Pelvic Congestion Syndrome: The Role of MRI

Gligor Milosevic, M.D. 1; Bianka Freiwald, M.D. 1; Manuela Birrer, M.D. 2; Christoph L. Zollikofer, M.D. 1; Rahel A. Kubik-Huch, M.D., M.P.H. 1

1 Institute of Radiology, Kantonsspital Baden, Baden, Switzerland
2 Center for Vascular Diseases, Kantonsspital Baden, Baden, Switzerland

Clinical background

Chronic pelvic pain is a common condition occurring in women of childbearing age. Up to 38 out of 1,000 women annually present in primary care with intermittent or constant pain in the lower abdomen or pelvis, a rate comparable with that of Asthma and lower back pain (37 and 41 in 1000, respectively) [1]. Chronic pelvic pain associated with pelvic venous insufficiency has been termed ‘Pelvic Congestion Syndrome’ and recognized as an often overlooked cause of chronic pelvic pain [2].

The list of differential diagnoses is long and includes gynaecological, urological, gastrointestinal or musculoskeletal entities such as endometriosis, recurrent urinary tract infections, irritable bowel syndrome or pelvic floor myalgia [3].

The etiology of Pelvic Congestion Syndrome is probably multifactorial, with valvular insufficiency (e.g. congenital absence of ovarian vein valves), venous obstruction (e.g. nutcracker syndrome), hormonal factors/reproductive age and multiple pregnancies being widely acknowledged risk factors [4].

Presentation

Most women report noncyclic, intermittent or constant, dull pain or fullness, sometimes associated with nonspecific symptoms such as headache, nausea, vulvar swelling or feeling of leg fullness. They may also complain of sharp exacerbations of pain, dyspareunia, dysmenorrhea and urinary urgency. The symptoms are typically exacerbated by menstruation, coitus, pregnancy, prolonged standing, walking or activities that increase intraabdominal pressure. The pain is usually unilateral, but can also be bilateral. At presentation, the symptoms have often already persisted for more than six months. Possible clinical findings are varicose veins of the vulva, perineum, buttocks and lower extremities [3].

Imaging findings

It must be stressed that imaging studies alone cannot diagnose Pelvic Congestion Syndrome in the absence of according patient history or the clinical features listed above, since dilated pelvic veins can often be incidentally found in asymptomatic women [5].

Ovarian vein dilatation more commonly affects the left side, presumably due to the right angle formed when it joins the left renal vein, facilitating reflux [3, 6]. This is in contrast to septic puerperal ovarian vein thrombosis, which reportedly more often occurs on the right side [7].

Ultrasoundography with color Doppler allows a dynamic examination of flow in the pelvic veins. Dilated peri-uterine and peri-ovarian veins can be identified in Pelvic Congestion Syndrome. The Valsalva maneuver or examining the patients in an upright position can be used to increase venous filling. Established diagnostic criteria are reversal of flow in the ovarian veins, tortuosity of the ovarian veins and pelvic varicosities > 6 mm [8].

Both CT and MRI allow a detailed depiction of anatomy including vascular structures and pelvic organs. Contrast-enhanced studies are preferred to visualize the pelvic venous system. MRI is widely being regarded as the modality of choice, as it has the advantage of not relying on ionising radiation and, based on its superior soft tissue contrast, being able to show signs of other pathological conditions, e.g. of the gynaecologic

Key points and implications for patient care

• Dilatation of ovarian and pelvic veins in the context of chronic pelvic pain is the imaging hallmark of Pelvic Congestion Syndrome, but can also be found in asymptomatic women.
• MRI is the imaging modality of choice, offering good spatial and temporal resolution, as well as the possibility to show other pathologic conditions causing chronic pelvic pain.
• In our experience, examinations of diagnostic quality are more reliably achieved using dynamic contrast-enhanced MR-angiography than with its time-resolved counterpart.
organs or the intestine, like endometriosis or inflammatory bowel disease. The findings of dilatation of the peri-uterine and peri-ovarian venous plexus and ovarian veins are the same as in ultrasonography (Figs. 1-4). Ovarian vein reflux can directly be shown using time-resolved MR-angiography [9], as well as be observed in dynamic contrast-enhanced MR-angiography in some cases (Figs. 2-4). Compared to ultrasound, different cut-off values for venous diameters in cross-sectional modalities have been proposed by Coakley et al.: Identification of four ipsilateral pelvic veins, at least one of which measuring > 4 mm, and an ovarian vein diameter > 8 mm are regarded as consistent with pelvic varices and, in the appropriate clinical setting, with Pelvic Congestion Syndrome [10]. Selective retrograde catheter venography of the ovarian veins using a femoral approach is regarded as the imaging gold standard, which can show retrograde flow in the ovarian and pelvic veins, incompetent pelvic veins and congestion of flow in the ovarian, pelvic, vulvovaginal or thigh veins [11]. Drawbacks are it being an invasive procedure and the use of ionising radiation. In our institution, percutaneous venography is accordingly performed with the intent of therapeutic intervention in the same session.

**MRI protocol and post-processing**

MRI is usually performed using a body phase-array coil. In our institution the examination includes axial T2*-weighted TrueFISP sequences covering the abdomen and pelvis from the upper pole of the left kidney to the proximal thighs, pre-contrast T1-weighted fast low angle shot (FLASH) in axial plane and T2-weighted turbo spin echo in axial and sagittal planes covering the pelvis. Five phases of dynamic contrast-enhanced angiography (Gd-DOTA [Dotarem®], 0.1 mmol/kg body weight) are performed in coronal plane. Contrast medium

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1. Illustration showing the uterine and ovarian venous plexus, the ovarian veins draining into the inferior Vena cava on the right and the left renal vein on the left.

   *Illustration by Wolfgang Herzig.*

2. Arterial-predominant phase contrast-enhanced MR-angiography in a 37-year-old patient shows early filling of the dilated left ovarian vein indicating reflux as well as dilatation of ovarian and uterine venous plexus of the left side (arrowheads in cranio-caudal order, respectively).

3. Arterial-predominant phase contrast-enhanced MR-angiography in a 33-year-old patient showing early filling of the left ovarian vein (arrowheads) indicating reflux.

4. Contrast-enhanced MR-angiography in the same patient as in Figure 3 shows progressive filling of the left ovarian vein (arrowheads) in a later phase.
is injected after acquisition of the first phase, which is later used for subtraction. Finally a post-contrast 3D fat-suppressed T1-weighted sequence covering the abdomen and pelvis in axial plane acquisition is performed (CAIPIRINHA parallel imaging technique). The protocol is summarized in Table 1.

The contrast-enhanced angiography images are post-processed using maximum intensity projection (MIP) algorithms.

The whole examination is completed in approximately 20 minutes (Siemens MAGNETOM Aera 1.5T).

We employ dynamic contrast-enhanced MR-angiography due to the higher spatial resolution it provides compared to time-resolved angiography (TWIST technique). Before switching to gadoterate-based contrast media, we used a gadofosveset-based product (Ablavar® or formerly Vasovist®) prior to its withdrawal from the European market [12].
Treatment

Even if a causal relationship between pelvic varicosities, venous stasis and pelvic pain has not been proven, it is supported by limited data from numerous smaller studies. Conservative treatment with gonadotropin-releasing hormone agonists or synthetic progestins has been reported to have positive effects on patients’ pain levels [1]. Nevertheless, ovarian and pelvic vein embolisation has now become the standard of treatment of Pelvic Congestion Syndrome. The procedure is commonly performed under analgosedation, using embolisation coils, sclerosants or a combination of both [13]. Success rates of up to 80% have been reported after a follow-up of 5 years [14]. An exemplary case is shown in Figures 5 and 6.

Conclusion

Pelvic Congestion Syndrome is an important cause of chronic pelvic pain, typically occurring in women of reproductive age. When clinically suspected, imaging can reliably confirm the diagnosis showing dilated ovarian and pelvic veins or retrograde venous flow. Notably, different cut-off values have been proposed for ultrasound and CT/MRI. MRI is considered the modality of choice and may better show other pathologic conditions causing the symptoms. Treatment by ovarian and pelvic vein embolisation can provide long-term benefit.

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References

5 Arnoldussen CWKP, de Wolf MAF, Wittens CHA. Diagnostic imaging of pelvic congegestive syndrome. Phlebology. 2015; Vol. 30(15).

Contact

Prof. Rahel A. Kubik-Huch, M.D., M.P.H.
Head of Department
Institute of Radiology
Kantonsspital Baden
Im Ergel 1
5404 Baden
Switzerland
rahel.kubik@ksb.ch

Contact

Gligor Milosevic, M.D.
Institute of Radiology
Kantonsspital Baden
Im Ergel 1
5404 Baden
Switzerland
gligor.milosevic@ksb.ch