



LOWER ABDOMINAL SURGERIES AMONG WOMEN WITH INFERTILITY: HSG IMAGING FINDINGS

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ABSTRACT

Objective: To ascertain the various lower abdominal surgeries undergone by women with infertility prior to referral for HSG and document the various uterine and tubal abnormalities detected during the HSG procedure. **Methodology:** This is a prospective and analytical study of 157 women referred for hysterosalpingography on account of infertility. History of previous lower abdominal surgeries were obtained. Both ethical clearance and informed consent were obtained prior to the study. Analysis was with simple frequency, measures of central tendency and dispersions, and crosstabulation; using the Statistical Package for Social Sciences. **Result:** A total of 157 had positive history of lower abdominal surgery. Out of this total, 155 (98.7%) were able to identify clearly the surgery they underwent, while 2(1.3%) were not. Within the various subgroups of patients with single lower abdominal surgery only, intrauterine adhesions occurred most frequently among patients with CS 4(50%), followed by myomectomy 2(28.6%) and D&C 2(7.7%); while tubal abnormalities occurred in highest frequency among those with history of laparotomy 3(75%), D&C 15(57.7%), myomectomy 3(42.9%), appendectomy 6(40.0%), and CS 3(37.5%). Among those with multiple surgeries, intrauterine adhesions occurred commonest among patients with D&C, myomectomy and CS 1(100%), CS and appendectomy 1(50%), D&C and CS 3(21.4%), while tubal abnormalities occurred more frequently among those with myomectomy and laparotomy 1(100%), D&C and myomectomy 7(77.8%), multiple D&C 22(59.5%), D&C and appendectomy 11(57.9%). **Conclusion:** The patients were commonly aware of the lower abdominal surgeries undergone. Intrauterine and tubal pathologies were common among infertile women with lower abdominal surgery, hence special attention should be paid to the medical and surgical management of women of child bearing age.

KEYWORDS: Lower abdominal surgery, intrauterine adhesions, tubal abnormalities.

INTRODUCTION

Infertility constitutes a challenge to the propagation of human life. As a result, it is of both regional and global concern.^[1] In our clime, female infertility is of particular concern as infertility among couples is commonly attributed to the female partner.^[2]

The uterus and fallopian tubes play key roles in female fertility. Some women with infertility might have undergone some lower abdominal surgical interventions prior to or during the period of infertility. Examples of such interventions include myomectomy, cesarean section (CS), dilatation and curettage (D&C), appendectomy, ovarian cystectomy and laparotomy. Such interventions might be part of the management of infertility or for different indications. Surgeries

involving the uterus such as CS, myomectomy, and D&C could result in various uterine abnormalities,^[3-6] On the other hand, surgical interventions involving the pelvic cavity as in CS, myomectomy, appendectomy, and laparotomy, might lead to pelvic inflammation which may directly or indirectly affect the tube(s) causing tubal abnormalities.^[7] The uterine and tubal abnormalities may cause infertility or complicate an already existing infertility condition.

Hysterosalpingography (HSG) is a radiological procedure that is commonly deployed in the early investigation of the uterus and fallopian tubes in women with infertility.^[6] When compared to hysteroscopy as the gold standard for diagnosis of intrauterine adhesions, HSG has a 75% sensitivity and a 95% specificity,^[8-10]

and when compared to laparoscopy as the gold standard for the diagnosis of tubal patency, HSG is considered to have a sensitivity of 72–85% and a specificity of 68–89%.^[11]

Just like other important medical histories in clinical practice, obtaining the history of lower abdominal surgery as well as the name of the particular surgery undergone by the patients, help the radiologist in preparation for the HSG procedure and in the proper interpretation of the HSG images obtained. Proper communication of the nature of the intended procedure from the surgical unit to the patient constitutes an important part of informed consent.^[12] It also enables the patient to communicate the same to the radiologists and this enhances further proper management of the patient.

Some authors have documented the various forms of abnormalities likely to be detected on HSG investigation of the uterus and tubes in women who have undergone certain lower abdominal surgical procedures. The abnormalities seen in HSG of women with uterine surgeries include intrauterine adhesions, uterine diverticulum, small uterine cavity size and abnormal uterine shape.^[3-4,5-6] On HSG, intrauterine adhesions may appear as irregular linear filling defects in the cervical canal and uterine cavity, reduction in size, effacement, or distortion of the shape and orientation of the uterine cavity.^[5-6]

The risk of Asherman's syndrome (severe form of IUA leading to infertility) after one episode of D&C was reported to be 16% and that after three or more D&Cs as 32%.^[13-14] Lev-Toaff et al.^[15] reported synechiae in 7 out of 32 (21.9%) women who underwent post myomectomy HSG, 5 of them were minor synechiae while 2 were major synechiae resulting in unilateral or bilateral tubal occlusion. They also found diverticulum in 6 out of the 32 patients (18.8%), 3 of which were minor while the other 3 were major diverticuli.^[15]

Ahmadi et al.^[4] noted the defects detected with HSG in the uterine cavity of post CS patients in their study to include different shapes like thin linear defect, focal saccular outpouching (diverticula) including unilateral and bilateral (dog-ear like) types, and fistula. They further noted different locations where the defects were detected to include the uterine body, lower uterine segment, uterine isthmus and the upper endocervical canal.^[4] A study by Surapaneni and Silberzweig,^[3] noted CS as the most common uterine surgery and reported diverticula in the expected site of incision in HSG of 60% of the 148 patient with CS. It further noted that 65% of the diverticula appeared as focal outpouchings while 35% appeared as thin linear defects.^[3]

Tubal abnormalities present on HSG in various patterns; for instance, tubal occlusion presents as no spill of contrast medium at all into the peritoneal cavity, while hydrosalpinges presents as ampullar dilatation and

tortuosity but peritubal adhesions in addition to the features of hydrosalpinges above, may present as loculated peritoneal spill of contrast medium, peritubal halo effect, or vertical fallopian tube.^[6,16,17]

A study by Bello,^[7] reported that right sided hydrosalpinx was commoner than the left and ascribed this finding to the presence of the appendix on the right side since appendicitis and/or appendectomy would lead to pelvic inflammation near the fallopian tube and such would predispose to right unilateral hydrosalpinx. But Akinola et al.^[18] found unilateral hydrosalpinx commoner on the left. The cause of this disparity in the laterality reported by the two studies is not obvious.

METHODOLOGY

This is a prospective and descriptive study. We studied a total of 157 women with history of lower abdominal surgery referred for HSG on account of infertility. It was carried out over a period of six months. Prior to the study, institutional ethical clearance was obtained. Booking was in compliance with the 10 day rule. Informed consent was obtained from the subjects. Only those who gave their consent were included for the study. Patients were clerked in line with a predesigned questionnaire and appropriate clinical histories obtained. Those who declined to be recruited for the study and those without history of lower abdominal surgery were excluded.

An antispasmodic agent, (Hyoscine bromide, 20mg) was administered intravenously after ruling out the history of glaucoma. Aseptic protocols were observed during the procedure. After the introduction of Cusco's speculum into the vagina, the anterior lip of the cervix was held in place with a volsellum forceps. About 5-60ml of water soluble contrast medium [sodium diatrizoate/meglumine diatrizoate 76% (Urograffin 76%)] was introduced in stages through Leech-Wilkinson's cannula inserted into the cervical canal to demonstrate the cervical canal, uterine cavity, fallopian tubes and peritoneal spill, since there was no functional fluoroscopy machine during the period of the study.

Analysis of data was with the Statistical Package for the Social Sciences (SPSS) version 21.0 by IBM Corp. Armonk, New York, USA. Frequency tables, measures of central tendencies and measures of dispersion were carried out. Appropriate variables were further analyzed by pairing and carrying out crosstabulation test. The relevant subgroups like those with only one surgery and those with multiple surgeries were selected and also analyzed by frequencies and crosstabulation.

RESULTS

A total of 157 subjects that had positive history of previous lower abdominal surgery were recruited and analyzed for the purpose of this study. Out of this total, 155 (98.7%) were able to identify clearly the surgery

they underwent, while 2(1.3%) gave history of lower abdominal surgery but not able to identify which.

A total of Sixty three (40.1%) subjects underwent D&C with no other lower abdominal surgery, 26 (16.6%) had it only once while 37(23.6%) had it twice or more. Seven patients (4.5%) had myomectomy with no other lower abdominal surgery, 8(5.1%) had only CS, 15(9.6%) had only appendicectomy, 4 (2.5%) had only laparotomy, while 2(1.3%) could not name the lower abdominal surgery they underwent and were referred to as others. A total of 58 patients had two or more different lower abdominal surgeries. All the patients with history of D&C also had history of abortion. Primary infertility occurred in 15(9.6%), while secondary infertility occurred in 142 (90.4%). Intrauterine adhesions were diagnosed in 21(13.4%) of the total subjects. Tubal abnormalities were seen in 85(54.1%), bilateral in 48(30.6%), right unilateral in 19(12.1%) and left unilateral in 18(11.5%).

Table 1. shows the frequencies of single lower abdominal surgeries among the patients, such that the only lower abdominal surgery undergone by 26 subjects (16.6%) was one D&C, that by 7 subjects (4.5%) was one myomectomy. It can be seen that the frequency was in this order D&C 26(16.6%), followed by appendicectomy 15(9.6%), CS 8(5.1%), myomectomy 7(4.5%), and laparotomy 4(2.5%).

In table 2. the frequencies of IUA and tubal abnormalities detected (see also fig.1 and fig.2) among the subgroups of patients with single lower abdominal surgery only are shown. Intra uterine adhesions occurred most frequently among patients with CS 4(50%), followed by myomectomy 2(28.6%) and D&C 2(7.7%), but did not occur among those with appendicectomy nor with laparotomy.

Table 1: Frequencies of single surgeries.

| Variable | Frequency | Percentage |
|----------|-----------|------------|
| D&C | 26 | 16.6 |
| Myo | 7 | 4.5 |
| CS | 8 | 5.1 |
| App | 15 | 9.6 |
| Lap | 4 | 2.5 |
| Others | 2 | 1.3 |

Table 2: Frequencies intrauterine adhesions and tubal abnormalities among patients with a single surgery only.

| Variable | Intrauterine Adhesions | | Tubal Abnormalities | |
|----------|------------------------|------------|---------------------|------------|
| | Frequency | Percentage | Frequency | Percentage |
| D&C | 2(26)** | 7.7 | 15(26) | 57.7 |
| Myo | 2(7) | 28.6 | 3(7) | 42.9 |
| CS | 4(8) | 50.0 | 3(8) | 37.5 |
| App | 0(15) | 0.0 | 6(15) | 40.0 |
| Lap | 0(4) | 0.0 | 3(4) | 75.0 |
| Others | 0(2) | 0.0 | 1(2) | 50.0 |

Key: Myo = myomectomy, App = appendicectomy, Lap = laparotomy **The numbers in bracket refer to the specific subgroup total

The table also shows that tubal abnormalities occurred in highest frequency among those with history of laparotomy 3(75%), followed by D&C 15(57.7%), myomectomy 3(42.9%), appendicectomy 6(40.0%), and CS 3(37.5%) in that order.

Table 3 shows the frequencies of multiple lower abdominal surgeries among the subjects: 37(23.6%) had multiple surgeries consisting of D&C only, D&C with appendicectomy accounted for 19(12.1%), D&C with CS occurred in 14(8.9%), D&C with myomectomy in 9 (5.7%), D&C with laparotomy in 8(5.1%), CS and appendicectomy in 2(1.3%), myomectomy with laparotomy 1(0.6%), D&C with myomectomy and CS which also occurred in 1(0.6%).

In table 4, the frequencies of IUA and tubal abnormalities among patients with multiple lower abdominal surgeries. Intrauterine adhesions occurred commonest among patients that underwent the triple surgeries of D&C with myomectomy and CS 1(100%). It was followed by CS and appendicectomy 1(50%), D&C and CS 3(21.4%), D&C and laparotomy 1(12.5%), D&C and myomectomy 1(11.1%), multiple D&C 4(10.8%), and D&C and appendicectomy 1(5.3%), myomectomy and laparotomy 0(0.0%).

Tubal abnormalities occurred more frequently in the study among the following combinations of multiple lower abdominal surgeries in descending order: myomectomy and laparotomy 1(100%), D&C and myomectomy 7(77.8%), multiple D&C 22(59.5%), D&C and appendicectomy 11(57.9%), D&C and CS 8(57.1%), CS and appendicectomy 1(50%), D&C and laparotomy 3(37.5%), D&C with myomectomy and CS 0(0.0%). Neither uterine nor cervical diverticulum was detected in our study.

Table 3: Frequencies of multiple surgeries.

| Variable | Frequency | Percentage |
|--------------|-----------|------------|
| ONLY D&C ≥ 2 | 37 | 23.6 |
| D&C + MYO | 9 | 5.7 |
| D&C + CS | 14 | 8.9 |
| D&C + APP | 19 | 12.1 |
| D&C +LAP | 8 | 5.1 |
| D&C +MYO +CS | 1 | 0.6 |
| MYO + LAP | 1 | 0.6 |
| CS + APP | 2 | 1.3 |

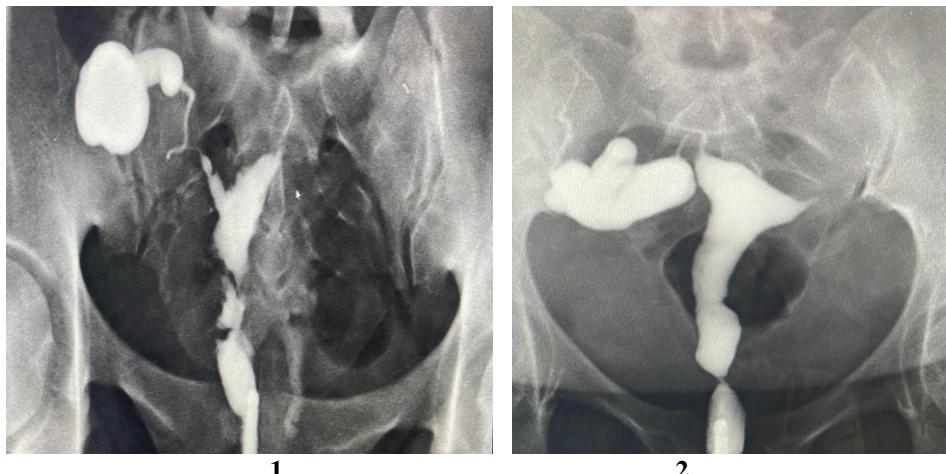
Key: Myo = myomectomy, App = appendicectomy, Lap = laparotomy

Table 4: Frequencies of intrauterine adhesions and tubal abnormalities among patients with multiple surgeries.

| Variable | Intrauterine Adhesions | | Tubal Abnormalities | |
|--------------|------------------------|------------|---------------------|------------|
| | Frequency | Percentage | Frequency | Percentage |
| Only D&C ≥2 | 4(37) ** | 10.8 | 22(37) | 59.5 |
| D&C + Myo | 1(9) | 11.1 | 7(9) | 77.8 |
| D&C + CS | 3(14) | 21.4 | 8(14) | 57.1 |
| D&C + App | 1(19) | 5.3 | 11(19) | 57.9 |
| D&C +Lap | 1(8) | 12.5 | 3(8) | 37.5 |
| D&C +Myo +CS | 1(1) | 100.0 | 0(1) | 0.0 |
| Myo + Lap | 0(1) | 0.0 | 1(1) | 100.0 |
| CS + App | 1(2) | 50.0 | 1(2) | 50.0 |

Key: Myo = myomectomy, App = appendicectomy, Lap = laparotomy

**The numbers in bracket refer to the specific subgroup total

**Fig. 1: Severe IUA with right sided hydrosalpingx and bilateral tubal occlusion.****Fig. 2: Right sided hydrosalpingx with left sided proximal tubal occlusion.**

DISCUSSION

Our study showed that most of the patients were able to identify clearly the surgeries they underwent. This suggests that the surgical units were able to communicate appropriately to the patients, a practice that is important not only in obtaining informed consent,^[12] but also in proper patient management.

The study also showed preponderance of D&C among the lower abdominal surgeries undergone by the patients and that all the patients with history of D&C also had history of abortion. It is possible that the D&C and abortions were independent events. It is likely that some cases of abortion were eventually managed with D&C. It

is also possible that some of subjects mixed up the terms ‘abortion’ and ‘D&C’. Whichever way is applicable, this calls for more care in managing women of child bearing age as poor management might have serious adverse effect on fertility.

Tubal abnormalities were seen in more than half of the patients. This is of great concern knowing the vital role played by the tubes with regards to fertility.^[6] Therefore all factors that lead to tubal pathology should be monitored closely by the appropriate healthcare personnel.

Among the patients with a single lower abdominal surgery, IUA occurred highest among those with CS. In this subgroup, half of the patients developed detectable IUA. The interruption of all the endometrial layers during CS may be responsible for this. The size, site and orientation of incision as well as the expertise of the operating surgeon and the post-operative management might all be contributory. Hence, the need to put all in focus in considering embarking on CS. On the other hand, the finding of tubal abnormalities commonest among those with laparotomy only may be explained by the wide incision commonly used and which would lead to wide area of peritoneal inflammation that may affect one or both tubes.

The relatively high frequency of tubal lesions seen among those with myomectomy and appendectomy can be explained by interruption of the peritoneal cavity during these surgeries. But, the high frequency noted among those with D&C appears somewhat surprising. However D&C carried out near the cornua may result in adhesions that lead to tubal occlusion; and detached amorphous tissues during or following D&C may be lodged in the fallopian tube and either block it temporarily,^[17] or if it triggers off inflammatory response within the tubal lumen, it may lead to adhesions and tubal occlusion. Besides, since all the patients with D&C also had history of abortion, the high incidence of tubal abnormalities noted among them may be associated with post-abortal complications. The absence of IUA among patients with appendectomy only and those with laparotomy only can be explained by non-interference with the endometrial lining by these surgeries.

Among the patients who had multiple surgeries, IUA occurred most frequently among those with D&C, myomectomy and CS (the only patient that had these three surgeries developed IUA); followed by those who had CS and appendectomy, and those with D&C and CS. This can be explained by the fact that both CS and D&C involve the breech of the endometrial lining. It calls for performance of these surgeries by well trained personnel.

The 28.6% of IUA among patients with a single surgery of myomectomy in our study is higher than 6.1% reported among patients with myomectomy by Lev-Toaff et al.^[15] The difference can be explained by their emphasis on severity since those reported by them in this percentage were only those with severe IUA with unilateral or bilateral tubal occlusion.

Contrary to the report of Surapaneni and Silberzweig^[3] of diverticula seen in the expected site of incision in HSG of 60% of patient with CS, and the finding of diverticulum in 18.8% of the post myomectomy patients by Lev-Toaff et al.,^[15] our study did not find any diverticulum. The reason for this is not obvious.

CONCLUSION

The patients were commonly aware of the pelvic surgeries undergone. Intrauterine and tubal pathologies were common among infertile women with lower abdominal surgery. Incidence of IUA is high among patients with CS, D&C or myomectomy. Tubal pathologies are high among those with laparotomy, D&C or myomectomy. Improved medical and surgical management is advocated for women undergoing such procedures.

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