

Color-Doppler in the diagnosis and postoperative follow-up of varicoceles

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Color-Doppler is a recent diagnostic method which besides palpation, ultrasonography, Doppler and phlebography is routinely used in the diagnosis of the varicocele of the testis, the disease which is the very common cause of sterility in males.

In 39 completely examined patients, we performed the color-Doppler analysis of varicoceles prior to and following the surgery, as well as the follow-up examination using phlebography.

Color-Doppler showed high sensitivity of 91 per cent and specificity of 83 per cent. At postoperative examination color-Doppler showed a persistent varicocele caused by accessory veins not visualized at phlebography in 6 per cent of patients.

The importance of color-Doppler examination as a routine preoperative and postoperative diagnostic method, is presented in this paper.

Key words: varicocele; ultrasonography, Doppler, color

Introduction

Varicocele is a disease caused by the incompetence of the valvular apparatus of the internal spermatic vein accompanied by compromised venous blood flow through the testes and increased temperature of the scrotum, which is considered the main cause of disorders in spermatogenesis.

It is the cause of sterility in as much as 40 per cent of infertile males,^{1,2} and in fertile young males varicoceles can be found in 10-15 per cent of cases.³⁻⁵

The detection of a varicocele and its timely treatment can improve fertility in as much as 51-85 per cent of patients.

Besides other available methods the diagnosis of varicocele is also possible with color-Doppler, while the phlebography of the internal spermatic vein is the "golden diagnostic standard" in its detection.

In this study we present the value of color-Doppler in the detection of varicocele, as well as the feasibility of the application of this non-invasive method in determining the success of the operative procedure.

Materials and methods

In 39 patients treated endocrinologically for sterility varicocele was suspected as the main cause of sterility.

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Besides endocrinologic tests, palpation, color-Doppler examination and phlebography of the internal spermatic vein were performed.

Positive finding on the phlebography of the internal spermatic vein was an indication for surgery, and 4 days following the procedure all patients operated on were examined by color-Doppler to evaluate the result of the procedure, ie. the existence of accessory veins. Patients ranged from 24 years to 42 years in age.

Bimanual palpation of both testes was applied as the first diagnostic method. Color-Doppler examination in the prostrated and upright position with increased intra-abdominal pressure was performed after that. The same examination procedure was repeated 4 days after the surgery. The scanner Radius CF with a 7.5 MHz probe with possibility of low-velocity flow analysis was used.

Phlebography of the internal spermatic vein was performed using the standard technique: by introducing the catheter into the left then right internal spermatic vein and by their visualization with the radiologic contrast medium, followed by the determination of the venous insufficiency degree.

Varicoceles confirmed at phlebography were operated according to the Palomo method consisting of the high ligation of the artery and spermatic vein.

Results

Comparing clinical findings with the findings of color-Doppler examination and spectral analysis, ie. monitoring the direction of venous blood flow and the finding of phlebography as the gold standard, we found out that in 39 patients the clinical finding at inspection and palpation was a suspected or palpated incipient varicocele.

Retrograde blood flow, ie. a change of colour at the color-Doppler under increased abdominal pressure was visualized in 31 patients or 79 per cent, while in 8 patients or 20.5 per cent color-Doppler finding, ie. spectral analysis were not indicative of the existence of a varicocele. A follow-up phlebography, performed in all

patients as a part of the routine preoperative treatment, revealed varicoceles in 33 patients (83.6 per cent), and normal finding in 6 patients (15.6 per cent).

The positive finding at phlebography was an indication for operative treatment, and 33 patients were operated on. Due to the possible incidence of accessory veins, ie. persistent varicocele, the color-Doppler examination was performed immediately after surgery to evaluate its success, as well as the accuracy of phlebography.

The value of ultrasonography in the preoperative treatment compared to phlebography showed sensitivity of 91 per cent and specificity of 83 per cent. In respect to phlebography 9.1 per cent were false negative, and 16.7 per cent were false positive.

Postoperative examination of 33 patients showed that phlebography failed to reveal aberrant veins in 2 patients (6 per cent), and that a varicocele persisted further as a consequence of venous drainage by veins which were not visualized by phlebography.

Discussion

Varicocele is a varicose condition of the veins of the pampiniform plexus mainly appearing on the left testis, and appearing also on the right testis, though in a smaller number of patients. Clinical symptoms can be different, varying from local discomfort to abnormal semenogram in younger males connected with infertility.

Diagnostic procedure of varicoceles can include palpation, termography, ultrasonographic examination, Doppler examination, color-Doppler examination and phlebography which is considered the golden standard for discovering varicocele, as well as for the gradation of varicoceles, resulting in the possibility of interventional therapy during the examination.⁶

Palpation has proved an uncertain method, especially in small varicoceles. In our study we compared color-Doppler finding with the finding of phlebography and spectral analysis of the Doppler curve and the result of monitoring the direction of blood flow with the contrast

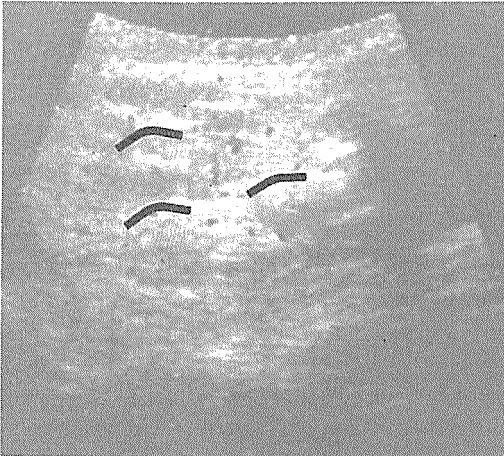


Figure 1. Shows the veins of the pampiniform plexus above the testes in which venous flow is discernible as blue colour, in this picture as dark shadows (arrows).

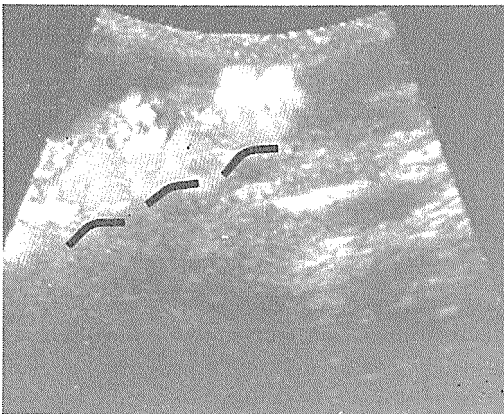


Figure 2. In the Valsalva's maneuver the red coloured pampiniform plexus is visualized above the testes which is shown in the black-and-white picture as a white shadow, and corresponds to the retrograde high velocity flow; it is an indication of the pampiniform plexus varicosity.

radiographic visualization of the spermatic vein. (Figure 1, Figure 2). By comparing these diagnostic modalities, the degree of their accuracy was found to be very similar. However, the advantages of color-Doppler are its non-invasiveness, low cost and little time needed to perform the examination.

In spite of phlebography being considered the golden standard in the diagnostics of varico-

celes, color-Doppler examination must be additionally performed after phlebography, as well as after surgery because of its ability to discover the existence of a persistent varicocele, caused by the incompetence of the valvular apparatus in the accessory veins which often fail to be visualized at phlebography. High sensitivity and high specificity are comparable with the results of some other authors.⁷⁻⁹

Non-invasiveness of this diagnostic method, and good results in comparison with phlebography are suggestive of the need for introducing such examination into the diagnostic procedure as a routine method in young males with spermatogenesis disorders. In our study, unlike other diagnostic methods, especially palpation, color-Doppler has proved a much more reliable diagnostic method. Postoperative color-Doppler examination of the patients in whom varicoceles have been proved at phlebography, as well as at surgery, and of the patients treated by an interventional radiographic procedure, is also mandatory because of the ability of color-Doppler to detect the existence of a persistent varicocele caused by the accessory veins which can further continue obstructing spermatogenesis.

References

1. Dubin L, Amelar RD. Etiologic factors in 1294 consecutive cases of male infertility. *Fertil Steril* 1971; **22**: 469.
2. Greenberg SH, Lipshultz LI, Wein AJ. Experience with 425 subfertile male patients. *J Urol* 1978; **119**: 507.
3. Uehling DT. Fertility in men with varicocele. *Int J Fertil* 1968; **13**: 58.
4. Charny CW, Baum S. Varicocele and infertility. *JAMA* 1968; **204**: 1165.
5. Oster J. Varicocele in children and adolescents. An investigation of the incidence among Danish school children. *Scand J Urol Nephrol* 1971; **5**: 27.
6. Ahleberg NE, Bartley O, Chidekel N, Fritjofsson A. Phlebography in varicocele scroti. *Acta Radiol Diagn* 1966; **4**: 517.
7. Petros JA, Andriole GL, Middleton WD, Picus DA. Correlations of testicular color - Doppler ultrasonography, physical examination and venography in the detection of the left varicoceles in men with infertility. *J Urol* 1991; **145**: 785.

8. Geatti O, Gasparini D, Shapiro B. A Comparison of scintigraphy, thermography, ultrasound and phlebography in grading of clinical varicocele. *JNM* 1991; **32**: 2092.
9. Basile-Fasolo C, Izzo PL, Canale D, Menchini Fabris GF. Doppler-sonography, contact scrotal thermography and venography: A comparative study in evaluation of subclinical varicocele. *Int J Fertil* 1986; **30**: 62.