MODERN METHODS OF SURGICAL TREATMENT OF VARICOCELE (LITERATURE REVIEW)

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Abstract: *varicocele is an enlargement of the plexus plexus. Varicocele causes decreased testicular function and occurs in about 15% of all men, up to 35% of men with primary infertility and 81% of men with secondary infertility. Understanding the significance of this anatomical anomaly in infertile patients requires a brief overview of the history and current understanding of functional anatomy, as well as the methods and results of surgery. Many different methods have been described for the treatment of varicocele. These include ligation of the cremasteric and internal spermatic vein in the inguinal canal, the use of an operating microscope to prevent damage to arteries and lymphatic vessels; microsurgical inguinal and subinguinal operations, formation of testicular-lower-epigastric and testicular-iliac venous anastomoses; laparoscopic high dressing; antegrade and retrograde sclerotherapy or embolization under radiological control. The article presents modern methods of surgical treatment of varicocele, comparative characteristics of various methods of surgical interventions for this pathology, as well as ways to further optimize the management of patients with this disease. Particular attention is paid to the need to prevent male infertility at the stage of surgical treatment.*
Keywords: *varicocele, surgery, complication, relapse.*

СОВРЕМЕННЫЕ МЕТОДЫ ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ ВАРИКОЦЕЛЕ (ОБЗОР ЛИТЕРАТУРЫ)

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Аннотация: *варикоцеле - это расширение лозовидного венозного сплетения. Варикоцеле является причиной снижения функции яичек и встречается примерно у 15% всех мужчин, до 3 % мужчин с первичным бесплодием и у 81% мужчин с вторичным бесплодием. Понимая значение этой анатомической аномалии у бесплодных пациентов, требуется краткий обзор истории и современных представлений о функциональной анатомии, а также методов и результатов хирургического вмешательства. Для лечения варикоцеле описано множество различных методов. К ним относятся перевязка кремастерной и внутренней семенной вены в паховом канале, применение операционного микроскопа для профилактики повреждения артерий и лимфатических сосудов; микрохирургические ингвинальные и субингвинальные операции, формирование тестикуло-нижнеэпигастральных и тестикуло-илиакальных венозных анастомозов; лапароскопическая высокая перевязка; антеградная и ретроградная склеротерапия или эмболизация под рентгенологическим контролем. В статье представлены современные методы хирургического лечения варикоцеле, сравнительная характеристика различных методик оперативных вмешательств при данной патологии, а также пути дальнейшей оптимизации ведения больных с данным заболеванием. Особое внимание обращено на необходимость профилактики мужского бесплодия на этапе хирургического лечения.*
Ключевые слова: *варикоцеле, операция, осложнение, рецидив.*

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Despite the centuries-old history of the study of varicocele, this disease currently remains one of the most relevant pathology in urology and surgery. The relevance of this pathology is determined by its high frequency of occurrence among the male population - from 10 to 30% [2, 8], a high frequency of infertility among patients (more than 40%), as well as a large number of cases of the disease, relapses occurring both in the immediate and in the long-term period after surgery [5, 10]. Currently, the operation is recognized as the only radical treatment for varicocele. There are many varieties of it. In 1918, the Argentine doctor O. Ivanissevich proposed a method of ligation of varicose veins of the testicle, stating that this method does not have relapses. Its further widespread use showed the development of recurrent varicocele in about half of the cases [3, 7]. At the turn of the 70s and 80s, methods of switching blood flow using microsurgical imposition of testicular-iliac and testicular-saphenic anastomoses appeared. At the moment, many authors consider the technique to be the most effective, but it is not without its drawbacks: it is difficult to perform, special equipment is required and, although not as often as after other techniques, relapses are also possible with this pathology [6, 13]. In the 90s of the twentieth century, the laparoscopic clipping technique was widely recommended as the least traumatic and more effective. However, laparoscopic clipping, in fact, is only a minimally invasive variant of Ivanissevich's operation: its effectiveness depends on the type of venous reflux (the effect is manifested only in the renospermatic variant of reflux and is absent in the ileospermatic and mixed variants) [1, 8]. Later, newer methods of surgical treatment of varicocele appeared, such as, for example, X-ray endovascular embolization, but there is no consensus in this direction. It should be noted that even the etiology of varicocele has not been fully studied. Very often, this disease occurs with concomitant pathology of venous structures in other anatomical areas [8, 10].

All this determines the relevance of the study in the modern literature of various theories and recommendations regarding the surgical treatment of patients with varicocele. Among the currently existing methods of surgical intervention for varicocele, there is a division into indirect (operations on the scrotum; membranes of the testicles and spermatic cord; muscle lifting the testicle) and direct (operations on the veins of the spermatic cord). In rare cases, some surgeons use combined modifications of the techniques of both groups [5, 12].

Operations of group I include the creation of a fascial-muscular suspension to strengthen the walls of the testicles, resection of the scrotum according to Cooper and his modifications [5], strengthening the vein wall according to Palomo (1898), restoration of the periodic contraction of m. cremaster (according to Voskresensky). These methods are palliative in nature and are currently almost never used [10].

Today, most operating specialists use operations belonging to the second group, in particular, microsurgical operations on the vessels of the spermatic cord. The most commonly used of this group are the Ivanissevich and Palomo operations. As mentioned above, in about half of the cases, Ivanisevich's operation gives a positive result. Unsuccessful results of this operation are observed not only with ileospermatic and mixed forms of casting, but also with the renospermatic version. One of the reasons for this may be that blood circulation in the transected vein can be restored by a roundabout way through various anastomoses [7]. Some authors report a fairly high percentage of relapses when using this technique - from 10 to 87% [10]. Many urologists believe that, regardless of the degree of varicocele, Ivanissevich's operation is indicated for patients with no renal hypertension, moderate aorto-mesenteric compression of the left renal vein, and stenosis of the left renal vein orifice diagnosed before surgery. by the method of left-sided phleborene-testicular and left and right renal ventiography [3, 11]. According to some foreign researchers, Ivanissevich's operation for the treatment of varicocele should be performed in two cases: either when the patient's material capabilities are limited, or when the result of the operation is not of great importance to the patient. In all other situations, one of the other types of operations should be preferred [10].

In Bernardi's operation, in contrast to Ivanissevich's operation (vein ligation at the level of intersection with the iliac vessels), the spermatic vein ligation is performed much lower at the level of the inner inguinal ring. Bernardi's operation is also characterized by many complications in the form of testicular hypotrophy, hydrocele, and relapses [14].

During the ligation of the testicular veins at the level of the inner ring of the inguinal canal, the testicular artery is also ligated. However, with the simultaneous ligation of the latter with the artery of the vas deferens, there is a danger of testicular atrophy. The advantage of the Palomo method is the simplicity and convenience of performing the operation, which can be performed by a surgeon of any qualification. Modification of Palomo's operation [4] excluded ligation of lymphatic vessels and significantly reduced the number of complications (scrotal edema, hydrocele, epididymitis) [5, 10].

Operation J.L. The mini-access Marmar was developed in 1985 and has recently become widespread. An incision is made in the area of the external opening of the inguinal canal. The operation is performed without opening the inguinal canal. The length of the incision is on average 3 cm. The spermatic cord is isolated, from which the internal spermatic vein is separated, tied and crossed. If necessary, additional sclerosing substances are injected into small collateral veins [5, 18]. This operation is performed for varicocele of any degree. Its purpose

is to completely block the blood flow through the testicular vein. The results of the Marmara operation for varicocele are significantly better than those of the Ivanissevich technique. The advantage is that the operation is performed without incision of the abdominal wall and without opening the inguinal canal [2]. The appearance of the postoperative scar is cosmetically acceptable; the postoperative course does not require hospitalization. Moreover, at the subingivinal level, it is much easier to find and ligate all branches of the internal spermatic vein. In this regard, the frequency of varicocele recurrence during Marmara surgery is significantly lower and amounts to about 10%. However, this method also has all the disadvantages and complications that are possible during ligation operations. A feature of this operation is the displacement of the testicle with the spermatic cord from the inguinal or subinguinal approach to the surgical wound. It is believed that using this procedure it is possible to ligate all possible venous collaterals, including the veins of the governorate. Subsequently, the testicle is returned to the scrotum, and the veins of the spermatic cord are ligated (clipped). Numerous studies show that with this procedure, the vas deferens, arteries and lymphatic vessels remain intact in all cases [6, 9].

Analysis of long-term publications has shown that the disadvantages of these techniques are mainly reduced to a large number of relapses of varicocele, the formation of hydrocele and testicular atrophy during ligation of the testicular artery. Recently, more and more popularized the Marmara operation using microsurgical operating techniques to reduce the number of postoperative complications. When using microsurgical techniques, it becomes possible to bandage all the veins of the spermatic cord. In this case, the nerves, lymphatic vessels and arteries remain intact. In addition, this modification allows ligation of the inguinal venous collaterals, cremasteric veins and veins of the governorate. According to the author (M. Goldstein), this technique is devoid of the disadvantages inherent in other surgical interventions, is less traumatic, but here it is necessary to consider the hemodynamic type of varicocele. The operation is performed under local or local anesthesia. A skin incision is made considering the development of the subcutaneous fat and the size of the testicle. When the spermatic cord is exposed, it is necessary that the femoral genital nerve remains intact. After the dislocation of the testicle wound, the lips are revised with their subsequent coagulation or bandaging. The venous collaterals of the external spermatic vein system are also ligated and transected. This procedure is mandatory, since ileosperm reflux is the cause of recurrence in 10.7% of cases. It is necessary to pay attention to the presence of liquid under the tunica albuginea. If it is present, when fluctuation can be felt, it must be emptied, for which it is sufficient to make a window in the protein envelope [3, 12].

Before microdissection of the spermatic cord, in order to prevent spasm of the arteries, 2-4 ml of 1% lidocaine solution should be injected under the fascia. The artery of the spermatic cord is isolated, a tape is brought under it. All isolated veins must be differentiated from lymphatic vessels. The selected veins are ligated and dissected. Other authors have also pointed to the advantages of the inguinal microsurgical method for treating varicocele using an operating microscope. The results obtained after these operations showed no relapses within 3-29 months. In 1 case, a hydrocele was recorded, a year after the operation, 1 patient developed epididymitis. The authors claim that the microsurgical method allows the identification of the testicular artery and lymphatic vessels, as well as all venous trunks [10, 12].

Another study presented the results of microsurgical inguinal and sub-groin varicocelectomy in adolescents. The patients were 9 boys, whose average age was 12.7 years (each was less than 15 years old at the time of surgery). The duration of the operation averaged 170.4 ± 45.6 minutes (range 105–240 minutes), testicular arteries were preserved in all patients. None of the patients developed a relapse of varicocele or postoperative hydrocele after 24 months of follow-up. The authors argue that microsurgical inguinal and inguinal varicocelectomy is safe and effective and can be considered one of the suitable treatments for varicocele in both adults and adolescents [6, 14].

In the works of other authors, the results of treatment of 140 patients with subclinical left-sided varicocele are presented. The patients were divided into three groups: those who agreed to microsurgical varicocelectomy (n = 25, operated group); for L-carnitine treatment (n = 93, treatment group), and those patients who did not agree to any treatment (n = 25, observation group). Sperm results were evaluated twice within 6 months after treatment. The reproductive function of patients was assessed by the number of women who became pregnant, according to telephone interviews 1 and 2 years after treatment. In the group of operated patients, sperm analysis after microsurgical varicocelectomy showed a significant improvement. In the group of patients receiving medication, sperm counts after treatment improved slightly. The onset of natural pregnancy in women from living together with patients was observed in 60.0% in the group of operated patients, in 34.5% in the group of patients receiving drug treatment, and in 18.7% in the observation group. According to the authors, surgical treatment is the best option for subclinical varicocele.

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