Relationship between body mass index and development of Varicocele

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Abstract

Introduction: Varicocele is characterized by abnormal elongation, dilatation and tortuosity of the pampiniform plexus within the spermatic cord and is the most commonly see and correctable cause of male factor infertility.

Objectives: Our study aimed to investigate the correlation between Body Mass Index(BMI) and development of Varicocele among a cohort of infertile patients as compared with the same number of subject without Varicocele (control group).

Patients and methods: Between January 2016 and December 2017,atotal of 102 patients underwent surgery for varicocele. All patients underwent history taking, careful physical examination and scrotal ultrasound scan to determine the presence and severity of Varicoceles. An age- matched controls group consisted of 103 subjects who were found not to have varicoceles according to physical examination only. The age, weight, height, and BMI of the two groups were compared. In addition both grades and side were analyzed in patients group.

Results: The mean age was 33.38 ±5.68 in patients group and 38.63± 7.150 in control group .Of the 102 patients 29(28.43%) were grade I, 70 (68.63%) were grade II, and 3(2.94%)were grade III. All 102 patients had left-side varicoceles and 18 of them had bilateral varicoceles.No cases with only right side involvement.

The BMI (mean ±SD)of 102 patients with Varicocele was (26.55± 4.4)while that of control group was (28.30± 4.3) which is clinically significant (p=0.0001).

Conclusions: From our data; we conclude that there is an inverse relationship between varicocele development and BMI, irrespective of varicocele grade. It seems that slim and tall (high risk)persons will benefit from evaluation during puberty.

Keywords: Height, weight, body mass index, Varicocele , infertility

Introduction

Varicocele has been described as early as the first century B.C. [1].

It is the pampiniform plexus of veins around the testis that dilate to form a varicocele [2].

At present Varicocele is recognized as the leading cause of male infertility[3].

The prevalence of Varicocele is 15-20% in general population, in 30-40% in infertile men [4].

Levinger et al proposed that Varicocele is increased over time and the risk of incidence is approximately 10% for each decade of life [5].

Approximately75% to 90 % of Varicocele are left side .The incidence of bilaterality is anywhere from 15% to 50% but isolated right varicocele are fairly rare[6].

The definitive etiology of Varicocele is not well known, but its increased frequency of presentation on the left side preponderance has led to the discussion of several theories[7].One theory postulate that the length of the left internal spermatic vein and the angle with which it drains into the left renal vein can result in increased hydrostatic pressure. This increased pressure is transmitted to the scrotal pampiniform plexus causing dilatation and tortuosity of the plexus [8].

Varicocele is associated with progressive and duration -dependent decline in testicular function[9].

Our study aim is to examine a possible influence of body weight, height and body mass index on the formation of varicocele.

Patients and methods

prospective, hospital-based, case series study was conducted at Department of Urology, Hawari center for Urology and Otolaryngology, Benghazi –Libya from January 2016 to December 2017. It include a total of 102 consecutive infertile patients(Varicocele group) who underwent Varicocelectomy. All patients underwent history taking, careful physical examination and scrotal ultrasound scan to determine the presence and severity of varicoceles. Among them; 18 patients (17.64 %) had bilateral varicocele which assigned higher grade. The control group consisted of 103 patients who referred to our department for unrelated pathology during the same period but were found not to have varicoceles on physical examination only. Somatometric parameters including(Weight, height and BMI)as well as age were measured in both groups and compared . In addition both grades and side of varicocele were analyzed in varicocele group. All patients were examined by two urologists in a special warm room both in supine and erect position, with and without the Valsalva maneuver.Only palpa-

ble varicoceles were recorded.

Varicocele was graded according to the criteria defined by Lyon and colleagues: Grade I as palpable only with Valsalva maneuver, Grade II as palpable without valsalva and Grade III as visible from a distance [10,11]. To account for the relationship between height and weight, BMI was used . Body mass index was calculated from height and weight data according to the formula weight (Kg) height(m)^2.Using the national institutes of health definition , those patients with BMI of less than 25 Kg / m^2 were categorized as normal weight . patients with BMI of 25 kg/m^2 to less than 30 kg / m^2 were considered overweight , those with BMI of 30 kg /m^2 to less than 35kg/ m^2 as obesity class I, those with BMI of 35 kg/ m^2 or more as obesity class II[12].

Our study aim is to examine a possible influence of body weight, height and body mass index on the formation of varicocele.

Statistical analysis.

The data was analyzed using the SPSS 14.0 statistical software for windows (SPSS, Chicago, IL, USA). Comparison between variables measured by using chi-square test(student test) , Kolmogorov- smirnov/ Shapiro wilk tests, kruskal – wallis test and bonferroni post Hoc test . Analysis of variances (ANOVA). Statistical significance was considered at $p \leq 0.05$.

Results

In the varicocele group(102), the mean age, height, weight and BMI were, range 25-50 (33.68 ± 5.99 years), range162-198 (173± 6.3cm), range 56-124 (78±3.51kg), range 19.4-41.8 kg/m2(26.5± 4.4 kg/ m2) respectively(Table1).The distribution of varicocele grades were as follows:3(2.94 %) grade III, 70(68.63 %) grade II, and 29 (28.43%) grade I (figure1).Among the varicocele group; varicoceles were present on the left side in 84.82%, bilateral involvement in18.18% and no cases with only right side involvement(figure2). In the control group(103) the mean age, height, weight and BMI were, range 25-53 (38.6±7.13 years), range 163-193 (171±6.4 cm), range 59- 112.5 (82±3.9 kg) ,range 19.031-38.7kg/m2 (28.35±4.3 kg/m2) respectively(Table1).

Analyzing these data showed significant differences in age, height,and BMI

(P = < 0.001, P < 0.001 and P 0.001) respectively between the two groups ,There were no clinically significant differences in age, height, weight and BMI among patients with different grades of varicocele. Varicocele grade significantly decreases with increasing BMI(P= 0.0001).(Table 2).

There was no clinical significant differences of family history across different grades (P= 0.570).

Table 1: The demographic characteristics of two studied groups .

Group	Age patients	BMI Patients Control
Number	102 103	102 103
Range	25-50 25- 53	19.4 -41.8 19.031-38.7
Mean ±SD	33.68±5.99 38.6±7.13	26.5±4.4 28.35± 4.3
p	< 0.001	0.001

Table 2: Comparison between mean BMI and different grades of varicocele.

Grade	I	II	III	Total
Number	29	70	3	102
Mean BMI	27.924	25.0175	21.0577	
SD	4.75	4.12	4.95	
p		0.0001		

Figure 1. Distribution of cases of varicocele according to grade

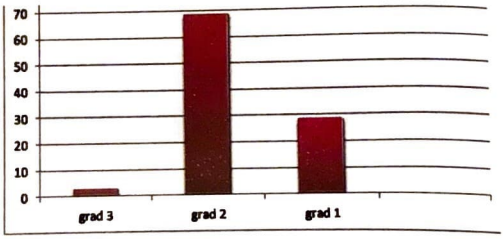
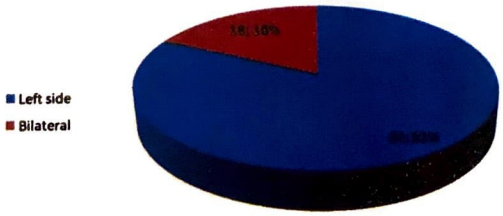


Figure 2. Distribution of varicocele cases according to side involvement



Discussion

There is probably no subject that is more controversial in the area of male infertility than varicocele [13]. Varicocele is defined as dilatation of the spermatic vein and the pampiniform plexus which is a scrotal extension of these veins[14].

The prevalence of varicoceles markedly increases with pubertal development. It is a progressive lesion that may hinder testicular growth and function over time and is 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[15,16].Varicocele is most commonly observed on the left side, although some men are affected bilaterally. The isolated right sided varicocele is rare [17].The definitive etiology of varicocele is obscure; but it is likely that a combination of factors play a role in the formation of varicocele [18].The right testicular vein drains obliquely into the vena cava, whereas the left drains perpendicularly into the left renal vein, resulting in higher hydrostatic pressure on the left compared with the right side. Also believed to increase left-sided hydrostatic pressure is the so-called nutcracker effect with compression of the left renal vein between the aorta and the superior mesenteric artery [19,20].In addition , the left internal spermatic vein is 8 to 10 cm longer, resulting in increased hydrostatic pressure transmission[21].Another theory describes absent or malfunctioning venous valves as a potential cause of varicocele formation[12]. However, despite these differences, Varicoceles have been demonstrated in males with competent valves as well[22]. The exact pathophysiology behind the adverse effect of varicocele on semen quality remains uncertain. A number of proposed mechanisms have been examined including scrotal hyperthermia, altered testicular blood flow, increased venous pressure, hypoxia, testicular hormonal dysfunction, accumulation of toxic substances, and catecholamine reflux[17,19,20]. In 1957, Smith from London was the first to hypothesize that patients with varicocele were taller and heavier, on the basis of a comparison of 840 patients with varicoceles with an age matched group without varicocele[23,24].Numerous researches have assessed the relationship between varicocele and BMI. It is suggested that in obese men excess fat around the renal vein provide a cushion protecting against the «nutcracker phenomenon [28-25]. To account for the relationship between varicocele and BM , it was reported that varicocele was more prevalent in tall boys with a lower BMI, who has progressed through puberty [29].Tsao et al., showed that the prevalence and severity of varicocele is inversely correlated with obesity ,which indicates that obesity may result in decreased nutcracker effect [26]. Celiktas M et al evaluated a possible effect of the amount retroperitoneal fat tissue on testicular venous drainage to shed light on the mechanism of varicocele occurrence. The relationship between bilateral pampiniform plexus diameters and retroperitoneal fat was stronger and significant[30,31]. Although some studies have revealed a positive correlation between the incidence of adolescent varicoceles and weight gain, it has been shown to be inversely proportional to reduced body mass index[14]. In a large –scale study by Liu et al., it was shown that varicocele grade was decreased with reduced body mass index[23,32]. Delaney et al. retrospectively evaluated 43 adolescent with varicocele regarding their physical constitution and compared the data with age –correlated normal values from the centers for Disease Control and prevention. They also concluded that children with varicocele were taller and heavier, but did not show a significant differences in BMI [33]. Hassanzadeh et al suggested that height, weight and BMI, all are effective on varicocele occurrence [34]. The result of our present prospective study support the finding of May et al[23], Smith [24], Delaney et al[33] and Hssanzadeh et al [34].

In the present study, weight and BMI were significantly more in controls than cases. However, the height was significantly related not only to varicocele occurrence but also to its grade and the patients were taller than control cases. In the present study , patients with varicocele had a lower BMI than normal age – matched controls , but patients with grade III varicocele have a clinically significant lower BMI than patients with lower-grade varicocele(0.0001) ; in contrast to Chen and Huang[18]who evaluated 197 patients with and without varicocele , they showed that patient with grade III varicocele more frequently had a lower BMI than patients with grade I and grade II varicocele , but the differences were not significant(0.06).

The limitations of this study was the number of patients included in this study is somewhat small and as the varicocele and its impaction on fertility status is a common pathology ; a large number of patients and controls is to be included in the future study. Furthermore regarding the diagnosis of varicocele among control group was the reliance of the diagnosis on physical findings only with no ancillary imaging (Color Doppler imaging) to diagnose sub clinical varicoceles or confirm the diagnosis of the clinical varicoceles.

Conclusion

The results of this prospective study showed that the patients with Varioceles were significantly taller and heavier than control group. It suggest that there is association of Varicocele prevalence and physical constitution of the body.

Conflict of interest

No conflict of interest to declare

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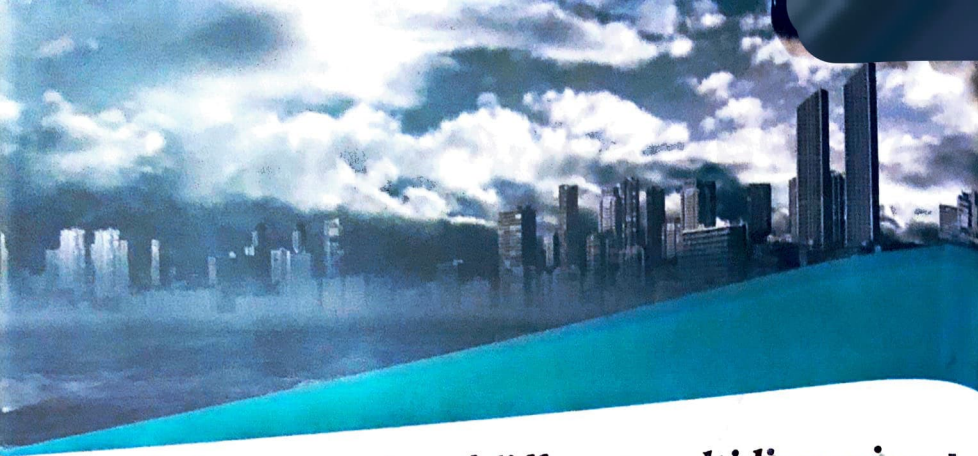

Predictive properties of different multidimensional staging systems in patients with chronic obstructive pulmonary disease

Background

Chronic obstructive pulmonary disease (COPD) is considered to be a respiratory disease with systemic manifestations. Some multidimensional staging systems, not based solely on the level of airflow limitation, have been developed; however, these systems have rarely been compared.

Methods

We previously recruited 150 male outpatients with COPD for an analysis of factors related to mortality. For this report, we examined the discriminative and prognostic predictive properties of three COPD multidimensional measurements. These indices were the modified BODE (mBODE), which includes body mass index, airflow obstruction, dyspnea, and exercise capacity; the ADO, composed of age, dyspnea, and airflow obstruction; and the modified DOSE (mDOSE), comprising dyspnea, airflow obstruction, smoking status, and exacerbation frequency.

Results

Among these indices, the frequency distribution of the mBODE index was the most widely and normally distributed. Univariate Cox proportional hazards analyses revealed that the scores on three indices were significantly predictive of 5-year mortality of COPD ($P < 0.001$). The scores on the mBODE and ADO indices were more significantly predictive of mortality than forced expiratory volume in 1 second, the Medical Research Council dyspnea score, and the St. George's Respiratory Questionnaire total score. However, peak oxygen uptake on progressive cycle ergometry was more significantly related to mortality than the scores on the three indices ($P < 0.0001$).

Conclusion

The multidimensional staging systems using the mBODE, ADO, and mDOSE indices were significant predictors of mortality in COPD patients, although exercise capacity had a more significant relationship with mortality than those indices. The mBODE index was superior to the others for its discriminative property. Further discussion of the definition of disease severity is necessary to promote concrete multidimensional staging systems as a new disease severity index in guidelines for the management of COPD.