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INFLUENCE OF OPERATIVE TREATMENT OF VARICOCELE ON THE DEVELOPMENT OF ARTERIAL HYPERTENSION

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Purpose of the research. To assess the incidence of arterial hypertension in men with varicocele and to identify the relationship between increased blood pressure and surgical treatment of varicocele. **Material and methods.** A survey of 412 men receiving treatment for arterial hypertension, 482 men previously operated on for varicocele and 68 patients with varicocele who had no surgical treatment was conducted. **Results.** Varicose veins of the spermatic cord in patients with arterial hypertension were detected in 44.6% of cases, which exceeds the incidence of varicocele occurrence in men of a comparable age category by 1.5–2 times. Surgical treatment of the left spermatic cord varicocele is combined with the development of arterial hypertension in 51.2% of patients, which is three times higher than the incidence of hypertension in men who didn't undergo surgical treatment for varicocele and twice the frequency of hypertension in the general population of men of comparable age. The more frequent occurrence of renal arterial hypertension in patients who underwent surgical treatment for varicocele may indicate an adverse effect of occlusion of the internal spermatic vein on the state of renal venous hemodynamics. **Conclusion.** Varicocele should be considered as a compensatory process for renal venous hypertension due to obstruction of blood flow through the renal vein, and elimination of compensatory blood flow can lead to renal venous hypertension, hypoxia and the development of arterial hypertension.

Keywords: varicocele; arterial hypertension; renal venous hypertension.

ВЛИЯНИЕ ОПЕРАТИВНОГО ЛЕЧЕНИЯ ВАРИКОЦЕЛЕ НА РАЗВИТИЕ АРТЕРИАЛЬНОЙ ГИПЕРТЕНЗИИ

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Оценена частота встречаемости артериальной гипертензии у мужчин с варикоцеле и выявлена связь повышения артериального давления с оперативным лечением варикоцеле. Проведено анкетирование 412 мужчин, получавших лечение по поводу артериальной гипертензии, 482 мужчин, ранее оперированных по поводу варикоцеле и 68 больных варикоцеле, которым оперативное лечение не проводилось. Варикозное расширение вен семенного канатика у пациентов с артериальной гипертензией выявлено в 44,6 % случаев, что превышает частоту встречаемости варикоцеле у мужчин сопоставимой возрастной категории в 1,5–2 раза. Оперативное лечение варикоцеле слева сочетается с развитием артериальной гипертензии у 51,2 % больных, что в 3 раза превышает частоту артериальной гипертензии у мужчин с неоперированным варикоцеле и в 2 раза частоту артериальной гипертензии в общей популяции мужчин сопоставимого возраста. Более частая встречаемость ренальной артериальной гипертензии у пациентов, оперированных по поводу варикоцеле, может свидетельствовать о неблагоприятном влиянии окклюзии внутренней семенной вены на состояние почечной венозной гемодинамики. Варикоцеле следует рассматривать как компенсаторный процесс при венозной почечной гипертензии вследствие затруднения кровотока по почечной вене, и устранение компенсаторного кровотока может приводить к почечной венозной гипертензии, гипоксии и развитию артериальной гипертензии.

Ключевые слова: варикоцеле; артериальная гипертензия; венозная почечная гипертензия.

INTRODUCTION

Arterial hypertension is one of the most common cardiovascular ailments in the world, and among those with arterial hypertension, renal hypertension is detected in 5% of these patients [1]. The prevalence rates of arterial hypertension in young men and women are 22.2% and 4.5%, respectively [2]. Arterial hypertension affects 29.9% of the population of the Nizhny Novgorod region, and among those affected, 20.5% are in the 30–39 age group and 35.1% are in the 40–49 age group [3].

The origin of renal hypertension is determined by many factors, the most important of which are the disorders of both arterial and venous hemodynamics in the vascular system of the kidneys. The disorder of the outflow through the renal vein, when it is compressed in the aortic mesenteric section, leads to congestive venous hypertension and, eventually, to increased venous pressure in the kidneys [4, 5]. Even slight hypertension in the left renal vein can lead to the fibrous degeneration of part of the renal glomeruli, and prolonged hypoxia exacerbates this process [6–8]. The leading clinical manifestations of left-sided venous nephrogenic hypertension are phleborenohypertension nephropathy and varicocele [9]. Meanwhile, the most common and easily diagnosed symptom of regional renal venous hypertension is varicose veins of the spermatic cord [10]. In this regard, varicocele is considered a secondary manifestation with respect to impaired venous hemodynamics in the left renal vein [11, 12]. The study of the relationship of arterial hypertension and varicocele forms the basis of our study.

Aim of the study. The study aimed to assess the prevalence of arterial hypertension in men with varicocele and to identify the relationship between increased blood pressure and the surgical treatment of varicocele.

MATERIAL AND METHODS

A survey was conducted among 412 men aged 20–55 years. The respondents were patients of the therapeutic and cardiology departments of the medical institutions of Nizhny Novgorod and Cheboksary and received treatment for arterial hypertension. In addition to questions that extracted general information about the patients, the questionnaire included questions regarding the presence of varicocele, the timing of its detection, history of receiving surgical treatment of varicocele, and the time limitation of arterial hypertension detection. A joint survey and examination was also conducted, which involved 482 men aged 35–51 years, who were previously operated for left-sided varicocele in various medical institutions of Nizhny Novgorod, Nizhny Novgorod Region, and the Republic of Chuvashia. Finally, 68 patients aged 34–49 years with confirmed varicocele but did not receive surgical treatment were also examined.

STUDY RESULTS

Among 412 patients, 184 (44.6%) were diagnosed with arterial hypertension and had varicose veins of the left spermatic cord, which exceeded significantly the average statistical data on the prevalence of varicocele among adult men (11%) [13, 14]. As the frequency of varicocele can increase by 10% during each

Table 1 / Таблица 1

The prevalence of varicocele in patients with arterial hypertension in different age groups (*n* = 412)

Распространенность варикоцеле у пациентов с артериальной гипертензией в различных возрастных группах (*n* = 412)

Age	Prevalence of varicocele					
	Total number		Unoperated patients		After varicocelectomy	
	n	%	*n*	%	*n*	%
20–29 years, *n* = 84	29	34.5	6	7.1	23	27.4
30–39 years, *n* = 114	49	43.0	7	6.1	42	36.8
40–49 years, *n* = 154	53	34.4	5	9.4	48	31.2
50–55 years, *n* = 160	53	33.1	13	8.1	40	25.0

decade of life, reaching 75% by 80 years of age [14], the managed patients with arterial hypertension were divided into groups depending on age (Table 1). Notably, the vast majority of patients (153 patients) with arterial hypertension have already been operated for varicose veins of the spermatic cord during their adolescence or youth.

Of the 153 operated patients, 143 underwent Ivanissevich surgery, 2 underwent Marmar surgery, and 3 patients underwent endovascular occlusion of the superior testicular vein. The nature of the surgery performed could not be established as their medical documentation was lost among 5 patients. Moreover, 12 patients had previously undergone operation for recurrent varicocele, and all of them underwent Ivanissevich surgery. In the vast majority of patients with arterial hypertension operated for varicocele, an increase in blood pressure before surgery was not registered. Most of the patients noted an increase in blood pressure 3–5 years after the surgery; hence, we cannot confirm the presence of an objective association between these events. However, the presence of such a relation is manifested by the fact that, among the group of patients with arterial hypertension who underwent varicocele operation, 12 patients had verified malignant hypertension of renal origin, making up 7.8% or almost double the statistical data on the prevalence of renal hypertension [1]. Among patients with arterial hypertension who were not operated for the present varicocele (31 patients), 1 patient with polycystic kidney disease had a malignant course of arterial hypertension.

Based on the examination results of 482 men aged 35–51 years who previously underwent varicocele operation, 247 patients (51.2%) had verified arterial hypertension. This frequency was almost one and a half times higher than that of arterial hypertension for a population of men in the same age group [3]. When an increase in blood pressure was recorded from the moment the diagnosis of varicocele or surgery for varicocele, the terms varied although more than three years had passed in the vast majority of cases (see Figure, Table 2). In 3 (0.6%) patients, an episodic increase in blood pressure was noted from the age of 18 years, 1–3 years before the surgical treatment of varicocele. Meanwhile, 79 (32.0%) patients received the antihypertensive therapy on a constant basis and 43 (17.4%) patients received it from time to time.

Among 68 varicocele patients who did not undergo surgical treatment, high blood pressure was recorded in 9 patients (13.2%) (see Figure). Moreover, a persistent increase in blood pressure, which required medical correction, was diagnosed in 6 patients (8.8%) all of whom were over the age of 40 years. In 2 patients, the diagnosis of arterial hypertension was established 5 years after the detection of varicocele, in 4 patients, it was established within 6–9 years, and in 3 patients, the increase in blood pressure, which was noted occasionally, was recorded over 10 years after the detection of varicocele.

The study results indicated that in patients who underwent surgery for varicocele, arterial hypertension was developed more often compared with those who did not undergo operation. Arterial hypertension was detected in 247 (51.2%) out of 482 patients who underwent surgical treatment of varicocele. Meanwhile, out of 68 patients with varicocele who did not undergo surgery, only 9 patients (13.2%) had verified hypertension.

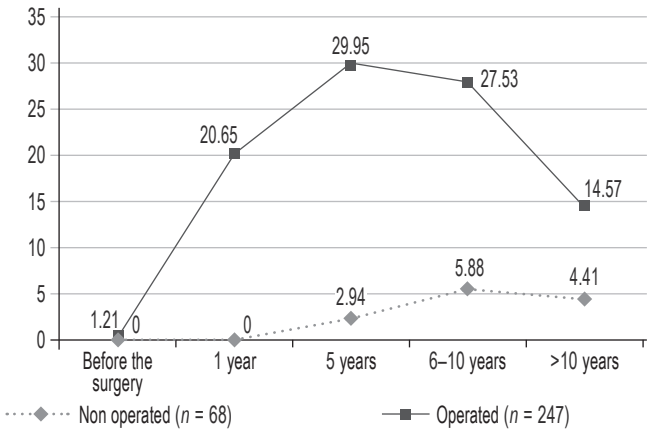

Fig. The frequency and timing of detection of arterial hypertension in patients operated on and not operated on for varicocele

Рис. Частота и сроки выявления артериальной гипертензии у пациентов, оперированных и неоперированных по поводу варикоцеле

Table 2 / Таблица 2

The timing of the appearance of arterial hypertension after surgical treatment of varicocele (*n* = 247)

Сроки появления артериальной гипертензии после оперативного лечения варикоцеле (*n* = 247)

Terms of postoperative treatment of varicocele	*n*	%
Before the surgery	3	1.2
1 year	15	6.1
3 years	51	20.7
5 years	74	30.0
6–10 years	68	27.5
More than 10 years	36	14.6

DISCUSSION

Varicose veins of the spermatic cord are considered by most experts as the most likely cause of spermatogenesis disorders, which determine the indications for surgical treatment of varicocele [11, 15–17]. Moreover, the mechanism of the effect of varicocele on spermatogenesis is not fully understood [18–22]. The effectiveness of surgical treatment of varicocele to restore spermatogenesis is extremely low and has short-term impact; in some cases, it may even be harmless for spermatogenesis, which casts doubt on the need for the surgery [23–28]. At the same time, the internal spermatic vein occlusion is accompanied by impaired renal venous hemodynamics and the formation of venous renal hypertension due to blocking of the "compensatory" reno-testicular-caval shunt [29].

Our study results reveal a clear association between varicose veins of the spermatic cord and a higher incidence of hypertension in men. In the population of men with arterial hypertension, varicose veins of the spermatic cord were detected in 44.6% of the patients, exceeding the incidence of varicocele in men of a comparable age category. At the same time, among men with arterial hypertension, the number of patients who underwent varicocele operation exceeded significantly the number of those who did not undergo operation. This ratio indicates the relationship between the surgical treatment of varicocele and the subsequent increase in blood pressure. A higher percentage of renal arterial hypertension (7.8%) in patients who underwent varicocele operation may also confirm this relationship.

CONCLUSIONS

1. Varicose veins of the spermatic cord in patients with arterial hypertension were detected in 44.6% of cases, exceeding the frequency of varicocele in men of a comparable age category by 1.5–2 times (20.5%–35.1%).

2. Surgical treatment of varicocele on the left is combined with the development of arterial hypertension in 51.2% of the patients. This is three times higher than the frequency of hypertension in men with unoperated varicocele and twice higher than the frequency of arterial hypertension in the general population of men of comparable age.

3. The greater prevalence of renal arterial hypertension (7.8%) in patients who underwent surgery for varicocele may indicate an adverse effect of the internal spermatic vein occlusion on the state of renal venous hemodynamics.

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