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ROLE OF HYSTEROSALPINGOGRAPHY AS A SIMPLE TOOL IN THE DIAGNOSIS OF UTEROTUBAL CAUSES OF INFERTILITY IN A DEVELOPING COUNTRY SETTING

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ABSTRACT

Objective: The objective of the study was to evaluate the role of hysterosalpingography in the diagnosis of utero-tubal causes of infertility.

Material and Method: All hysterosalpingograms taken for infertility from July 2000 to June 2001 at the Federal Medical Centre Gombe were analysed for utero-tubal and pelvic pathologies as seen on radiological examination.

Result: One hundred and forty one hysterosalpingograms were reviewed for cervical, uterine, tubal and pelvic pathologies. In 100 (70.9%), the HSG was able to detect some abnormality. The abnormalities were usually multiple. Synaechiae accounted for 28.4% and 19.9% of cervical and uterine pathologies respectively, followed by uterine fibroids in 9.2% of cases. In 38.3% of cases, the tubes were blocked with the cornua being the commonest site of blockage. There was a 4:1 ratio between right-sided and left-sided distal tubal block, with equal cornual involvement on both sides. There were 10 (7.1%) cases of hydrosalpinges. Twenty patients (14.2%) had dye loculation in the pelvis, suggestive of pelvic adhesions, mainly perifimbrial. There were statistically significant associations between cervical and uterine synaechiae, and between uterine synaechiae, uterine fibroids and tubal block.

Conclusion: Hysterosalpingography remains an important and invaluable tool in defining utero-tubal causes of infertility. Hysteroscopy and laparoscopy are recommended to complement HSG in further evaluating uterine synaechiae and pelvic adhesions respectively, considering their high prevalence.

Key Words: Hysterosalpingography, utero-tubal, infertility.

INTRODUCTION

Infertility is a symptom rather than a disease; it is hence necessary to identify the definite cause(s) of the infertility in order to institute appropriate intervention. It may be sequel to a pelvic inflammatory disease[1]. Indeed for most developing countries of the tropics, poorly managed pelvic inflammatory disease and its sequelae are probably responsible for most cases of female factor infertility. These would usually give rise to utero-tubal as well as pelvi-peritoneal causes of infertility. Improperly carried out instrumentation with cervico-uterine consequences may also be a common contributory factor.

Hysterosalpingography (HSG) has been extensively, used in the past to exclude anatomic factors of failure to conceive of either congenital or acquired aetiology[2, 3,4]. Although it is usually performed as a [6] diagnostic procedure, HSG may also be therapeutic. This therapeutic effect is possibly achieved by mechanical release of small intra-tubal obstruction; release of peritubular adhesions, stimulation of mucosal cilia and an effect on the cervical mucus may occur with oil and water soluble contrast media[5,] Hysteroscopy and laparoscopy have long been used along with HSG as complementary diagnostic tools without replacing it, due to their inherent limitations[7]. More recently however, techniques have been developed that may seek to replace, at least in part, the role of HSG as a diagnostic tool in the investigation of infertility. Partly because the procedure is painful, invasive, may flare up latent infection and involves exposure to irradiation[8,9]. These include falloscopy, tuboscopy, sonohysterosalpingography, colour doppler and magnetic resonant imaging[10-15]. But, the insufficiency of highly skilled manpower and funds in the developing parts of the world may limit greatly the use of these sophisticated techniques in the investigation of infertility. Hence, the current need to

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re-evaluate the place of HSG in identifying utero-tubal and pelvic causes of infertility. The study was aimed at identifying the role of hysterosalpingography in the evaluation of utero-tubal causes of infertility.

METHODOLOGY

All hysterosalpingograms taken for infertility from July 2000 to June 2001 at the Federal Medical Centre Gombe were reviewed by the authors together and analysed for utero-tubal and pelvic pathologies. The HSG were taken using standard technique described by Chapman and Nakielny[16].The procedure is conducted by the radiologist, sometimes with a resident gynaecologist in attendance. Films are taken using ceiling-suspended X-ray machines without facility for fluoroscopy. A scout anterio-posterior (AP) film of the pelvis taken and an aseptic pelvic examination performed. The external cervical os is exposed with a Cusco's speculum under good illumination and inspected for erosion or discharge that may contraindicate the procedure. The anterior lip of the cervix was grasped with a Volsellum forceps and the uterine cavity sounded to estimate its capacity. A 20ml syringe filled with 76% Urografin is attached to a Wilkinson's canula. After expelling the air column, this is introduced into the cervical canal just deep enough to retain the canula. The speculum is removed, a film place in the under couch and the patient positioned for the AP view pelvic radiograph. The contrast medium is injected slowly and the patient observed for the sign of pain or discomfort, signifying uterine distension, an exposure s made at this point. The film is processed and reviewed in the the dark room immediately and this step is repeated with the patient subsequently in the right and right oblique views. The canula and forceps are removed, the patient is asked to walk around for five minutes and another APdelayed film is taken. SPSS version 9.0 statistical package was used for frequency analysis and test of significance using chi-square.

RESULTS

One hundred and forty-one hysterosalpingograms were reviewed for cervical, uterine, tubal and pelvic pathologies. Table 1 shows that 42 patients (29.8%) had detectable cervical abnormality on HSG, 95.2% (40/42) of this were accounted for by cervical synaechiae. There were 47 women (33.3%) with HSG-detected uterine abnormalities, ranging from uterine synaechiae as the commonest abnormality accounting for 59.6% (28/47) of uterine abnormalities, to contracted uterus which was detected in only one patient. The extrauterine masses occurred as filling defects in one or other adnexum shifting the uterus to the contra-lateral side.

Table 2 shows the influence of cervical synaechiae on the occurrence of uterine synaechiae and tubal disease. Significantly more patients with cervical synaechiae had uterine synaechiae (21/38) compared to those who had a normal cervix (7/74). There was no statistically significant association between cervical synaechiae and the detection of tubal block. The prevalence of tubal disease is shown on table 3. There were 54 patients (38.3%) with tubal block. The blocks were most commonly bilateral (21/54 = 38.9%), there was no significant difference between exclusively occurring right (12.1%) and left tubal block (11.3%), $X^2 = 0.03$, df = 1, p = 0.85. Cornual block was the most common site of tubal blockage on both sides accounting for 19.9% and 19.1% on the right and left respectively. There was no statistically significant difference in the prevalence of cornual block between the right and left tubes (Yates' corrected $X^2 = 0.02$, p = 0.88). And although there was a ratio of 4:1 for right distal tubal blocks compared to the left, this was not found to be statistically significant (Yates' corrected $X^2 = 0.81$, p = 0.37). There was also twice as much hydrosalpinges occurring exclusively on the right than on the left, overall only 10 patients (7.1%) had hydrosalpinges and these were bilateral in 4 cases (4/10 = 40%). Again, there was no statistically significant difference between exclusively occurring right (2.8%) from left (1.4%) hydrosalpinges, $X^2 = 0.17$, df = 1, p = 0.68. In 21 cases (14.9%) where there were bilateral cornual or proximal tubal block, it was not possible to detect the presence or otherwise of hydrosalpinges on HSG.

Table 4 shows the effect of uterine synaechiae on tubal factors. Significantly more patients with uterine synaechiae had tubal block (15/29) compared to those with normal uteri (26/85). The prevalence of tubal block was also significantly greater in patients who had uterine fibroids (12/18) than in those with normal uteri. There was no statistically significant difference between patients with uterine synaechiae and those who developed peritoneal adhesions and hydrosalpinges.The evidence of peritubal adhesions, as indicated by peritubal dye loculation, was seen in 21 patients (14.9%) of which 31.1% (8/21) were bilateral without much difference in exclusively occurring right or left peritubal adhesions (table 5). It was not possible to detect peritubal and/or pelvic adhesions in those patients where there was no dye spillage into the pelvis, 17.7% (25/141), which may be due to bilateral tubal block or spasm. Dye reflux occurred in 57 patients (40.4%) and was marked in 16 of these (16/57 = 28.1%). There were HSG-detectable abnormalities in 100 patients (70.9%). Of these there were 10, 21, 42, 47 and 54 cases of hydrosalpinges, peritubal adhesions, cervical factors, uterine factors and tubal block respectively. Multiple pathologies were the rule.

Dye reflux was significantly associated with patients who had cervical synaechiae (P = 0.01) with 8 out of 40 patients with uterine synaechiae exhibiting severe dye reflux against 7 out of 99 patients with normal cervices. Tubal block is significantly associated with dye reflux, 11 of 54 patients with tubal block had severe dye reflux compared to 5 out of 87 with patent tubes. There was no statistically significant association between dye reflux and uterine synaechiae, hydrosalpinges or peritubal adhesions as shown on table 6.

Table 1: **Cervical and Uterine Factors.**

	Frequency	%
Cervical		
Normal	99	70.2
Synaechiae	40	28.4
Stenoses	2	1.4
Total	**141**	**100**
Uterine		
Normal	94	66.7
Synaechiae	28	19.9
Submucous fibroid	11	7.8
Intramural fibroid	5	3.5
Extrauterine mass	2	1.4
Contracted uterus	1	0.7
Total	**141**	**100**

Table 2: **Effect of Cervical Synaechiae on Uterine and Tubal Factors.**

Cervix	Uterus		
	Normal	**Synaechiae**	**Total**
Normal	67	7	74
Synaechiae	17	21	38
Total	84	28	112
	X^2 = 28.09, P = 0.0000001		
	Fallopian Tubes		
	Patent	Blocked	Total
Normal	63	36	99
Synaechiae	24	16	40
Total	87	52	139
	X^2 = 0.16, P = 0.69		

Table 4: **Effect of Uterine Factors on Tubal Disease.**

Uterus	Fallopian Tubes		
	Patent	**Blocked**	**Total**
Normal	59	26	85
Synaechiae	14	15	29
Total	73	41	114
		X^2 = 4.19, P = 0.04	
Normal	59	26	85
Fibroid	9	12	18
Total	65	38	103
		X^2 = 8.30, P = 0.004	
		Peritubal Adhesions	
Normal	Free	Adhesions	Total
Synaechiae	61	18	99
Total	17	4	21
	78	22	100
		X^2 = 0.14, P = 0.71	
		Hydrosalpinges	
	No	Yes	Total
Normal	72	8	80
Synaechiae	20	2	22
Total	92	10	102
		X^2 = 0.2, P = 0.90	

Table 3: **Tubal Factors**

Factors	Frequency	%
Tubal Patency		
Bilateral	87	61.7
Nil (bilateral block)	21	14.9
Right	17	12.1
Left	16	11.3
Total	**141**	**100**
Right block		
Nil (patent)	95	67.4
Cornual	28	19.9
Forced spillage	8	5.7
Distal	4	2.8
Proximal	3	2.1
Spasm	3	2.1
Total	**141**	**100**
Left block		
Nil (patent)	96	68.1
Cornual	27	19.1
Forced spillage	8	5.7
Spasm	7	5.0
Proximal	2	1.4
Distal	1	0.7
Total	**141**	**100**
Hydrosalpinges		
Nil	110	78.0
Not detectable	21	14.9
Bilateral	4	2.8
Right	4	2.8
Left	2	1.4
Total	**141**	**100**

Table 5:**Dye Reflux, Pelvi-Peritoneal Factors and Hsg-Detected Abnormalities.**

	Frequency	%
Peritubal Adhesions		
Nil	95	67.4
Not detectable	23	16.3
Bilateral	8	5.7
Right	7	5.0
Left	6	4.3
Total	**141**	**100**
Dye in pelvis		
Free	88	62.4
Nil	25	17.7
Loculated	21	14.9
Scanty	7	5.0
Total	**141**	**100**
Dye reflux		
Nil	84	59.6
Mild	41	29.1
Marked	16	11.3
Total	**141**	**100**
HSG-detected abnormality		
Yes	100	70.9
No	41	29.1
Total	**141**	**100**
Types of abnormality*		
Hydrosalpinges	10	7.1
Peritubal adhesions	21	14.9
Cervical	42	29.8
Uterine cavity	47	33.3
Tubal block	54	38.3

*There were cases with multiple abnormalities.

Table 6: **Factors Affecting Dye Spillage/Reflux.**

Cervix	Dye Reflux			
	Nil	Mild	Marked	Total
Normal	66	26	7	99
Synaechiae	17	15	8	40
Total	83	41	15	139
			X^2 =8.42, P = 0.01	
Uterus				
Normal	51	25	9	85
Synaechiae	13	11	4	28
Total	64	36	13	113
			X^2 =1.58, P = 0.45	
Fallopian Tubes				
Patent	56	26	5	87
Blocked	28	15	11	54
Total	84	41	16	141
			X^2 = 7.21, P =0.03	
Hydrosalpinges				
No	68	34	8	110
Yes	8	2	0	10
Total	76	36	8	120
			X^2 =1.57, P = 0.45	
Peritubal Adhesions				
No	59	30	6	95
Yes	15	6	2	23
Total	74	36	8	118
			X^2 =0.37, P = 0.83	

DISCUSSION

Tubal disease remains the most important factor in female infertility[17]. In sub-Saharan Africa, tubal disease as a cause of infertility arises mainly from poorly treated pelvic infection[18], while in some populations; tuberculosis is a major cause of tubal disease[19]. HSG has been widely used in the diagnosis of both congenital and acquired uterine and/or tubal causes of infertility[2-4]. The role of HSG in diagnosing these causes of infertility is further buttressed in this study where HSG diagnosed utero-tubal and pelvic abnormalities as playing a role in the causation of infertility in 70.9% of cases, with multiple pathologies as the rule. Indeed, HSG has been reported to have a high sensitivity value in the detection of tubal lesions[20, 21], although Stewart et al. (1995) [22] asserted that it is only highly specific in excluding tubal obstruction, but of low sensitivity in detecting tubal patency. The commonest detectable disorders in this study were in the fallopian tubes 38.3%, followed by uterine factors 33.3% with cervical and pelvi-peritoneal abnormalities of 29.8% and 14.9% respectively. Dhaliwal et al (1999)[23], reported higher cases of tubal disease affecting 89.2% of infertile women and a lower uterine factor of 9.4%, whereas the prevalence of pelvi-peritoneal abnormalities of 12.7% was similar to our observation in this study.

The tubal block was most commonly bilateral, with the cornual being the most common site on both sides. It has been asserted that appendicitis could lead to ipsilateral salpingitis[24], this may lead to tubal block occurring significantly more on the right than left side of the tubes, a phenomenon that may be ascribed to the proximity of the right tube to the appendix. However, this study shows that when considered in its totality, there is no difference between exclusively occurring right from left tubal block. But, when the site of the tubal block was taken into account, it became obvious that there was a difference between right and left distal blockage of a ratio 4:1, while the prevalence of right and left cornual blockage were 19.9% and 19.1% respectively. However, this was not statistically significant.

The phenomenon may probably be because proximity of the right distal portion of the tube to the inflamed appendix may result in exclusive involvement of the fimbrial end of that tube with sparing of its cornual end and the whole of the left tube. This may also explain why there were twice as much hydrosalpinges on the right as on the left in the 10 (7.1%) patients with hydrosalpinges, 40% (4/10) of which were bilateral. However, this study did not evaluate a history of previous appendicitis or appendicectomy in these patients. Conversely, cornual tubal block may most likely arise from an endometritis that is unlikely so spare any side, thus resulting in equal involvement of both tubes. Synaechiae were the commonest abnormality in the uterus and cervix, 95.2% of HSG-detected cervical abnormalities were due to cervical synaechiae. This may most probably be due to poorly managed dilatation and curettage, but may arise from chronic cervicitis, which may be a precursor or even sequel to a pelvic inflammatory disease. On the other hand, 33.3% of the patients had HSG-detected uterine abnormalities, which were mostly also due to uterine synaechiae that may similarly arise from poorly managed dilatation and curettage and /or poorly treated pelvic infection particularly endometritis. Strange enough, the dilatation and curettage may have been performed as an erroneous treatment for infertility or to terminate a previously unwanted pregnancy. The prevalence of HSG-detected uterine abnormalities was much lower than the 63.1%[25] reported from Taiwan. It has been shown that HSG is a specific, though not, sensitive predictor of uterine pathology[26]. The extrauterine masses that occurred as filling defects in one or other adnexum shifting the uterus to the contra-lateral side may be due to uterine fibroids or ovarian masses and be more specifically diagnosed by ultrasonography or at laparoscopy.

There were statistically significant associations in the occurrence of pathologies in different parts genital tract, which may imply a similarity in aetiology. Both cervical and uterine synaechiae may arise secondary infection and/or poorly performed dilatation and curettage. However, the close association noted between patients with cervical and uterine synaechiae, to the exclusion of tubal block, probably

incriminates that trauma such as over zealous dilatation and curettage rather than infection, is the main aetiological factor. This is usually pregnancy related, particularly post-abortal cureatage[27]. In Asherman's original description, uterine synaechiae is associated with stenosis at the level of the internal cervical os[28]. The statistically significant association between uterine synaechiae and uterine fibroids with tubal block may further signify the preponderance a mechanical aetiology in the uterus resulting in cornual involvement. This is buttressed by the absence of a significant association with hydrosalpinges and peritubal adhesions, as these are more likely to arise from a separate aetiology (pelvic inflammatory disease), which may not leave an untoward effect on the uterus as much as on the tubes and the pelvic peritoneum.

CONCLUSION

Hysterosalpingography remains a central tool for the investigation of female infertility, particularly in sub-Saharan Africa where tubal disease is still a major pathological factor. Its value in defining utero-tubal causes of infertility makes it the primary investigation in our environment. With the high prevalence of uterine synaechiae and pelvic adhesions, the complementary use of hysteroscopy and laparoscopy is particularly valuable in further evaluating the uterine and pelvic cavities respectively.

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