THE VALUE OF ULTRASONOGRAPHY IN THE DIAGNOSIS OF LEIOMYOMAS IN SOUTHEAST NIGERIA

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ABSTRACT

BACKGROUND: *Uterine leiomyoma has been found to be of high prevalence among black women. Ultrasound scanning, a safe and non-invasive method of making early and accurate diagnosis will be invaluable in the diagnosis of leiomyoma.*

Objective: To establish the value of ultrasound in the diagnosis of uterine leiomyoma.

Method: *The ultrasound reports and surgical findings of the patients referred with uterine leiomyoma conditions from the gynecological unit of a Teaching Hospital in south east Nigeria, between January 2009 and December 2011 were considered for this study. The age of the women were noted. Their ultrasound finding/diagnosis was also noted, as well as the final diagnosis following the surgery. The association between the ultrasound diagnosis and the surgical diagnosis (accuracy of ultrasonography) was evaluated using tests of validity.*

Results: *The total number of subjects that were scanned for uterine leiomyoma was 200 out of which 100 underwent surgery after sonographic examination. The highest number of subjects 55(55.0%) was seen in the 31 to 40 years age group and ultrasound was able to diagnose 87% as having uterine leiomyoma. The positive predictive value of ultrasound scanning for uterine leiomyoma was 96.7% and the negative predictive value was 50%. The sensitivity of ultrasonography for uterine leiomyoma was 94.5%, with a specificity of 62.5%, accuracy of 92% and diagnostic odd ratio (DOR) of 29.*

Conclusion: *Test of validity revealed that ultrasound is a valuable tool in making diagnosis on women with this condition.*

Keywords: Ultrasonography, Uterus, Leiomyoma, Accuracy, Validity test.

INTRODUCTION

In this era of evidence-based medical imaging, medical imaging scientists need high-quality data to support decisions about whether or not to use a diagnostic test in a specific clinical situation and if so, what is the value of the imaging modality. A number of indicators for that performance were used in this study. All are quantitative indicators of the test's ability to discriminate patients with target condition (uterine leiomyoma) from those without it, resulting from a comparison of the test's result with those from the reference standard in a series of representative patients. In most application the reference standard is the best available method to decide on the presence or absence of the target condition (leiomyoma uteri). Uterine leiomyoma is regarded as the commonest gynecological tumor which affects approximately 15% to 20% of fertile women, but occurs most commonly in women aged 30 to 40 years (Szlark *et al.*, 2003). This tumor is commonly in black women in whom they tend to develop at a relatively early stage (Day Baird *et al.*, 2003). It is a benign tumor composed mainly of smooth muscle fibres very similar to normal myometrium with a variable fibrous tissue element.

Leiomyomas have been shown to increase in size during pregnancy likely due to pregnancy-related increase in estrogens (Baltarowith *et al.*, 1988). However, according to Quyang (Quyang *et al.*, 2006), the current literature on leiomyomas tends to underestimate the complications attributed to them. Over the years, several techniques have been employed in detecting these fibroid masses. One of the techniques is the use of bimanual pelvic examination which is a screening technique. This has the advantage of being cheap relative to other techniques. It can be carried out easily, and moreover does not require specialized equipments. But it has been shown from studies that it is neither sensitive nor specific enough to be used as a modality in screening.(Thomas, 1997) Ultrasound has been utilized as an invaluable imaging modality in evaluating and detecting uterine leiomyomas. An added advantage is that it is safe; non invasive and superior to other modalities of investigations like x-ray, computed tomography, pregnancy test which are non-specific and cannot be used to make accurate diagnosis.(Baltarowith *et al.*, 1988) Ultrasound is regarded as the third arm of the gynecologist (Emuveyan, 2000), and its efficacy in the diagnosis and management of uterine leiomyomas has been acknowledged (Nzeh *et al.*, 1988).

Ultrasonography (USG) is the initial investigation for examining the female pelvis. Ideally, both transabdorminal (TA) and transviginal (TV) scans are performed. Transvaginal scans are more sensitive to diagnosis of small fibroid (Wilde and Scott-Barret., 2009) however, when the uterus is bulky or retroverted, the uterine fundus may lie outside of the field of view. Transabdominal views are often of limited value if the patient is obese and in societies with strong socio-cultural and religious attachment like ours, abdominal scanning may be preferred to vaginal scanning because of limited exposure. Ultrasonography is operator dependent and in skilled hands, fibroids as small as 5mm can be demonstrated on TV USG. There is high prevalence of fibroids among black women (Day Baird *et al.*, 2003) and the accuracy of ultrasound in its diagnosis to the best of our

knowledge has not been carried out in south-east Nigeria. The study was designed to establish the value of ultrasound in proper diagnosis of uterine leiomyoma.

MATERIALS AND METHOD

This research was a retrospective study conducted in Nnamdi Azikiwe University Teaching Hospital, Nnewi, Anambra State. It covered a period of three years from the month of January 2009 to the month of December 2011. It was carried out by first of all going through the ultrasound register to note all cases for pelvic scan with clinical history of uterine fibroid. Then using their hospital numbers, the folders were traced at the medical records department of the hospital with permission from the chief medical record's officer. There were about four hundred and fifty patients who underwent abdominopelvic scan in the hospital but only two hundred had uterine fibroid as the provisional diagnosis. However, only one hundred out of these patients underwent surgery. Data on these 100 patients were used for analysis in this research work. Those without surgery were excluded as definite diagnosis was necessary. Data was analyzed using validity test (signal theory)

Results

Medical records of 100 female subjects were sorted to confirm the accuracy of ultrasound in the diagnosis of uterine leiomyoma. The females within age of 20 years and 70 years old (mean+ SD= 36.23± 6.91) were recruited for this study. The recruited subjects are Nigerians.

Table-1. Distribution of Uterine Leiomyomas According To Age of Subjects.

AGE(YEARS)	NO OF PATIENTS	PERCENTAGE (%)
0-20	0	0%
21-30	22	22.0%
31-40	55	55.0%
41-50	22	22.0%
51-60	0	0%
61-70	1	1.0%
TOTAL	100	100%

Mean age=36.32± 6.91

Table-2. Representation of the comparison between ultrasound finding and surgical findings using a 2x2 contingency table

Reference test	
Leiomyoma	**No Leiomyoma**
TP(87)	FP(3)
FN(5)	TN(5)

The following values were obtained for validity tests. Sensitivity = 94.6%; Specificity = 62.5%; Positive Predictive Value (PPV) = 96.7%; Negative Predictive Value (NPV) = 50%;

Accuracy =92%; Diagnostic odd ratio (DOR) = 29

DISCUSSION

Leiomyomas are the most common type of uterine tumor that are composed primarily of smooth muscle and a variable amount of fibrous tissue (Szlark *et al.*, 2003). The size of Leiomyomas is highly variable. As they increase in size, leiomyomas begin to distort the normal uterine contour. This increase in size of leiomyoma often occurs during pregnancy, likely due to pregnancy-related increase in estrogens (Robboy *et al.*, 2000). Leiomyomas are gynecological conditions which can be life threatening, and presents with abdominal swelling and/or dysmenorrhea with patient sometimes in severe pains (Stewart, 2001). Ultrasound has been utilized as an invaluable imaging modality in evaluating and detecting uterine leiomyomas. Its advantage is that it is safe, non invasive and superior to other modalities of investigations like x-ray, computed tomography, pregnancy test, which are non-specific and cannot be used to make accurate diagnosis (Baltarowith *et al.*, 1988).

From the result the sensitivity of ultrasonography in diagnosis of leiomyoma is 94% while the specificity is 62.5% and ultrasound accuracy in diagnosing uterine leiomyomas is 92.0%. The positive predictive value (PPV) which was taken as the proportion of leiomyoma free subjects in surgical diagnosis to that reported by ultrasound was 50%. The estimated diagnostic odd ratio (DOR) from ultrasound in detecting leiomyoma is 29. This means that for ultrasound, the odds for positivity among subjects with uterine leiomyoma are 29 times higher than the odds for positivity among subjects without leiomyoma.

Some researchers may feel that there are already too many indicators of test performance. This is true. But it is hard to see how selection can or should be produced. Each of the indicators serves a different purpose. Sensitivity and specificity are expressions of the conditional hit rates of the test. Predictive values are the numbers that are most salient for clinical practice. Among these useful indicators, DOR has a place as a single statistics with a long history and useful statistical properties (Afina *et al.*, 2003).

From the result, it shows that the sensitivity and specificity of ultrasound in the diagnosis of uterine leiomyomas were 94.6% and 62.5% respectively which agrees with the existing studies on the sensitivity and specificity of ultrasound in the diagnosis of foreign bodies in the hand. (Bray *et al.*, 1995)It clearly supports the view that the sensitivity (94%) of ultrasound in detecting foreign bodies is almost the same as the sensitivity (94%) of ultrasound in the diagnosis of leiomyomas. But the specificity which is 99% in detecting foreign bodies does not support the researcher's findings in the specificity of ultrasound in diagnosing leiomyoma which is 62.5%. It therefore shows that ultrasound is highly specific in detecting foreign bodies than in detecting leiomyoma.

From the result, the sensitivity, specificity and positive predictive value of ultrasound in diagnosis of uterine leiomyomas were 94.6% and 96.7% respectively. This shows a variation from values

obtained in the study of the sensitivity and specificity of ultrasound screening for ovarian cancer (Menon, 2009) which were 84.9%, 98.2%, and 5.3% respectively. It therefore shows that ultrasound has a higher sensitivity in diagnosing leiomyoma than ovarian cancer. On the other hand, ultrasound is highly specific in detecting ovarian cancer and the positive predictive value (PPV) of ultrasound is grossly higher in detecting leiomyomas than ovarian cancers. These variations also could be due to difference in quality of equipment used in the procedure and even the expertise of the observer. The results show that the highest prevalence of uterine leiomyomas (55.0%) is between 31- 40 year age group which is a very active period in the adult female reproductive life. This finding is similar to that of Szlark et al Szlark *et al.* (2003) which noted higher prevalence of leiomyomas between 30-40 years. A total of 87 patients representing 87% of a sample size of 100 were recorded. This analysis agrees with the existing studies about uterine fibroid occurrence in women. It clearly supports the view that about 40% of women older than 35 years are being affected, Szlark *et al.* (2003) since according to the research about 55% between the age range of 31-40 years was estimated. It was shown that those false positive cases where ultrasound diagnosis indicated no leiomyomas and surgery confirms were cases of ovarian cyst and endometrial hyperplasia. However this agrees with the findings that fibroids appear on sonogram as ovarian tumours and surgery is the only way an accurate diagnosis can be made (Trace, 2009). A meta-analysis of diagonistic performance of ultrasound in investigation of uterine leiomyoma is recommended for further research.

CONCLUSION

Ultrasonography gives 92% accuracy in the diagnosis of leiomyomas. Uterine leiomyomas are found more in patients between the ages of 21 years to 50 years. This was proved based on the information collected on patients that came for abdominopelvic ultrasonography and were later managed by surgery. From the research, it has been shown that ultrasound is of great importance in diagnosing uterine leiomyomas accurately. The 94.6% sensitivity of ultrasound was shown to be within normal when compared with surgical findings. The researchers are of the view that sonographers, gynaecologists and clinicians should advise patients on the need to go for routine ultrasonography of their pelvis at a determined interval of time. This is necessary to reduce the inconveniences associated with uterine leiomyomas like sub fertility, pains, menorrhagia among others that mostly occur in the submucosa.

REFERENCE

Afina, S.G., G.L. Jeroen, H.P. Martin, J.B. Gouke, Patrick. and M. Bossuyta, 2003. The diagnosis odd ratio: A single indicator of test performance. J Clin Epidermol, 56: 1129-1135.

Baltarowith, H., H. Hricak and E. Tanagho, 1988. Pictoria essay, pitfalls in the sonographic diagnosis of uterine fibroid. Am J Obtets Gynaecol, 188: 100-107.

Bray, P., J. Mahoney and J. Campbell, 1995. Sensitivity and specificity of ultrasound in the diagnosis of foreign bodies in the hand. J Hand Surg, 20: 661-666.

Day Baird, D., D. Dunson, M. Hill, D. Cousins and J. Schetman, 2003. High cumulative incidence of uterine leiomyoma in black women: Ultrasound evidence. Am J Obstet Gynecol, 188: 100-107.

Emuveyan, E., 2000. Ultrasonography in pregnancy comprehensive obstetrics in the tropics. London: Churchill Livingstone

Menon, e.a., 2009. Sensitivity and specificity of multimodal and ultrasound screening for ovarian cancer and stage distribution of detected cancers. Lancet Oncol 4: 30-39.

Nzeh, D.A., F. Komolafe and A.A. Adetoro, 1988. Ultrasound evaluation of pelvic masses in females. Nig Med 5, 188: 458-460.

Quyang, D.W., K.E. Economy and E.R. Norwitz, 2006. Obtetrics complications of fibroids. Obstet Gynaecology Clin North Ant, 33(1): 153-169.

Robboy, S.J., R.C. Bentley, K. Butnor and M.C. Anderson, 2000. Pathology and pathophysiology of uterine smooth muscle tumors. Environ Health Perspect, 108(5): 7795-7845.

Stewart, E.A., 2001. Uterine fibroid. Lancet, 357: 293-298.

Szlark, J., E. Tamm, H. Choi and V. Varavithya, 2003. Mr imaging of common and uncommon large pelvic masses. Radiographics, 23: 403-424.

Thomas, H.G., 1997. The gynaecological physical examination, essential of clinical practice. Gynaecology little brown and company boston: 5-9.

Trace, C., 2009. Benign uterine fibroid tumors. About Com Guide.

Wilde, S. and Scott-Barret., 2009. Radiologic appearances of uterine fibroid. Indian J Radiol Imaging, 19(3): 222-231.