Original Article

Role of MRI in pre-operative evaluation of obstructing reproductive tract anomalies in young girls presenting with hematometrocolpos

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Objective: To study the role of MRI in pre-operative evaluation of obstructing congenital uterine and vaginal anomalies in adolescent girls presenting with hematometrocolpos.

Methodology: This study was conducted in Radiology department, Holy family Hospital, Rawalpindi. The study included 15 adolescent female patients presenting to Radiology department with clinical of sonographic suspicion of hematocolpos or hematometra.

Results: Out of the 15 patients, 6(40%) had imperforate hymen, 5(33.3%) distal vaginal atresia, 3(20%) transverse vaginal septum and one (6.6%) had cervico-vaginal agenesis. All (100%) had hematometra while hematocolpos was seen in 14(93.3%) patients. Three(20%) patients had hematosalpinx and endometriotic cysts. MRI findings were correlated with surgical findings giving MRI a sensitivity, specificity and accuracy of 100%.

Conclusion: Congenital obstructive anomalies of uterus and vaginal were diagnosed accurately with MRI. It is the investigation of choice in determining the accurate pre-operative level of obstruction and associated uterine anomalies. (Rawal Med J 202;45:148-153).

Keywords: Magnetic Resonance Imaging (MRI), imperforate hymen, vaginal atresia, vaginal septum, cervical agenesis.

INTRODUCTION

Congenital obstructive anomalies of uterus and vagina have a varying clinical presentation and can occur at multiple levels.[1] Congenital anomalies of uterus and vagina have a prevalence of 0.3 to 10%.[2,3] The incidence of obstructive reproductive tract anomalies ranges from 0.1%-3.8%.[4] Female reproductive tract obstruction can result in blood accumulating in endometrial and vaginal cavities referred to as hematometra and hematocolpos, respectively. Hematometrocolpos is a rare anomaly of pediatric and adolescent females with atypical presentation like constipation, cyclical lower abdominal pain and urinary retention in setting of primary amenorrhea.[5] Congenital causes of female genital tract obstruction are imperforate hymen, vaginal atresia, transverse vaginal septum, cervico-vaginal atresia and acquired vaginal stenosis.[6]

Uterus, cervix, fallopian tubes and upper two thirds of vagina embryologically arise from paired Mullerian ducts and lower one third of vagina including the hymen arises from urogenital sinus.[7] Ovarian development on the other hand is not related to Mullerian ducts and is therefore spared in congenital genital tract outflow anomalies.[8] If untreated, obstructing reproductive tract anomalies can result in hematosalpinx and recurrent endometriosis. Thus correct and timely diagnosis is crucial to avoid these complications.[9]

Failure of canalization of urogenital sinus results in imperforate hymen accounting for 0.1% cases of hematocolpos presenting at puberty.[4,10,11] It usually presents at puberty with amenorrhea and cyclical pain.[12] Transverse vaginal septum is a rare obstructive reproductive tract anomaly and has a reported incidence of 2 in 100,000 female live births.[13] It is commonly seen in upper vagina but can occur at any level in vagina.[14] Thickness of these septa varies but usually are < 1 cm thick with more thick septa commonly occurring near the cervix.[15] Vaginal atresia can result in utero vaginal outflow obstruction.[16,17] It is a condition in which the lower one third of vagina fails to form and is replaced by fibrous tissue.[18]

MRI, due to its multiplanar multisequential capabilities, large FOV (field of view), soft tissue contrast, and lack of ionizing radiation, remains the preferred investigation of choice in pre-operative

evaluation of congenital obstructive genital tract anomalies. The aim of this study was to study the role of MRI in pre-operative evaluation of obstructing congenital uterine and vaginal anomalies in young girls presenting with hematocolpos and/or hematometra.

METHODOLOGY

This study was conducted in department of Radiology, Holy Family Hospital, Rawalpindi after its approval from the ethical committee of Rawalpindi Medical University. It included 15 adolescent females with suspicion of obstructive uterine or vaginal anomalies on colposcopic examination and ultrasonography presenting to us over a period of one year from October 2017 to September 2018. An informed consent was taken from all patients.

Their medical record evaluated. All patients had an MRI examination of pelvis in 1.5T GE machine. Fast spin echo (FSE) sagittal T1WI and fat suppressed T2WI images of pelvis was obtained followed by fast spin echo (FSE) T2WI and fat suppressed T2WI coronal and axial T2WI of pelvis. Finally axial and coronal T2WI of abdomen were taken to evaluate the kidneys. MRI scans were evaluated to look for the detailed anatomy of reproductive tract, congenital anatomical variations, signal intensities of collections either in vaginal and uterine cavities, ovaries and fallopian tubes. Associated renal anomalies were also evaluated. Findings of MRI examination were then correlated with the surgical findings. Follow up ultrasound was done in all patients.

RESULTS

The study had 15 adolescent females with mean age of 14.2±1.5 years. Presenting complaint was primary amenorrhea in 11 patients, cyclical lower abdominal pain in 2 patients and lower abdominal pain with hypogastric mass in 2 patients. Out of the 15 patients, 6 (40%) had imperforate hymen, 5(33.3%) had vaginal atresia, 3(20%) had transverse vaginal septum and 1(6.6%) had cervico vaginal atresia (Table).

Table. MRI and Colposcopic findings in 15 study patients.

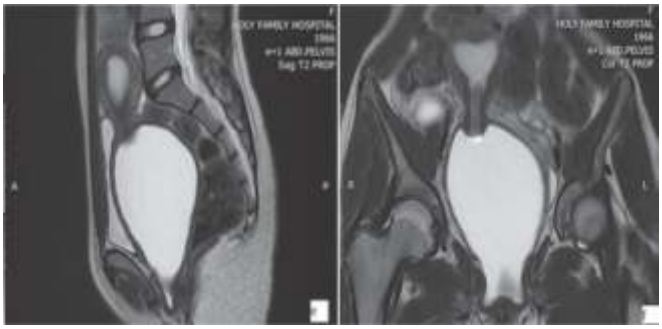
S.N.	MRI findings	Signal intensity of hematocolpos/ hematometra on T1WI	Signal intensity of hematocolpos/ hematometra on T2WI	Colposcopic findings	Diagnosis	Associated anomalies
1.	Unicornuate uterus .Absent right horn. Distended left horn and upper vagina representing hematometra and hematocolpos. Atresia of distal vagina. Malrotated left kidney.	Hyperintense	Hyperintense	Small introitus with a small narrow pouch at the site where vaginal opening should be present	Vaginal atresia	Malrotated left kidney
2.	Uterine morphology normal. Hematometra with Hematocolpos .Imperforate hymen.	Hyperintense	Hypointense	Inferiorly bulging imperforate hymen	Imperforate hymen	No
3.	Uterine morphology normal. Hematometrocolpos. Left hematosalpinx. Left endometriotic cyst. Distal transverse vaginal septum	Hyperintense	Hypointense	Transverse inferiorly bulging vaginal septum	Transverse vaginal septum	No

S.N.	MRI findings	Signal intensity of hematocolpos/ hematometra on T1WI	Signal intensity of hematocolpos/ hematometra on T2WI	Colposcopic findings	Diagnosis	Associated anomalies
4.	Well defined uterine corpus with hematometra. Agenesis of cervix and upper vagina	Hyperintense	Iso to hypointense	Small introitus with small vaginal canal and poorly developed cervix	Cervico-vaginal Atresia	No
5.	Uterine morphology normal. Hematometra with Hematocolpos. Imperforate hymen.	Hyperintense	Iso to hypointense	Inferiorly bulging imperforate hymen	Imperforate Hymen	No
6.	Uterine morphology normal. Hematocolpos. Hematometra with transverse vaginal septum in the distal vagina.	Hyperintense	Hypointense	Transverse inferiorly bulging vaginal septum	Transverse Vaginal Septum	No
7.	Unicoruate unicollis uterus. Hematocolpos. Hematometra. Left sided hematosalpinx. Left endometriotic cyst. Hypoplastic distal vagina.	Hyperintense	Hyperintense	Dimple at the expected site of vagina	Vaginal Atresia	No
8.	Uterine morphology normal. Hematometra with Hematocolpos. Imperforate hymen.	Hyperintense	Hyperintense	Inferiorly bulging imperforate hymen	Imperforate Hymen	No
9.	Uterine morphology is normal. Hematometra. Bilateral hematosalpinx. Bilateral endometriotic cysts. Atretic vagina.	Hyperintense	Hypointense	Shallow depression at the anatomical location of vagina	Vaginal Atresia	No
10.	Uterine morphology is normal. Hematometra. With Hematocolpos. Imperforate hymen.	Hypointense	Hyperintense	Inferiorly bulging imperforate hymen	Imperforate Hymen	No
11.	Uterine morphology is normal, hematometra with hematocolpos. Centrally interrupted transverse vaginal septum in distal vagina	Hyperintense	Hyperintense	Inferiorly bulging transverse vaginal septum with central defect.	Transverse vaginal septum	No

S.N.	MRI findings	Signal intensity of hematocolpos/ hematometra on T1WI	Signal intensity of hematocolpos/ hematometra on T2WI	Colposcopic findings	Diagnosis	Associated anomalies
12.	uterine morphology normal. Hematometra. With Hematocolpos. Imperforate hymen.	Hypointense	Hyperintense	Inferiorly bulging imperforate hymen	Imperforate Hymen	No
13.	Normal uterine morphology. Hematometra. Hematocolpos. Atretic distal vagina.	Hyperintense	Hyperintense	Small introitus with a small narrow pouch at the site where vaginal opening should be present	Vaginal Atresia	No
14.	Normal uterine morphology. Hematometra.	Hyperintense	Hyperintense	Inferiorly bulging imperforate hymen	Imperforate Hymen	No
	Hematocolpos. Imperforate hymen.					
15.	Normal uterine morphology. Hematometra. Hematocolpos. Vaginal atresia	Hyperintense	Hyperintense	Dimple at the expected site of vagina	Vaginal Atresia	No

All 15(100%) patients had hematometra while hematocolpos was seen in 14(93.3%) patients. Three(20%) patients had hematosalpinx and endometriotic cysts. Hematocolpos, hematometra and endometriotic cysts showed variable signal intensities on T1WI and T2WI. Hematocolpos and hematometra showed T1 hyperintense signal in 13(86.6%) and T1 hypointense signal in 2(13.3%) patients while 4(26.6%) patients showed hypointense signal, 2(13.3%) patients iso-hypointense signal and 7(46.6%) patients showed hyperintense signal T2 weighted images. Ovaries were well demonstrated in all study patients. Normal uterine morphology was seen in 13(86.7%) out of 15 study patients while 2(13.3%) patients had unicornuate uterus with rudimentary horn. In all patients MRI correctly identified the cause and level of obstruction on correlation with surgical findings giving it a sensitivity, specificity and accuracy of 100%.

Fig. Hematometrocolpos with imperforate hymen.



All the six patients (40%) with imperforate hymen had hematocolpos and hematometra with inferiorly bulging of imperforate hymen well demonstrated both on MRI as well as colposcopy (Fig 1). All these patients had normal uterine morphology.

DISCUSSION

At present, no standard classification system exists for congenital obstructive uterine and vaginal anomalies. Classification system currently used is by the American Society of Reproductive

Medicine.[19] This is mainly based on uterine abnormalities. Lower 1/3rd of vagina and hymen are not included in this classification system. Since obstructive genital tract anomalies occur at different levels with different embryological origin, correct diagnosis of level of obstruction is crucial for management.

Imperforate hymen has a prevalence of 0.1%.[20] MRI is usually not advised once the diagnosis is made on colposcopy. MRI however can tell about the lowest level of bulge and differentiate it from vaginal atresia and transverse vaginal septum.[21] In our study, six patients had imperforate hymen for which they underwent Hymenectomy and had complete resolution of obstruction on follow up.

Distal vaginal atresia and transverse vaginal septum are believed to constitute segmental vaginal obstruction. A study by Deligeoroglou et al found that 46% patients had transverse vaginal septum in upper 1/3rd, 40% in middle 1/3rd and 14% in lower 1/3rd of vagina.[22] Some authors consider distal vaginal atresia as a thick transverse septum while others consider them as two different entities. MRI is important in demonstrating the level and the length of atretic segment and transverse vaginal septum. In present study, five (33.3%) patients had distal vaginal atresia and 3 (20%) had transverse vaginal septum. In all these cases, MRI correctly diagnosed the level and length of obstruction which correlated with the surgical findings.

Cervico-vaginal agenesis constitutes vaginal agenesis along with cervical malformation. Anomalies of genitourinary tract can occur in association with it. In present study, one (6.6%) patient had cervico-vaginal atresia. Colposcopy showed small atretic vagina and underdeveloped cervix in this patient. This patient underwent repeated cervical and vaginal canal dilatation.

According to American Society of Reproductive Medicine classification, unicornuate uterus falls in type IIb category.[19] On ultrasound, at times it can be difficult to demonstrate. MRI is very important in diagnosis of unicornuate uterus assuming a curved, elongated morphology having banana like configuration of external contour of uterus.[23] Hematometra is usually seen in the center of rudimentary horn. Our results are similar to already published studies.[21,24]

CONCLUSION

Congenital obstructive reproductive tract anomalies usually present at puberty and should be diagnosed early in order to preserve reproductive function and avoid complications. MRI due to its imaging advantages and high accuracy is the investigation of choice in determining the cause and level of obstruction and associated uterine anomalies.

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Conflict of Interest: None declared
Rec. Date: Oct 29, 2018 Revision Rec. Date: Nov 20, 2019 Accept Date: Dec 6, 2019

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