



CASE REPORT

Hysterosalpingography (HSG) Findings in Primary Infertility: Serial Cases

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ABSTRACT

Infertility is a condition in which a couple fails to achieve pregnancy after 12 months of unprotected sex. In Indonesia, the prevalence of infertility is estimated to be around 10-15%. Primary infertility occurs when a woman has never had a pregnancy. Hysterosalpingography (HSG) examination is a radiological modality that is often used to evaluate the condition of the uterus and fallopian tubes in infertile women. The case series features data from five female patients diagnosed with primary infertility, where each patient underwent an HSG examination, and the results of the analysis were based on radiological findings that included structural abnormalities in the uterus and fallopian tubes. The HSG findings showed various abnormalities such as hydrosalpinx, tubal occlusion, uterine arcuatus, uterine bicornuate, and salpingitis isthmica nodosa. Uterus arcuatus was found in two cases, while hydrosalpinx was detected in three cases. In addition, two cases showed the presence of bilateral occlusion of the fallopian tubes, which correlated with primary infertility. HSG examination is an effective modality for detecting various abnormalities in the female reproductive tract that contribute to primary infertility. Findings such as hydrosalpinx, tubal occlusion, and uterine anomalies play an important role in determining the right treatment strategy for patients.



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INTRODUCTION

Infertility is a condition of the reproductive system, defined as the inability to achieve pregnancy after 12 months or more of regular, unprotected intercourse. In Indonesia, the incidence of infertility is around 10-15% or 4-6 million couples out of 39.8 million couples of childbearing age (Safitriana, 2022; World Health Organization, 2021, 2023). In the female reproductive system, infertility can be caused by abnormalities in the ovaries, fallopian tubes, and uterus, as well as disorders in the endocrine system that cause an imbalance of reproductive hormones. Infertility can be primary or secondary. Primary infertility is when a pregnancy has never been achieved by a person, while secondary infertility is when at least one previous pregnancy has been achieved. The diagnosis of infertility can be established through a complete anamnesis, physical examination, and supporting examinations, including imaging using ultrasonography (USG), HSG, to magnetic resonance imaging (MRI) (Puscheck, 2024; World Health Organization, 2021).

HSG is the most commonly used diagnostic modality of radiography, especially to look at the uterus and fallopian tubes. Uterine abnormalities are considered a causative factor in about 10% of infertile women, and 50% of women with recurrent abortions, while the prevalence of tubal abnormalities in infertility is about 20%. These data show that the assessment of the uterus and fallopian tubes is an important standard in the initial examination of infertility (Steward & Price, 2021).

Infertility is defined as the inability to achieve pregnancy after 12 months or more of regular, unprotected intercourse. In Indonesia, the prevalence of infertility is estimated at 10–15%, affecting approximately 4–6 million

couples out of 39.8 million of reproductive age (Safitriana, 2022; World Health Organization, 2021). In women, infertility may result from abnormalities in the ovaries, fallopian tubes, uterus, or endocrine disorders causing hormonal imbalance. It is classified as primary (no prior pregnancies) or secondary (at least one previous pregnancy). Diagnosis involves comprehensive history-taking, physical examination, and supporting investigations such as ultrasonography (USG), hysterosalpingography (HSG), and magnetic resonance imaging (MRI) (Puscheck, 2024; World Health Organization, 2021). HSG is the primary radiological modality for evaluating the uterus and fallopian tubes. Uterine abnormalities are implicated in about 10% of infertile women and 50% of those with recurrent miscarriage, while tubal pathology accounts for approximately 20% of infertility cases. Thus, assessment of the uterus and fallopian tubes is a key component of initial infertility evaluation (Steward & Price, 2021). This case study aims to highlight the diagnostic value of HSG in identifying uterine and tubal abnormalities contributing to female infertility.

CASE REPORT

This was a case series with a collection of data of five patients who presented to the Radiology Department at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital, Bali, between January 2018 and December 2023. The written informed consent was obtained from the patient before the preparation of this case study.

Case 1

A 32-year-old woman with the chief complaint unable to have children and diagnosed with primary infertility was referred to the Radiology Department to undergo HSG. The results of the contrast study showed that the uterine cavity was in a retroflexion position, with indentation at a blunt angle on the uterine

fundus, the mucosa was slippery, and there was no filling defect/additional shadow (see picture 1a). The right lumen of the ampulla is dilated, the regular mucosa, peritoneal spillage (-), the left lumen of the ampulla is dilated, the regular mucosa, peritoneal spillage (-) (see Figure 1b), so that the HSG result is Uterus arcuatus with a retroflexion position, bilateral hydrosalpinx without spillage.

Case 2

A 39-year-old woman was referred by the obstetrics and gynaecology department with the chief complaint unable to have children and diagnosed with primary infertility, referred to the Radiology Department to be examined for HSG. The results of HSG cavum uteri showed the position of ante flexion, uterine bicornuate unicollis, mucosa was regular (see Figure 2a), contrast material flowing out of the distal end of the fallopian tubes and into the pelvic peritoneal cavity (see Figure 2b). The impression is uterine ante flexion with uterine bicornuate anomalies. Peritoneal spillage right left (+).

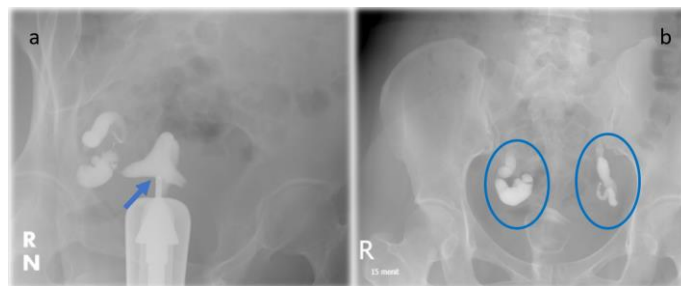


Figure 1. (a) Indentation fundus uterine (Uterus arcuatus), the position of the retroflexion (arrow) (b) dilation of the right and left ampulla (Circle)

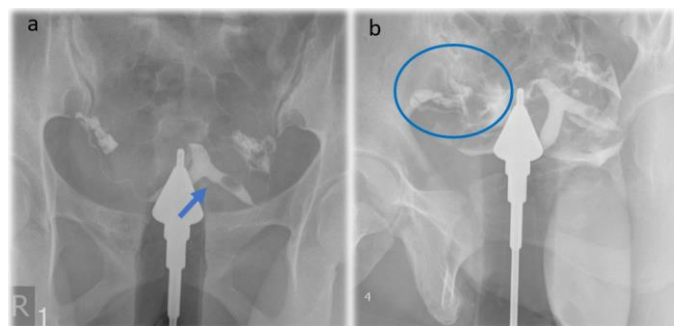


Figure 2. (a) Deep indentation at the top of the uterus, creating two separate "horns" that appear to extend from the main uterine body (arrow). (b) Peritoneal spillage, contrast material flowing out of the distal end of the fallopian tubes and into the pelvic peritoneal cavity (circle)

Case 3

A 39-year-old woman with the chief complaint unable to have children and diagnosed with primary infertility was referred to the Radiology Department to undergo HSG. Contrast did not appear in the right and left fallopian tubes. The Cervix canal is difficult to evaluate due to contrast extravasation. The cavum uteri is in the position of anteflexion (see Figure 3b), and the contour of the concave in the cavum uteri regio fundus is visible. There is a mucosal irregularity in the endometrium (see picture 3a). It appears to be contrasting only filling the interstitial pars of the right and left fallopian tubes, peritoneal spillage (-), so that the impression is obtained: Uterine arcuate with an anteflexion uterine position, bilateral fallopian tube occlusion, endometritis.

Case 4

A 33-year-old woman with the chief complaint unable to have children and diagnosed with primary infertility was referred to the Radiology Department to undergo HSG. The results of the HSG examination showed amputation of the left fallopian tube of the ampulla with the largest measured diameter of 1.1cm, which occurred post-evacuation. Multiple nodules appeared in the right fallopian tube of the pars

ismus (see Figure 4a). There was no spill on the right and left tubes. Cavum uterine position of the anteflexion, normal shape and size, smooth mucosa, no filling defect/additional shadow so that the impression obtained is an anteflexion uterus (see Figure 4b), non-patent right and left tubules with left hydrosalpinx and salpingitis isthmica nodosa.

Case 5

A 29-year-old woman with the chief complaint unable to have children and diagnosed with primary infertility was referred to the Radiology Department to undergo HSG. There is an irregularity of the cervical canalis (see Figure 5b). Cavum uterine position anteflexion, visible dilatation of the right distal fallopian tube with the largest measured diameter of +/- 2 cm (see Figure 5a) fixed at post-evacuation (+/- 10 minutes) (see picture 5c), regular mucosa, peritoneal spillage (-). The left tuba appears to be contrasting, flowing in the pars isthmus-ampulla, obstruction appears in the pars infundibulum to the distal part with a measured diameter of +/- 0.8 cm, peritoneal spillage (-). The impression obtained from HSG is a non-patent right fallopian tube with hydrosalpinx, a Non-patent left fallopian tube with obstruction in the distal part of the tube, Uterus anteflexus, cervicitis.

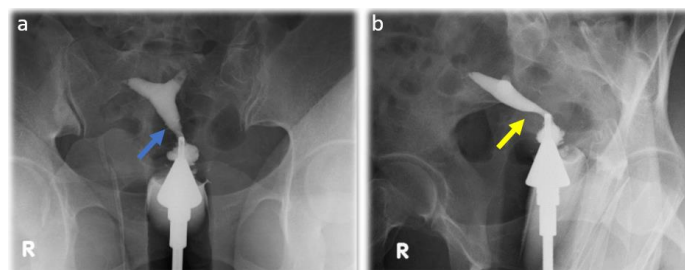


Figure 3. (a) Endometritis, irregularities of the endometrial mucosa (blue arrow). (b) Uterine anteflexion, anterior angulation of the uterus to the cervix (yellow arrow)

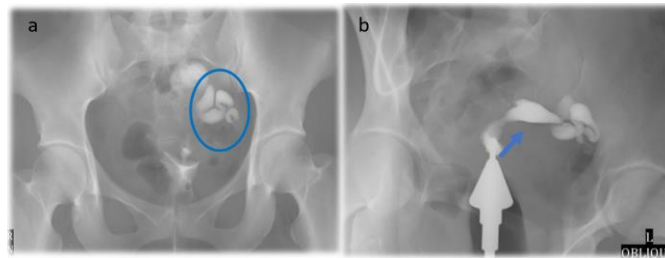


Figure 4. (a) Multiple nodules in the right fallopian tube (circle). (b) Uterine Antelexion, anterior angulation of the uterus to the cervix (Arrow)



Figure 5. (a) dilation of the fallopian tubes (blue circle). (b) Irregularity of the edges of the cerviclis canalis (arrow). (c) Dilation of the fallopian tubes after evacuation (yellow circle)

DISCUSSION

In this case series, data on patients aged between 29-39 years old were obtained. According to a study conducted in 2018 by Bushra Sultana, et al in Saudi Arabia, data were obtained from 90 female patients with a diagnosis of primary infertility, 65.5% of patients aged 18-30 years, 18.8% in the age group of 30-35 years and 15.5% of patients aged 35-40 years. The average length of marriage of the patients who participated was 4.36 ± 1.78 years. There were 37 (41.1%) patients who were asymptomatic, 19 (21.1%) had irregular cycles, 15 (16.6%) women came with abnormal menstrual discharge, 14 (15.5%) with dysmenorrhea, 4 (4.4%) with pelvic pain and only 1 (1.1%) patient with hair growth disorders (Sultana et al., 2018). In the HSG examination of the serial cases above, images of the uterus arcuatus, uterine bicornuate, hydrosalpinx, endometriosis, salpingitis, and cervicis were found. These findings are in line with the research of Sultana et al on 90 patients

with a clinical diagnosis of primary infertility based on the results of HSG examination. Normal HSG examination results were found in 38 people (42.2%). In 32 people (35.5%) were diagnosed with tubal blockage, and of the 32 people, 17 people (18.9%) had unilateral blockage, 15 people (16.6%) had bilateral tubal blockage. Hydrosalpinx was found in 10 people (11.1%), 7 people (7.8%), unilateral. Endometriosis was diagnosed in 6 (6.7%) patients, and uterine anomalies in 4 (4.4%) patients (Sultana et al., 2018).

Uterus arcuatus was found in cases 1 and 3, with findings of indentation of the uterine fundus in case 1, concave contours in the uterine fundus in case 3. Uterine arcuatus occurs due to endometrial indentations in the uterine fundus. The description of HSG in this case follows the literature, namely, the shape of the concavity on the uterine fundus (Hernández et al., 2014; Úbeda et al., 2001).



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Uterine bicornuate in case 2 is seen on HSG, where the contrast that has filled the uterine cavity in the anteflexed position appears to be indented in the uterine fundus. This is in line with the description of the bicornuate in the literature, which states that the bicornuate appears as a separate horn when contrasting filling the uterine cavity, and there will be a gap in the contour of the uterine cavity. The type of uterine bicornuate in this case is unicollis, in which the uterine cavum separates after passing through the cervix (Chandler et al., 2009; Hernández et al., 2014).

In 60% of serial cases, hydrosalpinx is found. In case 1, a dilated tubal ampulla was found, while the left tubal amplitude in cases 4 and 5, there was a dilated tubal distal disorder. The findings are in accordance with the literature that states that hydrosalpinx, as a dilation of the ampulla segment in the fallopian tubes, is associated with thinning of the attached fimbria and damage to the fluid-filled mucosa. If the fluid in the tube is an infected fluid, it is called pyosalpinx, and if it contains blood, it is called hematosalpinx. In HSG hydrosalpinx, there will be dilation of the fallopian tubes, which are filled with contrast, and there is no contrast spill at the end or the peritoneal cavity (Bello, 2004; Radswiki, 2010).

In HSG salpingitis, there are several pockety nodules involving up to two-thirds of the fallopian tubes. In severe cases of salpingitis, the image of the nodule sac is filled with contrast material (Barkwill & Tobler, 2025; Choudhary et al., 2010). Salpingitis was found in case 4. Seems *multiple additional shadows*, which are nodular, ranging from isthmus to ampula, which indicates the presence of isthmica nodosa salpingitis.

In the case series, irregularities of the uterine

cavity mucosa were also found. Irregularities of the mucosa of the uterine cavity are found in case 3, which indicates the presence of endometritis. Fallopian tube occlusion in case 3 is characterized by no visible contrast entering the fallopian tubes, both right and left. This is usually caused by the presence of a mass in the tubes (adnexal mass).

In case 5, a cervical canal with an irregular edge was found, which indicated an infection in the cervical area (cervicitis). Infection of the cervix will look like fur (*feathery*) or a serrated shape that can be used as an illustration of irregularities when filling in contrast (Ahmadi et al., 2014; Zafarani et al., 2015).

CONCLUSION

Infertility is a disease of the male or female reproductive system that is characterized by failure to achieve pregnancy after 12 months or more of regular unprotected sex. The source of infertility can come from women or men with the same percentage, which is 35% each, while the remaining 30% comes from both partners or problems whose cause is unknown. Primary infertility is when a pregnancy has never been achieved by a person. Hysterosalpingography (HSG) is the most commonly used diagnostic modality of radiography for the uterus and fallopian tubes. Uterine abnormalities are considered a causative factor in about 10% of infertile women, and 50% of women with recurrent abortions, while the prevalence of tubal abnormalities in infertility is about 20%. Primary infertility diagnosis based on data is found in women of childbearing age, 18-30 years, and most often occurs in the fallopian tubes, both hydrosalpinx and salpingitis.



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