Phlebographic semeiology in some gynaecological diseases

by
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The study of pelvic venous pathology requires, as basic research, to see radiologically the whole venous system. Such research can be carried out, as is usual, by injecting a contrast medium into the uterine wall or into some of the pelvic bones or into the clitoral vein.

Such techniques do not permit sufficient display of all the venous areas and can cause iatrogenic damage. Much better are the results obtained by an alternative technique based upon our experience which we want to demonstrate here.

The study of phlebographic semeiology must be based on an awareness of the anatomy and the functions of the pelvic venous system.

Venous blood coming from the ovaries and uterus has two outlets; the connexion between these two venous areas is such that there is no significant flow in one direction or the other, it being virtually a case of a single « venous pool » where the differentiation is solely one of anatomical topography.

Ovarian veins (o.v.) have a course similar to that of the corresponding arteries with the exception of the upper tract of the left side which is more lateral ([1]). O.v. originate in the ovarian plexus and flow into the marginal vein joining the uterine vein and the intramural veins of the body of the uterus ([2, 3, 4]). In the lumbar tract o.v. are almost always single; sometimes they can be partially or totally separated or actually plexiform in appearance along their whole course ([2, 4, 5]). Pregnancy causes a sizeable increase in the diameter of the veins, more evident in the left o.v. ([2, 4, 7]). The left o.v. empties into the renal vein ([5, 8]); the right one opens into the lower cava (7, 9), but occasionally into the homolateral renal vein ([7, 9, 10]) (7-21% of cases) or even into the left one ([10]) and finally in 21% of cases a duplication of outlet occurs - into the lower cava and into the homolateral vein ([9]). Valves are very frequent in the upper tract of the ovarian veins ([4, 6, 7]), but more rare in the lumbar tract. They are often multiple distributed along the whole course of the vein ([2, 9]). Ovarian veins are heavily anastomosed ([1, 2, 4, 9, 11]); the most constant connexions occur with the lumbar plexus, with the renal capsular veins, upper and lower, with the retroperitoneal vein with the uretheral vein and with the vein of the lateral abdominal wall. Often there is anostomosis between upper tract, gonadal veins and homolateral renal veins.

The *uterine vein* (u.v.) originates from the marginal vein running along the side of the body and of the cervix of the uterus and also the upper tract of the vagina. The marginal and the intramular veins make up the utero-vaginal plexus; the utero-vaginal plexus is connected with the ovarian plexus and the vescico-vaginal plexus respectively. The u.v. has a similar course to that of the artery of the same name and flows into the hypogastric vein from which is formed one of the visceral tributaries.

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An essential condition for the normal functioning of the utero-ovarian venous system is that its overall capacity is sufficient to allow the passage, within a given period of time, of the blood which reaches it. This is brought about by the favourable pressure ratio usually corresponding to the outflow of the o.v. into the renal vein and of the hypogastric vein into the iliac vein.

Such gradations are primarily maintained by the suction that the larger blood vessels have on the thinner ones; in this way the centripetal direction of the venous flow is maintained in the ovarian and uterine veins.

Changes in the flow of the utero-ovarian venous system can be determined schematically from:

a) *increased arterial flow*
b) *emptying difficulties in one or both venous routes*

When the capacity of the system to withstand these is exceeded, *pelvic varicocele* sets in with functional and structural characteristics which are dependent on the nature of the cause.

Increased arterial flow is generally encountered in the fibromyomata, especially those with a loose structure and well developed vascular component. When the amount of the increased arterial flow exceeds the available venous capacity, a progressive dilation of the ovarian and/or the uterine vein begins, the possible selection of the one or the other depending on local conditions of which more will be said later. This « back to front » type of varicocele is limited to the ovarian and uterine venous structure.

The second and much more frequent physiopathological occurrence in the diagnosis of pelvic varicocele is *utero-ovarian discharging difficulties*; this depends on the reduction or absence of a pressure gradation at the outflow points of the ovarian and hypogastric veins — this physiopathological condition being maintainable by three states:

a) a pressure increase in the renal vein and particularly in the iliac vein (e.g. right ventricular insufficiency); therefore a slowing down of the flow of the utero-ovarian venous reflux occurs;

b) a reduction of vasal tone (e.g. in pregnancy) or parietal changes (inflammatory or adhesive processes) of the utero-ovarian venous system, resulting in dilation and/or deformation of the vessel lumen with a slowing down of the flow;

c) impeded venous discharge due to local pelvic causes (abnormal uterine position, pelvic tumors).

In such conditions, in order to maintain the capacity of the system, there must be provision for an increase of the upwards venous pressure; this is attained, within certain limits, by an increase in the amount of the venous blood flow. Nevertheless such a compensatory mechanism brings about or increases the dilation of the venous lumen. If the capacity of the valvular system is exceeded this compensatory mechanism rapidly becomes the cause of *varicocele due to emptying difficulties.*

Reverse utero-ovarian phlebography is a more recent technique since it involves selective catheterisation.

Following percutaneous insertion of a cannula into the femoral vein it is possible schematically to catheterise the hypogastric as well as the ovarian veins.

It is possible to catheterise the hypogastric vein ([23]) with the same ease from

both sides; nevertheless, the display of the uterine plexus is often unsatisfactory and the ovarian plexus is excessively injected; in addition the injection of contrast medium into the hypogastric vein shows up the numerous visceral and parietal vessels which in the phlebogramm appear superimposed on the uterine plexus.

Catheterisation of the o.v. presents a technical difficulty ([2, 3, 4, 8, 9]) which varies according to the side selected. It is decidedly easier from the left. With this technique, however, the contrast medium is conveyed and retained exclusively within limits of the area which one wants to analyse. Valvular structures do not usually present obstacles to the introduction of the catheter nor to the counter-flow of the contrast medium ([9]).

We think it advisable to describe the basic aspects which the reverse utero-ovarian phlebography shows in pathological conditions.

With obstruction of the uterine and hypogastric veins the phlebographic picture is characterised by:

A - FUNCTIONAL ELEMENTS

1 - a slowing of the flow with prolonged stagnation of the contrast medium ([22]).

2 - reflux of contrast medium from the hypogastric vein into the tributaries of the parietal vein and into those of the extra-uterine viscera with prolonged pooling.

3 - whenever utero-hypogastric obstructions result from changes in the extra-pelvic venous haemodynamic, be it general (cardiopathy) or local (venous insufficiency of the lower limb), there is also a reflux of the contrast medium from the hypogastric vein into the external and femoral iliac veins. Such findings are detected only in an upright position.

B - MORPHOLOGICAL ELEMENTS

1 - increase in cross-section: this is easily in the o.v. where the lumen can increase its cross-section fourfold as can the ovarian and uterine plexi. Dilation of the u.v. is unusual because the blood flow falls on the collaterals of the hypogastric vein. Dilation of the hypogastric vein is also rarely met with, in so far as the vessel has a large cross-section and an abundant extra-uterine, visceral and parietal tributary area, which is used for the pooling of surplus blood.

2 - increase in numbers: this semeiological finding is quite evident in the o.v., in the ovarian plexus and in the parametrial uterine plexus: it is probable that the in increase in the number of vessels is to a great extent invisible due to a dilation of the branches which are too thin to be seen angiographically. The increase in the number of intramural uterine veins in the fibromyoma is on the other hand a fact and is in proportion to the volume of the tumor and to its more or less compact structure.

3 - the varicose aspect: when the increase in the cross-section and the number of these veins is insufficient to contain the « blood pool » a lengthening of the individual vessels takes place which then assume a tortuous route until one cannot distinguish the individual components among their convolutions ([5, 22]).

4 - reverse display of the collateral veins: this finding is more frequent and more marked in the hypogastric area (parietal and visceral branches) and keeps the pelvic varicocele « sensu strictiori ». The visceral extra-uterine veins (the

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vescical and haemorroidal veins) and the parietal vessels (obturator and pudendal veins) are shown thus; the sacral veins are of particular interest in that they connect almost directly the two hypogastric systems, forming a true and collateral circulation of their own. Reflux in the extra-uterine vein depends on the position of the patient, given the uniformity of pressure in these vessels. When lying on the back the sacral veins are well displayed whilst in an upright position the parietal and extra-uterine visceral branches which are in the central ventral areas (pudendal, obturator and vesical veins) are better displayed.

5 - impression and displacement: the course of the utero-ovarian venous system is easily affected by tumors or contracting processes given the laxity of the structure running through the small pelvis.

Increasing ovarian or uterine structures (cysts, tumors — benign or malignant) as in sclerosis of the tissues (after inflammation, radiation, pelvic fibrous congestion syndrome) cause obvious or early angiographic changes. It is a question of impression ([4, 8, 23, 24]) infiltration, displacement. Also within the area of the uterus conspicuous evidence of indentation from fibromyoma is clearly present; at times aspects of simple intramural varicose dilation are associated with the delicate effects of regional impression.

Reverse utero-ovarian phlebography is a simple method with a very low failure rate. Since the functional morphological findings are at least similar to those observed with trans-uterine phlebography, this latter method should be abandoned in that it is relatively risky, unpleasant for the patient and has a considerable number of failures.

SUMMARY

The study of pelvic venous system is carried out by various techniques. The phlebographic semeiology is based on the anatomy and function of pelvic venous system.

Better results are obtained by reverse utero-ovarian phebography with selective cateterization.

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BIBLIOGRAPHY

1. Chidekel N.: *Acta radiol. diagnosis* 7, 193, 1968. - 2. Doppman J. L. and Chretien P.: *Radiology* 98, 405, 1971. - 3. Ferris E. J., Hipona F. A., Kahn P. C., Philipps E. and Shapiro J. H.: *Venography of the inferior vena cava and its branches.* Williams and Wilkins Co., Baltimore, 1969. - 4. Helander C. G. and Lindbom A.: *Acta radiol.* 53, 97, 1960. - 5. Ahlberg N. E., Bartley O. and Chidekel N.: *Acta radiol. Diagnosis* 3, 385, 1965. - 6. Ahlberg N. E., Bartley O. and Chidekel N.: *Acta radiol. Diagnosis* 4, 593, 1966. - 7. Tavernier J. et Lange D.: *Presse Med.* 73, 863, 1965. - 8. Jacobs J. B.: *Radiology* 92, 888, 1969. - 9. Ahlberg N. E., Bartley O., Chidekel N. and Wahlquist L.: *Scand. J. Urol. Nephrol.* 1, 43, 1967. - 10. Galmarini D., Pisani F., Bossi R., Fassati L. R.: *Annali medici,* Terme di S. Pellegrino 10/2, 131, 1966. - 11. Mainoldi F., Alessandri S.: *La flebografia pelvica intraparietale uterina,* Forni ed., Bologna 1964. - 12. Ducuing J., Guilhem P., Enjalbert A., Baux R., Paille J.: *J. Radiol. Electrol.* 32, 713, 1951. - 13. Lessman F. P., Waldrop G. M.: *Acta radiol.* 50, 501, 1958. - 14. Lea Thomas M., Fletcher E. W. L.: *Clin. Radiol.* 18, 399, 1967. - 15. Guilhem O., Baux R.: *La phlébographie pelvienne par voie veineuse, osseuse et utérine.* Masson et Cie, Paris, 1954. - 16. Topolanski-Sierra R.: *Amer. J. Obstet. Gynec.* 76, 44, 1958. - 17.

Wegryn S. P., Harron R. A.: *Obstet. Gynec.* 15, 39, 1960. - 18. Schussler R., Heinen G.: *Fortscher. Röntgenstr.* 98, 610, 1963. - 19. Buhl J., Lefevre H.: *Acta Obstet. Ginec. Scand.* 43 (Suppl. 7), 124, 1964. - 20. Hammen R.: *Acta Obstet. Gynec. Scand.* 44, 370, 1965. - 21. Chidekel N. and Edlundh K. O.: *Acta Radiol. diagnosis* 7, 1, 1968. - 22. Helander C. G., Lindbom A.: *Acta radiol.* 51, 401, 1959. - 23. Bernardi R., Pistolesi G. F.: *Ann. rad. Diagn.* 43, 232, 1970. - 24. Bartley O.: *Acta radiol.* 49, 169, 1958.

Modified technique for selective percutaneous catheterization of the hypogastric artery and its branches

by

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We describe below a modified technique for the selective percutaneous catheterization of the branches of hypogastric artery which reduces trauma to the patient to the greatest possible extent. This technique is of great value in the selective exploration of the pelvic vascular system for both diagnostic (angiological, haemodynamic and radiological) purposes and also therapeutic purposes (endarterial infusion of antiblastics and radioisotopes).

For example, selective arteriography by means of the catheter provides a method of identifying in particular the symptoms indicative of the spread and encroachment of a pelvic neoplasm.

In particular, it is possible to reveal *changes in the calibre of the vessels* through concentric compression, *displacement of the vessels or deformation of the lumen* through unilateral compression, *traction* on a large arterial branch, the *formation of collateral circulations or arterio-venous shunts* typical of an expanding process.

Angiographic findings are of particular importance in the pathology of the trophoblast as they allow the differential diagnosis to be made between benign and malignant forms and the study of their evolution in the course of therapy ([1, 2, 3, 4]).

The most characteristic findings are the *opposite cups* in the as yet unexpelled vesicular mole, the « mitotic spindle » in the expelled mole and the « irregular mitotic spindle » in the already discharged malignant vesicular mole.

The angiographic evidence of chorionepitheliomas is characterized by the presence of newly formed circulations, abundant haematic lacunae, clear arteriovenous shunts and rich vasal conglomerates.

Selective catherization of the branches of the hypogastric artery is also of great value for therapeutic purposes.

The ideal conditions for endoarterial oncochemotherapy are achieved only by regional perfusion with closed circuit extracorporeal circulation which provides maximum concentration of the drug in the tumoral bed with minimum immediate toxicity.

It is difficult to achieve at pelvic level the same degree of extracorporeal cir-

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