difficult. The use of MR-HSG has been limited to isolated clinical studies [1, 2], largely due to the fact that the non-distended endometrial cavity is normally easily distinguished on conventional T2-weighted images [3]. However, without distending the endometrial cavity with contrast agents, demonstration of endometrial adhesions is difficult, and on MR imaging is restricted to 2 isolated case reports [4, 5]. In those cases, therefore, where demonstration of uterine adhesions is the primary objective but visualization of the whole uterus is required and where it is necessary to limit the use of ionizing radiation to the pelvis for purposes of fertility, MR-HSG is ideal.

Three *in vivo* pilot studies have reported visualization of the uterine cavity following instillation of saline or gadolinium chelates as contrast agent [1,2,6]. Two of these [1, 2] report data from human subjects where MR-HSG was able to demonstrate a normal uterine cavity. In order to show the endometrial cavity as high signal intensity against the low signal intensity of the surrounding myometrium, T1-weighted or proton density sequences with an intracavity gadolinium contrast agent have been used preferentially [1]. Alternatively, with the use of intracavity saline, a fluid attenuated inversion recovery sequence has been explored [2]. The purpose of this study was to develop the technique of MR-HSG using gadolinium contrast agent in the uterine cavity as an adjunct to conventional MR imaging of the pelvis.

Methods

The study was approved by the local research ethics committee. Three women aged 31, 34 and 43 yrs., two with primary infertility and one with secondary infertility were recruited. A 5Fr balloon catheter (Rocket Medical plc, UK) was inserted into the endocervical canal and the balloon inflated with 1.5ml of saline. The patient was then transferred into the centre of the scanner. Imaging was done in a Philips 1.5-T Intera using a four-channel pelvic phased array coil. 20mg of hyoscine butyl bromide was given i.m. Single shot T2-weighted images were obtained for localization and orientation of subsequent imaging in relation to the endometrial cavity. Conventional T2-W FSE images (2600/90 msec [TR/effective TE]) were then obtained sagittal and transverse to the uterine cavity using a 4mm slice thickness and a 20cm FOV. A T1-W fat-suppressed 3D gradient-echo sequence (10.4/5.2 msec/90^0 [TR/TE/FA]) with a 30cm FOV and 2 mm slice thickness was used to cover the uterus coronally in 20-30 secs. The acquisition was repeated continuously following injection of 5-6 ml of a 1 in 50 dilution of gadobenate dimeglumine (Bracco UK, Ltd.) into the uterine cavity over a period of 3 mins. Subtractions of the pre-contrast acquisition from each of the post-contrast images were processed to produce a Maximum Intensity Projection for a dynamic series. Patients were given a 4-day course of doxycycline 100mg daily following the procedure.

Results

In the multiparous patient, contrast by-passed the catheter and collected in the lateral vaginal fornix. In the 2 nulliparous patients a normal triangular outline of the uterine cavity was seen. A hydrosalpinx was demonstrated on the left in both patients. One patient had a previous right salpingectomy, and no contrast was seen beyond the right cornua (Fig. 1). In the other patient, contrast outlined the entire length of the Fallopian tube but no spill was demonstrated (Fig. 2). Conventional MR images showed adenomyosis in one nulliparous and one multiparous patient. No adverse reactions were seen.

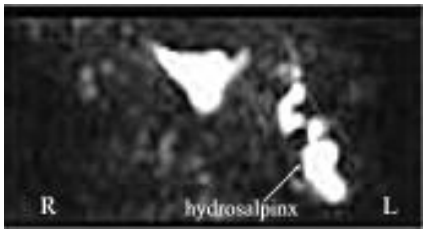

Fig 1 MR-HSG showing absent R tube and L hydrosalpinx

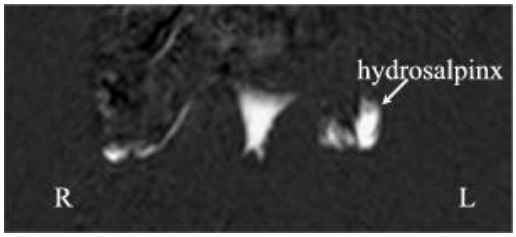

Fig 2 MR-HSG outlining R tube without spill and L hydrosalpinx

Conclusion

MR-HSG is potentially a valuable adjunct to conventional MR imaging in the investigation of infertility. It is safe and well tolerated, contributing further information on tubal patency, cavity anomalies and endometrial adhesions in less than 5 minutes of additional scan time.

References

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