Original Research Article

Incidence of congenital anomalies of the uterus in primary infertility as detected by hysterosalpingography in western Maharashtra

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Abstract

Hysterosalpingography (HSG) is the radiographic technique used for evaluation of the female genital tract. HSG plays an important role in detecting abnormalities related to the uterus and fallopian tubes. It is the commonly performed investigation in the work-up of female infertility. In the present study 320 hysterosalpingograms of infertile women were included who were referred between June 2013 to June 2015 at the Bharati Vidyapeeth's Deemed University and hospital and Dhwani-kiran Diagnostic centre, Sangli. The uterine anomalies on these hysterosalpingograms were noted and statistically analyzed.

Keywords: Anomalies, hysterosalpingography (HSG), mullerian duct, primary fertility.

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INTRODUCTION

Female infertility is not an uncommon problem in Western Maharashtra. Approximately 13 -15 % of couples are affected by infertility which is either primary or secondary type. Primary infertility is defined as an inability to conceive after 12 months of regular unprotected sexual intercourse[1]. The secondary infertility refers to those who have conceived at some time in the past regardless of whether the pregnancy ended in abortion. Infertility can be due to problem in either partner, or both. The male is responsible in about 30-40 %, the female in about 40-55 % and both are responsible in about 10 % of cases. Hysterosalpingography (HSG) is invaluable in the investigation of female infertility, especially in assessing tubal and uterine factors[2]. Uterine abnormalities that can be detected at HSG include congenital anomalies, polyps, leiomyomas, surgical changes, cynechiae and adenomyosis. Tubal abnormalities that can be detected include tubal occlusion, salpingitis isthmica nodosum, polyps, hydrosalpinx and peritubal adhesions[3] The aim of this study was to determine the incidence of congenital anomalies of uterus encountered on HSG in females presenting with primary infertility in Western Maharashtra. And how far they are responsible to cause infertility in patients. The study therefore concentrates only on uterine factor and exclude tubal and ovarian (hormonal) factor.

Embryogenesis

During 6th week of intra uterine life (at 10 m.m. c.r. length of embryo) two mullerian (paramesonephric) ducts develop. They play an important role in the development of reproductive organs of female. The uterus, cervix, fallopian tubes and upper four –fifth of vagina above the hymen are derived from mullerian ducts. An abnormal development of these ducts during embryogenesis results into various congenital anomalies of the uterus.[4] According to Amerian Fertility Society (AFS) classification scheme, mullerian duct anomalies are categoriezed into following classes.

Class I: Ageneis or Hypoplasia of the uterus - the most common from is the Mayor-Rokitansky-Kuster-Hauser

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syndrome, which is combined agenesis of uterus, cervix and upper portion of the vagina. The patient presents with primary amenorrhea.

Class II: Unicornuate uterus (Diag. 1) this is due to unilateral suppression of mullerian duct leading to a unilateral rudimentory horn at the left or the right of the midline. The unicornaute uterus communicates only with the ipsilateral fallopian tube. If the contralateral horn is almost fully developed, a full term pregnancy is believed to be possible.

Class III: Didelphys uterus (Diag. 2) results from complete failure of fusion of the two mullerian ducts leading to the duplication of the uterus, the cervix and the vagina. A single vagina or a vaginal septum may be noted as well. Since each horn is almost a fully developed uterus, patient has been known to carry pregnancies to full term.

Class IV: Bicornuate uterus (Diag.3) Results from partial non fusion of the mullerian ducts. This anomaly is characterized by double uterus and double cervix (bicornis bicollis) or double uterus with single cervix (bicornis unicollis). Bicornuate uterus demonstrates some degree of fusion between the two horns and they are usually not fully developed. So, we can distinguish this from didelphys uterus in which the two horns and cervix are separated completely and horns are fully developed.

Class V: Septate uterus (Diag. 4) Apparently the uterus is normal, but a septum divide the uterine cavity into two parts. The septum can be partial or complete. Women with uterine septum have a high incidence of miscarriages. Septate uterus can be treated by using transvaginal hysteroscopic resection of the septum, where as bicornuate uterii need an abdominal approach to perform metroplasty.

Class VI: Arcuate uterus (Diag. 5): The fundus is concave, otherwise uterus is normal. The endometrial cavity demonstrates a small concave dimple or cleft (< 1.5 c.m.). This anomaly is often consided a normal varient as it is not significantly associated with the increased risks of miscarriages.

Class VII: DES uterus (T-shaped uterus) (Diag. 6) – The female fetuses of pregnant women treated with diethylstilbestrol (DES) show uterine hypoplasia and a T – shaped uterine cavity. The DES was an estrogen analogue prescribed to prevent miscarriages from 1945-1971. The drug was later on withdrawn due to its teratogenic effects.

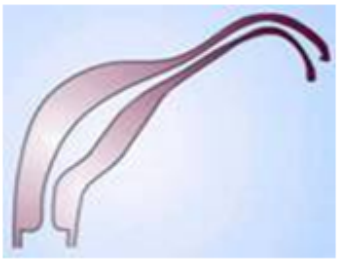


Figure 1: Class II: Unicornuate uterus

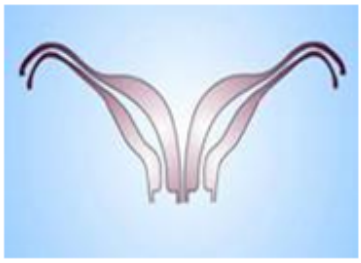


Figure 2: Class III: Didelphys uterus

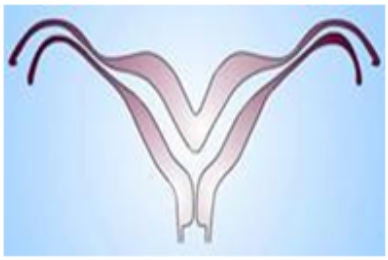


Figure 3: Class IV: Bicornuate uterus

Figure 4: Class V: Septate uterus

Figure 5: Class VI Arcuate uterus

Figure 6: Class VII DES uterus (T-shaped uterus)

Acute anteversion and cervical canal stenosis with elongated cervix are the conditions present since birth in some of the patients, which could be considered as normal variants. So also, uterine folds are normal variants that are occasionally seen at HSG. They can be caused by infolding of the luminal aspect of myometrium in an underdistended uterus. They can be seen parallel to the long axis of the uterus and can extend into the uterine horns.[5]

MATERIALS AND METHOD

The present study was carried out with due consent from the hospital ethical committee. Hysterosalpingography is a fluoroscopic study performed by instilling radiopaque dyeinto the uterine cavity via a cannula to determine

contour of the uterine cavity and patency of the fallopian tubes. It is a less invasive, reliable and the most commonly used first line of investigation in the evaluation of the female genital tract in infertility. Contraindications for the procedure are menstruation and pregnancy. Other Contraindications include current pelvic infection, a recent dilatation and curettage, endometrial carcinoma, a history of kidney problem. (as the dye used during HSG can cause kidney damage in people with poor kidney function.) or sensitivity to contrast media, or patient has asthma or allergic tendency to any medicines. In the present study all these contraindications were ruled out before performing HSG by taking detail history o patient. Between the June 2013 to June 2014, 800 patients were investigated for sterility and there HSG studies were performed ; at Bharati Vidyapeeth Deemed University's hospital and at Dhwanikiran diagnostic centre, Sangli. In the present study, we have done retrospective study of 320 hysterosalpingograms. The couples having secondary infertility were excluded. The semen analysis of all male partner's causing infertility was done and couples with male factor (i.e. pathological semen reports) were also excluded from the study. The HSG showing tubal occlusion or tubal anomalies were not included in the present study. At both the centers following technique was used to perform Hysterosalpingography. All patients were given prior appointments for HSG examinations; as procedure was performed during 7^{th} – 12^{th} day of menstrual cycle (day 1 being first day of menstrual bleeding). The endometrium is thin during this proliferative phase, a fact that facilitates image interpretation and should also ensure that there is no pregnancy. This procedure was performed on OPD basis and no specific patient preparation is required for HSG. The procedure is done before patient ovulate the next month to avoid using x-rays during early pregnancy. An informed consent was obtained from all patients where in patient was explained in detail about this procedure, a little pain factor during procedure, after effects and after care and benefits of HSG over few negligible side effects. There after patient's acceptance of this procedure was good.

Method

The patient was asked to take light lunch 2-3 hours before the procedure. Premedication given were injection atropine and ½ cc of contrast media as test dose about 20 minute before procedure. Sometimes patients may have cramping pain during HSG. To avoid it patients were given analgesic drug one hour prior to the procedure. The patient was instructed to empty her bladder before HSG. The patient was placed in supine position on fluoroscopy table in the modified lithotomy position i.e. patient was placed at the foot end of table and asked to flex her knees on abdomen and hold them with her hands. The perineum was cleaned with antiseptic solution. The patient was clinically examined to determine position of uterus and to make sure that these was no pelvic infection. The whole amount of the injected contrast agent was not more than 10 c.c. With the help of valselum and vaginal wall retractor, cervix was identified and held with the help of a tenaculum (as we found it less traumatic than valselum.) Again cervix and adjacent fornices were cleaned by antiseptic solutions. Approximately 3-4 c.c. of contrast agent (non ionic omnipaque 300) was introduced with the help of a cannula into the uterus and it's passage was observed under the fluoroscopy. Acute anterversion or retroversion was corrected as far as possible by retracting cervix. Then first film was obtained on visualization of the uterine cavity. the second film was taken after tubal passage of contrast media and its peritoneal spillage into abdominal cavity or after completion of introduction of 10 c.c. of contrast agent. The films were processed on CR system and analysed with the help of different modalities on computer softeware including magnification and window setting. Documentation was made and the findings were analysed.

OBSERVATIONS AND RESULTS

A retrospective study of 800 cases of infertility between June 2013 to June 2015 was done. Out of that 440 cases having secondary sterility and 40 cases having male factor infertility were excluded from the present study. The percentage of patient having secondary infertility was 55 % which was more than patients having primary infertility (40 %). In present study 5 % of couples were having male factor infertility. This frequency of infertility is tabulated in table no. 1 and same is graphically shown in the graph no. 1

Table 1: Types of infertility (n - 800)

Types	Types of infertility (n - 800)	
	Frequency	Percentage
Primary	320	40%
Secondary	440	55%
Male Factor	40	5%

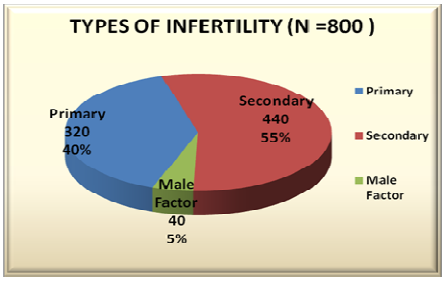


Figure 7:

In all the 320 HSG investigations in this study, the procedure was tolerate well with no post- procedural complications noted, except mild pain and slight per-vaginal bleeding in a minority of patients. The patients with primary infertility were between age of 18 to 30+ years with maximum percentage of cases. i.e. 45% belonged to age group 22 to 25 years; as shown in table no. 2 and graph no. 2

Table 2:

Age distribution of the patients (n 320)		
Age group (years)	No. of pt with primary Infertility	Percentage
18 - 21	64	20%
22 - 25	144	45%
26 - 29	90	28%
30 - +	22	7%

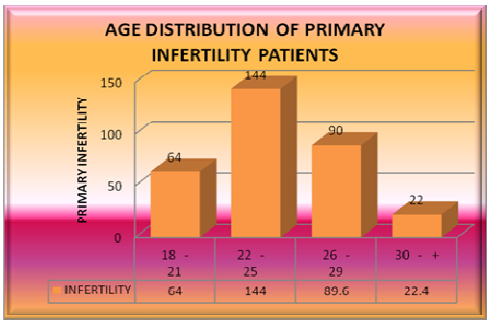


Figure 8:

Out of 320 hysterosalpingograms included in the present study, 275 were normal studies while 14.07 % HSG demonstrated uterine anomalies of congenital origin. In the present study, it was observed that bicornuate uterus was the most common abnormality of uterine shape (n=19) (5.94 %) of congenital origin as shown in table no. 3 and graph no. 3

Table 3:

Congenital Uterine Anomalies Detected By Hsg		
Types	Frequency	Percentage
Normal HSG	275	85.93%
Bicornuate unicollis uterus	19	5.94%
Unicornuate uterus	11	3.44%
Hypoplastic uterus	12	3.75%
T - shaped uterus	3	0.94%

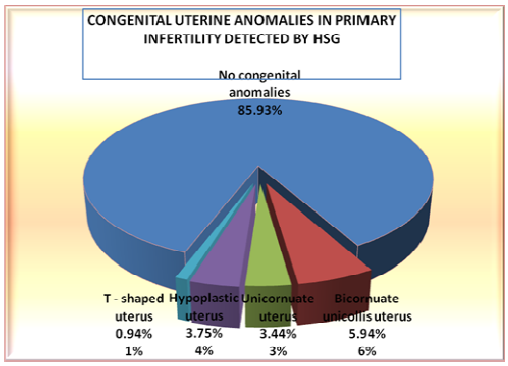


Figure 9: Types of congenital uterine anomalies

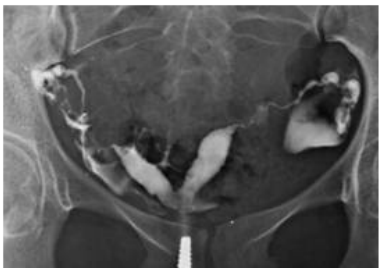


Figure 10: Bicornuate unicollis

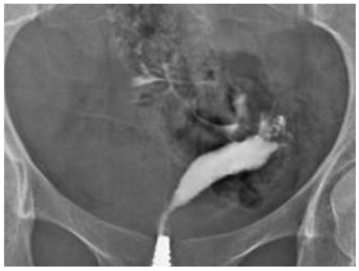


Figure 11: Unicornuate

Figure 12: Hypoplastic

Figure 13: T- shaped

Other congenital anomalies of uterus observed were unicornuate uterus (n= 11) (3.44 %), hypoplastic uterus (n= 12) (3.75 %) and T -shaped uterus in (n=3) 0.94 % of cases. We have listed four normal variants of congenital origin in table no. 4 as a separate group. Acute anteversion found in 3.13 % of cases (n=10) and arcuate uterus detected in 0.94 % of cases (n=3)

Table 4:

Normal Variants Of Congenital Origin		
Types	**Frequency**	**Percentage**
Acute Anteversion	10	3.13%
Arcuate uterus	3	0.94%
cenvical canal stenosis (with elongated cervix)	12	3.75%
Uterine folds	4	1.25%

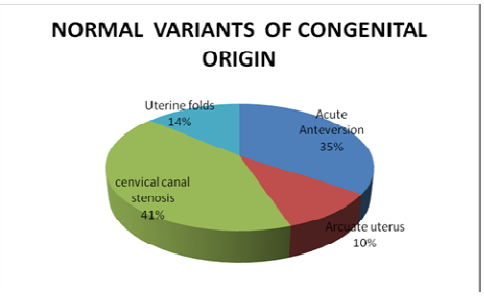


Figure 14:

Figure 14: Acute Anteversion

Figure 15: Arcuate uterus

Figure 16: Cenvical canal stenosis

Figure 17: Uterine folds

Uterine folds (with elongated cervix)

The cervical factor i.e. cervical canal stenosis with elongated cervix was found in 3.75% (n=12) cases while uterine folds were observed in 1.25 % (n=4) cases. All these conditions could be normal variations present since birth, so we feel that they need not be considered exactly as anomalous or abnormal. That is why we have grouped them in separate category.

DISCUSSION

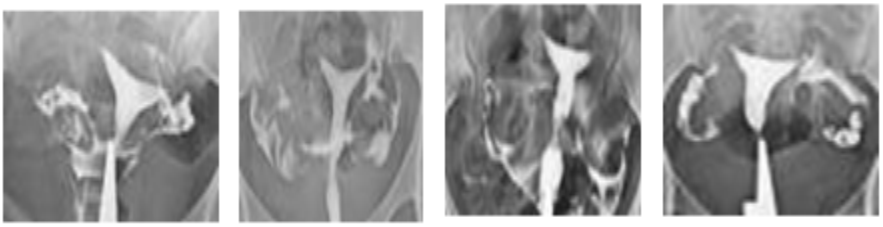
In Western Maharashtra, Hysterosalpingography is still the most commonly advised and performed first –line diagnostic test in cases of primary infertility. HSG is relatively easy to perform, low cost, well accepted and well tolerated by the patients and can be done as an outpatient procedure. HSG is fast technique and fluoroscopic time can be reduced up to two minutes[6]. Since the test films are available for interpretation, second opinion is always possible for comparison which excludes subjective error in interpretation. By enlarge HSG is considered as the best imaging modality for visualizing and evaluating the fallopian tubes and their patency[7]. However, in the present study, we do emphasise HSG s significance in the detection of congenital anomalies of uterine cavity, cervix in addition to that of fallopian tubes; which is the unique feature of this project. After completion of this study, we do feel that due importance should be given to these anomalies as many of them like uterine folds, cervical canal stenosis etc. are correctable surgically and then pregnancies can occur in these patients. There was higher percentage of secondary infertility compared to primary infertility in previous studies and this is in harmony with the findings in the present study[8,9,10,11] In a present study maximum number of infertile patients belonged to the age group of 22 to 25 years (45%), that is, in the peak of the fertile period of life ; which was comparable with the study done by Santhalia PK *et al* in Eastern Nepal.[12] However in the studies by Malwadde ek *et al*[13] and Dutta *et al*[14], the most common age group in infertility was 26 to 30 years, which is just beyond the maximum fertile stage. In the

present study, congenital uterine anomalies were observed in 14.07 % of cases, which was comparable with the study by Poonam[15] where she found uterine anomalies in 20 % of cases. In the study done by Malik E. *et al*, percentage of anomalies detected was higher i.e. 31.4%. The present study demonstrates that bicornuate uterus is the most common congenital anomaly of uterus. The same fact is supported by S. Mesbani *et al* in his study. In Western Maharashtra, the congenital uterine anomalies were found in 14.07 % cases which is statically not significant. However, their early detection by HSG has got great importance since HSG gives important clues in management of these patients e.g. in bicornuate unicollis uterus, septum can be surgically resected, in unicornuate uterus adequate preventive care can be taken after 32 weeks of gestation to prevent premature labour, in cervical canal stenosis a simple dilatation and curettage can be curative and in acute anteflexion Hypoplastic uterus needs hormonal corrections. Thus, all these measures can lead to pregnancies in infertile women. The hysterosalpingography has both therapeutic and diagnostic value. Following HSG, certain minor / mild uterine adhesions and partial tubal occlusions are lysed as well as there occurs improved patency of fallopian tubes because of flushing of tubes by contrast media[16] during examination. As a result infertile women have conceived months after HSG without any other gynecological intervention. Interestingly, an increase in pregnancy rate has been observed in the months after HSG[17]

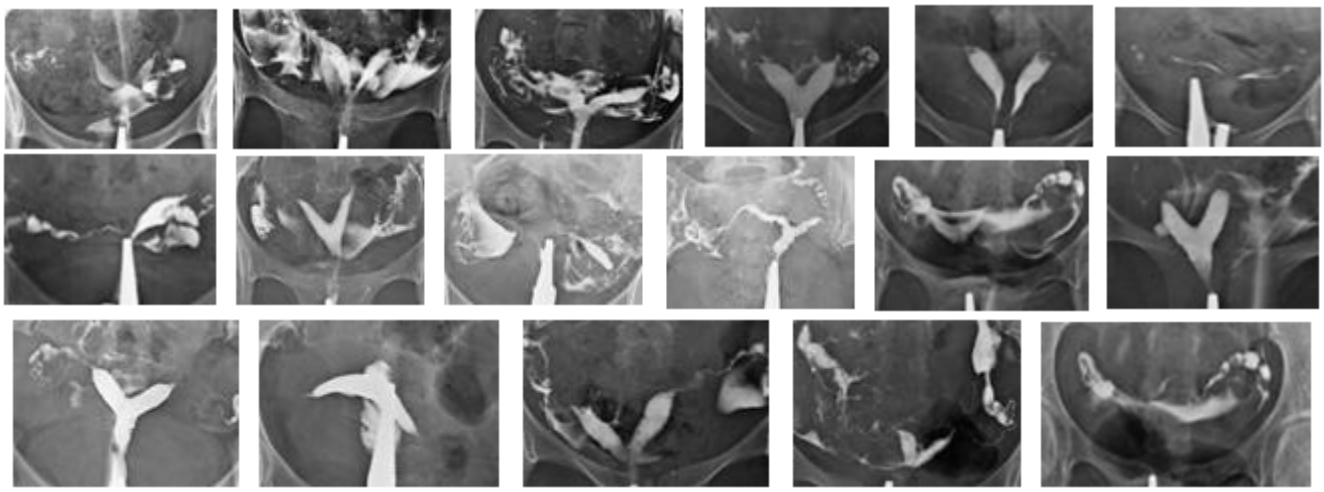
CONCLUSIONS

Hysterosalpingography is the gold – standard and cost effective method in diagnostic work-up of female patients with infertility. It is highly sensitive method of assessing the integrity of female genital tract. Despite new innovations and recent advances in imaging field, HSG remains a frontline radiographic modality in detecting tubal and uterine factors causing infertility. According to present study, the incidence of congenital anomalies of uterus as detected by HSG in Western Maharashtra is 14.07 % which is not statistically significant. Thus, our results indicate that the congenital anomalies of uterus was not the main reason for primary infertility in Western Maharashtra. But as many of them are correctable, their timely detection is very important to treat cases of infertility. With wide spread use of HSG as a basic imaging modality, there is a high probability of making accurate diagnosis of abnormalities of uterus and fallopian tubes which will lead to prompt treatment and surgical corrections wherever possible and this will in the long run decrease the high prevalence rate of female infertility. Thus it is very important that, Radiologist should become familiar with HSG technique, the interpretation of HSG images and possible complications of this procedure.

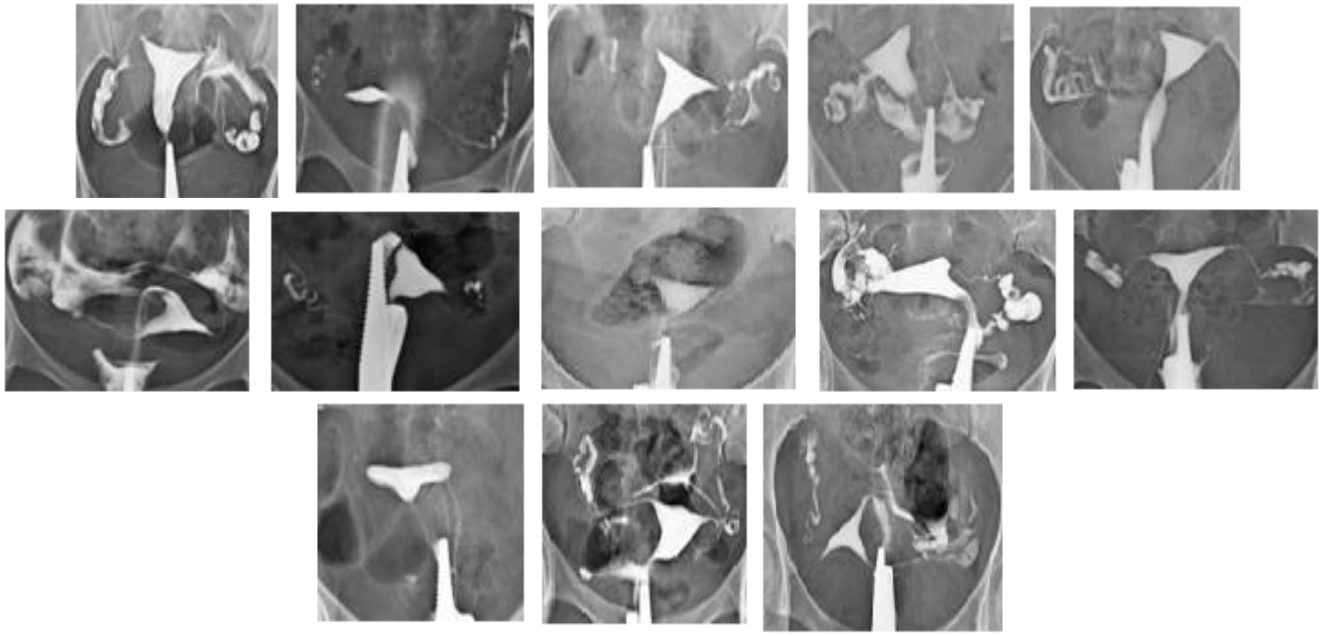
Different patients showing acute anteversion



Different patients showing intra uterine bands / folds



Different patients showing bicarnuate unicollis

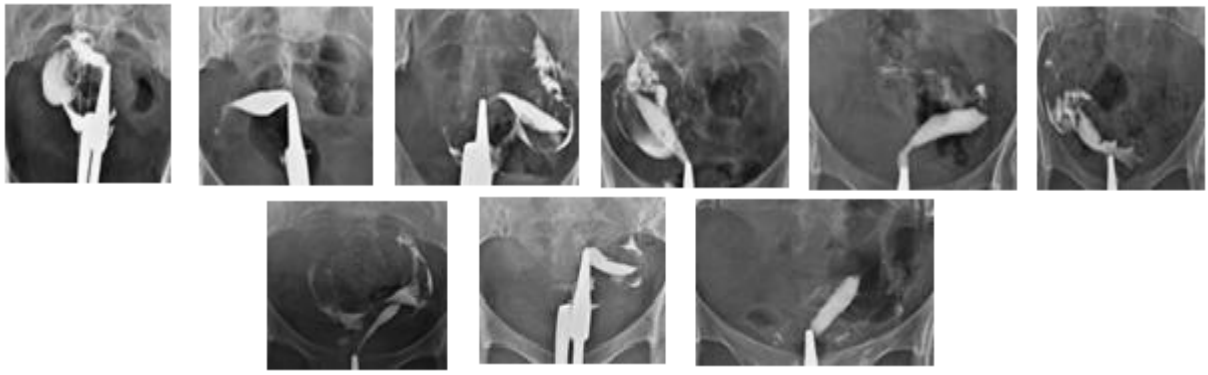


Different patients showing cervicle canal stenosis

Different patients showing arcuate uterus

Different patients showing hypoplastic uterus

Different patients showing 't'-shaped uterus



Different patients showing unicornuate uterus

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