PhD Thesis

BILATERAL VARICOCELE TREATED WITH MICROSURGERY
AND
MALE INFERTILITY

Edit Erdei

2000.

BILATERAL VARICOCELE TREATED WITH MICROSURGERY
AND
MALE INFERTILITY

Edit Erdei
Department of Urology and Andrology
Semmelweis University
Faculty of Health Sciences
Budapest

PhD Thesis
2000

Contents:

PUBLICATIONS CONNECTED WITH THE THESIS

I. Tritto G., Giargia E., Crozes C., Erdei E., Morlier D.
The role of testicular biopsy in microsurgical correction of bilateral varicocele
The First International Symposium on Andrology Bioengineering and Sexual Rehabilitation
Proceedings edited by Tritto G., 274-78, Paris, 1995.

II. Erdei E., Tritto G., Arvis G., Magyar É., Laki A., Karsza A.
The microsurgical treatment of the varicocele (live video surgery)
Presented in Budapest on the 9-th World Congress of Videourology, 1997.

III. Tritto J., Erdei E. and M.-O. North
Azoospermia, maturation arrest and bilateral varicocele: the role of the microsurgery
Monduzzi Editore /Intern. Procedings Division/ Vancouver, 615- 618, 1997.

IV. Delhomme G., Dittmar A., Tritto J., Erdei E.
Mesure en per-operatoire et en temps reel de la microcirculation et de la temperature du testicule par microcapteur implantable
Biometrie humanie et anthropologie 15: 1-2, 81-88, 1997

V. Krausz C., Quintana-Murci L., Barbaux S., Siffroi J.-P., Rouba H., Delafontaine D., Souleyreau-Therville N., Arvis G., Antoine J.-M., Erdei E., Taar J.-P., Tar A., Jeandidier E., Plessis G., Bourgeron T., Dadoune J.-P., Fellous M., McElreavey K.
A high frequency of Y chromosome deletions in males with non-idiopathic infertility
J. Clinic. Endocr. and Metab. 84 (10): 3606-12, 1999. IF: 4,53

VI. Erdei E., Magyar É., Lellei I., Rózsahegyi J., Laki A., Rusz A., Karsza A.
Herebiopsia jelentősége az asszisztált reprodukció szempontjából
Magyar Andrológia, 3. 99-103, 1999.

VII. <u>Erdei E.</u>, Magyar É., Rózshegyi J., Kovács L., Arvis G., Drávucz S., Karsza A.
Is the diagnostical testis biopsy important in the age of assested reproductive technology?
Monduzzi Editore /Intern. Proceedings Division/ Sydney, 53-56, 1999.

VIII. Tóth A., <u>Erdei E.</u>, Drávucz S., Doszpod J.
Genetikai szempontok a meddőség kezelésével kapcsolatban
Magyar Nőorvosok Lapja, 62: 79-85, 1999.

IX. <u>Erdei E.</u>, Tritto G., Magyar É., Arvis G., Rózshegyi J., Karsza A.
The role of microsurgery on the treatment of varicocele (live video surgery)
Presented in Stockholm on the 14-th Congress of European Association of Urology.
Can be seen at the *Videolibrary of European Association of Urology*, 1999.

X. <u>Erdei E.</u>, Magyar É., Lellei I., Rózsahegyi J., Laki A., Rusz A., Papp Gy.
Testicular biopsy helping assisted reproduction
Acta Chirurgica Hungarica, 2000. in press 38/3

ABBREVIATIONS

VC	varicocele
BVC	bilateral varicocele
SE	scrotal exploration
TB	testicular biopsy
DBTB	double and bilateral testicular biopsy
ART	assisted reproductive technique
OAT	oligo-astheno-teratozoospermia (severe oligozoospermia)
TESE	testicular sperma extraction
IVF	in vitro fertilization
MNS	Mean Number of Spermatids per tubule for each biopsy
MNST	global Mean Number of Spermatids per tubule for each Testis
DMNS	quantitative differences between the percentage of mean number of spermatids per tubule
TI	testicular index: ratio between MNST and DMNS
GI	global index: difference between the bilateral TI
C	sperm count before microsurgery
C2	sperm count after microsurgery
M	motility before microsurgery
M2	motility after microsurgery
NM	normal morphology before microsurgery
NM2	normal morphology after microsurgery
z	result of statistical analysis
p	value of significancy

INTRODUCTION

General Aspects

It is well-established that procreation is essential to the continuation of the species.

The number of the polulation in Hungary is continuingly and heavily decreasing, due to the negative tendencies of the demographic indicators. This negative tendency started in the 1980s and will even show it's effects in 2015 according to prognosis. The percentage of old age people in Hungary is 63,1%.

Sadly the number of spontenauos births has fallen back. The reason for this is not primarily due to the lack or decrease of will to have children, but more to the rising number of health related problematic marriages. While in the previous eras, the fact that disorders can also be responsible for the decrease in male fertility didn't emerge among specialists. Today it is a well known fact even among infertile couples that both parties can be responsible in the same amount for the late births or complete lack of children. (Tables 1. and 2.)

My Personal Motives for the Topic Choice

I have been working in the field of Urology since 1973, and Andrology from the start has been in the focal point of my professional interest. "I have become familiar with the methods in an autodidactic way, but as a senior lecturer I have always been drawn to the deeper meaning of things, and sought the ways to further develope my professional knowledge in the interest of better patient care."

What thoughts led me in the choice of topic?

I was looking for an disorder causing male infertility that affects a large proportion of the population (63). As a Urologist I have primarily focused on an disorder that can be treated with surgical methods (62). I have looked for surgical methods that can ensure the best healing chances. I have so come to choose varicocele, the surgical effective-ness of which is debated to this day (58). With my knowledge and experience I will try to contribute to giving a clearer picture to this problem.

Chronological History Overview

The correction of varicocele is an often performed method among urologists. The symptom, the dilatation of the venes of the plexus pampiniformis is know since 1541. The first observer was Ambroise Paré (65). Experts have been trying to find a reason for it's etiopathogenesis but several theories exist today (12, 43, 81, 82). From these the most well known are vein, the lack or relative insufficiency of the valves of the spermatic internal, or collateral veins, anastomosys between the left and right testicular veins, the inflow angle difference between the left and right side, the so called upper and lower nutcracker phenomenon. The authors dealing with these subjects are well known: Ahlberg (1), Bigot(11) , Pontonnier(67), Murray (55).

It is long since known that the effective therapy is surgical or recently radiologic intervention. First Barwell (6) made an account on a varicocele operation in 1869, and his experiences were published in Lancett. Later, Bennet (10) in 1889, Macomber and Sanders (47) in 1929, published further details.

A variety of surgical approaches have been advocated for varicocelectomy (23). The surgical techniques can be classified into three main groups.

1. Classic surgical methods, which mean the lower -Ivanissevich (36) 1918, and Bernardi 1941) or upper -Palomo (61) 1949, surgical approach to the internal spermatic vein (73).

2. The microsurgical method developed in the 1970s.

3. The recently developed videolaparoscopic operation (74).

In the beginning microsurgical techniques meant making a veinal anastomosis, such as sapheno- spermatic termino- terminal anastomosis - Ishigami 1970 (35) -, sapheno-pampiniforme latero-terminal anastomsis - Fox 1976 (21) -, spermatico-epigastic termino lateral anastomosis - Belgrano 1986 (9) -. Even though this latter method is considered the most effective, performing anastomosis has not completely realised in the therapeutic treatment of varicocele. The essence of the methods developed later is the dissection of the spermatic chord and the ligation of the plexus pampiniformis complemented with the ligation of the cremaster - Giuseppe Tritto (90) and gubernaculum veins - Marc Goldstein (24). Even though VC is present in more than 15% among the adult male population, and was found to be at 5-10% in the 10-14 year old age group (68), its relation with male fertility has only been revealed in 1952 by the works of Tulloch (92). He made a detailed account on an azoospermic male regaining his fertilizing abilty after varicocelectomy. The alterations caused by VC in the spermatogram and spermatocytogram were reported by MacLeod in 1965, and this phenomenon came to be known as the "stress pattern"(46). The effect of the thermodynamic changes on the microenvironment and testicular function was studied by Zorniotti (100). The taking shape and development of radiologic imaging and it's introduction and consecutive utilization in the Uroandrological field made it possible for the early recognition of the forms of VC that cannot be defined with palpation (14). Even though 400 years have passed since the first written record of VC, and this short chronological overview demonstrates that our knowledge has enriched, the most important questions are as yet unanswered (23, 72).

Is VC uni- or bilateral?

In what cases is surgical intervention necessary?

Why? When? How? And is it really necessary (2, 8, 56, 89)?

These are the questions I will attempt to answer in my study.

Aim of Study

- The introduction of microsurgical techniques in the treatment of VC associated with male infertility to the domestic practice.
- The connection and parallel performance of testicular biopsy with surgical correction to prove how the spermagenetic functions of the testis are influenced by the changes in the microenvironment.
- To point out that in determining whether VC associated with male infertility is uni-or bilateral radiologic imaging has a decisive role.
- To call attention to the fact that VC is often a bilateral disorder and in such cases the surgical correction of both sides should be performed at the same time to improve, or at least maintain the level of spermatogenezis.
- To prove with facts that even though microsurgery is expensive, and the operating time is longer than that of traditional techniques, the good results and the advantages due to the sophisticated techniques make these secondary issues.

I. PATIENTS, MATERIALS AND METHODS

Between 1993 and 1999, 251 varicocele patients consulted us at the andrological outpatient care because of male infertility. All patients have supported microsurgical varicocelectomy. The diagnostic exploration preceeding surgery has been carried out in a previously determined protocoll.

Mean age of the patients is 33,35 years (between 19 and 55 years). The patients are classfied into two groups of infertility: mean age of the primery infertility group is 32,4 years, in the group of secondary infertility it is 35,9 years. The mean age of the two groups falls relatively close to each other, which indicates that those with primary infertility go to consultation late.

Table 3. shows the distribution of patients with bilateral or unilateral VC treated with microsurgery between October 1993 and October 1999, respectively.

Our statistical data proves that the discovery of the number of bilateral VC has grown parallel with the improvement of microsurgical techniques. Why? The cure for VC with microsurgical correction has numerous advantages compared to conventional surgical techniques. This made a much more precise radiodiagnostical exploration necessary (37). The development of the various methods of radiologic imaging in the field of andrology such as Doppler, echo color Doppler, dynamic scrotal scinthigraphy, tomoscinthigraphy, or thermography and the systematic utilisation of these permit more perfect diagnostics that are indispensable before microsurgical intervention (89). At the same time microsurgical interventions are founded on a wider diagnostical basis and thus puts the criteria of VC onto new basis (dilated veins greater than 3 mm in diameter)(26).

Momentarily the development of assisted reproductive technology has increased the medical responsibilty of the specialists during the treatment of the infertile couples (60). This is why it is an obligatory challenge to search and research the ethiological factors of male infertility. VC often exists in these cases (77).

The introduction of modern radiologic imaging as a non invasive diagnostical tool makes possible:

a.) the detection of the infraclinical VC and

b.) the realization that VC is very often bilateral.

Even though most of the specialists think that VC is a unilateral symptom with left side manifestation, the controversial statements (a,b) are especially true in cases of VC associated with infertility.
Every work group which deals with VC puts primary emphasis on the WHO studies (97, 98).
In this current study, 87 patients with bilateral VC combined with infertility are evaluated and followed up.

A) CLASSIFICATION OF VARICOCELE

However the accurate classification of VC is very important from the point of better understanding of its damaging effects on spermatogenesis.

i. Clinical Classification

The clinical classification of varicocele is based on four categories, relative to the inspection of the scrotum, to the palpation of the spermatic cord and to the Valsalva manouvre in stand –up and supine positions (18, 22, 31).

ii. Radiological Classification

One one side, the classification between grade I to IV is confirmed by the echo color Doppler Duplex scan (20). The detection of infraclinical varicocele (Grade I) is realised bilaterally in supine position. It is also confirmed in supine position by the analysis of the hemodynamic reflux, even if the Valsalva manouvre in clinical evaluation is negative (5). On the other side the detection of the spermatic artery and the measure of the arterial inflow can establish the throphic condition of the testes (16).
Of 251 varicoceles submitted to surgical correction and bilateral testicular biopsy, 166 are found to be bilateral (66%), confirmed by echo color Doppler (66). In the study group of 84 patiens, the degree in bilateral varicocele is similar in 23 cases, corresponding at 27%. The great majority presents a different degree on both side , 73%, with very large prevalence of higher degree on the left side in front of the right side. The great prevalence of the degree III, IV is localized on the left side and lower degree clinical classes are localized on the rigth side. For sumerised data see Table 4.

iii. Scintigraphic Classification

There was a possibility to submit 37 patients for scrotal scintigraphy. The time-dependent curves are similar on both cords, whereas the degree of activity depends on the degree of varicocele. On the contrary, the time-dependent curves of both testes do not demonstrate any correlation with the clinical degree of varicocele.

The sequential analysis of the differnt phases of the accumulation of radioisotope on the cords permits to detect, with complex procedures of high resolution imaging, the presence of intrascrotal communications that link both sides dynamically (8).

The application of Tomoscintigraphic reconstruction procedures on the spermatic cords permits to confirm the presence of these intrascrotal vessels between both sides, and to analyse the configuration of the anterior and posterior compartments of bilateral varicoceles, carrying out the indication for a more selective dissection during the microsurgical correction.

iv. Intraoperative Classification

During scrotal exploration the degree of varicocele can be visualized and the configuration of the anterior and posterior compartments of bilateral varicocele on the spermatic cords can be determined while the communicant vessels on the scrotum can be verified (7).

The classification of VC used by us is summerized on Table 5.

B) EXAMINATIONS

The following exams have been performed on our patients, before surgery.

- semen analysis as a basis examination
- scrotal exploration for testicular biopsy
- hormon analysis, primarily performed in the azoospermic and severe oligozoospermic groups.

i. Semen Analysis

By sperm concentration the patients are classified in 4 different groups, azoospermia, oligo-astheno-teratozoospermia (severe oligozoospermia), oligozoospermia and normozoospermia. The value of the semen concentration is presented on Table 6.

ii. Scrotal Exploration (SE)

In this protocol surgical intervention includes the curing of VC with microsurgery and then in the first step a systematical realisation of double and bilateral testicular biopsy (DBTB) during SE (69).

SE is indispensable because it permits:

1. to discover and to precisely define the intrascrotal anatomical and functional situation, which is not evident in conventional diagnostical techniques, nor in testicular biopsy guided with a small incision on the surface of the testis - for example fusional (51);
2. to carry out tonometrical and biometrical, furthermore of thermodynamic and mikrocirculation measures (15);
3. to complete the intraoperative classification of VC (90).

Testicular biopsy (TB)

In the diagnosis of male infertility the basic method is semen analysis. In numerous cases, it does not give any or sufficient information about spermatogenesis in the testis (29, 30), for example in the cases of azoospermia (70) and severe oligozoospermia when testicular biopsy is a mandatory step. It is know since more than 50 years (13, 32) but it has been living its renaissance since the introduction of ICSI (60).

On one hand a relatively fast decrease of the sperm concentration to a criticaly low value, on the other hand the technical development of ART gave more impotance to the diagnostical TB. This is why it needed more accurate processing. Today TB doesn't only have diagnostical importance, but also therapeutical importance (Testicular Sperm Extraction – or TESE process).

Because spermatogenesis is a very heterogeneous phenomenon, the good quality of the spermatozoa depends strictly on the testicular microenvironment which the spermatogenesis realizes (28, 94). All negative effects of the microenvironment that damage micromillieu stability, have negative influences on the spermatogenesis and spermiogenesis.

In this study all patients with BVC are submitted at the same time for microsurgical correction to the Double and Bilateral Testicular biopsy (DBTB) (90).

Techniques of the TB

The TB is realised using a standardised microsurgical protocol, the SINB procedure in which 4 parameters are evaluated :

the **S**ector of the biopsy, that is the quadrant in which the sample will be taken in both testis, on two opposite sides. These are usually upper-inner and lower-outer part of the testis, used to establish a quantitative and qualitative mean score (Figure 1.),

the **I**ncision of the albuginea of the testis (transversal, oblique),

the **N**umber of samples taken from the specific zone,

the **B**leeding under the albugineal incision is evaluated 0 to 3.

This method of TB is atraumatical, very fine, delicate technique and it is carried out with microinstruments. The albuginea is sutured with 6/0 Monocryl.

Does this particular TB model have any advantage compared to the classical TB techniques? Definitely. The DBTB permits to obtain more information about the structure and function of both testis at the same time, than the conventional methods (28).

The DBTB permits:

- to define the state of spermatogenesis in the testis with the help of a quantitative, qualitative hystological score;
- to compare the states of spermatogenesis in both testes;
- to establish a strict correlation between the grade of VC and the state of spermatogenesis;
- to classify the anomaly of spermatogenesis;
- to evaluate the prognosis after the microsurgical cure of VC;
- finally, to choose the best site of the testis for an eventual ART with TESE.

TB indices

Starting from the histo-pathological description and the quantitative distributions of basic lesion in the testis, through the application of the quantitative analysis of the spermatogenetic process (3), a series of Global indices is introduced in order to obtain a global evaluation of the Fertility Power of the testis in terms of percentage of spermatogenesis, relative to the clinical degree of BVC.

Applied Terminology

MNS: the Mean Number of Spermatids per tubule is obtained during the quantitative analysis of the bioptic sample for each biopsy.

MNST: the global mean number of spermatids per tubule in the odd-couple for each testis.

DMNS: the quantitative differences between the percentage of spermatids per tubule (MNS) in each odd-couple is calculated.

TESTICULAR INDEX (TI): the introduction of the relative ratio between the mean percentage number of spermatids per tubule of each testis (MNST) and the difference between the percentage number of spermatids per tubule in the odd-couple of the testis (DMNS) permits to obtain a special index.

GLOBAL INDEX (GI): the difference between the bilateral TI.

C) CURE OF BVC WITH MICROSURGERY

i. SURGICAL TECHNIQUE

Repair of VC will halt any further damage to testicular function and in a large percentage of men, will result in improved spermatogenesis. The potentially important role of urologists in preventing future infertility underscores the importance of utilizing a varicocelectomy technique that minimizes the risk of complications and reccurence. The introduction of microsurgical technique to varicocelectomy (49, 83) has resulted in a substancial reduction in the incidence of hydrocele formation (87). This is because the lymphatics can be more easily identified and preserved. Furthermore, the use of magnification enhances the ability of the surgeon to identify and preserve the testicular artery, thus avoiding the complication of atrophy or azoospermia(45) . At the subinguinal level, however, significantly more veins are encountered. At this level , the testicular artery has often divided and two or three branches need to be identified and preserved (28). An advantage of this approach is that it permits access to cremasteric veins and collaterals that perforate the floor of the canal (78).

Mini-incision microsurgical subinguinal varicocelectomy

The method performed with a small incision of the skin in the subinguinal exploration of the spermatic cord, using microsurgical technique.

a. Anesthesia

Because of the danger of testicular artery injury with blind cord block, light general or regional anesthesia is preferred.

b. Technique

The first step is a scrotal excision and bilateral testicular biopsy. In cases of BVC the microsurgical intervention is performed on both sides (90).

The second step is the macroscopic part such as the preparation of the spermatic cord usualy started on the left side.

The location of the external inguinal ring is determined by the investigation of the scrotal skin and then marked. The incision is made transversally beginning at the external inguinal ring and extending 2 to 3 cms laterally, subinguinally, just below the external ring, leaving the fascia intact. With the subinguinal approach, however, there are more veins, the artery has often divided, and its pulsations are often dampened by compression on the edge of the external ring. This approach is easier in men with a history of any prior inguinal surgery, in obese men, in men with long cords and low-lying testes. The spermatic cord is then encircled with a Babcock clamp and delivered through the wound. The ileoinguinal and genital branch of the genitofemoral nerves are excluded from the cord, which is then surrounded with a large Penrose drain. The cord is then bluntly dissected with a finger down to the wound. All external spermatic veins are identified and doubly ligated with 4-0 Vicryl and divided. The edges of the cremasteric fascia are then spread widely with a self-retaining retractor to expose the cord structures.

The Leica Wild operating microscope is then brought into the field. Under 3 to 6 power magnification, the external and internal spermatic fascia are opened (78). The magnification is now inceased to 8 to 15 power to identify the presence of pulsation revealing the location of the testicular artery. If the testicular artery is identified, it is dissected free of all surrounding tissue, tiny veins, and lymphatics, using a fine-tipped, nonlocking microneedleholder and microforceps. If the artery is not immediately identified, the cord is carefully dissected beginning with the largest vein. In approximately 30 % of cases, the testicular artery is adherent to the underside of the large vein. All veins within the cord, with the exception of the vasal veins, are doubly ligated with 4-0 Vicryl. If the vas deferens is accompanied by dilated veins greater than 3 mm in diameter, they are dissected free of the vasal artery and ligated. As long as at least one set of vasal veins remains intact, venous congestion will not occur. At the completion of the dissection, only the testicular artery, lymphatics, and vas deferens and its vessels remain intact. The cord is then inspected for bleeders and returned to its bed. The external oblique aponeurosis, if opened, is reapproximated with continuous sutur using the previously placed 4-0 Monocryl, and the skin is closed with continuous intracutan sutur using 4-0 Monocryl.

As a third step the same intervention is performed on the right side too. The patient is discharged the next day.

Microsurgical intervention has three important points.

1. The good preparation of the spermatic cord, which is indispensible before microscopic part;
2. The dissection of the veins, around the artery, and the ligation of every collateral;
3. With this technique the mean operating time is longer as with the conventional surgical technique, but in accordance with numerous authors it has to be emphasised that the time and the cost of intervention can only bear secondary importance as opposed to the results.

It is essential that every group that deals with the treatment of VC associated with infertility has a surgical protocol, that permits to improve or at least conserve the current status of the testicular function in order to help fertility and protect virility.

c. Real Time Monitoring With Multimicrosensor for the Metabolic Activity of the Testicular Tissue

In six cases the microcirculation and temperature was monitored during microsurgical intervention using a termal diffusion microsensor. The microsensors were placed in two sites of the testis, the upper and lower.

In the normal testis the time course of tissue blood flow and temperature decrease in the same time. The time courses of both parameters of the upper and lower almost the same. The relationship between tissue blood flow and temperature is quasi-linear for the normal testis. In the contro-lateral testis which a hemodynamic active VC, the time courses of tissue blood flow and temparature are independent. The measurements show large differences between the upper and lower quadrant, for both tissue blood flow and temperature: the tissue blood flow of the lower quadrant is about 50% lower then that of the upper quadrant. The relationship between tissue blood flow and temperature is non linear, tissue blood flow is quasi-independent with tissue temperature. These results are confirmed by biopsies which show more important interstitial and peri-vascular fibrosis on the lower part of the right testis (91).

ii. COMPLICATIONS

The surgical complications of microsurgical intervention are listed later. The most common problem was transient epididymal discomfort 3,6 %. Other problems included minimal wound infection 2,8 %, which was usually a reaction to the sutures. There was only one transient hydrocele in this series 1,1 %. The incidence of VC reccurence following surgical repair varies from 0,6 % to 45 %. In this study the recurrence rate was 4,7 %, and there were no cases of testicular atrophy either in the main study group or among a small group of 12 patients who were examined for various reasons at least 5 years after subinguinal microvaricocelectomy.

Complications of Subinguinal Microvaricocelectomy

Complications	No. of Patients	
Immediate Postoperative Period		
Epididymal pain	3	
Wound infection (suture reaction)	2	
Hydroceles	1	
Transient		1
Permanent	-	
Recurrence	4	
Palpable	0	
Apparent on Doppler examination only	4	
Testicular atrophy	0	
At 5-Year Follow-up	**12**	
Testicular atrophy	0	
Recurrence	1	

D) POSTSURGICAL FOLLOW-UP OF PATIENTS

a.) Semen analysis control between the 3-5th , 6-11th months and from the 12th month,

b.) The registration of obtained pregnancies and deliveries,

c.) A color Doppler examination three months after microsurgery to detect disappearance of spermatic reflux.

E) STATISTICAL ANALYSIS

The mean values for each parameter were compared before and after surgery by Wilcoxon's signed rank test, a nonparametric test.

II. RESULTS

A) THE ADVANTAGE OF DBTB

i. CALCULATED VALUES AND EVALUATION

The indices are obtained starting from the quantitative analysis of bioptic samples, taken according to the odd-couple procedure. The selection of odd quadrants for each testis permits to analyse the relative difference of spermatogenetic process perturbated by the hemodynamic effect of the VC.

The values of MNST and DMNS were well compared with the degree of VC. (See Figure 2.) It demonstrated that the two calculated values show direct correspondance between the damaging effect of VC degree and the spermatogenesis.

A low TI indicated a large gradient in each testis, independent of the mean value of percentage of spermatids per tubule. The contrary, a hight TI demonstrates a high stability of the percentage of spermatids into the testis. The differences between the bilateral TI represents the GI, that describes the potential status of spermatogenetic balance of both testes as a whole and identifies the position of the patient in the exponencial distribution of VC population. Two classes of patients with BVC are identified through the application of GI distribution relative to the bioptic analyses.

When the GI is high, there is inverse correspondence between the TI on one side, and the degree of VC and the DMNS on the other side.
In cases of low GI there is a direct correspondence between the TI and degree of VC and an inverse correspondence between the TI and DMNS (90).

Three patients have been excluded from the study on the basis of testicular biopsy. One patient with Sertoli Cell Only Syndrome, and two patients with total testis fibrosis. The FSH values and biopsy analysis show there was no correlation found between maturation arrest (33, 64) and the high level of FSH values in the azoospermic and severe oligozoospermic groups, other groups were not examined.

ii. EXISTANCE OF SPERMATOGENESIS IN THE AZOOSPERMIC AND OAT GROUP AND THE RATION OF POSITIVE TO NEGATIVE SIMPLE

Spermetogenesis in one testis 12/47 (25,5%):

- Azoospermic group 9/ 27 (33 %). In 5 cases only one site of the testis 19%.
- OAT group 3 /20 (15 %).

Spermetogenesis in both testes 35/47 (74,5%):

- Azoospermic group 18 /27 (66 %): 1-1 site = 7; 3 site = 9; 4 site = 2.
- OAT group 17/20 (85 %): 1-1 site = 4; 3 site = 8; 4 site = 5.

In the oligozoospermic and normozoospermic group the rate of findings is significantly higher.

iii. PRACTICAL ADVANTAGE

In recent studies several renowned authors call attention to the fact that biopsies from different sites of testes give more information of the true spermatogenesis then one blind biopsy (28, 34).
Significant differences can be found inter-testes and inter-biopsies of the odd-couple samples. In ART protocol for IVF or ICSI in azoospermia and in OAT or in other problems this type of TB was helpful to select the best location for the retrieval of spermatozoa, when there was a difference in the score of biopsies. There is a very important step for the good development of

the embryo. In this study two fertilizations were performed with TESE. One patient had spermatogenesis in only one quadrant, that was determined by diagnostic bilateral testicular biopsy. After microsurgical correction of BVC the patient remained azoospermic. As a next step, during ART, we took TESE focusing on the site of good spermatogenesis, the first assay of ICSI with TESE was positive, and the healthy baby was born. In the other case, the patient had spermetogenesis in all quadrants, but with differing quality. The best quality site was chosen for ICSI, and the pregnancy was obtained on first attempt (90).

B) GENERAL IMPACT OF MICROSURGERY ON SEMEN QUALITY

i. SEMEN ANALYSES

Tables 7-10 shows the evaluation of semen in all groups of count I-IV for each patient. Compared values before and after microsurgery are indicated on Table 11. Table 12 summarised the new repartition of patients after microsurgical correction of BVC. Azoospermia: 13/84 (15%), OAT: 14/84 (17%), Oligozoospermia: 24/84 (29%), and Normozoospermia: 33/84 (39%).

Statistical analysis of semen

A statistical analysis of the preoperative and postoperative semen data were compared by nonparametric statistical analysis Wilcoxon Matched pairs test. This type of statistical approach was indicated because the distribution of data for several parameters was nongausian. The differences between the medians were statistically significant for all parameters, count (C, C2), motility (M, M2), normal morphology (NM, NM2) where p is smaller than 0,05, except for sperm count in the normozoospermic group. (p = 0,3823) A statistical analysis of the semen data is presented in Tables 13/a-d and Figure 3/a-d.

ii. PREGNANCY

Table 14. presents the obtained and announced pregnancies, and deliveries. These data are much smaller than reality because part of the patients disappeared from our vicinity. Global pregnancy is 16 with 17 babies (1 twins); 15 babies were born, there are 2 ongoing

pregnancies. Pregnancy rates were 16/84 (19%), babies 17/84 (20%), no abortion. The mean time from microsurgery to fecondation was 13,4 months (57).

iii. GENERAL APPROACH OF EVALUATION

In our series 48 patients out of 84 improved (57%), 8 out of 84 decreased (10%), and 28 out of 84 had no change in their semen quality (33%). In the group of normozoospermia 13 patients were included and 12 remained in the group. They are not included here, because their results are presented in the best semen group. Without them the results are: 48/72 improved (67%), 8/72 decreased (11%), 16/72 had no change. (See Table 12.)

C) HOMOGENEAOUS GROUPS

Our idea was that in order of better comparison and deeper analysis the patients will be regrouped in different groups of semen count with associated anomalies. These are known from the results of SE and DBTB. The essence of this evaluation is to performe homogeneaous groups.

"isolated" bilateral varicocele	= BVC
bilateral varicocele associated with obstruction	= BVC+O
bilateral varicocele associated with maturation arrest	= BVC+M
bilateral varicocele associated with obstruction and maturation arrest	= BVC+O+M

Out of the 84 patients 33 have BVC (39%), 6 patients have BVC associated with epididymal obstruction (7%), 30 patients have BVC associated with maturation arrest (36%), and 15 patients have BVC associated with epididymal obstruction and maturation arrest (18%). The number of patients with an improved spermatogram is 48 (57%). See Table 15.

a.) Results in the group of isolated varicocele by semen group as presented in Table 16.
The number of patients in this group were 33, the global improvement was 26 (79%).
b.) Results in the group of bilateral varicocele associated with epididymal obstruction in Table 17. The number of patients in this group were 6, of these 2 improved (33%).

c.) Results of the group of bilateral varicocele associated with maturation arrest in Table 18. In this group the number of patients were 30, of these 12 improved (47%).

d.) Results in the group of bilateral varicocele associated with epididymal obstruction and maturation arrest in Table19. In this group the number of patients were 15, of these 9 improved (60%).

From the point of view of male infertility the treatment of the azoospermic and severe oligozoospermic groups is very delicate and particularly difficult. For this reason, we analysed the postoperative semen change of these in all homogeneaous groups.

i. SEMEN IMPROVEMENT IN THE HOMOGENEAOUS GROUPS OF AZOOSPER-MIA AND SEVERE OLIGOZOOSPERMIA

a.) In case of azoospermia (also see Table 20.):

Number of patients: 27 global improvement 59%, (16/27)

- Isolated bilateral varicocele
  Number of pts. 7 improvement 57% (4/7)
- Varicocele associated with epididymal obstruction
  Number of pts. 1 improvement 1.
- Bilateral varicocele associated with maturation arrest
  Number of pts. 10 improvement 60% (6/10)
- Varicocele associated with epididymal obstruction and maturation arrest
  Number of pts. 9 improvement 56% (5/9)

b.) In case of severe oligozoospermia (also see Table 21.):

Number of patients: 20 improvement 80% (16/20)

- Isolated bilateral varicocele
  Number of pts. 7 improvement 100% (7/7)
- Varicocele associated with epididymal obstruction
  Number of pts. 2 improvement 50% (1/2)
- Bilateral varicocele associated with maturation arrest
  Number of pts. 8 improvement 63% (5/8)

- Varicocele associated with epididymal obstruction and maturation arrest

  Number of pts. 3 improvement 100% (3/3)

The analysis of the patients included in the homogenous groups of azoospermia and severe oligozoospermia demonstrates that the semen count improvement after microsurgical intervention is at least 50% but can reach as much as 100% in some cases.

III. DISCUSSION

With the introduction of new sophisticated techniques of investigations (color Doppler, Scintigraphy), a relevant number of BVC is found (52).

An analysis of our study groups shows that not all bilateral VC is identical. This difference doesn't only manifest in the grade of VC, but it equally manifests in the associated anomalies that need to be accounted for in the realistic evaluation of the results. Our criteria for the analysis of the improvement of the spermatogram was that the patient is classified into at least one higher range. For following the postoperative improvement we applied the monitoring of the semen concentration, which, even though being only one parameter, is the most characteristic. It is part of a very complex and dynamic process (27).

The double bilateral testicular biopsy made with scrotal exploration bears particular importance in every bilateral VC case that is associated with male infertility, and primarily in cases of azoospermia and OAT (28, 34, 53, 54, 90, 95).

From the total of 251 VC patients there was bilateral VC in 166 cases (66%), so more than half of the patients had a bilateral form. From the 84 bilateral VC cases we followed up and analysed in our study 22 cases were obstructive (26%) - the relatively high percentage of obstructive anomalies can be associated with the systematically performed scrotal explorations (69) - and 62 non-obstructive (74%). From the non-obstructive cases there was an improvement of 63%, while the obstructive from improves in 46%. The forms without maturation arrest are 40 patients out of 84, (this is 48%). These cases show an improvement of 56%. The forms with maturation arrest are 44 patients out of 84, (that is 52%), and show an improvement of 53%.

In the azoospermic group 10 out of 27 are obstructive (37%). In the OAT group this number is 5 out of 20 (25%). The forms associated with maturation arrest, are in the azoospermic group 19 out of 27 (70.3%), while in the OAT group this number is 11 out of 20 (55%).
In the azoospermic group the obstructive and mixed associated anomalies (obstruction and maturation arrest existing together) are 9 out of 27 (33.3%). This number is significant even if the surgical intervention does not result in the rise of spontenaous pregnancies, but it creates much favourable conditions for ART (4). Indeed, recent studies by other authors prove a definitive regaining of a satisfactory spermatogenesis -after microsurgical intervention- which in the azoospermic group can reach 47% (2). In our case this rise was 59.25% (16 improvements of 27 cases). Apart from this another significant effect of microsurgical intervention is that the number of normozoospermic cases has risen significantly, from 13 to 33 (253.8% growth). We can also state that compared to the starting percentage of 15%, the proportion of normozoospermic cases rise to 39% of which 4 (8%) is from the azoospermic and OAT groups.
During the microsurgical intervention of the bilateral VC patients we measured the microcirculation of the testes and the testes temperature with a last generation thermic microprobe (15). Our results before and after correction show a significant correlation with VC. (Non-linear curve.) Even though the etiopathogenetic mechanism is not entirely known, we can assume – based on the literary fact and the synthesis of contrary opinions - that VC is a multifactoral anomaly. Probably bilateral, in most cases asimetric manifestation (77). This predisposition is probably genetically determined. The co-existance of various anatomo-physiopathologic factors plays an important role in the genesis of hemodynamic troubles (93). The perturbation of the hemodynamic equilibrium provokes an disequilibric state, which – by the well known mechanisms promotes the appearance of left sided VC. Furthermore, this sets off a cascade of physiopathologic events, that are more or less known, such as: the thermodynamic disequilibrum, the troubles of microcirculation and testicular thermoregulation, consulting in the alteration of the gonadic tissue, and finally, the disfunctions of spermatogenesis and Leydig cells (96). During the first consultation, the degree of the manifestation of VC and the alteration of spermatogenesis can be determined (27) but, we know neither the hemodynamic trouble, nor the time period of that, but we are also anaware of the interaction of the co-existing factors. The consequences of the effects of

microenvironmental changes on thermodynamics (24, 42). are also partially unknown to us. But there is well knowed a progressive duration-dependent testicular injury to the seminiferous epithelium associated with VC (26, 71). The response of various patients differs. The compensational capacity (75, 81) and individual tolerance are not measurable qualities. These conditions give good explanation why the manifestational forms of VC can be so varying. This is a demonstraive example for a banal and ordinary symptom that can resist time, in other words, to which a definitive therapeutic solution can be found. This is why "VC is seen as a never-ending story" (50).

IV. CONCLUSION

It must be emphasised that the spermatogenesis is realised in a neuro-endocrinological and vasculary strictly controled way, namely in an "epididymo-testicular unit"(17, 41). In the pathological status varicocele is a "suffering" of the testes. **The BVC deserves special attention, because according to Steno's clinical experience and published data, it already appears in puberty age** (86)**. Every data emphasizes the important role of BVC and its dramatic impact on male infertility, primarily in the azoospermic and oligozoospermic group.** Surgical intervention plays an important role in the reestablishment of a satisfactory testicular state (19).

Before the surgical correction an accurate diagnosis of bilateral VC plays a basic role in the definitive improvement of spermatogenesis.

Even if varicocele is an entirely common entity and its surgical repair is one of the most commonly performed operations within the urological community, only a few specialists follow and control their patient's bettering on a long term basis. The international as well as domestic literature lacks prospective, comparative studies on different surgical techiques and radiological interventions (39) based on the same diagnoistical principles and follow up methods.

The obtained results depend on the practiced methods. Generaly it is true that every surgeon obtains the best results with the method they practice the most (23, 40, 48, 74, 76,) however it is unquestionable that VC correction obtains best results with microsurgical methods (2, 4, 26). It is advisable to associate VC repair with testicular biopsy from scrotal exploration, (double-bilateral testicular biopsy, DBTB), for the verification of the state of the exact spermatogenesis. Thorough analyses of DBTB need to be performed by a very experienced histologist (3, 32). Histopathology helps in determining whether microsurgery alone is enough or if other medical treatment is necessary to bring about bettering in the patient (60, 84, 99).

In the past 6 years the principles concerning the criteria of VC surgery have changed immensely. Among the experts performing microsurgical correction, the most renowned professional of our times, Mark Goldstein said that the VC patients with a high FSH level need not undergo surgical operation (26). Since then this theory has changed, and today all VC associated with fertility problems must be operated on. The operation is preventive in case of patients in puberty and young adulthood, because the damaging effect of VC on spermatogenesis depends on the elapsed time (8, 38,.56, 58, 59, 68).

According to our own experience and principles, especially taking ART into consideration, every VC combined with fertility problems indicates surgical procedure. Even if the semen parametres do not change significantly, stabilizing the microenvironment of the testis, and thus preventing the starting parametres can only be ensured with this method (79, 80).

Concerning the evaluation of results, associated anomalies and the period of correction have to be taken into consideration. Unfortunatly we don't know how much time elapses between the first consultation due to male infertility and the evolving of VC. In this current study 85% of the patients have consulted another doctor before turning to us for help. In most of the cases the time elapsed between the two consultation was from 3 to 4 years.

When deciding to perform surgical intervention, namely VC, it is of upmost importance to hold a deep consultation, preceding the intervention, between the patient and the urologist because the patient has to know and understand the chances of short and long term fertility improvement. Our opinion is that every possible negative factor that plays an important role in the degredation of the testes has to be corrigated as soon as possible. Further on, according to our own experience and principles, every VC indicates surgical procedure at males in a fertile age, with special attention to bilateral VC, even if that is not associated with infertility (90).

With microsurgical intervention which has the best technical conditions, it is possible to try to improve spermotogenesis on a long term even if the starting semen parameters are criticaly low. Azoospermia or OAT. In our case 32 out of 47 patients improved (68%). Maintaining the testicular condition in a sufficient status protects the virility of these patients from an erectal disfunction or early andromiosis (44, 85, 96).

In most of the cases when conventional surgical techniques were performed, the amelioration of the spermatogram was transient. In such cases the "suffering" of the testes returns. This is why we propose a systematic utilization of microsurgical techniques (4).
The goal of microsurgery is:

- either the restoration of a normal spermatogram that creates an opportunity for an eventual, natural fecondation,
- or the sufficient reparation of the spermatogram for an ART,
- or, if the number of the spermatozoa in the semen is insufficient, to make possible the ICSI technique with the application of MESA or TESE.

Currently the new ART, namely ICSI technique, caused a dramatic improvement in fecondation (60), but this brought about major psychic and financial burdens for the patient. In health care the basic rule is always the same: finding a reason, and adaquate treatment based on our findings. This is also true in the case of assisted reproduction, with special attention on male infertility, where it would not be beneficial to choose symptomatic treatment instead of adequat diagnostically based treatment. The treatment of VC and the results indicate that it is possible to find a much cheaper and traumatic cure for the infertile couple.

Fertility is a couple-related phenomenon. For fecondation an intact ovocyte and spermatozoa is necessary. This means that in every case the couple needs to be treated together. In case of infertility, also including VC, and in order to reach the best possible results, an intense co-operation between the experts involved in reproductional medician such as the gyneocologist, andrologist, hystologist, genetician, biologist and the psychologist is absolutley necessary.

TABLES

Table 1. The decrease of population in Hungary from 1980

Time span	Number of population	Population density	Actual volue	Increase / decline %
1941 – 48	9 204 799	98,9	- 111 275	- 1,2
1949 – 59	9 961 044	107,1	+ 756 245	8,2
1960 – 69	10 322 099	111,0	+ 361 055	3,6
1970 – 79	10 709 463	115,1	+ 387 364	3,8
1980 – 89	10 374 823	111,5	- 334 640	- 3,1
1990	10 354 842	111,3	- 19 981	- 0,2
1991	10 337 263	111,1	- 17 606	- 0,2
1992	10 310 179	110,8	- 27 057	- 0,3
1993	10 276 968	110,5	- 33 211	- 0,3
1994	10 245 677	110,1	- 31 291	- 0,3
1995	10 212 300	109,8	- 33 377	- 0,3
1996	10 174 442	109,4	- 37 758	- 0,4
1997	10 135 358	108,9	- 39 084	- 0,4

Table 2. The main indicators of natural demographic movement

Year	No. of mariages	No. of divorces	No. of natural births	No. of deaths	Natural demographic growth
1966	93 230	20 631	138 489	101 943	36 546
1980	80 331	27 797	148 673	145 355	3 318
1990	66 405	24 888	125 679	145 660	- 19 981
1995	53 463	24 857	112 054	145 431	- 33 377
1996	48 930	22 590	105 272	143 130	- 37 858
1997	46 905	24 992	100 350	1139 434	- 39 084

Table 3. VC treated with microsurgery 1993-99

VARICOCELE	No. OF PATIENTS	PERCENTAGE
Bilateral	166	66%
Unilateral	85	34%
TOTAL	251	100%

Table 4. Grade of bilateral VC by side

Grade	Left	%	Right	%
I.	2	2	8	9,5
II.	16	19	45	53,6
III.	43	51,5	28	33,3
IV.	23	27,5	3	3,6
Total	**84**	**100**	**84**	**100**

Identical grade: 23/84~27%
right grade > left = in 3 case

Table 5. Classification of VC

Grade	Class	Inspection	Palpation	Valsava manouvere		Color Doppler	Intra-operative
				Stand-up	Supinal		
I.	infra-clinic	-	-	- +	-	+	anterior
II.	clinic	- +	+	+	+	+	anterior
III.	clinic	+	+	+	+	+	anterior
IV.	clinic	+	+	-	+	+	antero-posterior

Table 6. Patients group by semen concentration

Group name	Group category	concentration

		M/ml
Azoospermia	I.	0 - 0,9
OAT	II.	1 - 4,9
Oligozoospermia	III.	5 –19,9
Normozoospermia	IV	20 <

Table 7. Semen analysis in the azoospermia group before and after microsurgery of BVC

PTS initials	***BEFORE***			***AFTER***								
				3 - 5 months			***6 - 11 months***			***12 months -***		
	C	*M*	*NM*	*C*	*M*	*NM*	*C*	*M*	*NM*	*C*	*M*	*NM*
AK EF	0	0	0	0	0	0						
AL BR	0,1	0	0	0	0	0						
DE XA	0,4	20	72	1,2	40	72						
HABO	0	0	0	0	0	0						
GA AB	0	0	0	8	10	10						
TI FR	0,31	0	48	0,03	10	48						
TR BR	0,1	35	33	2	50	51						
VE PI	0	0	0	0,3	0	10						
LA VI	0,8	10	32	0,4	10	35						
KO MI	0,72	25	18	2,2	15	34	22,6	45	43			
LE AL	0	0	0	2,9	40	42						
LE DI	0,5	40	20	13,2	45	5						
LO JE	0	0	0	3,6	25	26						
LE EM	0,3	20	22	4,4	20	10						
GO HO	0,7	1	32	4,8	15	31	10,4	55	59			
RO FR	0,71	1	1	4,8	40	46						
AT BE	0	0	0	0	0	0						
BA OL	0,2	40	38	1,7	55	56	1,7	55	59			
GR FR	0,9	10	10	5	40	40	10	50	40			
PA TA	0	0	0	0	0	0						
TH SI	0,5	50	25				17,5	50	30			
MA IS	0	0	0	0	0	0	15	50	50			
RO KA	0	0	0	0	0	0	0	0	0			
LA OT	0	0	0	0	0	0						
SZ SA	0	0	0				0	0	0			
KO GY	0	0	0	1	10	20	25	40	40			
BO AK	0	0	0	0	0	0	1	10	10			

Table 8. Semen analysis in the OAT group before and after microsurgery of BVC (No. of patients 20)

PTS initials	***BEFORE***			***AFTER***								
				3 - 5 month			***6 - 11 month***			***12 - month***		
	C	*M*	*NM*	*C*	*M*	*NM*	*C*	*M*	*NM*	*C*	*M*	*NM*
NÉ RO	3	30	30							12	60	20
KU GA	5	30	30				8	50	40			
MA AT	0	0	0				1	10	10	1,5	10	38
SZ SA	3	10	10				20	80	60			
BA IS	3	10	30	7	60	26						
FA TA	2	10	10	2	20	20	2	20	20			
FI ER	4	30	20	7	50	40	12	50	40			
KI ZO	4	20	30	7	30	30						
JA KU	5	30	30	7	30	30						
DA FR	1	30	25	25,4	50	33						
DA JE	2	55	40	184	55	61						
HO BE	4,3	40	27	4,1	40	36						
TR BR	3	35	33				2	40	45	8	50	51
CO PA	1,2	20	40	12	30	40						
FO AL	2,3	10	65				23	60	70	86,1	65	76
FO JA	3	10	7				24,2	20	26			
LO DI	1,35	21	9	9,6	20	5						
RA SA	4,2	30	9				58,7	55	37			
ME BR	1,2	0	1	0	0	0						
DJ AK	1	2	10				18	30	40			

Table 9. Semen analysis in the oligozoospermia group before and after microsurgery of BVC (No. of patients 24)

PTS initials	***BEFORE***			***AFTER***								
				3 – 5 month			***6 - 11 month***			***12 - month***		
	C	*M*	*NM*	*C*	*M*	*NM*	*C*	*M*	*NM*	*C*	*M*	*NM*
CS M	10	10	50	20	50	50				22	60	60
PA ZO	0	40	30	11	40	30	20	50	40			
BA JA	14	40	20				24	60	40			
KO LA	12	30	20				25	80	40	65	70	38
KÁ LA	5	40	20	18	60	60						
HE IS	8	50	50	1	50	50	18	60	80			
BE IS	12	50	40	15	30	40	25	60	50			
HA AT	10	20	20				17	60	40	22	60	40
KU FE	12	30	30				20	20	18			
JA ZS	15	30	30				34	50	40			
KU GA	12	50	40	15	50	50	27	40	40			
KO SA	18	60	30	77	80	40	9,3	55	40	26,8	55	40
CI LU	5,2	40	27	2,7	55	40				1,4	10	57
RO DA	6,6	40	34	2,6	20	57						
LE RO	8,7	40	15	3,1	40	40						
CE JB	6	20	20	10	40	30						
CA GO	5	20	5	3	40	22						
MA AN	5,1	30	44	14	50	38						
SA SI	6,9	30	25	4,2	45	30	38,9	30	46			
TA FA	7,7	60	90				37	55	55			
TE RO	5,8	20	30	6,7	30	40						
PE ER	5	30	33	11,6	35	33						
TO SA	10	20	80	0,5	70	90	44					
KR TH	10,6	20	21	10	30	44	5,9	40				

Table 10. Semen analysis in the normozoospermia group before and after microsurgery of BVC (No. of patients 13)

PTS initials	***BEFORE***			***AFTER***								
				3 - 5 month			***6 - 11 month***			***12 - month***		
	C	*M*	*NM*	**C**	*M*	*NM*	*C*	*M*	*NM*	*C*	*M*	*NM*
SO FR	68	30	80	51,6	45	67						
EL AL	44	10	18	34	30	40						
LI PA	20,3	40	48	21,8	65	55						
BE YO	40,8	45	30	22,3	50	45						
BE PA	42	30	11	40	40	30						
FA PA	25	50	55	26,2	55	60						
PO DA	137,6	45	3	136	40	20						
BA FR	83	20	20				103	50	40			
LE TH	26	30	51	8,8	65	41						
SO MA	82	55	20	99	45	40						
TR FO	126	55	59	122	50	60						
VA PH	32	30	30	6	30	30	40	50	40			
BO TH	52	65	25				45	60	72			

Table 11. Repartition of patients by semen quality before and after microsurgery

Name of groups	**Category**	**Before no. of pts.**	**%**	**After no. of pts.**	**%**
Azoospermia	**I.**	27	32	13	15
Severe oligozoospermia	**II.**	20	24	14	17
Oligozoospermia	**III.**	24	29	24	29
Normozoospermia	**IV.**	13	15	33	39
Total		**84**	**100**	**84**	**100**

Table 12. Global change of semen quality after microsurgical correction

Groups	**Before/no. of pts.**	**After/no. of pts.**	**Improve**	**Decrease**	**No change**
I.	27	13	16	0	11
II.	20	14	16	1	3
III.	24	24	16	6	2
IV.	13	33	0	1	12
Total	**84**	**84**	**48**	**8**	**28**
%	**100**	**100**	**57**	**10**	**33**

Table13/a-d. *Mean, Standard Deviation and Wilcoxon Matched Pairs Test by semen groups*

Table 13/a.

AZOOSPERMA									
	Base data			After surgery			WMPT		
	Mean	SD	N	Mean	SD	N	N	z	p
C	0,3016	0,4716	27	5,3344	7,3860	27	27	3,4719	0,0005
M	9,3333	15,4422	27	22,8846	21,3622	27	27	3,1074	0,0018
NM	13,0000	19,0545	27	25,8846	23,5292	27	27	2,9474	0,0032

Table 13/b.

SEVERE OLIGOZOOSPERMIA									
	Base data			After surgery			WMPT		
	Mean	SD	N	Mean	SD	N	N	z	p
C	2,6775	1,4462	20	25,3300	42,7106	20	20	3,7023	0,0002
M	21,1500	14,5973	20	40,2500	20,4858	20	20	3,4650	0,0005
NM	22,8000	16,0315	20	30,4500	17,9750	20	20	3,0060	0,0026

Table 13/c.

OLIGOZOOSPERMIA									
	Base data			After surgery			WMPT		
	Mean	SD	N	Mean	SD	N	N	z	p
C	9,3320	3,5469	24	21,6960	18,4038	24	24	3,4709	0,0005
M	34,4000	13,2539	24	50,2000	15,4434	24	24	3,4977	0,0004
NM	33,6000	18,8171	24	45,2400	15,7910	24	24	3,2285	0,0012

Table 13/d.

NORMOZOOSPERMIA									
	Base data			After surgery			WMPT		
	Mean	SD	N	Mean	SD	N	N	z	p
C	59,9769	37,7823	13	57,6697	42,1656	13	13	0,8735	0,3823
M	38,8461	15,5662	13	49,6153	10,0957	13	13	2,0965	0,0360
NM	34,6923	22,1825	13	46,9230	14,9469	13	13	2,4459	0,0144

Table 14. Sperm count and Pregnancy

			Sperm count M/ml					
Original semen group	**Patient**	**Before**	**After**			**Pregnancy**		**Times**
			3-5 month	**6-11 month**	**12- month**	**Spontanous**	**ART**	**Month**
I.	RO KA	0	0				1	16
	GA AB	0	8			1		6
	LE AL	0	2,9		3		1	26
	LA OT	0	0				1	0
II.	CO PA	1,2	12			1		10
	LO DI	1,35	9,6				1	19
	SZ ZO	3		20		1		6
III.	KO DA	6,6	2,6		1,4	1		36
	LE RO	8,7	3,1			1		18
	CA GO	5	3				1	21
	PE ER	5	11,6			2		2,24
	PA ZO	11		20		1		11
	KA LA	5	18			1		3
	HA TA	10		17	22	1		6
	HE IS	8	10		18	1		22
IV.	BA FR	83		103		1		9
					Total	**12**	**5**	
					Grand total	**17**		

Table 15. Homogeneaous Groups by BVC with associated anomalies

Groups	**No. of pts.**	**%**
VC	33	39%
VC + O	6	7%
VC + M	30	36%
VC + O + M	15	18%
Total	**84**	**100%**

Table 16. Isolated BVC by semen group

Groups	No. of pts.	Improve	Decrease	No change
I.	7	4	0	3
II.	7	7	0	0
III.	16	12	3	1
IV.	3	3	0	0
Total	**33**	**26**	**3**	**4**
%	**100**	**79**	**9**	**12**

Table 17. BVC associated with Epididimal Obstruction by semen group

Groups	No. of pts.	Improve	Decrease	No change	Inc %
I.	1	1	0	0	100
II.	2	1	0	1	50
III.	1	0	0	1	0
IV.	2	0	1	1	0
Total	**6**	**2**	**1**	**3**	
%	**100**	**33**		**50**	

Table 18. BVC associated with Maturation Arrest by semen group

Groups	No. of pts.	Improve	Decrease	No change	Inc %
I.	10	6	0	4	10
II.	8	5	1	2	8
III.	5	3	2	0	5
IV.	7	0	0	7	7
Total	**30**	**12**	**3**	**13**	
%	**100**	**47**	**7**	**46**	

Table 19. BVC associated with Epididymal Obstruction and Maturation Arrest by semen group

Groups	No. of pts.	Improve	Decrease	No change	Inc %
I.	9	5	0	4	9
II.	3	3	0	0	3
III.	2	1	1	0	2
IV.	1	0	0	1	1
Total	**15**	**9**	**1**	**5**	**15**
%	**100**	**60**	**7**	**33**	**100**

Table 20. Azoospermia group by BVC with associates anomalies

Groups	No. of pts.	Improve	%
VC	7	4	57
VC + O	1	1	100
VC + M	10	6	60
VC + O + M	9	5	56
Total	**27**	**16**	**59**
%	**100**	**59**	

Table 21. Severe oligozoospermia group by BVC with associated anomalies

Groups	No. of pts.	Improve	%
VC	7	7	100
VC + O	2	1	50
VC + M	8	5	63
VC + O + M	3	3	100
Total	**20**	**16**	**80**
%	**100**	**80**	

Figure 1. Sites of Testicular Biopsy

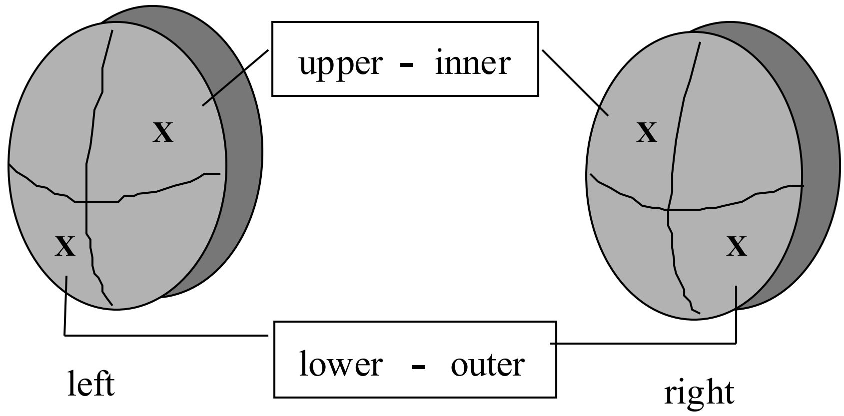


Figure 2. Relationship between DMNS and grade of VC, and MNST and grade of VC

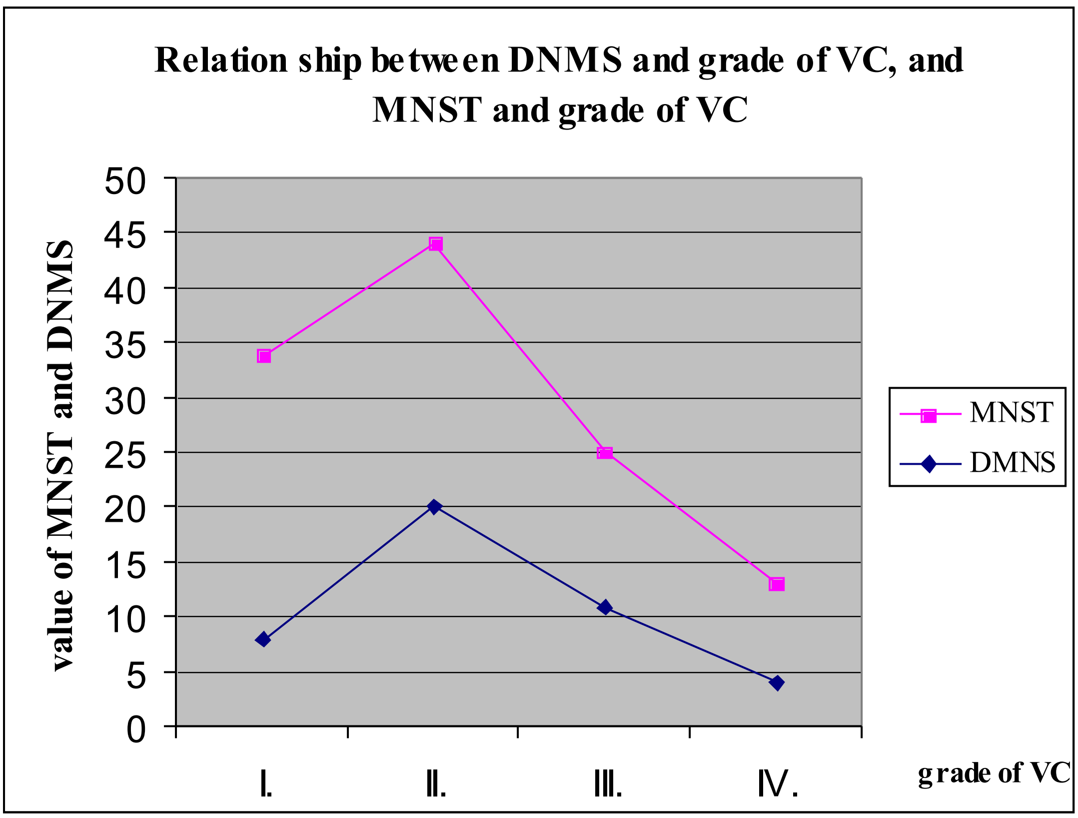
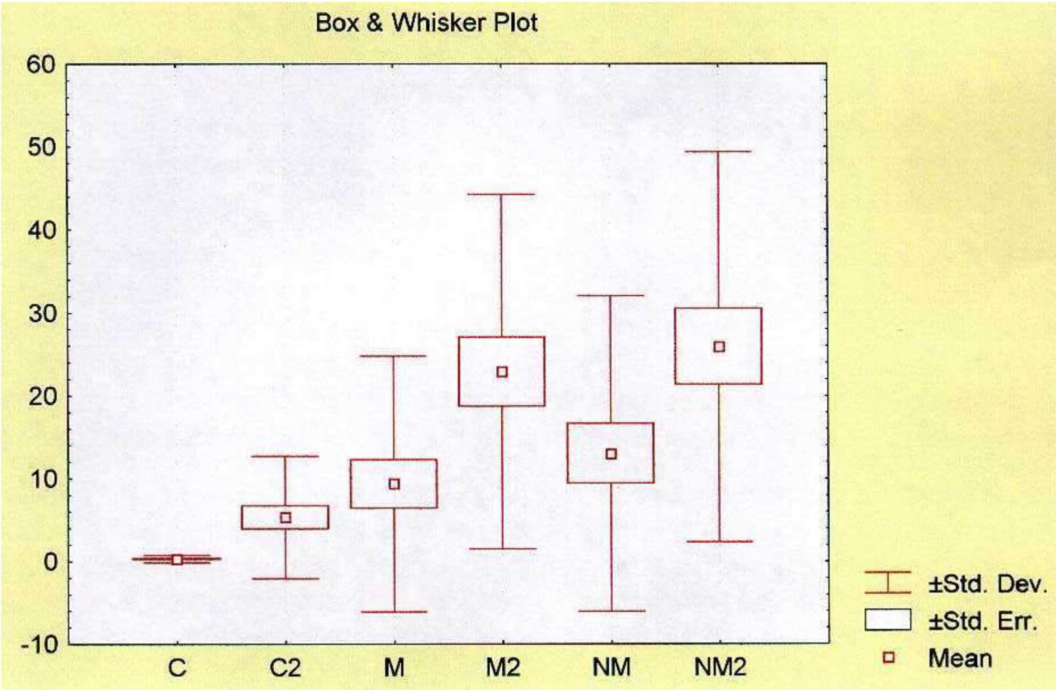
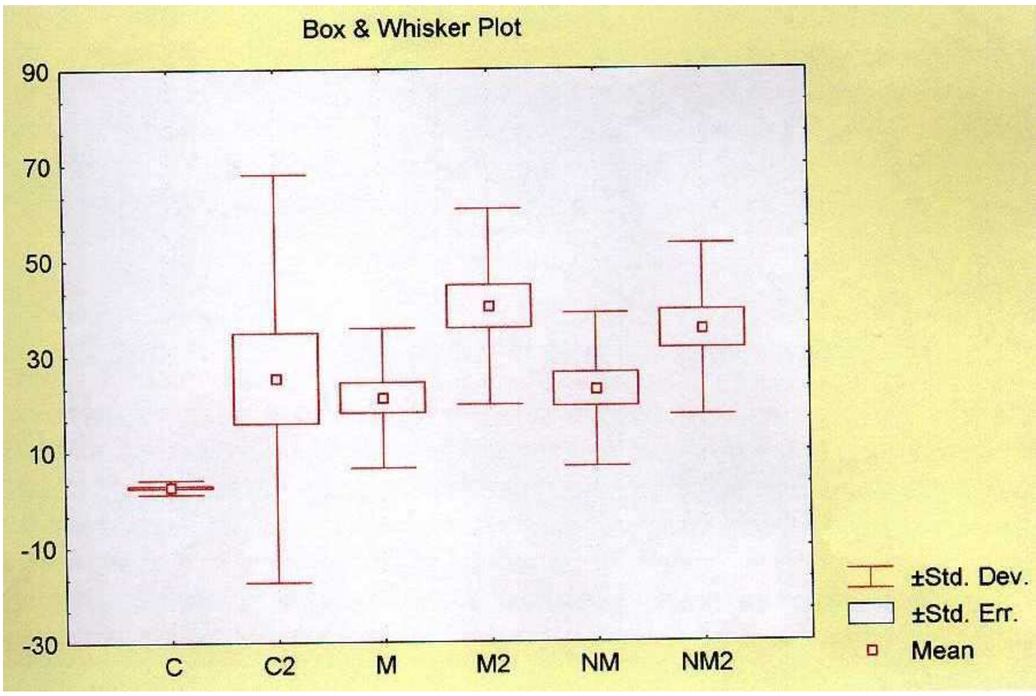


Figure 3/a-d. *Mean, Standard Deviation and Standard Error in different semen groups*

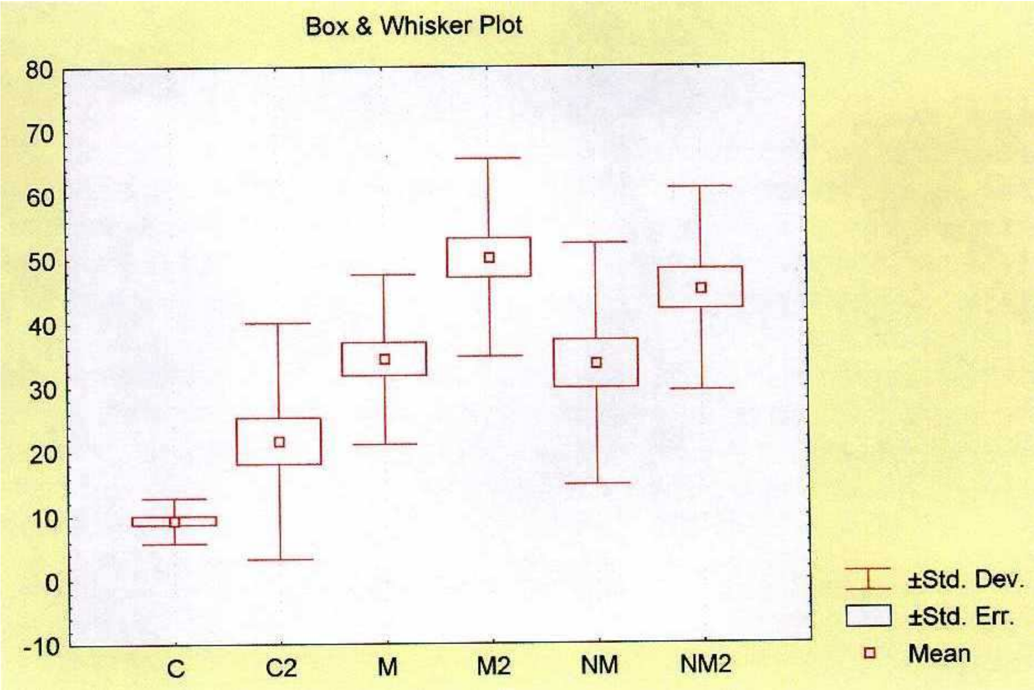
3/a Azoospermia



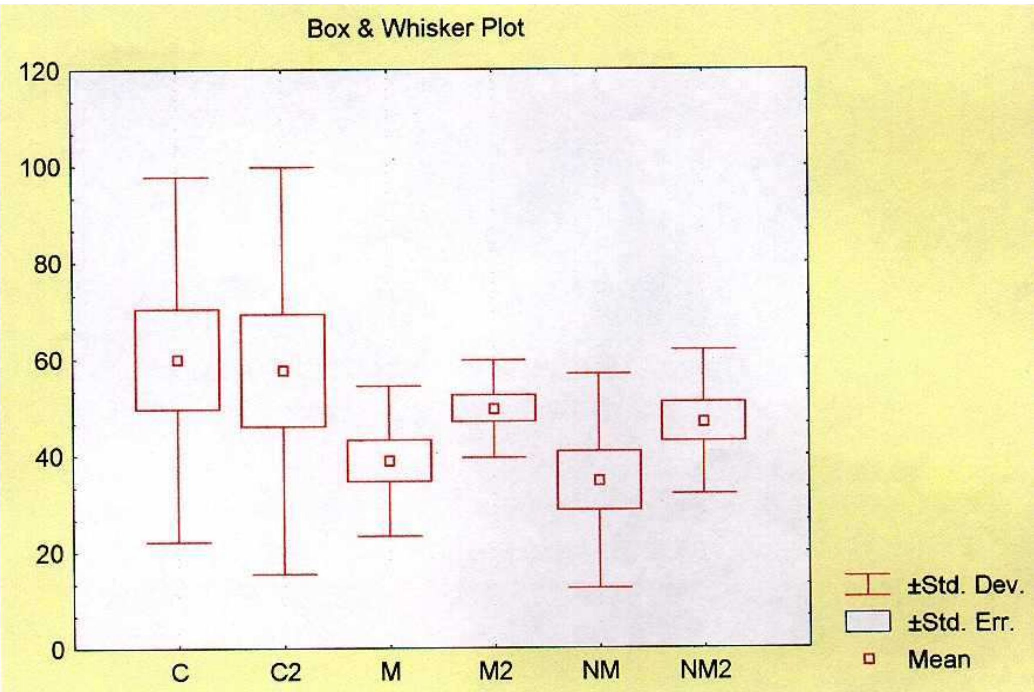
3/b Severe Oligozoospermia



3/c Oligozoospermia



3/d Normozoospermia



REFERENCES

1. **Ahlberg NE., Bartley O., Chindekel N., et al:** Phlebography in varicocele scroti. Acta Radiol.(Diagn) 4: 517, 1966.
2. **Adjiman M., Amar E. :** Cure chirurgicale du varicocele et hypofertilité masculine : pour ou contre? Contr. Fertil. Sex. : 24 : 439 - 443, 1996.
3. **Agger P., and Johnsen S. :** Quantitative evaluation of testicular biopsies in varicocele. Fertil. Steril. 29 : 52, 1987.
4. **Arvis G.** : Varicocele et infertilité. Progres en Urologie Monographie. 40-52. 1993.
5. **Aydos K., Baltaci S., Salith,M., Anafarta K., Bedük Y. and Gülsoy U. :** Use of color Doppler sonography in the evaluation of varicoceles. Eur. Urol., 24 : 221, 1993.
6. **Barwell R.:** Varicocele: Radical cure. Lancet 1: 711, 1869.
7. **Beck E.M., Schlegel N.P. and Goldstein M. :** Intraoperative varicocele anatomy : a macroscopic and microscopic stady. J.urol. 148 :1190, 1992.
8. **Becmeur F., Hsiung R., Salti A., Clavert A. :** La varicocele de l'enfant. Qui, pourquoi, et quand opérer? Andrologie, 5 : 250, 1995.
9. **Belgrano E., Puppo P., Gaboardi F., Trombetta C.:** A new microsurgical technique for varicocele correction. J.Androl. 5: 148-154 1984b.
10. **Bennet WH. :** Varicocele, particularly with reference to its radical cure. Lancet 1:261, 1889.
11. **Bigot JM.**, **Barett F., Henelon C.:** Phlebography of the right spermatic vein in varicoceles. In Jecht EW, Zeitler E.(eds): Varicocele and Male Infertility. Berlin, Springer-Verlag 1982.
12. **Braedel H. U., Steffens J., Ziegler M., Polsky M.S. and Platt M.L. :** A possible ontogenic etiology for idiopathic left varicocele. J. Urol. 151 : 62, 1994.
13. **Charny CV. :** Testis biopsy: its value in male sterility. JAMA 115: 1429-32, 1940.
14. **Dale McClure R. and Hricak H. :** Scrotal ultrasound in the infertile man : detection of subclinical unilateral and bilateral varicoceles. J. Urol. : 135 : 711, 1986.
15. **Delhomme G., Dittmar A., Tritto G., Martelet C., Esteve D., Depeursinge C. :** Continuous measurement of microcirculation and temperature in human testis using a thermal diffusion microsensor. AMBER '95, Paris, Proceedings : 81-85, 1995.

16. **Dhabuwala C.B., Hamid S., and Moghissi K.S. :** Clinical versus subclinical varicocele : improvement in fertility after varicocelectomy. Fertil. Steril. 57 : 854, 1992.
17. **Donohue R. E., and Browne J.S. :** Blood gases and pH determinations in the internal spermatic veins in subfertile men with varicocele. Fertil. Steril. 20 : 365, 1969.
18. **Dubin L., and Amelar R.D. :** Varicocele size and results of varicocelectomy in selected subfertile men with varicocele. Fertil. Steril. 21 : 606, 1970.
19. **Dubin L., and Amelar R. :** Varicocelectomy : 986 cases in a twelve-year study. Urology 5 : 446, 1977
20. **Eskew L.A., Watson N. E., Wolfman N., Bechtold R., Scharling E. and Jarow J.P. :** Ultrasonographic diagnosis of varicoceles. Fertil. Steril. 60 : 693, 1993.
21. **Fox U.:** Elements of experimental vascular microsurgery. Minerva Chir. 12: 709-64, 1976.
22. **Gentile D.P., and Cockett A.T. :** The effect of varicocelectomy on testicular volumen in 89 infertil adult males with varicoceles. Fertil. Steril. 58 : 209, 1992.
23. **Glezerman M. :** A sort historical review and comparative result of surgical treatment for varicocele; in Glezerman M, Jecht EW. (eds.): Varicocele and Male Infertility. II. Berlin, Springer, pp 87 - 93, 1984
24. **Goldstein M., Gilbert B.R., Dicker A.P., Dwosh J., and Gnecco C. :** Microsurgical varicocelectomy with delivery of the testis : an artery and lymphatic sparing technique. J. Urol. 148 : 1808, 1992.
25. **Goldstein M. and Eid J.-F. :** Elevation of intratesticular and scrotal skin surface temperature in men with varicocele. J. Urol.142 : 743, 1989.
26. **Goldstein M. :** Varicocelectomy : General considerations. Surgery of male infertility (W.B. Saunders company) Chap. 18 : 169-177, 1995.
27. **Gorelick J.I., Goldstein M. :** Loss of fertility in men with varicocele. Fertil. Steril. 59 : 613,1993.
28. **Gottschalk-Sabag S., Weiss D.B., Folb-Zacharow N., Zukerman Z. :** Is one testicular specimen sufficient for quantitative evaluation of spermatogenesis? Fertil. Steril. 64 : 2; 399- 402, 1995.
29. **Hadziselimovic F., Leibundgut B., Da Rugna D., and Buser W. :** The value of testicular biopsy in patients with varicocele. J. Urol.,135 : 707, 1986.

30. **Hadziselimovic F., Herzog B., Liebundgut B., Jenny P., and Buser M. :** Testicular and vascular changes in children and adults with varicocele. J. Urol.,142 : 583, 1989.

31. **Hargreave T. B. and Liakatas J. :** Physical examination for varicocele. Brit. J. Urol., 67 : 328, 1991.

32. **Hotchkiss RS.:** Testicular biopsy in the treatment of sterility in the male. Bull. NY. Acad. Med. 18: 600-605, 1942.

33. **Huszar, G. :** Spermatogenic arrest : a classical and a futuristic view. Fertil. Steril. 60 : 6; 947-949, 1993.

34. **Ibraham A., Award A., El-Haggar S., and Mitawi B. :** Bilateral testicular biopsy in men with varicocele. Fertil. Steril. 28 : 663, 1977.

35. **Ishigami K., Yoshida Y., Hirooka M et all.:** New operation for varicocele: use of microvascular anastomosis. Surgery (US) 4: 620-623, 1970.

36. **Ivanissewich O. :** Left varicocele due to reflux, exprience with 4470 operative cases in 42 years. J. Int. Coll. Surg. 1960, 24, 742.

37. **Jarow J. P., Ogle S.R. and Eskew L.A. :** Seminal improvement following repair of ultrasound detected subclinical varicoceles. J. Urol. 155 : 1287-1290, 1996.

38. **Kass E.J., Freitas J.E., Bour J.B. :** Adolescent varicocele: Objective indication for treatment. J. Urol. 142: 579 – 582, 1998.

39. **Kaufman S.L., Kadir S., Barth K.H., Smyth J.W., Walsh P.C., and White R.I. Jr. :** Mechanisms of recurrent varicocele after ballon occlusion or surgical ligation of the internal spermatic vein. Radiology, 147 : 435,1983.

40. **Kaye K.W. :** Modified high varicocelectomy : outpatient microsurgical procedure. Urology 32 : 13, 1988.

41. **Klotz T., Vorreuther R., Heidenreich A., Zumbé J. and Engelmann U. :** Testicular tissue oxygen pressure. J. Urol. 155 : 1488-1491, 1996.

42. **Lerchl A., Keck C., Spiteri-Grech J. and Nieschlag E. :** Diurnal variations in scrotal temperature of normal men and patients with varicocele before and after treatment. Int. J. Androl., 16 : 195, 1993.

43. **L'Hermite J. :** Le varicocčle : pathogénie, conséquence, traitement. Andrologie (Maloine) vol.: I Chap. 26, 253 - 262, 1987 .

44. **Li-Ming Su, Goldstein M., and Schlegel P. :** The effect of varicocelectomy on serum testosterone levels in infertile men with varicoceles. J. Urol. 154 : 1752, 1995.

45. **Lipshultz L.I., and Corriere J.N. Jr :** Progressive testicular atrophy in the varicocele patient. J. Urol. 117 : 175, 1977.

46. **Mac Leod, J. :** Seminal cytology in the presence of varicocele. Fertil. Steril. 16 : 735, 1965.

47. **Macomber D., Sanders MD. :** The spermatozoa count. N. Engl. J. Med. 200 : 981, 1929.

48. **Madgar I., Weissenberg R., Lunenfeld B. :** Controlled trial of high spermatic vein ligation for varicocele in infertile men. Fertil. Steril. 63 : 120, 1995.

49. **Marmar J.L., De Benedictis T.J., and Praiss D. :** The management of varicoceles by microdissection of the spermatic cord at the external inguinal ring. Fertil. Steril. 43 : 583, 1985.

50. **Menchini Fabris GF., Canal D., Basil Fasolo C., Di Coscio M., Izzo PL., Giannotti P., Marino P., Servadio L., Baldassarri S., Fratta M.:** Varicocele and male subfertility: prognostical criteria in in the surgical treatment. Andrologia 17: 16-21, 1985.

51. **Merksz M.:** A here-mellékhere fúziós rendellenességei. Magyar Androl. 2:43-54, 1997.

52. **Metin A., Bulut O. and Temizkan M. :** Relationship between the the left spermatic vein diameter measured by ultrasound and palpated varicocele and Doppler ultrasound findings. Int. Urol. Nephrol. 23 : 65 1991.

53. **Mihálkovics G.:** Adatok a here bonczés szövettanához. Or. Hetil.17: 125, 1873.

54. **Molnár J., Papp Gy. :** A herebiopszia helye az andrológiai diagnosztikában. Urol. Nephrol. Szle. 9: 67 – 69, 1982.

55. **Murray RR., Mitchell SE., Kadir S., et al:** Comparison of recurrent varicocele anatomy following surgery and percutaneous ballon occlusion. J.Urol. 135: 286, 1986.

56. **Navratil H., Mottet N., Costa P. :** Y a-t-il encore une place pour la chirurgie dans le traitement de l'infertilité masculine? Andrologie : 6 : 176 - 183, 1996.

57. **Nilsson S., Edvinsson A. and Nilsson B. :** Improvement of semen and pregnancy rate after ligation and division of the internal spermatic vein : fact or fiction? Brit. J. Urol. : 51 : 591, 1979.

58. **O'Donovan P.A., Vanderkerckhove P., Lilford R.J. and Hughes E. :** Treatment of male infertility: is it effective? Review and meta-analyses of published randomized controlled trials. Hum. Reprod., 8 : 1209, 1993.

59. **Okuyama A., Nakamura M., Takayema M., Utsunomiya M., Fujioka H., Itatani H., Matsuda M., Matsumoto K., and Sonoda T. :** Surgical repair of varicocele at puberty : preventive treatment for fertility improvement. J. Urol. : 139 : 562, 1988.

60. **Palermo G., Cohen J., Alikani M., Adler A.: Rosenwaks Z.:** Intracytoplasmic sperm injection: a novel treatment for all forms of male factor infertility: Fertil. Steril. 61: 1231-40, 1995.

61. **Palomo A. :** Radical cure of varicocele by a new technique : Preliminary report. J. Urol. 61 : 604, 1949.

62. **Papp Gy., Abdullah M. :** Korszerű álláspont a varicocele diagnózisában és megoldásában. Urol. Nephrol. Szle. 11/4: 211 – 213, 1984.

63. **Papp Gy., Molnár J. :** A varicocele andrológiai jelentősége. Magyar Sebészet 31: 330 - 333, 1978.

64. **Papp Gy., Molnár J. :** A spermatogenetic arrestől. Magyar Nőorvosok Lapja 45: 247 – 249, 1982.

65. **Pare A. :** Les Oevres d'Ambroise Pare. 1541.

66. **Petros J. A., Andriole G. L., Middleton W. D. and Picus D.A. :** Correlation of testicular color Doppler ultrasonography, physical examination and venography in the detection of left varicoceles in men with infertility. J. Urol. 145 : 785, 1991.

67. **Pontonnier F., Navratil H.:** La stérilité masculine, Rapport au 78éme Congres d'Urologie. J.Urol.(Paris), 90, 266. 1984.

68. **Pozza D., D'Ottavio G., Masci P., Coia L., Zappavigna D. :** Left varicocele at puberty. Urology 22: 271 – 274, 1983.

69. **Pozza D., Marchionni L., Ossanna P., Gregori A., Hallgass ME., Spera G. :** Unexpected findings of scrotal exprolation during varicocele surgery in infertile patients; in Colpi GM., Pozza D. (eds): Diagnosing Male Infertility. Prog. Reprod. Biol. Med. Basel, Kargel, vol. 15, pp 136 – 141, 1992.

70. **Pryor J.P., Cameron K.M., Collins W.P., Hirsh A.V., Mahony J.D.H., Pugh R.C.B., Fitzpatrick J.M. :** Indications for testicular biopsy or exploration in azoospermia. Br. J. Urol. 50: 591 – 594, 1978.

71. **Pryor J.P., Cameron K.M., Chilton C.P., Ford T.F., Parkinson M.C., Sinokrot J., Westwood C.A. :** Carcinoma in situ in testicular biopsies form men presenting with infertility. Br. J. Urol. 55: 780 – 784, 1983.

72. **Pryor J.L., Howards S.S. :** Varicocele. Urol. Clin. North Am. 14: 499, 1987.

73. **Ribero EB. :** Present conceptions of varicocele and its treatment. J. Int. Coll. Surg. 25: 179, 1956.

74. **Ross L.S. and Ruppman N. :** Varicocele vein ligation in 565 patients under local anesthesia : a long-term review of technique, results and complications in light of proposed management by laparoscopy. J. Urol. part 2, 149 :1361, 1993

75. **Sayfan J., Adam Y.G., Soffer Y. :** A new entity in varicocele subfertility : the " cremasteric reflux ". Fertil. Steril. 33 : 88, 1980.

76. **Sayfan J., Soffer Y. and Orda R. :** Varicocele treatment : prospective randomized trial of 3 methods. J. Urol. 148 : 1447, 1992.

77. **Scherr D., Goldstein M.**: Comparison of bilateral versus unilateral varicocelectomy in men with palpable bilateral varicoceles. J.Urol. 162: 85-88. 1999.

78. **Schlegel P., and Goldstein M. :** Anatomocal approach to varicocelectomy. Seminars in Urology, vol X, 4 : 242, 1992.

79. **Setchell B. P., Bergh A., Widmark A. and Dŕmber J.-E. :** Effect of testicular temperature on vasomotion and blood flow. Intern. J. Andrology, 18 : 120 - 126, 1995.

80. **Setchell B.P., Mieusset R. :** Régulation thermique du testicule. Androl. 6 : 137 - 140, 1996..

81. **Shafik A., Khalil A.M., and Saleh M.:** The fasciomuscular tube of the spermatic cord. A study of its surgical anatomy and relation to varicocele. A new concept for the pathogenesis of varicocele. Brit. J. Urol. : 44 : 147, 1972.

82. **Shafik A., Moftah A., Olfat S., Mohi-el-Din M., El-Sayed A. :** Testicular veins : anatomy and role in varicocelogenesis and other pathologic conditions. Urology, 35 : 175, 1990.

83. **Silber S.J. :** Microsurgical aspect of varicocele. Fertil. Steril. 31 : 230, 1979.

84. **Silber S., Nagy Z., Liu J., Tournaye H., Lissen W., Ferec C., Libaers I., Devroye P., Van Steirteghem A.:** The use of epididymal and testicular spermatozoa for intracytoplasmic sperm injection: the genetic implications for male infertility. Human Reprod. 10: 2031-43,1995.

85. **Sirvent J., Bernat R., Navarro M.A., Rodriguez Tolra J., Guspi R., and Boch R. :** Leydig cell in idiopathic varicocele. Eur. Urol. 17 : 257, 1990.

86. **Steno O.:** Varicocele in the adolescent. Temp. and Envir. Effects on the Testis Edited by A. W. Zorgniotti, Plenum Press, New York, Appendix: A 295-321, 1991.

87. **Szabó R., Kessler R. :** Hydrocele following internal spermatic vein ligation: A retrospective study and review of the literature. J. Urol. 132 : 924 – 929, 1984.

88. **Takada T., Kitamura M., Matsumiya K., Miki T., Kiyohara H., Namiki M. and Akihiko, Okuyama :** Infrared thermometry for rapid, non- invasive detection of reflux of spermatic vein in varicocele. J. Urol. 156, 1652 - 1654, 1996.

89. **Thomas A.J. Jr, Geisinger M. A. :** Current management of varicoceles. Urol. Clinics of North America Vol :17, No:4, 893 - 907, 1990.

90. **Tritto J., Giargia E., Erdei E., Morlier D. :** The role of testicular biopsy in microsurgical correction of bilateral varicocele. AMBER '95 Paris, Proceedings 274 - 278, 1995.

91. **Tritto J., Erdei E., Delhomme G., Dittmar A., Arvis G. :** Thermal diffusion microsensors in microsurgery of male infertility for ART. BIOMED' 96 Congr. Proceeding Book Budapest, 1996.

92. **Tulloch W.S. :** Consideration of sterility factors in light of subsequent pregnancies; subfertility in the male. Edinb. Med. J. 59 : 29 - 34, 1952.

93. **Turner T., and Lopez T.J. :** Testicular blood flow in peripubertal and older rats with unilateral experimental varicocele and investigation into the mechanism of the bilateral response to the unilateral lesion. J. Urol. : 144 : 1018, 1990.

94. **Tournaye H., Liu J., Nagy Z., Camus M., Goossens A., Silber S., Van Steirteghem A., and Devroye P.:** Correlation between testicular histology and outcome after intracytoplasmic sperm injection using testicular spermatozoa. Hum. Reprod. 1: 127-132, 1996.

95. **Vydra G.:** Varicocele kapcsán észlelt többmagvú spermatidák. Morph. és Ig. Orv. Szle. 18: 161, 1978.

96. **Weiss D., Rodriguez-Rigau L.J., Smith K.D., and Steinberger E. :** Leydig cell function in oligospermic men with varicocele. J. Urol. 120 : 427,1978.

97. **World Health Organisation :** Comparison among different methods for the diagnosis of varicocele. Fertil. Steril. 43 : 575, 1985.

98. **World Health Organization :** The influence of varicocele on parameters of fertility in a large group of men presenting to infertility clinics. Fertil. Steril. 57 : 1289 - 1293, 1992.

99. **Yamamoto M., Hibi H., Katsuno S., Miyake K. :** Human chorionic gonadotropin adjuvant therapy for patients with Leydig cell dysfunction after varicocelectomy. Archive of Androl. 35 : 49, 1995.

100. **Zorgniotti A.W., and MacLeod J. :** Studies in temperature, human sperm quality and varicocele. Fertil. Steril. 24 : 854, 1973.

ACKNOWLEDGEMENTS

My professional work has been helped by various professionals of the field and experts from the walks of diplomacy. I would like to say thanks to their help through these lines:

Professor **Péter Magasi**, my ex-boss who gave me the starting impetus to work in andrology.
Professor **László Kovács**, who took on the burdens of my training and felt my experiences in the microsurgical repair of varicocele and the beneficial effects of this on male infretility were worth it to be the topic of a thesis.
Dr. **János Szöllősi**, with whom I changed ideas on the development of andrology for years, and who helped me enrich my knowledge in the field.
I owe special thanks to Professor **Éva Magyar**, the director of the pathological institute of our university, who from the first time we talked, held the diagnosis of male infertility to be the most primary task of our institute, and has with all her will made me carry on my work with testis boipsy.
Dr. **István Kocsis** my ex-collegue at the dept.of urology in Debrecen, who first discovered my interest about andrology, and he allways encouraged me on my way.
Dr. **József Rózsahegyi**, next to whom I have started working in andrology in my current institute, and who still supplies me with his advices. Dr. **Attila Karsza** who let my introduce the new microsurgical technique in our department.
Professor **György Papp**, my current-boss helped me to publish articles.
Professor **István Furka**, who has revealed to me the hard, but very effective ways of microsurgery, and who still encourages me to carry on my work.
The people working in my institute, who have helped me in patient treatment and care, and who often take on more work than they would be obliged to.
The genetics lab emphasising the more than hard work of **András Tóth** my very good friend and **Erika Tardy**. The endocrinologic lab, emphasising the work of Professor István Szabolcs.

I would also like to thank my collegue, Dr**. Ilona Lellei**, for her work in the time consuming work on the testis biopsies. The leader of the radiological clinic Dr**. Béla Fornet** and my collegue Dr. **András Laki**, who have taken a lion's share in the diagnostical work.
Professor **Gabriel Arvis**, the founder of French andrology, next to whom I had the luck to spend three fantastic years; who gave me his advices, turned my attention to varicocele, and for giving me some of his untiring enthusiasm.
Dr. **Giuseppe Tritto**, who made it possible for me to gain experience in clincal microsurgery day by day, and woke my interest in the scientific studies and work connected with that.
Dr. **Anthony J. Thomas**, director of dept. of male infertility at the Cleveland Clinic, who took responsibility for my surgical work, and gave me all necessary conditions for best preparation. Who still follows my work and has helped me to get hold of the operation microscope.
Professor **Anatoly Kononov**, to whom I can only express my true gratitude after his death. Neglecting his mortal illness, he personally supervised and led my animal experiment work in his laboratory.
Professor **Marc Goldstein**, and Professor **Peter Schlegel** at the New York Hospital, Cornell Medical Center, who with their work, and teaching efforts gave me a role model for writing my thesis.
The **National Committee for Technical Development**, and the **Tempus-PHARE** Bureau for their financial support.
The French Ambassy in Hungary, particullary former cultural and scientific attaché Mr.**Jacque Molinari**, who has stood behind my scientific interest and made it possible for me to travel to France. Mr. **Bob Kaba Loemba**, who has even since I travelled back home, watched my professional career witgh interest.
Special thanks to **Béla Schmanc** for the statistical work in the thesis.

PAPERS

Erdei E., Tritto J., M.O. North, Laki A., Arvis G., Rózsahegyi J., Karsza A.

The role of microsurgery on the treatment of varicocele

9th VideoUrology World Congress Abstract book B24, p:59, Budapest, 1997

Varicocele is found in approximately 15 per cent of the general male population. Different studies have demonstrated that it is associated with a progressive and duration-dependent decline in testicular function.

The association of varicocele and male infertility has been well documented. The correction of these lesion has been an important therapeutic procedure for many infertile men. The authors have been reported new technique for varicocele, including microsurgery. A subinguinal approach is presented for correction of varicoceles which combinated microdissection of the spermatic cord and the external inguinal ring. This method had several advantages. The use of magnification enhances the ability of the surgeon to identify and preserve the testicular artery, the lymphatics, and obliterate all refluxing veins.

The incidence of complications can be reduced by employing microsurgical techniques.

Photos of live video surgery

Operating microscope in our operating room.

Subinguinal "mini" skin incision.

The incision is separated by small band retractors.

Self-retaining retractor is below the cord.

Dissection of veins with microinstrument.

Transected veins after ligation.