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# Testicular Criteria as an Indicator for Surgical Necessity in Stage 2, 3, 4 Varicocele in Children and Adolescents

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**Abstract:** ***Background: Pediatric varicoceles are common, affecting up to 15% of male children and adolescents. There is controversy surrounding the surgical management of varicoceles in the pediatric population. Aim of the work: To identify a testicular criteria for surgical necessity in stage 2, 3, 4 varicoceles in children and adolescents. Patients and Methods: This study involved thirty patients with varicocele (from 10 to 16 years old), 25 (83.3%) patients managed by conservative treatment while 5 (16.7%) patients needed surgical varicocelectomy due to grade 3 refluxing varicocele. Testicular measurements were assessed by scrotal ultrasound, and the formula length × width × height × 0.52 was used to calculate testes volume in cubic centimeters. Patient management was reviewed and evaluated for clinical varicocele grade, ultrasound-assessed testicular volume at initial diagnosis and change over time, and need for surgical intervention. Results: In our study, 25 (83.3%) patients managed by conservative treatment while 5 (16.7%) patients needed surgical varicocelectomy due to grade 3 refluxing varicocele. Considering follow up of volume changes in patients with varicocelectomy and conservative treatment at 3 months, 4 (80%) and 22 (88%) patients have volume greater than 20, respectively. At 6 months, 2 (40%) and 20 (77.3%) patients have volume greater than 20, respectively. However, at 12 months, 17 (76%) patients with conservative treatment only have volume greater than 20. There was significant difference between patients with varicocelectomy and conservative treatment at 6 and 12 months (p <0.001). Regarding outcome, all patients improved without complications. in patients managed by Conservative treatment, improvement occurred in 6 (24%) cases while surgical interference needed in 19 (76%) patients without complications in all cases. Conclusion: Early evaluation and timing intervention is very important in pediatric varicocele. The majority of cases who managed by conservative treatment needed for varicocelectomy to avoid testicular injury and future infertility.***

**Keywords:** Varicocele, Testicular Criteria, varicocelectomy

## 1. Introduction

Pediatric varicoceles are common, affecting up to 15% of male children and adolescents. There is controversy surrounding the surgical management of varicoceles in the pediatric population (***Alsaikhanet al., 2016).***

A varicocele can be detected clinically on physical examination with the patient in a standing position. The clinical grading system proposed by Dubin and Amelar is commonly used and consists of grade Ithat varicocele only palpable on valsalva maneuver, grade IIpalpable with no valsalva maneuver and grade 3 & 4 that visible with no need for palpation (***Kolon, 2015).***
Testicular asymmetry has generally been accepted as a potential indicator for long-term subfertility and, thus, an indication for treatment of adolescent varicoceles. Testicular size and volume can be estimated in the office with an orchidometer. Some studies have shown accurate correlation between testicular volume measurements from a Prader orchidometer and ultrasonography (***Lomboyand Coward, 2016).***

More recently, the use of surgical repair of varicoceles has been questioned with regard to whether or not it truly leads to improved clinical outcomes. Additionally, advances in surgical and radiological procedures, such as laparoscopic, microsurgical, and sclerotherapy techniques, have altered the landscape of management options for this condition. ***(de Los Reyes et al., 2017).***

Our rational was to identify a testicular criteria for surgical necessity in stage 2, 3, 4 varicoceles in children and adolescents.

**Patients and methods**
A prospective cohort study carried out at Pediatric Surgery Department, Faculty of Medicine, Al-Azhar University during the period from January 2019 to October 2021. This study involved thirty patients with varicocele, 25 (83.3%) patients managed by conservative treatment while 5 (16.7%) patients needed surgical varicocelectomy due to grade 3 refluxing varicocele.

***Ethical approval:***
The study was approved by the Ethics Board of Al-Azhar University. Each individual in the research provided informed written permission.

***Inclusion Criteria:***
1) Patient with testicular pain or heaviness
2) Age ranged from 10 years till 16 years.

***Exclusion Criteria:***
1) Patient with any systemic diseases.

2) Patient with secondary varicocele due to endocrine cause or syndromes.
3) Patient with urogenital anomalies or have a pervious trauma on the scrotum.

## 2. Methods

Patients were followed with history and physical and ultrasound measurements. Testicular measurements were assessed by scrotal ultrasound, and the formula length × width × height × 0.52 was used to calculate testes volume in cubic centimeters.

Patient management was reviewed and evaluated for clinical varicocele grade, ultrasound-assessed testicular volume at initialdiagnosis and change over time, and need for surgical intervention.

Early surgical intervention was done when there was decreasing in testicular volume during conservative management of the patient or there is more change in clinical picture of the patient e. g severe pain or grade 3 or 4 varicocele for fearing of damage of the testis (fig.1&2).

***Statistical Analysis:***
Data were collected, revised, coded and entered to the Statistical Package for Social Science (IBM SPSS) version 20. The qualitative data were presented as number and percentages while quantitative data were presented as mean, standard deviations and ranges when their distribution found parametric. Chi-square test were used to compare between both groups. The p-value was considered significant if < 0.05.

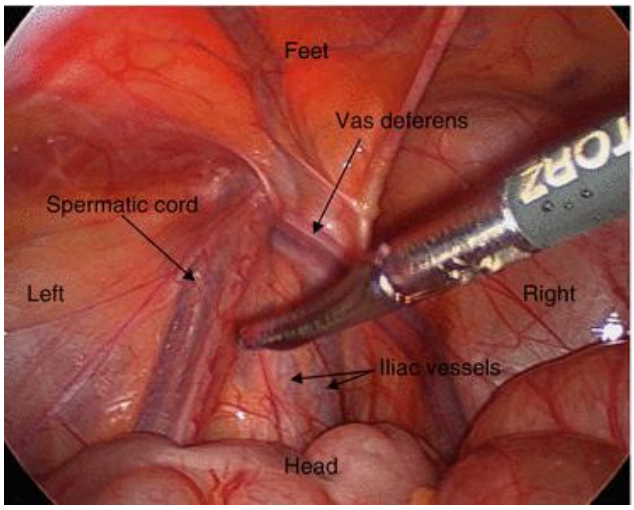


**Figure 1:** Laparoscopic varicocelectomy

**Figure 1:** Open varicocelectomy

## 3. Results

A total of 40 patients enrolled in this study, their median of age was 14 years and ranged from 11 – 16 years. Regarding side of affection, left side was affected in 28 (93.3%) patients, bilateral side was affected in 2 (6.7%) patients as shown in table 1.

**Table 1:** Distribution of studied patients regarding side of affection

| Cases / Side | Cases (n=30) | |
|---|---|---|
| | No | % |
| Left side | 28 | 93.3% |
| Right side | 0 | 0% |
| Bilateral | 2 | 6.7% |

Regarding grades of varicocele, grade 1 present in 10 (33.3%) patients, grade 2 in 5 (16.7%), grade 3 in 5 (16.7%) and there were 10 (33.3%) patients have subclinical varicocele as shown in table 2.

**Table 3:** Distribution of studied patients regarding grade of varicocele

| Cases / Grade | Cases (n=30) | |
|---|---|---|
| | No | % |
| Subclinical | 10 | 33.3% |
| Grade 1 | 10 | 33.3% |
| Grade 2 | 5 | 16.7% |
| Grade 3 | 5 | 16.7% |

Considering follow up of volume changes in patients with varicocelectomy and conservative treatment at 3 months, 4/5 (80%) and 22/25 (88%) patients have volume greater than 20cm, respectively. At 6 months, 2 (40%) and 20 (77.3%)

patients have volume greater than 20, respectively. However, at 12 months, 17 (76%) patients with conservative treatment only have volume greater than 20. There was significant difference between patients with varicocelectomy and conservative treatment at 6 and 12 months (p <0.001) (Table 3).

**Table 3:** Comparison between Conservative treatment and varicocelectomy regarding volume changes at 3, 6 and 12 month follow up

| % Vol. Change \ Management | | varicocelectomy (n=5) | Conservative (n=25) | P value |
|---|---|---|---|---|
| | | No (%) | No (%) | |
| 3 months | Less than 20 | 1 (20%) | 3 (12%) | 0.427 |
| | Greater than 20 | 4 (80%) | 22 (88%) | |
| 6 months | Less than 20 | 3 (60%) | 5 (22.7%) | < **0.001*** |
| | Greater than 20 | 2 (40%) | 20 (77.3%) | |
| 12 months | Less than 20 | 5 (100%) | 6 (24%) | < **0.001*** |
| | Greater than 20 | 0 (0%) | 17 (76%) | |

*p value is significant

Regarding outcome in patients managed by varicocelectomy, mean of operation time and hospital stay were 35.27 minute and 1.13 day and all patients improved without complications (Table 4).

**Table 4:** Outcome of patients managed by varicocelectomy

| Varicocelectomy \ Outcome | Varicocelectomy (n=5) | |
|---|---|---|
| | Mean / No | SD / % |
| Operation time (minute) | 35.27 | 5.31 |
| Hospital stays (day) | 1.13 | 0.07 |
| Improvement | 5 | 100% |
| Complications | 0 | 0% |

Regarding outcome in patients managed by Conservative treatment for 3 month up to 1 year, improvement occurred in 6 (24%) cases while surgical interference needed in 19 (76%) patients without complications in all cases (Table 5).

**Table 5:** Outcome of patients managed by Conservative treatment

| Conservative Treatment \ Outcome | Conservative treatment (n=25) | |
|---|---|---|
| | No | % |
| Improvement | 6 | 24% |
| Surgical interference | 19 | 76% |
| Complications | 0 | 0% |

## 4. Discussion

Adolescents with varicocele are heterogeneous, have rapidly changing hormonal levels, and may present at different stages of physical and pubertal development (**Glassberg et al., 2010).** For this reason, a standard approach for evaluation, management, and outcome assessment in these patients may not be possible, and considerable debate remains regarding these issues. Therefore, the current challenges in the management of varicocele lie in determining which patients to treat, when to initiate the treatment, and what type of treatment is the best (**Mehta et al., 2013).**

A total of 40 patients enrolled in this study, their median of age was 14 years and ranged from 11 – 16 years. In the same line, mean patient age of adolescents presented with varicocele in the study of **Moursy *et al.* (2014)** was 14.3 years, which is near our results. Also, in the study of **Calderón *et al.2* (016)** to Evaluate testicular growth after varicocele treatment in early childhood and adolescence, 69 patients with a median age of 14 years (7-19) were studied.

In our study, regarding side of affection, left side was affected in 28 (93.3%) patients, bilateral side was affected in 2 (6.7%).

In the study of **Kanté *et al.* (2019**), From the 10310 children and adolescents examined, 503 or 4.8% had varicocele, with 28.2% of children and 71.3% of adolescents. The mean age of students was 11.5 years, ranging from 6 to 17 years. Varicocele was left sided in 87.7% of cases and a prevalence of varicocele grade II and III with 65% and 23% of cases was noted.

The predominance of left sided varicocele is noted in many studies including those of **Fiogbé *et al.* (2013)** and **Paisant-Thouveny *et al.* (2019)** found that all patients in their respective series had left varicocele. The left spermatic vein drains into the left renal vein with an acute angle, in contrast to the right spermatic vein which drain directly in the Inferior Vena Cava, making it less likely to be affected by a primary varicocele.

In our study, 25 (83.3%) patients managed by conservative treatment while 5 (16.7%) patients needed surgical varicocelectomy due to grade 3 refluxing varicocele. Considering follow up of volume changes in patients with varicocelectomy and conservative treatment at 3 months, 4 (80%) and 22 (88%) patients have volume greater than 20, respectively. At 6 months, 2 (40%) and 20 (77.3%) patients have volume greater than 20, respectively. However, at 12 months, 17 (76%) patients with conservative treatment only have volume greater than 20. There was significant difference between patients with varicocelectomy and conservative treatment at 6 and 12 months (p <0.001). Regarding outcome, all patients improved without complications. in patients managed by Conservative treatment, improvement occurred in 6 (24%) cases while surgical interference needed in 19 (76%) patients without complications in all cases.

In a systemic review done by **Locke *et al.* (2017**), about Treatment of Varicocele in Children and Adolescents. Improvement was prominent with surgical intervention. Varicocele treatment improved testicular volume (mean difference 1.52 ml, 95% confidence interval [CI] 0.73–2.31)

and increased total sperm concentration (mean difference 25.54, 95% CI 12.84–38.25) when compared with observation. Open surgery and laparoscopy may have similar treatment success. A significant decrease in hydrocele formation was observed in lymphatic sparing versus non–lymphatic sparing surgery (p = 0.02). Our findings are limited by the heterogeneity of the published data, and a lack of long-term outcomes demonstrating sperm parameters and paternity rates.

Also, **Moursy *et al.* (2016)** concluded that, all adolescent varicocelectomy in the study were associated with a higher percentage of patients showing testicular catch-up growth, all semen analysis reported normal except one.

## 5. Conclusion

Early evaluation and timing intervention is very important in pediatric varicocele based on the practical guidelines and assessment for all patients with varicocele. The majority of cases who managed by conservative treatment needed for varicocelectomy to avoid testicular injury and future infertility.

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