

# The effectiveness of spectral and color Doppler in predicting ovarian torsion A prospective study

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## Abstract

We evaluated the effectiveness of color and spectral Doppler examination of the ovarian vasculature flow, using transvaginal sonography (TVS) in 65 women prior to laparoscopy due to suspected ovarian torsion. There were 15 cases of ovarian torsion. In all of them, a pathology was detected by the color and spectral Doppler examination. Of the 50 patients without torsion at laparoscopy, one had abnormal Doppler studies. Color and spectral Doppler can demonstrate the presence or absence of arterial and venous flow in cases of suspected torsion of the ovary. © 2002 Elsevier Science Ireland Ltd. All rights reserved.

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## 1. Introduction

Torsion of the vascular pedicle of the ovary results in ischemia and the rapid onset of acute pelvic pain. Therefore, torsion of the ovary is included in the differential diagnosis of this symptom [1], and the laboratory and the ultrasound findings in this condition are non-specific [1]. This study was performed in order to confirm that Doppler flow may be useful in the evaluation of ovarian torsion.

## 2. Materials and methods

During a 1 year period, 65 women were admitted to our department with a diagnosis which included suspected ovarian torsion. Excluded were women with pregnancy, obvious pelvic inflammatory disease, and hemorrhagic corpus luteum. Prior to laparoscopy all patients were evaluated by transvaginal sonography (TVS). Spectral Doppler was used for detecting the presence or absence of arterial and venous flow. At laparoscopy, torsion was diagnosed when the pedicle of the adnexa was twisted at least one turn and the ovary appeared edematous, congested and blue. If the

ovary was to be left in situ, detorsion was performed, otherwise, detorsion and cystectomy was performed. The predictive values of the sonographic studies were evaluated with regard to the laparoscopic findings.

## 3. Results

Of the 65 women undergoing laparoscopy, 15 (23%) had ovarian torsion. All 15 patients with torsion had pathologic color and spectral Doppler studies. In 10 cases with torsion, venous and arterial flow was not detected in the ovarian tissue. In five cases with torsion, arterial flow was detected peripherally without demonstrable venous flow (Fig. 1). Thirteen cases of torsion were managed by detorsion alone and two by detorsion and cystectomy. There were no postoperative complications. Torsion of the ovary was ruled out in 50 patients by laparoscopy. In 49 of them arterial and venous flow were detected in the ovaries by color and spectral Doppler examination. In one case, no flow was detected by the color and spectral Doppler studies. On laparoscopy, the ovaries were normal in this case.

The sensitivity, specificity, positive and negative predictive values of the color and spectral Doppler examinations in detecting ovarian torsion were 100, 98, 94 and 100, respectively.

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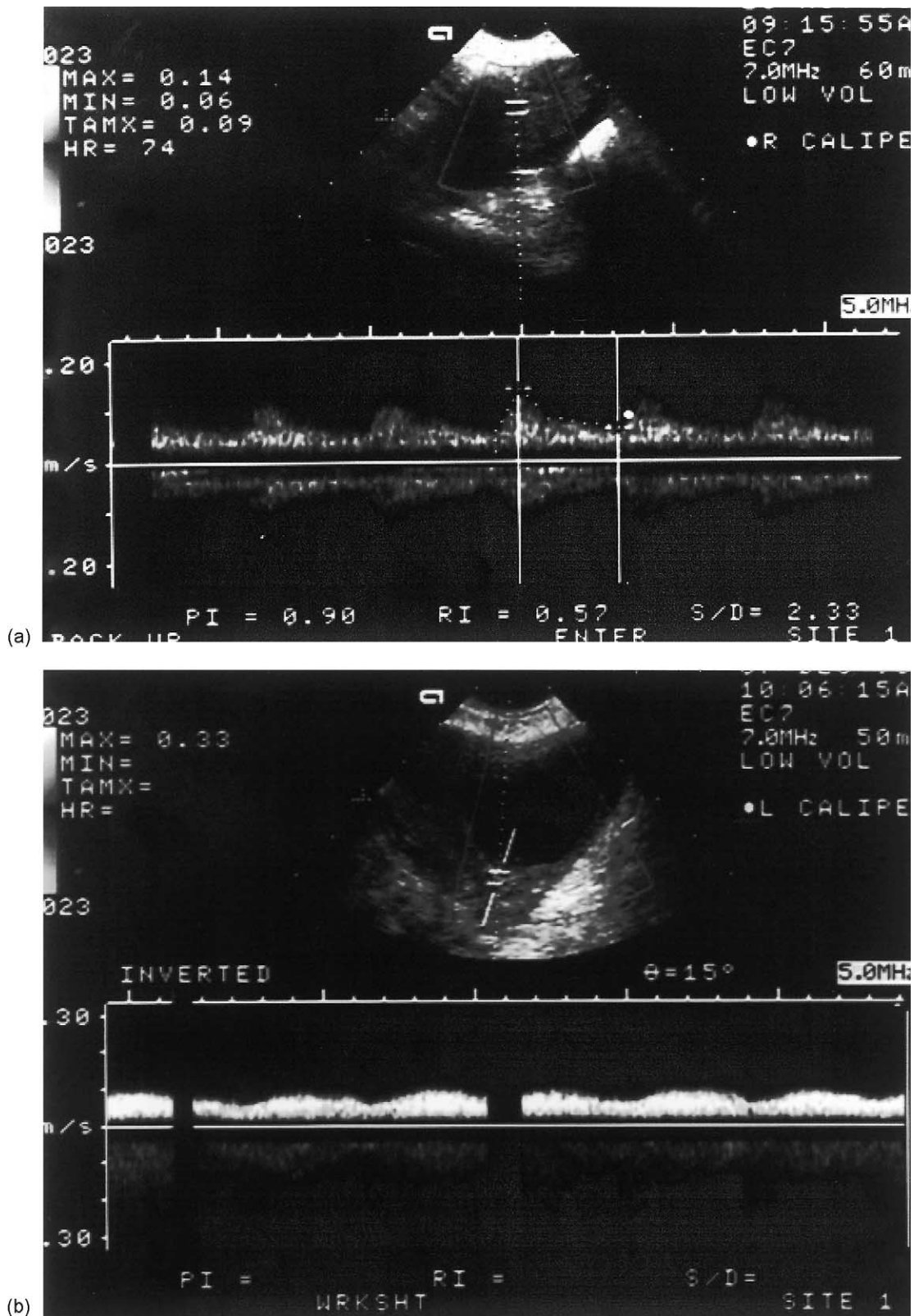


Fig. 1. Color and spectral Doppler studies of ovarian vasculature: (a) color and spectral Doppler—arterial flow at the periphery of the cystic ovary; (b) color and spectral Doppler—venous flow at the periphery of the cystic ovary.

#### 4. Discussion

In the current study, which is the largest one in the literature, we prospectively evaluated the effectiveness of color and spectral Doppler examination of the ovarian vasculature in the diagnosis of ovarian torsion. Color Doppler can demonstrate the presence of flow, while the addition of spectral Doppler allows differentiation between arterial and venous flow. The rationale for performing color and spectral Doppler studies stems from our assumption that when ovarian torsion occurs, the venous flow is the first to be compromised. For a certain period of time, arterial flow, mainly peripherally, may still be detected. This can be explained by the differences in the arterial and venous blood pressure in the ovary. The presence of arterial flow detected by color Doppler does not rule out torsion.

In our study, the positive predictive value of the Doppler studies was 94%. Tepper et al. [2] displayed no blood flow within eight ovaries suspected of ovarian torsion, which was confirmed by laparoscopy. Lee et al. showed a diagnostic accuracy of 87% detecting twisted ovaries preoperatively by color Doppler studies [3].

We conclude that the absence of either venous or arterial and venous blood flow in an enlarged or cystic ovary, as observed by color and spectral Doppler examination, can accurately predict torsion. The addition of spectral Doppler is useful in differentiating the presence or absence of venous and arterial blood flow and ruling out torsion. Torsion is very unlikely if spectral Doppler demonstrates venous flow (2% misdiagnosed). On the other hand, if venous flow is absent, the positive predictive value for torsion is 94%. The ability of ultrasound machines to detect and measure ovarian blood flow in the ovaries makes this a powerful and safe diagnostic tool in the evaluation of patients with abdominal pain.

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