



Relevance of Doing Transvaginal (TVS) and Transabdominal Scan (TAS) Consecutively in the Assessment of Women with Infertility

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Abstract

Introduction: Seventy women with infertility had sonographic scan to ascertain relevance of doing the transabdominal and transvaginal Sonographic Scan techniques consecutively in the assessment of the women with infertility.

Aim: This study is to find the relevance of doing transvaginal and transabdominal ultrasonographic technique in the assessment of women with infertility. It will also help to update the skill of sonographers on the assessment of females with infertility.

Methodology: A longitudinal study was conducted. The women recruited for the study were women of child bearing age between 20 to 40 years. Their pelvic reproductive structures and abdomen were first scanned with the transabdominal 3.5 MHz probe. Then the women emptied their bladder and had pelvic sonographic scan with 5MHz transvaginal probe. The both image qualities were scored 1 – 5 on a 5-point scale.

Result: The transabdominal scan showed abdominal organs including four (4) candidates 5.7% with bright liver, but with a mean image quality of 2.13 on a 5-point scale. The transvaginal scan (TVS) showed mean image quality of 3.50 on a 5-point scale. There was significant difference between the image quality of the TVS and TAS. ($p < 0.05$).

Conclusion: The combination of the two sonographic scan techniques provided a more comprehensive result than one scan technique.



Introduction

Infertility in women is a problem that has much impact on emotional, physical and financial life of the woman. An estimated four million women predominantly from developing countries have infertility issues which results to long term maternal morbidity [1]. Infertility in women have many origins but many other causes are directly related to abdominal organs like liver, kidneys, pelvic organs. In both men and women, Chronic Kidney Diseases (CKD) is associated with decreased fertility. Though a multitude of factors contribute to reduction in fertility, progressively impaired function of the hypothalamic, pituitary – gonad axis appear to play a key role in the pathophysiology of infertility as well as abdominal organ disorders[2]. Sonography is the first imaging modality in the investigation of the female infertility to detect disorders among the infertile group. It is an accurate non invasive and cost effective modality which provides useful knowledge for the detection and characterization of the probable cause of the female infertility.

All women with infertility undergo an initial ultrasound as a baseline to investigate other possible causes [3]. The various definitions of infertility have caused many changes in technology, researches, clinical practices and techniques relating to female reproduction [4]. Combinations of techniques for assessment of female infertility have improved diagnosis with application of Transvaginal Scan (TVS), Transabdominal Scan (TAS) and Doppler ultrasound.

Hrechorack and Nargued ran fertility scan using high resolution TVS and spectral Doppler in combination with Hormonal Assay and achieved satisfactory diagnostic result [5]. Mohini et al., used TVS and hysterosalpingography (HSG) to assess the cause of infertility in females and found that TVS has 40% specificity and HSG 96.1 % specificity. In the majority of the combination of sonographic techniques, the imaging procedure begin with transabdominal scan (TAS). This technique may compensate for any further investigation [5]. Transabdominal scan (TAS) is a valuable technique to complement for maximum information about causes associated with female infertility [6]. Ultrasound of the female may be performed using one or two of any ultrasound techniques [7]. This study is to highlight the one-step and the two-step techniques of Pelvic and abdominal scan in the ultrasound investigation of women with infertility.

Materials and Method

Seventy women with history of infertility were selected based on the inclusion criteria for the study and recruited by convenience sampling. The women were between the ages of 20 to 40years who had had history of infertility for more than twelve months. Only those with 28 days cycle were selected. Each of the 70 women drank water before the scan, when they had full bladder they came in for ultrasound. They were scanned for the pelvic and abdominal organ with a 3.5MHz transducer for organ and the liver, kidney, peritonium were scanned.

Liver: The size of the liver and echotexture were recorded

Kidney: The size of the kidneys, cortex-medulla differentiation and location were recorded.

Peritonium and GIT: To rule out extrapelvic location of endometriosis in the abdomen.

After the abdominal scan, the client empties the bladder and returns for the Transvaginal Scan (TVS). All the anatomic structures of the pelvic is assessed with the 5MHz transvaginal scan

probe and results recorded.

The mean scores of the image quality by the TVS and TAS were recorded.

The performance finding of the TAS and TVS with regards to abdominal organs were also recorded. The results were analysed using descriptive and inferential statistics.

Results were presented in tables and the z-test was used to test the Null Hypothesis to find out whether any significant difference existed between the scores of the image quality of the TAS and TVS.

Results

Seventy women with infertility first had transabdominal and pelvic scan with 3.5MHz transducer, then after they had pelvic scan with 5MHz transducer. The quality of the images were scored on a 1 – 5 points on a five point scale. The results of the one-step assessment and two- step sonographic assessment were compared with tables.

Figure 1: Comparison of TAS and TVS image Quality score.

S/N	Organ scanned	Frequency	Mean Score (1 – 5) of Image quality	
			TAS	TVS
1	Uterus	70	3	3
2	Endometrium	70	2	3
3	Ovaries	70	2	4
4	Cervix	70	1	4
Mean Score		70	2.13	3.5

The mean score the image quality of TAS 2.13 on a 5 point scale while the mean score of image quality of TVS was 3.5. There was significant difference between the score of TAS and TVS image quality.

Figure 2: ABD Scan Results.

S/N	Organ scanned	Frequency	Findings	
			TAS	TVS
1	Bright Liver	70	4 (8.6%)	Nil
2	Peritonium/GIT	70	Normal	Nil
3	Kidneys	70	Normal	Nil

The TAS showed the abdominal organs four subjects (5.7%) having fatty liver disease (bright liver). The assessment with TAS and TVS, each has advantage respectively. However, a combination of the TAS and TVS gave a more comprehensive evaluation of the cause of infertility for some of the clients.

Discussion

Seventy women with infertility had sonographic assessment of the pelvis and abdomen with transabdominal probe of 3.5MHz each, and followed also with a transvaginal pelvic scan with 5MHz probe. All the images were scored on a 5 point scale of 1-5. The Transabdominal Scan (TAS) showed the abdominal and pelvic reproductive organs. The TVS showed the pelvic reproductive structures only including the uterus, endometrium, cervical canal and ovarian follicles. The mean image quality score was 2.13 for TAS and 3.50 for TVS on a 5 point scale. There was significant difference between the mean score of the image quality of the TAS and the TVS ($p < 0.05$). This is in agreement with Moorthy, that TAS probe have limitations in image quality

because it uses lower frequencies for imaging due to the longer distance it is expected to interrogate. According to him another disadvantage of the TAS is the beam degrading effect of the anterior abdominal wall especially in obese patients. Both of these limitations lead to degradation in image quality the TAS [8, 9, 10].

The transabdominal scan however, that four subjects (5.7%) of the subjects had fatty liver disease (bright liver). Fatty liver is known to be related to infertility, therefore abdominal scan are relevant in the assessment of infertility. Due to value of abdominal organs in the diagnosis of infertility, abdominal scan is included which to be performed with TAS because TVS cannot perform it. Globally, the average age of parenthood is increasing with an increasing prevalence of abdominal diseases which influences fertility in men and women of reproductive age [8]. This underlines the value of abdominal scan in the evaluation of infertility. Furthermore, a close relation exists between cholesterol and female reproductive physiology. Indeed, cholesterol is crucial for steroid synthesis by ovary and placenta and primordial for cell structure during folliculogenesis. In addition oxysteroids and cholesterol derived ligands play a potential role in oocyte maturation. Anomalies of cholesterol metabolism frequently linked to infertility increase evidence that have described the biological roles of liver X receptors (LXRs) in the regulation of steroid synthesis and follicle maturation and ovulation [11]. Non Alcoholic Fatty Liver Disease (NAFLD) is a major risk factor for metabolic syndrome screening, therefore, abdominal ultrasound for the liver was suggested for women with Polycystic Ovarian Syndrome (PCOS) especially during infertility scan [12]. Fatty liver is associated with abnormal lipid and lipoprotein metabolism and insulin resistance, metabolic syndrome (Mets), renal disease, type 2 diabetes and infertility [13]. Even in males, association between metabolic syndrome and sexual problem is already well established. Human studies have established relationship of NAFLD with infertility [14, 15].

The transvaginal scan (TVS) provided better image quality of the the pelvic reproductive female organs, the TAS extends the investigation to the abdomen outside the pelvis. The TVS uses higher frequency and reduces the intervening distance. The study shows that by combining the transvaginal scan and the transabdominal scan, the advantages of both techniques complement to give improved diagnosis in female infertility.

Conclusion

To achieve achieve improved ultrasonographic evaluation among women with ifertility, the ultrasonographic scan of the abdomen and pelvic scan will be carried out with a transabdominal scan to assess the abdominal organs and follow up with a pelvic scan with a transvaginal scan.

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