A NEW CHALLENGE FOR THE TREATMENT OF UTERINE FIBROID - UTERINE ARTERY EMBOLIZATION (UAE)

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Abstract: *Uterine artery embolization is a safe and effective minimally invasive method ensuring permanent tumour tissue infarction without its subsequent relapse, being followed by significant improvement of symptoms with rapid socio-professional reintegration. Recovery takes usually 1-3 weeks. Significant complications occur in about 1% of cases, the most common being infection.*

The concept of therapeutic vascular embolization dates from 1904, when Dawbain (1) described preoperative injection of paraffin in the external carotid artery in the patients with malignant tumours at head or neck level. Brooks (2) described the first arteriographic embolization with particles (autologous muscle fragment) of a carotid-cavernous fistula in 1930, and Rosch (3) communicated the first embolization outside the neuraxis (for stomach bleeding) in 1972. In the '70s, after the introduction of specialized catheters and embolization dedicated substances, the number and diversity of these interventions has increased dramatically. Uterine artery embolization (UAE) for the treatment of uterine fibroids was among the first used by Ravina (4) in 1991 in order to minimize intraoperative bleeding during hysterectomy or myomectomy. It was surprising that in some cases, where embolization was performed days or weeks before surgery, the patients reported a significant improvement in symptoms and on ultrasound, there was found fibroids size reduction, which even led to the cancellation of the scheduled surgery and, of course, to the increase of research efforts on uterine artery embolization as a direct method of treatment for uterine fibroids. There have been several studies published conducted on small of large groups of patients, most of them leading to encouraging results, but which still arouse controversy, especially regarding the long-term outcomes. Uterine artery embolization for uterine fibroids has been widely used, being increasingly accepted by specialists despite all the inconsistency of the evidence for its effectiveness and, perhaps due to faster media information of today (the Internet) it has become a "requested" procedure by many patients.(5)

Patients' selection for embolization: The ideal candidates are the younger patients with multiple fibroids who wish to have children (for whom hysterectomy is not an alternative).(6) This allows simultaneous therapy of all fibroids and preserves the reproductive function of the uterus. Another category of patients includes patients with symptomatic uterine fibroids, who refuse hysterectomy, blood transfusion, refusal/ contraindication for general anesthesia, as well as patients with advanced cancers, who are not amenable to other treatments (7), or patients who are close to menopause. It is a much less aggressive intervention compared with hysterectomy and much cheaper compared to hormonal therapy.

Surgical technique: Arteriography is an invasive method that involves an arterial puncture and the introduction of a catheter up to the vascular segment that is to be investigated, followed by catheter injection of the contrast agent.(8) As a technique, arteriography investigation involves the following steps: preparation of the arteriography room, of the instrumentation and of the patient; achievement of vascular access routes; introducing and positioning the catheter selectively in the vascular territory concerned; injection of contrast and image recording; catheter withdrawal and achieving hemostasis at puncture site. In Romania, bilateral femoral approach is used with double crossing over, which reduces surgery time and therefore, the radiation dose accumulated, but it increases the risk of local complications while most of other countries are using the unilateral approach, achieving this way the ipsilateral embolization as well.

Emboligenic materials: The most common materials used for uterine embolization are polyvinyl alcohol (PVA) particles, embospheres and Gelaspon/TachoComb fragments. Depending on the indication and the anatomical structure to be embolized, embolization materials must be carefully selected.

*Particles (*9) are useful for the distal embolization - (small arteries and arterioles). These particles can be gelatine sponge (Gelfoam) 60 – gelatine that accomplished the temporary occlusion of about 8 hours, or microfibrilar collagen - temporary agent, orpolyvinyl alcohol (PVA) - permanent agent.

PVA (Trufill, Ivalon etc.) Such material has been mostly used since 1970. It is a biodegradable synthetic material that induces acute inflammation, angionecrosis, thrombosis and fibrosis of the vessel that is being injected. It is non-radio-opaque, safe, biocompatible (no allergic reactions have been reported), nonresorbable (25-30 years) - permanent embolization. Among the disadvantages of using PVA, the following can be mentioned: unequal size of the particles, presenting thus, migration risk; aggregation risk - plugging the catheter; more particles are needed to plug a vessel; it produces a moderate inflammatory reaction in the embolized vessels. There is risk of possible recanalization during months in the case of proximal aggregation of the large particles.

Embospheres.(10) Such materials are more expensive and therefore, they are rarely used. They do not aggregate. Fewer particles are used than PVA and they lower the risk of failed emobilization. The disadvantages of using such materials refer to the fact that they are nonabsorbable and are more expensive than PVA.(11)

Tachocomb, Gelaspon. These are collagen films coated with purified fibrinogen, thrombin and aprotinin, of which

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fragments of different sizes are cut with the scissors. In suspension, very small particles can come off. They mimic the first and the last step in the coagulation cascade. They have the advantage of being cheap, can be easily aggregated and close the large vessels, but are unwieldy. In addition, they are "temporary agents", which can be resorbed within 1-2 weeks.(12) As a result of the significant inflammatory reaction, there can be obtained the permanent occlusion of the small terminal vessels, while the blood flow in the large vessels is resumed.(13) They can also be used to ease embolization, intra-arterial injection of vasodilators, such as papaverine and nitroglycerin.(14) Repeating angiography few weeks after embolization showed flow resumption in uterine artery after PVA and Embospheres and the absence of flow after Gelaspon.(15)

Embolization technique: After studying the vascular anatomy of the uterus and after choosing the embolization material, the following step is to perform the embolization. The uterine artery is over-selectively cannulated. Where, due to the manipulation of the catheter and angiography guide, spasms occur in the catheterized vessels, one should wait for few minutes and if spasms do not cease, vasodilators (nitroglycerin, verapamil etc.) will be administered. The embolization material is injected, being mixed with contrast substance (for viewing) until the occurrence of the reflux behind the catheter. An injection control is carried out in which the area assigned by the catheterized vascular branch should not be viewed.(16) The final infrarenal aortogram highlights the cvasitotal obstruction of blood flow at the level of the fibroid nodule and ovarian artery anterograde filling up to 4% of cases. The technique is then repeated for the uterine artery of the opposite side. In some cases, pain can occur at the level of tumour formation (due to devascularisation) which can be treated by administering analgesic medications. The patient needs maximum 3 days of hospitalization, with symptomatic treatment, nonsteroidal anti-inflammatory agents (NSAIDs), antiemetics, antibiotics. In terms of ***results***, uterine artery embolization comes as an alternative to the surgical conservative treatments, such as myomectomy and miometrectomy, or as an alternative to the more expensive medical treatment with Gn-RH analogues. Most women, who turn to uterine artery embolization, fall within the age range of 20-35 years old. This age group is characterized by women who wish to have children and to preserve their menstrual function. Hospital stay has also constantly decreased, currently embolization being performed on an outpatient basis in most centres. Socio-professional reintegration is generally fast, work can be resumed in 7-10 days. Although initially, the desire to achieve a pregnancy constituted an absolute contraindication, current recommendations provide the possibility of performing embolization in these patients, as well under the reserve of lacking data regarding the long-term effects on fertility and on the development of future pregnancies. One of the problems is the onset of amenorrhoea, 8% of patients presenting this complication in the first 6 months after embolization, in most of them, menstruation is subsequently resumed. 5% of the patients over 45 years old experienced premature menopause installation, one of the reasons can also be the impaired ovarian function by passing the embolizing material particles at this level.(17) Uterine artery embolization is a safe and effective method for the treatment of uterine fibromyomas. The method allows the preservation of the internal genital organs, even of fertility, thus avoiding possible complications (physical, mental) of hysterectomy. In cases where surgery is contraindicated or refused by the patient, uterine artery embolization, alone, is an effective method of treating uterine fibromyomas. Interesting results are expected from the American Registry of uterine artery embolization in fibroids (Fibroid Registry), which will enrol more than 2 000 patients with 24-month follow-up. Until then, though, the number of patients treated by this method increases continuously, gynecologists being forced to consider this option when determining the course of treatment for the women with symptomatic uterine fibroids. It is an effective therapy for uterine fibromyomas with good results reported.

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