

Complications and side effects after pelvic vein embolization

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ABSTRACT

Pelvic venous disease (PeVD) are one of the most important causes of chronic pelvic pain in women resulting from the pathological venous flow in ovarian and pelvic veins. Pelvic vein embolization is the method of choice for treatment of PeVD caused by primary reflux in ovarian and internal iliac veins. In this review, we discuss possible complications and side effects after embolization therapy.

Keywords: Complication, embolization, pelvic veins.

Complication rate is an important component for the evaluation of outcomes for each treatment method. Choice of treatment of pelvic venous disease (PeVD), caused by reflux in ovarian and/or internal iliac veins is pelvic vein embolization (PVE), which is characterized by both extremely high level of technical success (96 to 100%),^[1-3] and significant positive clinical results. Complications after this type of treatment are rare, but may develop during the procedure, in the early or late post-procedural period. The importance of each incident must be evaluated by the type and severity.

Access site complications

Access site complications such as bleeding, hematoma, arteriovenous fistula are very rare and practically do not need additional therapy in comparison with complicated arterial puncture. However, Laborda et al.^[4] reported groin hematoma in 3% of cases after PVE via femoral access. Lopez^[5] also reported pneumothorax as a possible complication in case of jugular access and, therefore, recommended the use of ultrasound guidance. Some authors reported superficial

thrombosis of the upper extremities following brachial access.

The main reasons for technical failure are post-thrombotic changes (Figure 1) or congenital anomalies of pelvic veins. According to LePage et al.,^[6] *“one reason for the failure of interventional therapy for PVI could be the complex anatomy of the pelvic veins, which show a wide variation in terms of trunks, venous valves, duplications and crossover connections.”*

Another important intra-procedural complication is embolization of non-target vessel, which may be caused by incorrect coil deployment (Figure 2) or coil protrusion. Lopez^[5] presented cases of coil misplacement; e.g., left ovarian vein coils extending into the left renal vein, and obturator or circumflex coils protruding into the left external iliac or common femoral vein. A possible reason of coil misplacement could be incorrect evaluation of pelvic vein diameter (oversizing up to 30% is necessary) or the vasospasm. The author also noted that *“...it is advisable to avoid placing coils below the inguinal ligament in the perineal or*

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Figure 1. Thrombosis of right ovarian vein with partial resolution.

perianal submucosal tissues, as they may be palpable in the groin, vagina, or anus”.

Vein perforation

Vein perforation, with contrast extravasation, which is also rare, is mainly caused due to non-accurate placing of pushable coils by using of rigid guidewire. Capasso et al.^[7] reported two cases of perivulvar ovarian vein perforation. Heredia et al.^[8] also presented a very interesting case of coil-eroded left ovarian vein which caused chronic pelvic pain and genitofemoral nerve compression syndrome. According to the authors, “... (CT) scan depicted a 7-cm metallic chain-like foreign body located over the left psoas muscle, lateral and parallel to the left ureter...the caudal end of the coil was near the left ovary.” They reported successful surgical treatment of the patient by the dissection of the whole left infundibulopelvic ligament and total hysterectomy.

Embolic agent migration

The most important complication in the early post-embolization period is coil migration. Several authors presented a varying range of incidence: Verbrux et al.^[9] - in 3.6%, Creton et al.^[10] - 4.2%, Laborda et al.^[4] - 2% of cases. Retrospective evaluation of studies shows that, during the last



Figure 2. Incorrect deployment: part of coil is floating in inferior vena cava.

decade, the incidence of this complication has been reduced from 4.2% to 1.6%, which is likely the result of the increased experience and more active usage of detachable coils. The coils most often migrate to the pulmonary circulation and very rarely to the left cardiac ventricle. Kyaw et al.^[11] outlined a case of coil migration to the right atrium immediately after a PVE procedure for pelvic congestion syndrome, which required the open cardiac surgical intervention and Scott and Gullen^[12] reported about an asymptomatic migrated coil to the right ventricle without any intervention or medication. In the majority of cases, the patients are asymptomatic after coil migration and no additional therapy is needed. Some authors presented successful cases, when the coils were snared and retracted from the pulmonary artery.^[13]

Complications after using sclerosing agents requires special attention. Foam sclerotherapy is used in two ways to treat PeVD. First, there is the catheter-guided application of sclerosing foam to treat intrapelvic varices as part of the treatment of gonadal vein reflux in combination with the placement of coils and closure systems (plugs). Second, varices of the vulva and perineum are sclerosed with foam by direct puncture and under ultrasound guidance. Little data is available on the risks and side effects of using polydocanol foam or foam made from sodium

tetradecyl sulphate (STS) in the context of PeVD treatment. In this case, they are mainly case reports. No systematic literature review has been conducted on the topic of using foam sclerotherapy to treat PeVD.

Severe side effects and complications are very rare and can essentially be compared to those occurring in the context of sclerotherapy of leg varices. The European guidelines for sclerotherapy in chronic venous disorders^[14] provide an overview of possible adverse events (Table 1). Only side effects of the skin, such as telangiectatic matting and hyperpigmentation, are listed in the guidelines as “common” ($\geq 1\%$ to $< 10\%$). These side effects have been identified in the treatment of leg varices. In the context of PeVD, they only represent a transient cosmetic impairment following the treatment of vulvar varices and play no role in the intrapelvic catheter-guided application of foam. Serious complications such as distal thrombosis are listed as “uncommon” ($\geq 0.1\%$ to $< 1\%$), proximal thrombosis is considered “very rare” ($< 0.01\%$). There have only been isolated case reports of pulmonary embolisms, anaphylactic reactions, and stroke/transient ischemic attack. A risk-adjusted thromboprophylaxis is

recommended by the guidelines for Grade 1C. Visual disturbances and migraines are rare and are estimated to occur in 0.1 to $< 1\%$ of patients. The potential occurrence of such neurological complications needs to be considered in the context of treating PeVD, as the right-left shunt mechanisms (patent foramen ovale, pulmonary shunts) may work in the same way.

Despite weak evidence, the guideline recommends that patients with neurological symptoms remain lying down for an extended period after the procedure. In addition, larger foam volumes should be avoided and Valsalva maneuvers should not be undertaken immediately after the procedure (Grade 2C in each case). The guideline also states that the indication must be strictly evaluated (Grade 2C).

Patel et al.^[15] additionally lists cardiovascular reactions as possible side effects, as anecdotally sclerotherapy has been associated with myocardial infarction and Takotsubo cardiomyopathy.

In an Italian study, nine of 20 patients reported the short-term side effect of mild-to-moderate pelvic cramps over a period of 3 to 6 h after sclerotherapy of the pelvic veins with a mixture of 3% lauromacrogol, 95% ethanol and a contrast agent.^[16] Leal Monedero et al.^[17] observed cases of transient hyperthermia in their study, and more than half of the patients in the study complained of gluteal and lumbar pain. However, this treatment was not foam sclerotherapy on its own, but in combination with coiling.

Hyperpigmentation and small nodules (sclerothrombi) may appear after foam sclerotherapy of the external genitalia, similar to while treating the leg. These should be incised and expressed, if there is pain sensitivity.^[18]

Side effects and complications associated with foam sclerotherapy of PeVD are rarely described phenomena in the literature. This may be due to the fact that they very rarely occur, similar to after the treatment of leg varices. To reduce risk as much as possible, the risk of thromboembolic and cerebral embolic events should be assessed before the procedure. In addition, a limited amount of foam should be used (≤ 10 mL per day is recommended).

Maleux et al.^[19] observed temporary cardiac arrhythmias after embolization and suspected a connection to glue migration. It is necessary to mention that these cases of arrhythmia are the only ones in the existing literature (embolization was performed with a mixture of enbucilate and lipiodized oil).

Table 1. Frequency of adverse events after foam sclerotherapy (modifies from^[14])

Adverse event	Frequency
Severe complication	
Anaphylaxis	Isolated cases
Large tissue necrosis	Isolated cases
Stroke and TIA	Isolated cases
Distal DVT (mostly muscular)	$\geq 0.1\%$ - $< 1\%$
Proximal DVT	$< 0.01\%$
Pulmonary embolism	Isolated cases
Motor nerve injury	Isolated cases
Benign complications	
Visual disturbances	$\geq 0.1\%$ - $< 1\%$
Headaches and migraines	$\geq 0.1\%$ - $< 1\%$
Sensory nerve injury	$\geq 0.01\%$ - $< 0.1\%$
Chest tightness	$< 0.01\%$
Dry cough	$< 0.01\%$
Local allergic reaction	$< 0.01\%$
Matting	$> 1\%$ - $< 10\%$
Residual pigmentation	$> 1\%$ - $< 10\%$
Skin necrosis	$< 0.01\%$
Superficial phlebitis	Data unclear (0-45.8%)

TIA: Transient ischemic attack; DVT: Deep vein thrombosis.

Allergic reactions to medication, contrast material or coiling agent can occur, but the incidence is very low. A frequent cause is a reaction to contrast media. Fahrni et al.^[20] presented a case of hypersensitivity to nickel and palladium in a patient treated with coil embolization for pelvic congestion syndrome. Similar cases have been reported with the use of platinum coils.

In approximately 20% of cases, post-embolization syndrome occurs (e.g., abdominal/low back pain, sub-febrile temperature, nausea, bloating), which is usually self-limiting and can be symptomatically treated using non-steroidal anti-inflammatory drugs. Gandini et al.^[21] reported colic-like pain in all patients after the injection of 3% STS foam that spontaneously resolved after 5 min.

There is no evidence that reproductive function is affected. Kim et al.^[22] did not find any significant changes in follicle-stimulating hormone, luteinizing hormone, or estradiol levels. They reported a 50% pregnancy rate in premenopausal women after PVE. The same results were presented by Tarazov et al.^[23] and Liu et al.^[24]

Most of the publications available indicate a low rate of complications following PVE. However, it should be noted that these are almost exclusively case reports and small series. It should not go unmentioned that serious adverse events can also occur. Gavrillov et al.^[25] observed venous thromboembolism in 14 of 67 patients after embolization of gonadal veins, which is significantly higher than in other studies.

In conclusion, it should be noted that the systematic acquisition of data on risks and side effects is only possible to a limited extent. To solve this problem, we recommend using modern classification of complications which is provided by the Cardiovascular and Interventional Radiological Society of Europe (CIRSE).^[26]

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