

\*Krzysztof Pyra<sup>1</sup>, Sławomir Woźniak<sup>2</sup>, Piotr Czuczwar<sup>2</sup>, Anna Drelich-Zbroja<sup>1</sup>, Tomasz Roman<sup>1</sup>,  
Łukasz Świątłowski<sup>1</sup>, Tomasz Paszkowski<sup>1</sup>, Tomasz Jargiełło<sup>1</sup>

## Assessment of efficacy of intravascular ovarian vein occlusion for the treatment of pelvic congestion syndrome

### Ocena skuteczności wewnątrznaczyniowej embolizacji żył jajnikowych w leczeniu zespołu przekrwienia biernego miednicy

<sup>1</sup>Department of Interventional Radiology and Neuroradiology, Medical University, Lublin

Head of Department: prof. Małgorzata Szczerbo-Trojanowska, MD, PhD

<sup>2</sup>Third Gynecology Department, Medical University, Lublin

Head of Department: prof. Tomasz Paszkowski, MD, PhD

#### Key words

pelvic congestion syndrome,  
embolisation

#### Słowa kluczowe

zespół przekrwienia biernego macicy,  
embolizacja

#### Summary

**Introduction.** Chronic pelvic pain (CPP) is responsible for 20% of gynaecological out-patient visits. Pelvic congestion syndrome (PCS) is a common cause of CPP, which is underlain by the varicose and incompetent veins within the pelvis minor. According to estimates, such changes can develop in about 10-15% of women, predominantly under the age of 45 years.

**Aim.** Assessment of efficacy of intravascular occlusion of ovarian veins for the treatment of pelvic congestion syndrome.

**Material and methods.** In the prospective observational study carried out between January and September of 2014, 35 patients were scheduled for ovarian vein embolisation. Each patient experienced pelvic pain for at least one year – the visual analogue score (VAS) (0 – no pain, 10 – the most severe pain). The qualified patients were referred to phlebography to assess the extent of retrograde inflow to ovarian veins and occlusion of the appropriate ovarian veins. Phlebographies were carried out during the Valsalva manoeuvre from the catheter placed in the left renal vein; on the right side – at the ovarian vein ostium. Ovarian veins were occluded using detachable coils 0.035, 0.018 or a vascular occluder EOS. In cases of numerous collaterals, the obliterating material was additionally used, i.e. aethoxysclerol foam.

**Results.** The procedures were performed in 34 out of 35 patients. In one cases, none of the ovarian veins was successfully selectively catheterised. In 7 patients embolisations were performed using a vascular occluder EOS, in the remaining 27 using coils. In 9 cases additionally were used aethoxysclerol. A technical success was considered safe closure of veins/vein and lack of contrast medium inflow in follow-up phlebography using the Valsalva manoeuvre. The technical efficacy was found to be 97%. In 4 cases embolisation was ineffective. The clinical efficacy of the procedure was assessed using VAS and was considered as the pain score 2 or less. It was found to be 97% including 3 cases in which the pain subsided completely.

**Conclusions.** PCS embolisation seems to be an effective and safe treatment measure characterised by a high rate of clinical and technical success. However, further research is required on this method. In addition, an essential element is a good cooperation of gynaecologists and interventional radiologists in qualification of the patient for the treatment.

#### Streszczenie

**Wstęp.** Przewlekły ból miednicy (CPP) jest przyczyną 20% ginekologicznych wizyt ambulatoryjnych. Częstym powodem CPP jest zespół przekrwienia biernego narządów miednicy mniejszej (PCS). Jest on powodowany przez żyłki przymacicza i niewydolne żyły jajnikowe. Zmiany tego typu mogą rozwijać się u około 10-15% kobiet, głównie w wieku poniżej 45 lat.

**Cel pracy.** Celem pracy jest ocena skuteczności i wyników wewnątrznaczyniowej embolizacji żył jajnikowych w leczeniu zespołu przekrwienia biernego miednicy mniejszej.

**Materiał i metody.** W prospektywnym badaniu obserwacyjnym przeprowadzonym w okresie od stycznia do września 2014 roku u 35 pacjentek została zaplanowana embo-

#### Address/adres:

\*Krzysztof Pyra  
Department of Interventional Radiology  
and Neuroradiology  
Medical University  
ul. Jaczewskiego 8, 20-954 Lublin  
tel. +48 (81) 724-41-54  
k.pyra@poczta.fm

lizacja żył jajnikowych. U wszystkich występował chroniczny ból miednicy przynajmniej od roku. Ból został oceniany za pomocą skali wzrokowej VAS (0 – brak bólu, 10 – ból nie do zniesienia). U zakwalifikowanych pacjentek podczas flebografii oceniano zakres wstecznego napływu do żył jajnikowych. Flebografię przeprowadzano podczas próby Valsalvy z cewnika umieszczonego w lewej żyły nerkowej, a po prawej stronie – z ujścia żył jajnikowych. Żyły jajnikowe zamykano za pomocą spiral 0,035 i 0,018 lub zamykaczem naczyniowym EOS. W przypadku bogatej siatki żyłnej dodatkowym materiałem obliterującym był aethoxysklerol.

**Wyniki.** Zabieg skutecznie wykonano u 34 z 35 pacjentek. W jednym przypadku nie udało się selektywnie zacewnikować żył jajnikowych. W 27 przypadkach zastosowano spirale, a w 7 zamykacz naczyniowy EOS. W 9 przypadkach dodatkowo zastosowano aethoxysklerol. Za techniczny sukces uznawano bezpieczne zamknięcie żył/żyły i brak napływu środka cieniującego do żył jajnikowych podczas próby Valsalvy. Skuteczność techniczna została oceniona na 97%. W 4 przypadkach embolizacja okazała się nieskuteczna. Skuteczność kliniczną zabiegu oceniano w oparciu o skalę VAS. W 97% ból znacznie zmniejszył się, a w 3% przypadkach ustąpił całkowicie.

**Wnioski.** Zabieg wewnątrznaczyniowej embolizacji żył jajnikowych wydaje się bezpieczną i skuteczną metodą w leczeniu PCS. Przemawia za tym wysoki wskaźnik skuteczności zarówno technicznej, jak i klinicznej. Jednakże wymagane są dalsze badania tej metody leczenia. Konieczna jest ścisła współpraca ginekologa z radiologiem zabiegowym przy kwalifikacji chorej do zabiegu.

## INTRODUCTION

Chronic pelvic pain (CPP) remains a diagnostic and therapeutic challenge. CPP can occur in 1/3 of women and be responsible for 20% of gynaecological outpatient visits (1). The diagnostic procedures and treatment of this syndrome account for 35% of diagnostic laparoscopies and 15% of hysterectomies (2). Apart from pelvic varices, the causes of CPP are likely to include pelvic inflammatory diseases, endometriosis, structural uterine tube abnormalities and many others. Before establishing the diagnosis of pelvic congestion syndrome (PCS), it is essential to eliminate all the remaining possible diseases.

Pelvic congestion syndrome (PCS) is a common cause of CPP, which is underlain by the varicose and incompetent veins within the pelvis minor. According to estimates, such changes can develop in about 10-15% of women, predominantly under the age of 45 years. However, not all the women of this group report symptoms of CPP (3).

## Pathophysiology

The aetiology of PCS has not been fully known. The first theory regarding pain due to dilated venous vessels and slowed down flow in pelvic vessels was put forward by Taylor in 1949. One of the PCS factors is likely to be incompetence or lack of the valvular apparatus in the ovarian and parametrial veins. The anatomical defect of vessels results in retrograde flow in the ovarian veins, which causes visible dilatations of veins and varices. The lack of valves at the ostium of ovarian veins can be found in about 15% of women whereas incompetent valves are diagnosed in 40% of cases on the left side and in 35% on the right side. The development of pain is affected not only by physical blood volume and retrograde pressure but also by the resultant venous ischaemia. This impairs trophism of the epithelial and smooth muscle cells, which react by secreting substance P and neurokinin A and B. The predispos-

ing factors include multiparity, family history of CPP or genital prolapse (4).

## Clinical symptoms

In the majority of women, PCS manifests with non-cyclic abdominal or pelvic pain occurring for at least half a year. PCS is characterized by chronic, dull and continuous pain (can last for many hours or days). The symptoms usually intensify after prolonged time in the standing position, during menstruation, after sexual intercourses and during pregnancy. The non-specific symptoms include headaches, flatulence, nausea, general fatigue and low mood. Some patients with the diagnosis of PCS report only slight episodes of pain within the abdomen or lack of them and complain of hip pain or perineal and lower limb varices (5).

## Diagnosis

In order to find a characteristic syndrome of clinical symptoms, imaging examinations are required to differentiate the causes of their occurrence. The examinations in question can be divided into non-invasive – ultrasound, magnetic resonance and those of low invasiveness – CT or dynamic tests, i.e. phlebography, thanks to which the function of valves and competence of the venous system can be assessed. The transvaginal pelvic ultrasound examination combined with Doppler imaging is preferable. The examination enables to visualize pelvic venous plexuses with dynamic evaluation of blood flow. Veins of unaffected plexuses are < 4 mm in diameter (6). Most patients with the clinical suspicion of PCS have dilated veins > 4/6 mm, slowed down or reverse blood flow (particularly during the Valsalva manoeuvre), dilated arcuate veins running through the uterine muscle continuous with the varices on the opposite side. Moreover, the ovarian vein can be dilated > 8 mm. Interestingly, in over 50% of cases polycystic ovaries are observed (7). The development of ovarian cysts is unclear, although the theories

of excessive estrogen stimulation in women with PCS are repeatedly suggested (4).

For the majority of interventional radiologists treating PCS, MRI is the best imaging method. The examination is non-invasive, patients are not exposed to radiation, no contrast media are used, yet the method is extremely accurate. MRI enables to assess ovarian vein ostia, which helps during the procedure, and local anatomy, which facilitates the differential diagnosis of CPP. Our experiences show that it is optimal to perform MRI in the afternoon or evening hours. After the day activity, congestion is much better visible. The intravascular examination – phlebography – allows assessing functionally retrograde blood reflux to the affected plexuses and is a gold standard of management (8). The painless examination and procedure are carried out under local anaesthesia by puncturing the right common femoral vein and introducing the 5 Fr guiding catheter. Phlebography is performed during the Valsalva manoeuvre from the catheter left in the left renal vein; in the case of the right side, in the ovarian vein ostium.

The diagnosis of PCS is confirmed by the following phlebography results: ovarian vein diameter  $> 6$ , retrograde free inflow to the ovarian vein or/and parametrial plexuses, presence of several tortuous vessels of the collateral circulation and delayed outflow or contrast medium retention after the injection has been completed. Free retrograde inflow to ovarian veins and parametrial plexuses evidences incompetence of the valvular apparatus. Diagnostic phlebography immediately visualizes the dynamics of venous flow and can be performed in various positions. After completing the diagnostic part, the radiologist can smoothly initiate the occlusion of varicose veins (fig. 1). However, the radiologic examination should be finally assessed with reference to the clinical presentation.

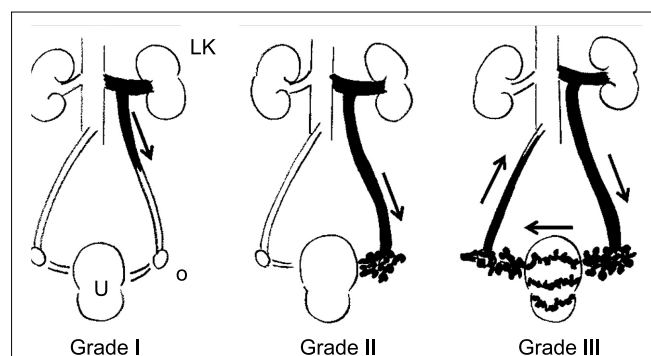


Fig. 1. Three grades of reflux are distinguished.

In search of proper diagnosis, diagnostic laparoscopy is commonly used. This direct visualisation is most suitable for exclusion of other CPP causes, e.g. endometriosis; however, since the examination is performed in the recumbent position and requires inflation with gas under pressure, the varices can compress, which will distort the result (fig. 2).

## AIM

Assessment of efficacy of intravascular occlusion of ovarian veins for the treatment of pelvic congestion syndrome.

## MATERIAL AND METHODS

In the prospective observational study carried out between January and September of 2014, 35 patients were scheduled for ovarian vein embolisation; each patient experienced pelvic pain for at least one year – the visual analogue score (VAS)  $> 6$  (0 – no pain, 10 – the most severe pain). History taking, physical examinations and laboratory tests (complete blood count, clotting time, renal tests, hormones, B-hCG), and transvaginal Doppler US without paramagnetic, were performed in each patient. The course of ovarian veins was assessed using SPACE. The qualified patients were referred (since the tenth day of cycle) to phlebography to assess the extent of retrograde inflow to ovarian veins and occlusion of the appropriate ovarian veins. The examination and procedure were performed by puncturing the right femoral vein under local anaesthesia using the Seldinger technique.

Phlebographies were carried out during the Valsalva manoeuvre from the catheter placed in the left renal vein; on the right side – at the ovarian vein ostium. Selective catheterization of the left ovarian vein was performed with a 5 Fr Cobra II catheter whereas of the right vein with a 5 Fr Simmons I catheter using a hydrophilic 0.035 guide. Ovarian veins were occluded using detachable spirals 0.035 or a vascular occluder EOS (fig. 3); in cases of numerous collaterals, the obliterating material was additionally used, i.e. aethoxysclerol foam. In cases of right ovarian vein embolisation, the majority of patients required the use of a microguide and microcoils 0.018. The lack of inflow of contrasting blood to the ovarian veins during the Valsalva manoeuvre was considered a technical success. The effectiveness of the procedure was re-evaluated after one month assessing the severity of pain according to VAS.

## RESULTS

The procedures were performed in 34 out of 35 patients. In one case, none of the ovarian veins was successfully selectively catheterised. The patients' age ranged from 21 to 48 years (34 on average). Three patients were nulliparas, 13 – primiparas, 11 – secundiparas and 7 – tertiparas and more.

In 7 patients, embolisations were performed using a vascular occluder EOS, in the remaining 27 using coils. Twenty-six patients underwent unilateral embolisation of the left ovarian vein. In 7 cases, an occluder EOS was used, in 15 – 00.035 detachable coils; in 4 – microcoils 0.018 were applied; in 9 cases, the obliteration material was additionally used (aethoxysclerol) due to extensive collateral network.

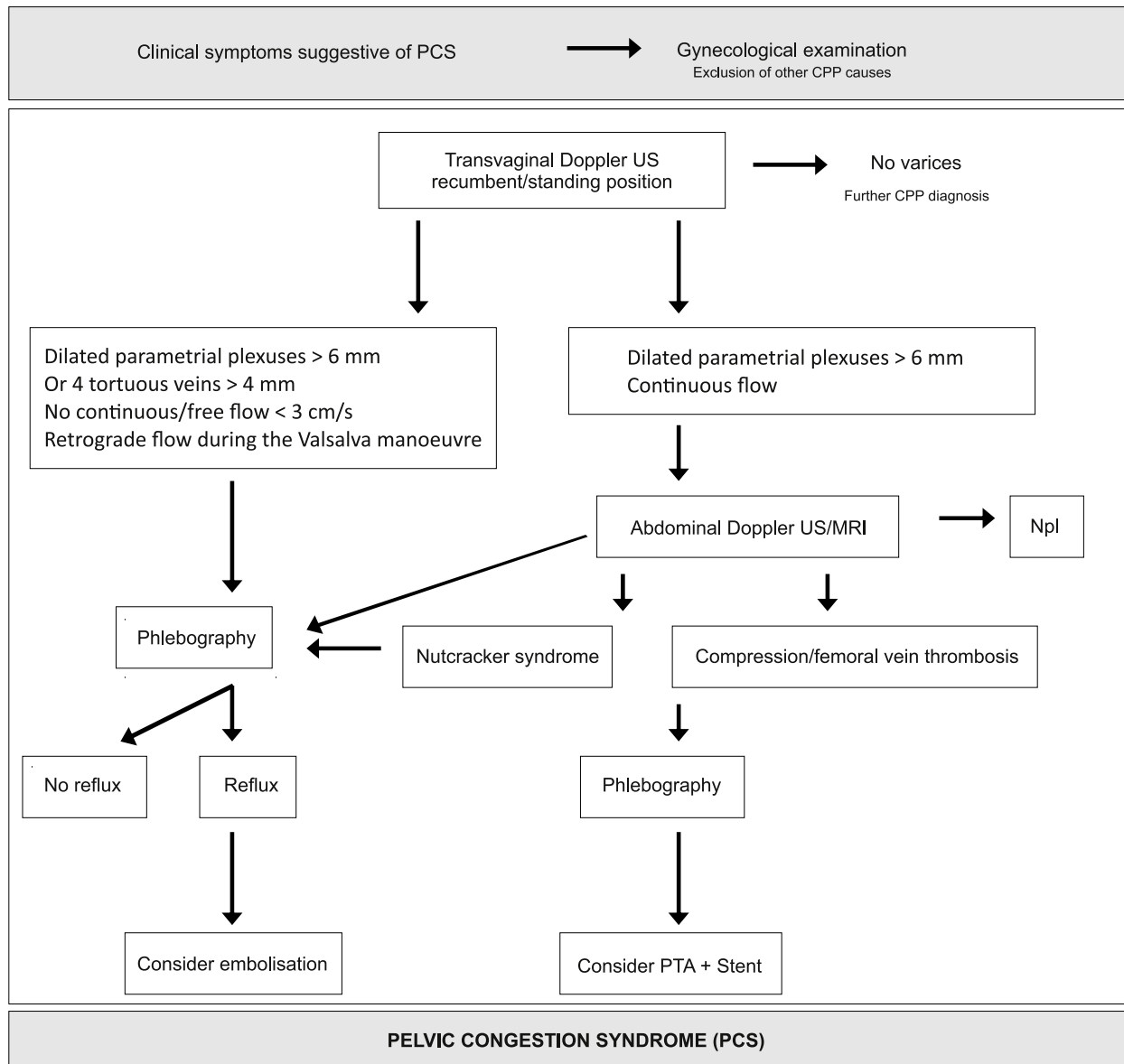


Fig. 2. Protocol for ultrasound PCS diagnosis.

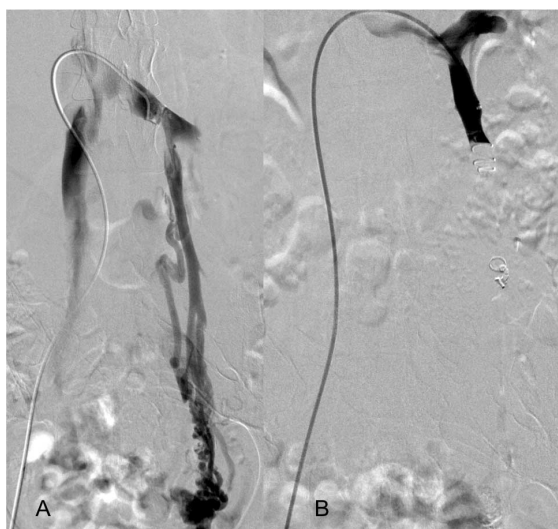


Fig. 3. Intravascular ovarian vein occlusion for the treatment of pelvic congestion syndrome. Phlebography before embolization (A), ovarian vein reflux is visible. After embolization (B) with EOS device. Successfully occluded vein is visible.

Bilateral embolisation of ovarian veins was performed in 8 cases. The right ovarian vein was occluded with microcoils in 4 cases, with macrocoils in 2 and with distally placed microcoils plus proximally placed macrocoils in another two cases. In total, 42 veins were embolized (35 left + 8 right veins); in 4 cases embolisation was ineffective. The efficacy of procedures was assessed (history taking, pain score, physical examination and transvaginal ultrasound) one month after the procedure. The pain intensity was evaluated using VAS (0 – no pain and 10 – unbearable pain).

A technical success was considered safe closure of veins/vein and lack of contrast medium inflow in follow-up phlebography using the Valsalva manoeuvre. The technical efficacy was found to be 97%, including the case in which selective catheterisation of right ovarian veins failed and two cases of ineffective catheterisation of right ovarian veins. Clinical efficacy was considered as the pain score 2 or less and

was found to be 97%, including 3 cases in which the pain subsided completely.

The median of pain intensity before the procedure was 8 and one month after the procedure – 1. The assessment of pain intensity before and after the procedure was presented in figure 4. In 4 cases, the contrast medium extravasated, which was clinically insignificant. In one case, a haematoma developed at the access side in the groin.

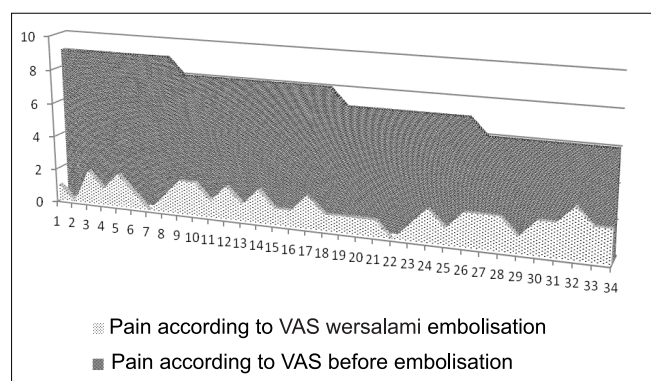


Fig. 4. VAS pain intensity before and one month after embolisation compared to the baseline pain scores.

## DISCUSSION

The treatment of PCS mainly depends on the severity of pain. Analgesics acting symptomatically are used, i.e. non-steroidal anti-inflammatory drugs. In cases of pains predominantly associated with menstruation, contraceptives are applied. According to prospective studies, medroxyprogesterone was also administered, which alleviated symptoms in about 40% of cases. When pharmacological methods fail, invasive methods are applied. Until the development of interventional radiology, hysterectomy was performed. Despite the radical nature of hysterectomy, the procedure is not as effective as ovarian vein ligation or embolisation (9).

Thanks to dynamic development of intravascular techniques, one of the most common methods currently used is embolisation, which is readily chosen due to its low invasiveness and high efficacy. The first embolisation procedure was performed by Edwards in 1993.

In the study by Laborda et al. carried out in 2013 in the group of 202 patients, the efficacy of embolisation during the 5-year follow was assessed as 93, 85%, including 33.52% of cases with complete subsidence of symptoms. The level of satisfaction with the procedure was found to be 7.4/9. The above results explicitly assess PCS embolisation procedures as effective and safe, of high rate of clinical success and satisfaction (10).

Our findings indicate high clinical efficacy reaching 97% and safety of transvascular occlusion of ovarian veins. Compared to the results reported by Laborda demonstrating 100% technical success,

which led to complete subsidence of symptoms in 33.52% of cases, our result, i.e. 91%, is likely to be responsible for considerably lower percentage (8.82%, n = 3) of complete pain resolution due to initially lower numbers of embolized vessels as well as no possibility of embolisation of appropriate veins in single cases. Moreover, the time of patients' follow up can be of importance. The longer the time, the better stabilization results are. Table 1 demonstrates that the procedure effect is better in patients with higher pre-procedure pain score compared to those with the pain score of 6. The latter assess a reduction in pain by only 4 points. The above is likely to result from the fact that pain intensity assessed at 6 persisting for many months was to some extent acceptable for patients and their procedure-related expectations those of complete pain subsidence. Thus, the subjective feeling, together with expectations, gave the result of a mean reduction by 4.

Table 1. A decrease in pain intensity in the groups according to the baseline VAS scores.

Number of patients	8	10	8	8
Pre-procedure baseline pain intensity according to VAS	9	8	7	6
Post-procedure pain scores	1	1.5	≈ 1	2
Decreases	↓ 8	↓ 6.5	↓ 6	↓ 4

The question posed in 2012 by the colleagues from the Department of Obstetrics and Gynaecology of the Royal London Hospital in Acta Obstet Gynecol Scand “Does pelvic venous congestion syndrome exist and can it be treated?” seems to be fully elucidated after the findings reported by Laborda in 2013 (10). However, not all the patients with PCS symptoms and pelvic varices confirmed during imaging examinations benefit from ovarian vein embolisation. The above can prove multifactorial character of CPP-type complaints. The elimination of retrograde blood flow in incompetent pelvic veins cannot necessarily guarantee the resolution of symptoms. Some authors suggest that pelvic varices in women are found accidentally (11). There are studies demonstrating their presence in even 38-47% of women who do not present PCS symptoms (12, 13). Moreover, it was observed that about 60% of patients with varicose ovarian veins present the symptoms of chronic pelvic pain (14). The above listed data justify the need for further studies evaluating indications for PCS treatment.

## CONCLUSIONS

PCS embolisation seems to be an effective and safe treatment measure characterised by a high rate of clinical success. Larger study populations and longer follow-ups are required. The key to success is cooperation of gynaecologists and interventional radiologists.

BIBLIOGRAPHY

1. Phillips D, Deipolyi AR, Hesketh RL et al.: Pelvic congestion syndrome: etiology of pain, diagnosis, and clinical management. *J Vasc Interv Radiol* 2014 May; 25(5): 725-733.
2. Association of Professors of Gynecology and Obstetrics (APGO). APGO Educational Series on Women's Health Issues. Chronic Pelvic Pain: An Integrated Approach. APGO DC: Washington 2000.
3. Liddle AD, Davies AH: Pelvic congestion syndrome: chronic pelvic pain caused by ovarian and internal iliac varices. *Phlebology* 2007; 22(3): 100-104.
4. Siskins GP (ed.): *Interventional radiology in women's health*. Thieme Medical Publishers, New York 2009; 90-105.
5. Jung SC, Lee W, Chung JW et al.: Unusual causes of varicose veins in the lower extremities: CT venographic and Doppler US findings. *Radiographics* 2009 Mar-Apr; 29(2): 525-536.
6. Park SJ, Lim JW, Ko YT et al.: Diagnosis of pelvic congestion syndrome using transabdominal and transvaginal sonography. *AJR Am J Roentgenol* 2004 Mar; 182(3): 683-688.
7. Coakley FV, Varghese SL, Hricak H: CT and MRI of pelvic varices in women. *J Comput Assist Tomogr* 1999 May-Jun; 23(3): 429-434.
8. Yang DM, Kim HC, Nam DH et al.: Time-resolved MR angiography for detecting and grading ovarian venous reflux: comparison with conventional venography. *Br J Radiol* 2012 Jun; 85(1014): e117-122.
9. Farquhar CM, Rogers V, Franks S et al.: A randomized controlled trial of medroxyprogesterone acetate and psychotherapy for the treatment of pelvic congestion. *Br J Obstet Gynaecol* 1989 Oct; 96(10): 1153-1162.
10. Laborda A, Medrano J, de Blas I et al.: Endovascular treatment of pelvic congestion syndrome: visual analog scale (VAS) long-term follow-up clinical evaluation in 202 patients. *Cardiovasc Intervent Radiol* 2013 Aug; 36(4): 1006-1014. doi: 10.1007/s00270-013-0586-2. Epub 2013 Mar 2.
11. Ball E, Khan KS, Meads C: Does pelvic venous congestion syndrome exist and can it be treated? *Acta Obstet Gynecol Scand* 2012 May; 91(5): 525-528. doi: 10.1111/j.1600-0412.2012.01368.x.
12. Rozenblit AM, Ricci ZJ, Tuvia J, Amis ES Jr: Incompetent and dilated ovarian veins: a common CT finding in asymptomatic parous women. *AJR Am J Roentgenol* 2001 Jan; 176(1): 119-122.
13. Nascimento AB, Mitchell DG, Holland G: Ovarian veins: magnetic resonance imaging findings in an asymptomatic population. *J Magn Reson Imaging* 2002 May; 15(5): 551-556.
14. Belenky A, Bartal G, Atar E et al.: Ovarian varices in healthy female kidney donors: incidence, morbidity, and clinical outcome. *AJR Am J Roentgenol* 2002 Sep; 179(3): 625-627.

received/otrzymano: 22.12.2014  
 accepted/zaakceptowano: 14.01.2015