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Sonographic Diagnosis Of Ovarian Torsion: Accuracy, Predictive Value, And Diagnostic Indicators

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ABSTRACT

Ovarian torsion is a life-threatening gynaecologic emergency that has to be initially diagnosed so as to avoid the irreparable damage to the ovary. The objective of the study was to determine the precision of sonographic diagnosis of ovarian torsion and predictive ability of different sonographic appearances. A retrospective study involving 45 women who had undergone ultrasound assessment and diagnostic laparoscopy was done. The researchers have determined that the general accuracy of sonographic diagnosis was 74.6%. The most predictive markers of torsion were the key sonographic ones involving ovarian edema, abnormal blood flow of the ovary, and free fluid surrounding the ovary. Free fluid in the Douglas pouch was largely related to ovarian torsion (P =.005). Nevertheless, the limitations such as small sample size and diversity in the operators of ultrasound were minimized, and the significance of the use of multiple sonographic signs was identified to achieve the better diagnostic accuracy in the context of diagnosing ovarian torsion and the importance of using sonography, as one of the diagnostic methods.

Keywords Ovarian torsion, Sonography, Doppler studies, Diagnostic accuracy, Ultrasound.

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INTRODUCTION

The fifth commonest gynecologic surgical emergency is ovarian torsion with prevalence rates of 2.7- 3% prevalence. It may represent a finding of necrotic adnexa or non-compromised ovary presenting as twisted blood vessels. Early diagnosis is of importance to avoid the loss of adnexa or ovary, and in uncommon cases, some complications like thrombophlebitis or peritonitis may occur. The condition is however difficult to diagnose, due to its presentation which is highly inconsistent and misleading in most cases and physical examination may not give much information.[1] Abdominal pain is the most constant symptom that has been frequently reported in the literature, and it is usually localized to the lower quadrant. The use of sonography has been enhanced in recent developments which have offered great utility. Traditional ultrasound results, with the help of Doppler flow imaging, can assist clinicians to diagnose ovarian torsion. Nevertheless, the validity of this diagnostic instrument is still questionable as literature indicates that the tool has the correct diagnoses before surgery only 23 to 66 percent of the time.[2] Part of this problem can be explained by the differences in the experience of the ultrasound operator that may include senior physicians with specialization in Ultrasound, medical residents, and sonographers, and also by the range of the sonographic assessment that can incorporate or not the Doppler ovarian blood flow. This study was aimed at determining the accuracy of sonographic diagnosis of ovarian torsion and determining the predictive worth of various sonographic observations.

MATERIALS AND METHODS

A detailed database that was kept by the ultrasound unit of a tertiary-levelled obstetrics and gynecology unit identified the study population. All the women who experienced ultrasound examination in the database were screened and the imaging results indicated an ovarian torsion possibility. The medical history of these people was studied and the ones who later had diagnostic laparoscopy after the ultrasound examination were enrolled in the study [3].

All the ultrasound tests carried out in the course of the study were conducted by a group of qualified physicians that specialized in ultrasonography.[4] The information obtained at each scan was automatically entered into the database of the department by the standard procedure such as uterine and ovarian length and size and presence of free fluid in the pelvic cavity. Other narrative information about the uterus, ovaries, pelvic cavity and the overall impression of the scan was also read through carefully.

Data mined on the records targeted sonographic characteristics related to torsion that comprised:

ovary edema with hypoechoic or heterogeneous central stroma and numerous small follies on the periphery;

ovary enlargement on both sides, the other one not affected;

Ovarian mass or ovarian cyst;

uncharacteristic location of the ovary: midline, anterior, above the uterus, or in pelvis;

Abnormal blood flow, which is the absence of venous and arterial blood flow or arterial flow alone on Doppler examination;

free fluid around the ovary or inside the pelvic cavity;

dilation of fallopian tube; and

ovary hemorrhage localities.

Diagnostic laparoscopy results were available as a result of surgical reports such as confirmation of torsion, ovarian cysts or masses, free fluid in the pelvis, adhesions or inflammatory pathology. Statistical software was used in data analysis. Chi-square and exact test based on Fisher were used to compare the frequency of each sonographic sign involving women who had laparoscopically confirmed torsion and those who did not.[5] The distribution of confirmed torsion cases that fit individual or combined sonographic findings were also evaluated with the use of these tests. Each sign had its sensitivity, specificity, positive predictive value, and negative predictive value, and a few combinations of signs.

All combinations of the eight sonographic markers were first examined; however, only the combinations that showed the most diagnostic accuracy have been presented due to the brevity. Torsion rate of each combination was then determined among women who demonstrated all signs that were included and none of those that were excluded. In case any of the required signs was not present in a combination, the result of the combination was taken as negative.[6] The analysis was a multivariate stepwise logistic regression model which was used to identify the strongest predictors of torsion using sonographic factors and also examined the effect of other variables on the predictor, including scanning mode, side, and operator variations.[7] Statistically all analyses were two tailed with $P < .05$ as the level of significance.

RESULTS

Table 1. Laparoscopic Findings in Women With a Sonographic Diagnosis of Ovarian Torsion

Laparoscopic Finding	**n (%)**
Total cases	45 (100.0)
Ovarian torsion	35 (77.8)
Left	15 (33.3)
Right	20 (44.4)
Hemorrhagic corpus luteum	5 (11.1)
Ovarian cyst	2 (4.4)
Pelvic inflammatory disease	1 (2.2)
Appendicitis	1 (2.2)
No pathologic findings	3 (6.7)

Table 2. Frequency of Sonographic Signs of Ovarian Torsion in Women With and Without Evidence of Ovarian Torsion on Laparoscopy

Sonographic Sign	**Torsion (n = 35)**	**No Torsion (n = 10)**	**P**
Ovarian edema, n (%)	30 (85.7)	8 (80.0)	.75
Abnormal ovarian blood flow, n (%)	30 (85.7)	6 (60.0)	.03

Absence of arterial and venous flow	27 (77.1)	6 (60.0)	.12
Only arterial flow detected	3 (8.6)	0 (0.0)	.23
Relative enlargement of ipsilateral ovary, n (%)	30 (85.7)	8 (80.0)	.72
Free fluid around ovary or in Douglas pouch, n (%)	25 (71.4)	3 (30.0)	.005
Ovarian cyst, n (%)	15 (42.9)	4 (40.0)	.89
Clear	6 (17.1)	2 (20.0)	.79
Turbid	9 (25.7)	2 (20.0)	.62
Abnormal ovarian location, n (%)	12 (34.3)	2 (20.0)	.27
Anterior to and/or above the uterus	7 (20.0)	1 (10.0)	.56
Douglas pouch	5 (14.3)	1 (10.0)	.67
Distended fallopian tube, n (%)	3 (8.6)	0 (0.0)	.21
Sites of bleeding within the ovary, n (%)	2 (5.7)	0 (0.0)	.39

Ovarian Torsion is a serious gynecologic emergency, which requires quick diagnosis and treatment to avoid permanently damaged ovary. Ovarian torsion has a rather nonspecific clinical presentation making it difficult to identify at an early stage. Sonography and Doppler studies are the main imaging modalities that are utilized in the diagnosis of possible ovarian torsion.[8] Nevertheless, sonographic diagnosis is rather debatable because a number of sonographic findings can be confused with other pathologies in the pelvis. This paper will determine the validity of sonographic appearances in diagnosing ovarian torsion and its predictability.[9]

The results presented in Table 1 indicate the laparoscopic outcomes in women who had sonographic diagnosis of ovarian torsion. Out of 45 women (45) recruited in the study, 35 (77.8) women were known to have ovarian torsion. Ovarian torsion was almost equally distributed in both the left (33.3) and the right (44.4) ovaries. Additional pathologies which were seen laparoscopically were hemorrhagic corpus luteum (11.1%), ovarian cysts (4.4%), pelvic inflammatory disease (2.2%), and appendicitis (2.2%). No pathological changes were found in 3 women (6.7%). These results highlight that there is a need to be cautious with the differential diagnoses in patients with pelvic pains.[10]

Table 2 shows the prevalence of different sonographic findings of ovarian torsion between the women who had laparoscopic evidence of torsion and those who did not have the laparoscopic evidence of the same. In the confirmed torsion, ovarian edema was the most common sonographic appearance of the condition, found in 85.7% of women. Abinormal ovarian blood flow, especially the lack of venous flow and arterial flow was also a prominent indicator of torsion, observed in 77.1 percent of torsion.[11] The Free fluid around the ovary or in the Douglas pouch was found in 71.4% of torsion cases which proves it to be very strongly associated with ovarian torsion. There were other signs like ovarian cysts, abnormal location of the ovaries and distended fallopian tubes which were less common yet still add to the overall diagnostic profile.[12]

It is worth noting that the free fluid that surrounds the ovary or in the Douglas pouch had a statistically significant correlation with ovarian torsion (P =.005) and this shows the significance of the free fluid as a diagnostic depiction. The results of the study highlight the intricacy of the diagnosis of ovarian torsion and the role of sonography, especially with clinical evaluation, in making treatment decisions and enhancing patient outcomes.[13]

DISCUSSION

This research was carried out to determine the correctness of sonographic diagnosis of ovarian torsion, and the predictive value of different sonographic appearances related to this disease.[14] The main study findings included: (1) overall sonographic diagnosis accuracy of ovarian torsion was 74.6 per cent; (2) false-negative rate was likely to be low because the most common laparoscopic finding in incorrectly sonographically diagnosed cases was a hemorrhagic corpus luteum; (3) a combination of multiple sonographic signs improved the specificity and positive predictive value (PPV) of ovarian torsion; and (4) an abnormal ovarian blood flow, the absence of an ovarian cyst, and Diagnosis of the ovarian torsion still remains a clinical challenge that may need a high index of suspicion. It is still grounded on clinical symptoms and physical examination.[15] Nevertheless, clinical appearance often manages to confuse with other disorders of pelvic pain, adnexal masses, including hemorrhagic cysts and

abscesses. Sonography is a generally the initial imaging modality that would be used to assess a patient with pelvic pain.[16] A sonographic image of a torsed adnexa may be solid, cystic, or complex. The ovary will generally be enlarged and cystic follicles with an extreme thickening of the cyst wall will be seen. Unilateral enlarged ovary is the most predictable observation in ovarian torsion and it is usually useful to compare it to the contralateral asymptomatic ovary of the body. In spite of this, the fact that the ovaries look normal does not rule out the possibility of ovarian torsion.[16] Findings of color Doppler imaging may be problematic because of the disparity in the levels of torsion. Full normal venous waveforms are hardly observed in ovarian torsion. Central venous flow and flow in the vascular pedicle could be an indication of ovarian viability.[17] Other important observations are an inverted pedicle and the whirlpool sign but these observations were not in this study. [18]The study was limited in a number of ways such as a rather limited sample size, retrospective design and data was gathered by different ultrasound operators. Also, only not all women with pain in the pelvis undergo laparoscopy, so false-negative results were not provided in the research.[19] However, in our department the index of suspicion of ovarian torsion is high and almost all women exhibiting with the acute pelvic pain undergo laparoscopic assessment reducing the chances of misdiagnosis.[20]

CONCLUSION

To sum up, ovarian torsion is still a difficult issue in gynecology that has to be diagnosed as soon as possible to avoid irreversible injury to the ovary. Sonography, specifically together with Doppler studies, is a useful first line imaging test in suspected cases of ovarian torsion. This investigation showed that sonographic diagnosis of ovarian torsion was an overall accurate diagnosis of 74.6, the best signs were ovarian edema, abnormal ovarian blood flow and the free fluid surrounding the ovarian gland. Notwithstanding a few weaknesses, including the retrospective design and the variability of the ultrasound operators, this study demonstrates the significance of having a high index of suspicion of ovarian torsion, particularly in cases in which the clinical manifestations are similar to other conditions of the pelvis.

Another important point of the findings is that sonographic signs can give very predictive results; however, the more different signs are combined, the more specificity and positive predictive value the diagnosis obtains. Availability of the free fluid both round the ovary and in the Douglas pouch, especially, was highly correlated with ovarian torsion and it was thus a very crucial indicator to diagnose. Besides, the research highlights the importance of the need to consider ovarian torsion in cases that show normal sonographic results because false negatives may also happen. Under these circumstances, it is possible to employ several sonographic features and Doppler assessment to enhance the level of accuracy.

Since early diagnosis is important in avoiding ovarian loss, clinicians should still use sonography as the major imaging modality and in cases where ovarian torsion is suspected. Finally, though imaging progress has enhanced diagnosis, more studies and standardization of sonographic practice are necessary to enhance the accuracy and reliability of the diagnosis of ovarian torsion in different clinical practices..

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