Pregnancy outcome can be improved by saline sonosalpingography in infertile women

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Abstract:

Introduction: Sonosalpingography (SSG) is a method for diagnosis mainly used for assessing fallopian tubes patency. It is a method of screening for infertility assessment. There are many causes of infertility, including some that medical intervention can treat. 20–35% cases of infertility are due to female infertility. Tubal cause the tubal factor accounts 30% of causes. The aim of study to help female with undiagnosed infertility by hydrotubation using saline sonosalpingogram and eliminate reversible obstructive causes and hostile components to getting spontaneous pregnancy. Method: Prospective study including 180 infertile patient. The period of study from 2017 to 2019. The examination procedure was explained to the patient, then after bladder emptying in lithotomy position, transvaginal sonography carried out by using (transvaginal volume probe for assessment of uterus, endometrial cavity and both adnexa for any evidence of pelvic abnormality before starting saline infusion. Results: mean age of females is 30 ± 7 years old, with duration of fertility 5 ± 4 years. 47.3% of females within age group 25-34 years old. (53.7%) of females with para 0, (13.8%) with para 1.88% of females with no abortion. 95.2% of females with normal shape uterus. According to duration of infertility; 30.85% of females with infertility more than 6 years. 44.7% of females with primary infertility while 55.3% with secondary infertility, 29.3% of females with not patent tubes while 70.7% with patent tubes, 76.6% of females with negative pregnancy test while 23.4% with positive pregnancy test. There is no significant association between pregnancy test results with age groups of females and types of fertility these mean age groups and infertility types not effect on results. While there is significant association between pregnancy test results and tubal patency after US; 28.6% of patent tubes with positive pregnancy test. Conclusion: saline sonosalpingogram use for primary diagnosis of tubal patency, tubal may remove tubal obstruction and detect intra cavitary lesion that lead to increase in spontaneous pregnancy rate.

Keywords: Pregnancy outcome, saline sonosalpingography, infertile women
Introduction:
Infertility is the inability to become pregnant after one year of intercourse without contraception involving a male and female partner\(^1\). There are many causes of infertility, including some that medical intervention can treat\(^2\). 20–35% cases of infertility are due to female infertility\(^3,4\). The most common cause of female infertility is ovulatory problems. In another hand tubal factors also considered one causes of females infertility\(^5\). Assessing whether the fallopian tube is patent is part of initial evaluation in the procedure of seeking the cause of infertility. The tubal factors account for 30% - 40%\(^3,6\). Sonosalpingography (SSG), or also called (Sion test), is an investigative technique mainly used for assessment fallopian tube patency\(^7\). It was presented as a screening technique for investigations of infertility problem\(^8\). It is more usual among GPs due to no adverse effect. Under US guided injection saline inside uterine cavity skillful through catheter. Outflow of fluid outside uterus can prevent by swelling bulb of the catheter. FT patency can evaluated by US picturing the saline flow through the tube detecting it as a shower at the end of fimbria this guided to examine tubal patency. In addition, free fluid present in Douglas pouch also approves patency of FT. Advantage of saline US are: identifying FT patency, identifying of fibroid polyp, identifying lesion inside uterus, infertility and amenorrhea examination particularly (Asherman's syndrome), examination recurrence pregnancy losses due to abnormality in uterus\(^9-11\). This method is easy to done, not expensive and not need any preparation technique\(^12,13\). Which gate proper location of obstruction in the tube, and recanalization of tube to remove spasms. Saline US decrease the exposure to radiation in infertile females whom need for HSG\(^14\). Low cost of saline US might be confirm the benefit of it rather than HSG and made it as a primary diagnostic tool in the work up of infertile females in future even it not give all data that HSG give it\(^15,16\). Many studies stated that procedures have the same sensitivity besides specificity when compared with gold standard method in diagnosis tubal patency (laparoscopy)\(^17\). Numerous studies showed that saline US encourage a spontaneous pregnancy. The chief philosophy supporting this theory is that the passage of liquid disruptions slight adhesions or flushes mucus accumulation inside tubes. So according to this theory saline US can enhanced natural pregnancy\(^18,19\). Therefore, the study aimed to help female with undiagnosed infertility by hydrotubation using saline sonosalpingogram and eliminate reversible obstructive causes and hostile components to getting spontaneous pregnancy.

Method:
Prospective study including 180 infertile patients. The period of study was from 2017 to 2019. The examination procedure was explained to the patient, then after bladder emptying in lithotomy position, transvaginal sonography carried out by using (transvaginal volume probe (Voluson P8 and Voluson S10 (GE Medical Systems) ultrasound machine with dedicated 3D imaging software) for assessment of uterus, endometrial cavity and both adnexa for any
evidence of pelvic abnormality before starting saline infusion. Following the baseline transvaginal ultrasound examination, the probe will be removed, then a sterile speculum inserted, the vagina and external part of cervix are disinfected with antiseptic solution. Catheter (IUI catheter) will be inserted into the uterine cavity and the transvaginal probe will be re-inserted into the vaginal canal. Sterile saline will then be injected through the catheter into the uterine cavity and. The ultrasound examination is continued while sterile saline fills the endometrial cavity, with examination assess the distention of cavity any abnormalities including masses as fibroids, polyps, other lesion including scar, calcification and recording of these lesions with both 2D and 3D pictures. Then tubal patency was assessed by fluid accumulation in the pouch of Douglas. Statistical analysis done by SPSS 22 mean, SD, frequency and percentage done for describe data. Chi-square done for analysis categorical data, P-value below 0.05 represented significant association between variables.

**Results:**

A cross-sectional study of 188 patients with infertility that done ultrasound and sonosalpingography examination for assessing uterine cavity and tubes, mean age of females is 30 ± 7 years old, with duration of fertility 5 ± 4 years. According to fig (1): 47.3% of females within age group 25-34 years old 30.85% within age group 35-44 years old 20.7%, 7.5% within age group 15-24 and above 45 years old respectively. According to fig (2): (53.7%) of females with para 0, (13.8%) with para 1, (15.96%) with para 2, (8.5%) with para 3 and other results show in fig 2. 88% of females with no abortion while 5.85% with one abortion and 3.7% with 2 abortion as show in fig (3). 95.2% of females with normal shape uterus while 2.13% bicornuated uterus, 1.6% of females with arcuate uterus 1% as show in fig 4. According to duration of infertility; 30.85% of females with infertility more than 6 years, 30.32% of them with 2-4 years infertility, 21.28% with 1-2 years of infertility and 17.55% of female with 4-6 years as show in fig (5).
Fig (1): age groups distribution

Fig (2): para distribution
Fig (3): abortion distribution

Fig (4): uterine shape distribution
As in table 1: 44.7% of females with primary infertility while 55.3% with secondary infertility, 29.3% of females with not patent tubes while 70.7% with patent tubes, 76.6% of females with negative pregnancy test while 23.4% with positive pregnancy test.

**Table (1): variables distribution.**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Types of infertility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>84</td>
<td>44.7</td>
</tr>
<tr>
<td>Secondary</td>
<td>104</td>
<td>55.3</td>
</tr>
<tr>
<td><strong>Tubal patency</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not patent</td>
<td>55</td>
<td>29.3</td>
</tr>
<tr>
<td>Patent</td>
<td>133</td>
<td>70.7</td>
</tr>
<tr>
<td><strong>Pregnancy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>144</td>
<td>76.6</td>
</tr>
<tr>
<td>Positive</td>
<td>44</td>
<td>23.4</td>
</tr>
</tbody>
</table>

According to table 2: there is no significant association between pregnancy test results with age groups of females and types of fertility this mean age groups and infertility types not effect on results. While there is significant...
association between pregnancy test results and tubal patency after US; 28.6% of patent tubes with positive pregnancy test.

**Table (2): association between pregnancy test results with age groups of females, types of fertility and Tubal patency.**

<table>
<thead>
<tr>
<th>Pregnancy</th>
<th>Age</th>
<th>P-value</th>
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<tbody>
<tr>
<td></td>
<td>15-24 years</td>
<td>25-34 years</td>
</tr>
<tr>
<td>Negative</td>
<td>27</td>
<td>74</td>
</tr>
<tr>
<td>Positive</td>
<td>12</td>
<td>15</td>
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<table>
<thead>
<tr>
<th>Type of infertility</th>
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<tbody>
<tr>
<td>Primary</td>
</tr>
<tr>
<td>Negative</td>
</tr>
<tr>
<td>Positive</td>
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<tbody>
<tr>
<td>Not patent</td>
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<tr>
<td>Negative</td>
</tr>
<tr>
<td>Positive</td>
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P-value less than 0.05 (significant).

**Discussion:**

Saline US is perfect imaging technique for the assessment of infertility it is not invasive and give data for numerous pelvic abnormalities. Sonohysterography with normal saline fluid injection inside uterus have high specificity for evaluation of patency of fallopian tube by showperitoneal leakage of fluid. Saline US suggested as a primary test for assessment genital tract and pelvic diseases, which give enough description of uterus cavity and fallopian tubes. In this study, mean age of females is 30 ± 7 years old, with duration of fertility 5 ± 4 years. 47.3% of females within age group 25-34 years old. 95.2% of females with normal shape uterus. 30.85% of females with infertility more than 6 years, 30.32% of them with 2-4 years infertility. (Singh et al. and Ferdows et al.) Agreed with...
our results that age 25 -34 is most common age in their study\textsuperscript{23,24}, also (Singh et al.) stated that 94% of females with normal uterus shape\textsuperscript{23}. In addition (Ferdows et al.) agreed with us and stated that most females with duration of fertility 2-6 years and 7-11 years 67% and 27% respectively\textsuperscript{24}. In current study, 44.7% of females with primary infertility while 55.3% with secondary infertility,(Singh et al. Ferdows et al. and Izhar et al.) disagreed with our results stated that more female came with primary infertility rather than secondary infertility\textsuperscript{23-25}. Saline sonosalpingography with induction of ovulation is high actual in females with adhesion in fimbria that have undiagnosed infertility \textsuperscript{25}. Standard US should be done for all infertile women for assessment follicular sum, any pathological abnormalities in ovary, uterus, and adnexa such as fibroid, mass in ovary, polyp and any accumulation of fluid inside Douglas pouch and checking patency of fallopian tube. Saline US when done on day 8-9 show full information within 15 min \textsuperscript{26}. Saline US associate with high accuracy to diagnosis any abnormalities in uterus and tubes. SIS efficient to detection any endometrium abnormalities, polyps, myomas, septas and many congenital abnormalities. So any females detected as endometrial abnormalities on standard US must go to SIS before hysteroscopy. With development in US techniques, saline US and hysterosalpingo-contrast sonography can substitute HSG for diagnosing any abnormalities in uterine cavity and patency of fallopian tube in numerous centers internationally \textsuperscript{26,27}. In our study, there is significant association between positive pregnancy test and tubal patency, 28.6% of females with patent tubes after the procedure get pregnant while 10% of female with not patent tubes after the procedure get pregnant this explain that the technique improve the patency of the tube. Randomized controlled trials examining tubal flushing for subfertility have demonstrated pregnancy rates between 17% and 32% using water-soluble contrast media\textsuperscript{17,28,29}. The medical impress of an improved pregnancy rate post saline US was not the single advantage, but also signifying a novel technique for assessment tubal patency, when compare it with HSG with contrast this method is costly or classical HSG which is time consuming and painful with low information method. Newly innovated technique by mixed saline and air used for diagnosis and assessment method tubal patency and lead to increase pregnancy rate in subfertility females \textsuperscript{30}. Kelekci et al. also stated that evaluated pregnancy rates after SIS observed a significant improvement in pregnancy rates by 55% than group without SIS \textsuperscript{31} while the clinical PR was 85.7%. In patients with a correctable uterine lesion detected on SIS as Gera et al. stated \textsuperscript{32}. SIS sensitivity and specificity for detection big or small uterine polyps was 100% and 86% respectively\textsuperscript{25}. Newly paper stated that SIS more accuracy to detected intrauterine anomalies with sensitivity and specificity 88% and 94% respectively\textsuperscript{33}. Saline US when compare with HSG was high specific (93%) to diagnosed uterine polyps, while in diagnosed hyperplasia of endometriosis was 93% sensitive and 97% specific\textsuperscript{34}. When use 3D US the sensitivity and specificity increase and become better\textsuperscript{35}. In our study, not patent tube was 29% of females and 70% of female with patent fallopian tube this agreed with (Izhar et al.)so this mean saline US can substitute the hystero-salpingogram for primary diagnosis of infertility \textsuperscript{25}. Therefore, the saline US is less discomfort to female and cost effective, in developing country the apparatus still high cost so use of it was limited.

Conclusion:
Salinesonosalpingogram use for primary diagnosis of tubal patency may remove tubal obstruction and detect intra
cavitaory lesion that lead to increase in spontaneous pregnancy rate.

References:
5. Infertility - NHS - NHS. Available at: https://www.nhs.uk/conditions/infertility/.


