STUDY OF SPERMATOGENIC FUNCTION AFTER DIFFERENT OPERATIONS FOR VARICOCELE

An Essay
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In General Surgery
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دراسة الخصائص الوظيفية للسائل المنوي بعد العمليات المختلفة لدوالي الخصية

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SUMMARY

Varicocele is defined as dilatation of pampiniform plexus that has long been recognized as treatable cause of male fertility.

Most varicocele is noted in teens or early life, however it is difficult to estimate the exact incidence of varicoceles because most of them are asymptomatic and impalpable and are diagnosed only with sonographic evaluation. The left side is affected in 95 % of cases. Varicocele is the result of retrograde flow of blood into the pampiniform plexus with subsequent dilatation of the veins and formation of varicosities with stasis of blood. The etiology of varicocele is probably multifactorial.

An adult male who is not currently attempting to achieve conception, but has a palpable varicocele, abnormal semen analyses and a desire for future fertility, is also a candidate for varicocele repair. Young adult males with varicoceles, who have normal semen parameters, may be at risk for progressive testicular dysfunction and should be offered monitoring with semen analyses every one to two years, in order to detect the earliest sign of reduced spermatogenesis.

The causes of varicocele are multifactorial, but the end result is a pathological dilation of the veins draining the testicles, leading to increased temperature in the seminiferous tubules and decreased sperm quality. Over 13.4% of the general population and 37% of infertile men will be diagnosed with varicocele. A dramatic improvement can be seen after treating varicoceles, especially in conjunction with other infertility treatment methods.

The spermatogenic function rate in patients who have undergone varicocelectomy increases substantially from 14% with no treatment to 29.7%

﴿اللَّهُ الَّذِي خَلَقَكُم مِّن ضَعْفٍ ثُمَّ جَعَلَ مِن بَعْدِ
ضَعْفٍ قُوَّةً ثُمَّ جَعَلَ مِن بَعْدِ قُوَّةٍ ضَعْفًا وَشَيْبَةً يَخْلُقُ
مَا يَشَاءُ وَهُوَ الْعَلِيمُ الْقَدِيرُ﴾

(سورة الروم:٥٤)

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Gomaa El Askary

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AQP-1: Aquaporin receptor-1

ATP: Adenosine triphosphate

CDU: Color Doppler Ultrasonography

FSH: Follicle stimulating hormone

ICSI: Intracytoplasmic sperm injection

IL-6: Interlukine-6

ISV: Internal spermatic vein

LH: Luteinizing hormone

ROS: Reactive oxygen species

TESE: Testicular sperm extraction

THD: Testicular hypothermia device

WHO: World Health Organization

INTRODUCTION

INTRODUCTION

Varicocele means varicosity (dilatation, elongation thickening and tortuousity) of the pampiniform plexus of veins draining the testis **(Hamed, 2010).**

The pathogenesis of infertility due to varicocele is still not clear, so there are many theories that try to explain the effects of varicocele on the testis and the spermatogcnic function that can be simplified as follows:

a- Extratesticular factors: Heat theory. Metabolites theory and Epididymal theory **(Hamed, 2010).**

b- Intratesticular theory: Intratesticular obstruction, immunological theory and endocrinal (lydig cell) theory **(Hamed, 2010).**

The basic rule is that varicoceles cause progressive testicular damage over time and hence its spermatogenic effect. Surgical repair of varicocele (varicocelectomy) not only stops this damage of the testis and its spermatogenic functions but often reverse it; overall varicocelectomy results in significantly improved semen parameters in 60% to 80% of patients & pregnancy rates of 20% to 60% **(Branded and Goldstein, 1999).**

Varicoceles are progressive lesions that may hinder testicular growth and function over time and are the most common and correctable cause of male infertility. Approximately 40% of men with primary infertility have a varicocele, and more than half of them experience improvements in semen parameters after varicocelectomy **(Robinson et al., 2010).**

In azoospermic infertilte men with varicocele, testicular biopsy revealed histopathologic patterns that varied from disorganized spermatogenesis with low

(spermatid stage) arrested spermatogenesis or germ cell aplasia and Sertoli cells only Diagnostic testicular biopsy can be helpful for accurate management of azoospermic infertile men with varicoceles before surgical repair **(Saleh et al., 2010).**

Since the first study that documented the beneficial effects of varicocelectomy even in the azoospermic patient, was published by **Tulloch** in **1955**, a large number of studies have confirmed the improvement of spermatogenic function as follows:

Some studies showed improvement in sperm count and motility after varicocelectomy however sperm parameters didn't significantly improve after medical treatment so surgical treatment is the best option for management of subclinical varicocele **(Seo et al., 2010).**

Improvement in the sperm parameters was evident even in the azoospermic patient and in some patient with zero motility **(Matthews et al., 1998; Okuno et al., 1998).** In addition, the operation leads to improvement in the sperm morphology and sperm penetration assays **(Perimenis et al., 2001).**

There is evidence from retrospective studies that varicocelectomy can improve sperm DNA damage in infertile men with a clinical varicocele. And correction of a varicocele can improve spermatogenesis, particularly spermiogenesis (the stage in spermatogenesis where compaction and stability of the sperm DNA and chromation occur) **(Zini et al., 2010).**

Another studies showed that after varicocelectomy sperm parameters significantly improved and sperm DNA fragmentation was significantly decreased. Low DNA fragmentation index values are associated with a higher pregnancy rate (spontaneous and with assisted reproductive technique) **(Smit et al., 2010).**

There are many operations for varicocelectomy the ideal operation should fulfill the following criteria. The veins responsible for varicocele should be completely ligated to prevent varicocele recurrence, the preservation of veins that accompany the vas deference to prevent vascular engorgement. The testicular arteries, lymphatics and vas deference should be preserved. The operation should be minimally invasive in order to reduce the post operative morbidity and recovery time **(Hamed, 2010).**

There are many techniques for operations:

a- Open surgical techniques (**Chan, 2011**)

- Suprainguinl approach**.**
- Inguinal approach**.**

b- Laparoscopic techniques **(Duong and Glassberg, 2010)**

c- Percutaneous selective embolization **(Storm et al, 2010).**

Some researchers compared the operative time, sperm analysis results, and complications of three different methods of open and laparoscopic varicocelectomies (laparoscopic varicocelectomy, open subinguinal varicocelectomy under general anesthesia, and open subinguinal varicocelectomy under local anesthesia) and found that subinguinal varicocelectomy under local anesthesia is better than laparoscopic method in terms of recurrence, hydrocele formation, and operative time (**Hamed, 2010**).

Subinguinal method under general anesthesia has intermediate efficacy regarding less complications than laparoscopic method and shorter operative time than the two other methods **(Shamsa et al, 2009).**

The improvement of semen parameters after high ligation of varicocele was reported by some researchers **(Avila-Vergara et al, 2001)** while the increase of testicular volume together with the increase in serum testosterone after the same approach was mentioned by others **(Yamamoto et al, 1995; Asci et al, l998).**

Concerning the outcome of low ligation technique, the improvement in semen parameters was reported by **Seftel et al (1997) and Perimenis et al (2001)** while an improvement in testicular volume as well as significant increase in semen testosterone levels were documented by **Grober et al (2004).**

Surgeons have argued about which procedure to recommend, identical improvement in semen quality after either high or low ligation techniques was reported by **Kamal et al (2001),** while the superiority of low approach was mentioned by **Cayan et al (2000).**

Further recommendation of this approach (low approach) was reported by **Watanabe et al (2005)** due to significant low rates of postoperative complications specifically recurrence and hydrocele compared with the laparoscopic and open high ligation, on the other hand, the superiority of the high ligation technique as regard the lower incidence of recurrent varicocele was documented by several researchers **(Pintus et al, 2001; Riccabona et al, 2003).**