

Transabdominal Saline Contrast Sonohysterography: Can It Replace Hysterosalpingography In Low Resource Countries?

ADEMOLA A. AREMU, VICTOR A. ADETILOYE, BOLANLE O. IBITOYE, DANIEL A. ADEKANLE, TOPE O.BELLO

ABSTRACT

Objective: The objective of the study was to assess the accuracy of transabdominal saline contrast sonohysterography (TASCCH) compared to Hysterosalpingography (HSG) in an (our) environment where the gold standard modalities are not readily available.

Study Design: One hundred consecutive patients referred to the radiology unit for Hysterosalpingography and who gave consent for TASCCH as well HSG were included in the study. Sensitivity specificity, positive and negative predictive values of TASCCH were calculated using the widely used HSG as the gold standard.

Results: TASCCH had 100% sensitivity, specificity and positive predictive value for uterine synechia, hydrosalpinges and

bilateral tubal blockade but 31% sensitivity for unilateral tubal blockade. TASCCH also showed 100% concordance with HSG in submucous masses (polyps & Fibroids) and found to be less painful by 80% of the patients.

Conclusion: The readily available, easy to interpret TASCCH is not only safer and cheaper but it's as accurate as HSG in evaluating the fallopian tubes and uterine cavity in infertile patients. We advocate its use as replacement for HSG in environment like ours where Hysteroscopy, MRI, positive contrast sonohysterography, transvaginal probes and skill are not readily available.

Key Words: Transabdominal, Saline contrasts Sonohysterography, Hysterosalpingography, infertility, developing countries

INTRODUCTION

Female infertility is associated with high incidence of uterine cavity and fallopian tube pathology [1,2]. therefore various methods are available for structural evaluation of female reproductive system.

Although, Hysterosalpingography used to be the mainstay of evaluation of the female genital tract for several decades, Hysteroscopy and laparoscopy with chromopertubation (HLC) is now the gold standard because of its improved ability to assess the uterine cavity, establish the tubal status and possibility to proper treatment [3]. Also, it (HLC) does not utilize ionizing radiation.

HLC and Magnetic resonance Imaging (MRI) are not readily available in Nigeria and other low resource (developing nations) and their cost is beyond the reach of the poor and middle class who constitute the majority of the population. However, a good alternative to HLC and MRI is sonohysterography (though not presented as the gold standard) because of its similar diagnostic accuracy with hysteroscopy, its less invasiveness, absence of radiation and non utilization of iodine contrast [4]. Although Sonohysterography was first described by Parson and Lence in 1993, [5] using saline contrast infusion and transvaginal scan, the procedure had undergone several modifications from the initial use of first generation agents (air ± Saline) to second generation agents like Sonovue and Definity with less solubility and diffusibility but longer duration of visualization allowing for easier evaluation

of the tubal course [6].

Furthermore, contrast-tuned imaging (CnTI) Biosound ultrasound software has been developed to detect only sound waves from the positive contrast agents thereby limiting interference from bowel gas and other hyperechoic signals from pelvic organs [3]. Sonohysterography has replaced Hysterosalpingography as the first line investigation in the developed countries because of its numerous advantages [4] and advancement [3].

However, in Nigeria, the positive contrast agents are not available, transvaginal probes are only found in few tertiary institutions and skilled personnel are not many; hysterosalpingography still remains the mainstay and frontline investigation of infertile patients in our environment while sonohysterography is rarely done. We therefore decided to assess the diagnostic accuracy of the available transabdominal saline contrast sonohysterography (TASCCH) with the Hysterosalpingography (HSG) with the aim of taking a small step forward to replace HSG with TASCCH as the first line diagnostic test in our environment.

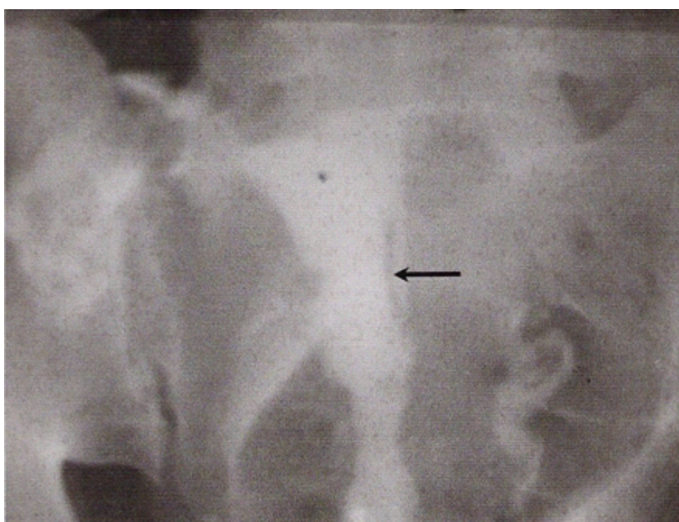
MATERIALS AND METHODS

Most of Two hundred and fifty consecutive patients referred to the radiology department of Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife for Hysterosalpingography who consented were recruited for HSG and TASCCH. Ethical approval was obtained from the hospital's ethical committee. One hundred patients were included in this study after excluding those who

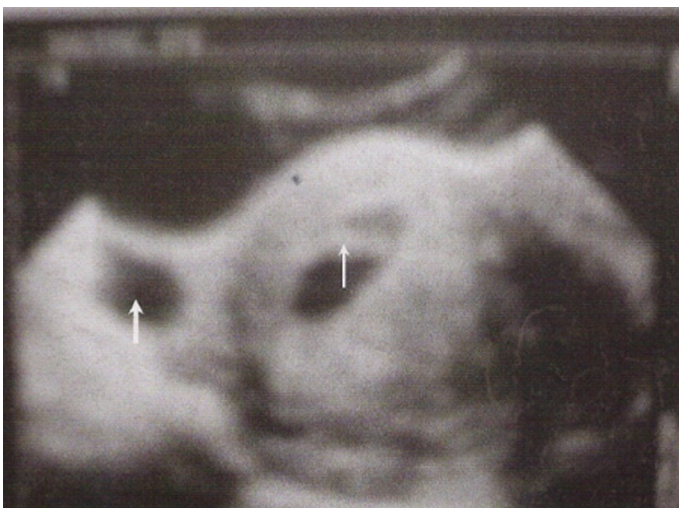
failed to complete the two procedures, those with acute pelvic inflammatory disease, bleeding per vaginam, recent dilatation and curettage and refusal to be recruited for the study.

TASCSH and HSG were conducted for the same patient by different radiologists, each blinded to the results of the other study. TASCSH was performed in the early mild proliferative menstrual cycle as previously described [7]. Preliminary transabdominal scan was done in full bladder with a 3.5MHz curvilinear probe to assess the uterus, adnexae and Pouch of Douglas. Through an aseptic procedure, a foley's catheter with introducer (size 8-12 FG) was introduced into the cervix with sterile water distention of its balloon for retention. Warmed normal saline (to room temperature) was introduced by an assistant while the radiologists did the scanning and reporting.

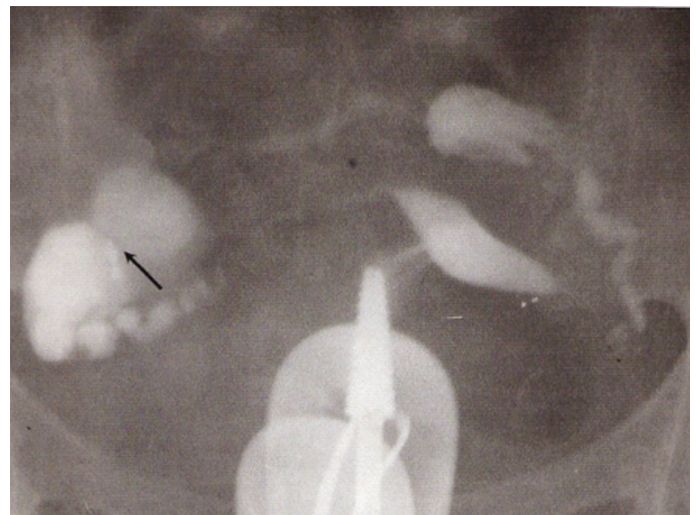
HSG was performed on the 10th day of menstrual cycle to avoid radiation of unfertilized ovum, damage to organogenesis in the recently implanted embryo [8]. This technique of hysterosalpingography had been previously described [9]. Statistical analysis was done using SPSS 13 and positive/negative predictive value, sensitivity and negativity etc were calculated; the findings on both procedures. (TASCSH and HSG) were also compared looking for concordant and discordant features.



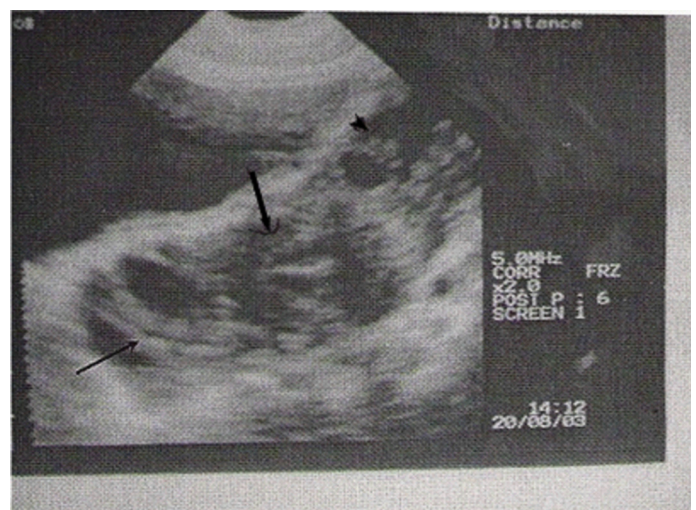
[Table/Fig-1a]: Hsg Showing a Linear Filling Defect Within The Uterine Cavity In Keeping With Uterine Synechiae



[Table/Fig-1b]: Tascsh Showing Thick Echogenic Band In The Uterine Cavity(thin arrow) : Uterine Synechiae.The Thick Arrow Show Art Ovarian Cyst



[Table/Fig-2a]: Showing Linear Filling Defect Within The Right Hydrosalpinx(black arrow).



[Table/Fig-2b]: TASCSH,Trasverse Scan Showing The Uterus(Thick Arrow),Thick Echogenic Band(Thin Arrow) Within The Right Hydrosalpinx

RESULTS

In this prospective study, one hundred patients had both TASCSH and HSG and were included. The mean age of 30.25 ± 4.5with the age range of 20-45years and majority of the patients i.e 55(55%) were between 26-30years of age.

All the patients complained of pain during HSG; ranging from mild 20 (20%)patients; moderate in 10 (10%) patients and severe seventy patients (70%) in contrast to TASCSH in which majority (85%) of the patients complained of mild pain and 15 (15%) complained of moderate pain, [Table/Fig-1].

Twenty minutes after HSG, 20(20%) patients still complained of pain while only 2 (2%) patients complained of abdominal pain, twenty minutes after TASCSH. A significant proportion 80 (80%) of the patients, described HSG as being more painful while 10(10%)

Experiences	During HSG (No. of Patients [%])	During TASCSH (No. of patients [%])
Not painful	0(0%)	0(0%)
Mildly painful	20(20%)	85(85%)
Moderately painful	10(10%)	15(15%)
Very painful	70(70%)	0(0%)
Total	100(100%)	100(100%)

[Table/Fig-1]: Patients experiences during HSG and TASCSH.

patients felt the experience was the same and the remaining 10(10%) patients were unsure. However, none of the patients felt TASCSTH was more painful than HSG.

Uterine synechiae were demonstrated by the two procedures and they showed 100% concordance rate (Ten patients in both studies). The sensitive, specificity and positive predictive value of TASCSTH in this regard was 100% respectively. For tubal pathologies, both studies showed 100% concordance and 100% sensitivity, specificity and positive predictive value for bilateral tubal blockades seen in 5 patients; and for Hydrosalpinges in twenty patients. However for unilateral tubal blockade, the sensitivity of TASCSTH is rather low 31%.

A total number of thirty (30) leiomyomas/polyps were seen in 24 patients with 3 of the patients having multiple lesions. TASCSTH and HSG showed 100% concordance in submucous lesions (fibroids/polyps) – eight lesions, though differentiation into submucous polyps (2) and submucous fibroid (6) by TASCSTH was not possible on HSG. For extracavitary fibroids, six of the twenty-two visualized on TASCSTH were not seen on HSG.

DISCUSSION

Although the technique of Sonohysterography had undergone several modifications and improvement ever since its advent in 1993 [3,5], usage of specialized catheters to introduce positive or negative contrasts during transvaginal scan remain a constant feature.

Also, most authors agree that sonohysterography should be carried out in the early/mid proliferative phase of the menstrual cycle because the endometrium would be thinnest at this period and focal lesions would easily be detected and false positive finding avoided [9]. The TASCSTH in this study was carried out at the same phase of menstrual cycle. HSG, also, was done around the 10th day of the menstrual cycle to avoid radiation to unfertilized ovum and damage to organogenesis [10].

However, unlike most investigators our ultrasound scanning was done with a 3.5mHz curvilinear transabdominal probe which is the most commonly seen in our environment and the patients had full urinary bladder. Also, Foley's catheters with introducer sizes 8-12 FG and/or Leach Wilkinson's cannulae were used instead of special catheters like 5F HSG Catheter [3,9], cervical vacuum cup cannula, HSG double lumen catheter [2,5] F Hysterosonography Elliptosphere catheter set [11] etc.

The discomfort from the full urinary bladder, non utilization of conventional catheters which necessitated the use of tenaculum might have resulted in mild to moderate pain felt by the patients in TASCSTH. The pain however disappeared in almost all the patients within twenty minutes of completing the investigations while in HSG, the pain was more (than TASCSTH) and persisted in 20% of the patients, twenty minutes after. The positive contrast agents and special ultrasound soft wares described by Danielle E et al [3] are not available in our environment so the cheap, readily available normal saline was used.

In this study, pelvic inflammatory disease (P.I.D) was ruled out by taking relevant history and carrying out vaginal examination to reduce cost. However, some authors actually did microscopy, culture and sensitivity of endo cervical swabs before the procedure [9] while others like Sergio Res Soares [4] placed the patients on prophylactic antibiotics.

Neither antibiotics nor analgesic were used in our study and none of the patients had post procedure infection though some researchers placed their patients on analgesics [4,9]. All authors with similar study used hysteroscopy as the gold standard [3,4] but this is hardly available in the country.

TASCSTH showed 100% concordance with HSG in the detected intrauterine adhesion (synechiae), therefore the sensitivity, specificity and positive predictive value of 100%. Sergio Res Soares et al [4] also reported same accuracy for TVSCSTH and HSG in their study with Hysteroscopy as the gold standard.

Samuel E. Brown et al [12] had also reported no significant differences in diagnostic accuracy of saline infusion hysterosalpingography, HSG and outpatient Hysteroscopy in their prospective, randomized study of infertile patients. Other authors [5,13] have also proved that sonohysterography showed 100% concordance with hysteroscopic diagnoses of uterine synechiae. It could therefore be inferred that the accuracy of TASCSTH in assessment of uterine synechiae is comparable to TVSCSTH (and HSG).

The synechiae seen in this study showed similar appearances to previously described features [4,5,7,13]. TASCSTH and HSG showed 100% concordance in submucous masses (polyps/fibroid) seen although TASCSTH was able to differentiate polyps, described as being of mostly homogenous echoes from fibroid. Soares [4] reported that the diagnostic accuracy of SCSH for submucous masses was the same with Hysteroscopy and better than HSG while Samuel E. Brown et al [12] did not record significant difference in the detected submucous masses for both procedures and operative hysteroscopy.

For extracavity fibroid (subserous and intramural), we found that some of the visualized twenty-two lesions were not seen on HSG. This was because of their relatively small size and/or eccentric location (away from the cavity) in the intramural region. Goldberg JM et al reported similar cases of extracavity myomas demonstrated by sonohysterography but not visualized on HSG [9].

The fact that no congenital anomaly was seen in the two procedures in our study was not surprising considering their rarity [7]. De Fence et al [2] found HSG more accurate in describing the six congenital anomaly seen in their study. However, Artur Ludoin et al [14] stated that SCSH correctly identified actuate, septate, bicornuate uterus and showed highest positive correlation with hysterolaparoscopy obtained diagnosis. They further stated that SCSH showed perfect accuracy, better sensitivity and specificity (compared to HSG) in septate and bicornuate uterus.

Both studies showed 100% concordant for bilateral tubal blockade. Similar finding was reported by Danielle E et al [3] in evaluation of 102 fallopian tubes with sonohysterography (done with positive contrast with special ultrasound soft ware) and HSG after hysteroscopic sterilization. The three cases of unilaterally tubal blockade seen on HSG were missed on TASCSTH. This was because in each case, the contralateral (patent) fallopian tube would have shown spillage into the POD/peritoneal cavity. A positive ultrasound contrast would have made a difference in this respect, but it's not available in our country [3,12].

Both studies showed 100% concordance in Hydrosalpinges, with sensitivity, specificity and positive predictive value of 100% for SHG. The mucosal folds' thickening seen in some of the hydrosalpinges were shown by the two procedures. Perifmbrial and pelvic adhesion were seen in ten (10%) of our patients on HSG but not appreciated

on ultrasound. Also, only one case of suggestive ovarian cyst was seen on HSG while TASCSh showed ten cases of ovarian cysts.

Debrah et al [10] and Goldberg et al [9] also reportedly visualized adnexal masses, hitherto unnoticed on HSG, on SHG in their studies. Though Samuel E Brown et al [12] did not find significant difference in duration of the two procedures (5.3min for HSG and 6.1min for SIS), the average time for HSG in our centre was found to be 20minutes while an average of 10 minutes was spent on TASCSh. The difference might be due to the waiting time for HSG film to be processed with automatic processors and the cumbersomeness in passing the unconventional catheters used. TASCSh cost N 5,000 (about 33US Dollars) while HSG cost about N 10,000 (66US Dollars) proving again the cheapness of the former.

CONCLUSION

The cheaper, readily available, time-saving, less painful and safer means of evaluating the uterine cavity and fallopian tubes is SCSH. Its diagnostic accuracy; even when done through a transabdominal scan is remarkably high and compared positively with HSG. We therefore advocate its routine use as first time investigation of infertile patients in our environment.

REFERENCES

- [1] Ibekwe PC, Udensi A.M, Imo A.O Hysterosalpingographic findings in patients with infertility in South Eastern Nigeria. *Niger J Med* 2010 April – June; 19 (2) : 165-7.
- [2] De Fence C, Porfiri L.M, Savelli S et al. Infertility in Women: Combined Sonohysterography and Hysterosalpingography in the evaluation of the Uterine cavity. *Ultraschall in Med* 2009; 30:52-57.
- [3] Danielle E. Luciano MD, Exacoustos C, Johns DA, et al. Can Hysterosalpingo- contrast sonography replace hysterosalpingography

in confirming tubal blockage after hysteroscopic sterilization and in the evaluation of the uterus and tubes in infertile patients? *AM J obstet Gynecol* 2011, 204: 79, el – 5.

- [4] Sergio Res Soares, Marcos Messala Batista Berbosa dois Reis, Aroldo Fernando Carmargos. Diagnostic accuracy of sonohysterography, transvaginal sonography, and hysterosalpingography in patients with uterine cavity diseases. *Fertility and Sterility*.Vol 73.No 2;2000.
- [5] Parson A.K, Lense J. J. Sonohysterography for endometrial abnormalities: preliminary results. *J. Clin. Ultrasound* 21: 89 – 95, 1993.
- [6] Miller DL, Aver Kiou Ma, Brayman A A et al. Bioeffect considerations for diagnostic ultrasound contrast agents. *J. Ultrasound Med* 2008; 27: 611-32.
- [7] Aremu AA, Adetiloye VA, Famurewa OC et al Saline contrast sonohysterography findings in Nigerian Patients with Infertility. *Research Journal of medical Sciences* 2(3): 133-136, 2008.
- [8] Mole R.H. Radiation effects on pre-natal development and their radiological significance *Br. J. Radiology* 52, 89 – 101.
- [9] Goldberg J.M, Faleone T, Attaran M Snohysterographic evaluation of uterine abnormalities noted on Hysterosalpingography. *Human Reprod* 1997;12: 2151 – 2153.
- [10] Debra L, Beridge C, Thomas Winter. Saline Infusion Sonohysterography. *Aium* 2004 97-112.
- [11] Gautam N Allah badia, Kanshal Kadam, Swati Allah badia. Saline infusion sonohysterography. *Reviews in Gynaecological practice* 4 (2004) 181 -193.
- [12] Samuel E.B., Charles C.C. John S et Al. Evaluation of outpatient hysteroscopy, saline infusion hysterosonography and Hysterosalpingography in infertile women: a prospective, rand omized study. *Fertil steril* 2000 vol 74, No 5.
- [13] Mario Menada Valenzano, Emanuela Mistrangelo, Davide Li joi. Transvaginal sonohysterographic evaluation of uterine malformations. *European Journal of Obstetrics and Gynaecology and Reproductive Biology* 124 (2006) 246-249.
- [14] Artur Ludwin, Inga Ludwin, Tomasz Banas et al. Diagnostic accuracy of sonohysterography, hysterosalpingography and diagnostic hysteroscopy in diagnosis of arcuate, septate and bicorniate uterus. *J. obstet. Gynaecol. Res.* Vol 37, No 3: 178 – 186, March 2011.

AUTHOR(S):

1. Dr. Ademola A. Aremu,
2. Dr. Victor A. Adetiloye,
3. Dr. Bolanle O. Ibitoye,
4. Dr. Daniel A.Adekanle
5. Dr. Tope O.Bello

PARTICULARS OF CONTRIBUTORS:

1. Corresponding Author,
 2. Radiology Department Professor,
 3. Radiology Department,
 4. Gynaecology department,
 5. Radiology Department,
- Ladoke Akintola University of Technology Teaching Hospital,
Osogbo, Osun State Nigeria.

NAME, ADDRESS, TELEPHONE, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Ademola A. Aremu
FWACS, FMCR, M.B ch.B, Radiology Department,
Ladoke Akintola University of Technology Teaching Hospital,
Osogbo, Osun State, Nigeria.
Phone: 234(0)8034061218
E-mail: lamode70@yahoo.com

DECLARATION ON COMPETING INTERESTS:

No competing Interests.

Date Of Submission: **Jan 15, 2012**
Date Of Peer Review: **Feb 02, 2012**
Date Of Acceptance: **Feb 15, 2012**
Date Of Publishing: **Apr 15, 2012**