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Dilemma of adolescent varicocele: Long-term outcome in patients managed surgically and in patients managed expectantly

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Abstract *Objective:* To evaluate outcomes of adolescent varicocele in the case of surgical versus conservative management.
Methods: 173 adolescent patients presenting with varicocele were evaluated clinically and sonographically to define varicocele grade and testicular volume. The patients were divided into 2 groups: A (53) with testicular size discrepancy >20% and bilateral varicoceles; B (120) unilaterally affected patients with testicular size discrepancy <20%, who were randomly allocated into 2 equal sub-groups (B1 & B2) of 60 patients. Group A & B1 patients underwent 3× loupe magnified inguinal varicocelectomy while B2 patients were conservatively managed.
Results: Mean patient age was 14.3 years with mean testicular volume of 11.75 mL and 10.15 mL for right and left testicles, respectively. There were no significant differences between sub-groups B1 & B2 for age, mean testicular volume, size discrepancy and varicocele grade. Mean follow-up of group A & B1 patients was 78 months showing grade I varicocele recurrence (4 cases), catch-up growth in 70% of cases and normal semen analysis in all cases. Mean follow-up of group B2 patients was 79 months showing catch-up growth in 50% of cases and normal semen analysis in all but 1 case. Four cases were shifted to surgical treatment due to reduction of testicular size (2 cases), varicocele upgrade (1 case) and oligoasthenospermia (1 case). At the last follow-up, the mean testicular volume for groups A, B1 & B2 was 16.2, 16.45 & 16.3 mL for right testes and 14.7, 15.6 & 15.2 mL for left testes, respectively. There was significantly better catch-up growth in sub-group B1 compared to B2 but the testicular volume was not statistically different.
Conclusions: Although adolescent varicocelectomy was associated with a higher percentage of patients showing testicular catch-up growth, the mean testicular volume was not significantly different. Further studies are needed to report on paternity among those patients.
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Introduction & objective

Varicocele is a relatively common condition affecting 15–39% of adult males [1,2], and it may be associated with oligoasthenospermia in 30%–50% of them [3,4]. In adolescents, there is an incidence of 7.8% in 11–14 year olds and 14.1% in 15–19 year olds, with observed varicocele-related testicular atrophy in 9.3% of the affected 15–19-year-old patients [5].

However, controversy still exists regarding the best line of managing adolescent varicoceles. Some authors recommend early surgical intervention to preserve fertility [6,7] while others still prefer conservative management based upon the reported testicular catch-up growth in some series [8] Moreover, controversy still exists regarding the indications for surgery. This debate is mainly attributed to two points. First, the exact mechanism by which varicocele can affect spermatogenesis is not clearly defined and, second, the data of semen analysis and pregnancy rate are frequently not attainable in adolescents.

This work aims at assessing the long-term outcome of adolescent varicocele in patients managed surgically and in those under conservative treatment, in terms of testicular catch-up growth and semen parameters.

Patients and methods

Patients

Between March 2004 and March 2007, 173 adolescents were detected to have varicoceles at a mean age of 14.3 (12–16 years) years. Varicoceles were clinically graded as grade I, II and III by two urologists (E. Moursy & A. Baday), according to the system of Dubin and Amelar: grade I (G I) → palpable with Valsalva, grade II (G II) → palpable without Valsalva, and grade III (G III) → visible [9]. Patients were sonographically evaluated by an attending ultrasonographer (M. Mourad) with color Doppler ultrasonography and scrotal ultrasonography recording the testicular volume and calculating size discrepancy using the formula: [(size of uninvolved testis) − (size of involved testis)]/(size of uninvolved testis) × 100%.

The patients were divided into 2 groups based upon case evaluation, with group A (53 cases) including patients with testicular size discrepancy >20% (42 left sided varicoceles and 11 cases with bilateral varicoceles); and group B (120 cases) including unilaterally affected patients with testicular size discrepancy <20%. Our protocol was to surgically manage all group A patients being operated only on the left (more affected) side in bilateral cases, while group B patients were randomly allocated into 2 equal sub-groups (using computer-generated random numbers) of 60 patients, each based upon the line of management, with a surgically managed sub-group (Group B1) and a conservatively managed sub-group (Group B2). The study was performed after Ethics Committee approval in our institute in addition to an informed consent being taken from all patients' parents. Patients' characteristics are shown in Table 1.

Management

The surgically managed patients underwent inguinal varicocelectomy aided by ×3.0 loupe magnification. The technique was performed through a 2–4 cm inguinal incision passing through the external oblique aponeurosis to ligate the external and internal spermatic veins sparing the testicular artery, vas and lymphatics.

Group B2 patients were conservatively managed with follow up according to the scheduled protocol.

Follow-up

All patients were evaluated every 3 months during the first year and then every 6 months. They were examined clinically, with scrotal ultrasonography and color Doppler ultrasonography to record varicocele persistence, recurrence (in Groups A & B1) or varicocele upgrade (in group B2), and calculate testicular volume and size discrepancy. Catch-up growth was defined as absence or reduction of testicular size asymmetry.

At the age of 18 years, assessment of FSH level and semen parameters was performed 4 successive times with a six month interval in patients of both groups.

Statistical analysis

Data were expressed as the mean, SD and range. Chi-square tests were performed to compare the measured outcomes using SPSS 16.0 (SPSS, Chicago, IL, USA) software, with $p < 0.05$ considered statistically significant.

Results

At presentation, the patient characteristics of groups B1 & B2 demonstrated no significant differences between the sub-groups for age, mean testicular volume, size discrepancy and varicocele grade ($p < 0.05$) (Table 2).

Table 1 Patients' characteristics at presentation.

		Group A	Group B1	Group B2	Total
No. of Patients		53	60	60	173
Mean age (range)		14.4 (12–16 y)	14.4 (12–16 y)	14.2 (12–16 y)	14.3 (12–16 y)
Varicocele grade	G III	38	27	26	91
	G II	15	33	34	82
Mean testicular volume	Right	11.69 (±2.372)	11.72 (±2.254)	11.85 (±2.365)	11.75 (±0.085)
	Left	9.31 (±2.113)	10.51 (±2.143)	10.62 (±2.278)	10.15 (±0.72)

Table 2 Size discrepancy and varicocele grade at presentation in groups B1&B2.

Size discrepancy	Patients (*n*)	Line of management					
		Surgery			Conservative		
		G II	G III	Total	G II	G III	Total
<15%	55	12	15	27	13	15	28
No size asymmetry	65	21	12	33	21	11	32
Total	120	33	27	60	34	26	60
		60			60		

Patients managed surgically (A & B1 = 113 cases)

The mean follow up period was 78 months (range 60–90 months). There was no varicocele persistence at the initial 3-month visit but asymptomatic grade I retrograde flow pattern was detected in 4 patients (2 in group A and 2 in group B1) demonstrated by color Doppler ultrasonography under Valsalva's maneuver.

They were managed conservatively with no observed change in varicocele grade, testicular size or consistency till the last follow-up visit.

Catch-up growth was observed in 70% (37 out of 53 cases) and 74% (20 out of 27 cases) in group A and B1, respectively; with absence and reduction in the degree of testicular size asymmetry in 23 and 14 cases of group A patients and in 13 and 7 cases of group B1 patients, respectively. The remaining patients in both groups showed no decrease in volume or change in consistency in comparison with preoperative findings. Catch-up growth was not significantly different among patients with preoperatively different varicocele grades (Table 3).

At the last follow-up visit, the mean testicular volume for groups A and B1 patients was 16.2 mL + 3.11 and 16.45 mL ± 3.321 (range 10–21) for the right testes and 14.7 mL + 3.08 and 15.6 ± 2.945 mL (range 9–20 mL) for the left testes, respectively. FSH level and semen parameters were normal in all patients according to World Health Organization criteria. No postoperative hydrocele was reported in our series.

Patients managed conservatively (B2 = 60 cases)

The mean follow-up period was 79 months (range 62–91 months). Catch-up growth was observed in 14 out of 28 cases (50%) with absence and reduction in the degree of testicular size asymmetry in 8 and 6 cases, respectively. The rate of catch-up growth was significantly better in patients with G II versus G III varicocele (Table 4).

Three cases were shifted to surgical intervention due to progressive reduction of testicular volume to have a size discrepancy of more than 20% (2 cases) and upgrading of varicocele grade from G II to G III (1 case). These 3 cases passed an uneventful postoperative course and follow-up period with normal semen parameters later. At the last follow-up visit, the mean testicular volume was 16.3 mL + 3.31 (range 10–20) and 15.2 ± 2.8 mL (range 9–19 mL) for the right and left testes, respectively. FSH level and semen parameters were normal in all cases but one, who showed oligoasthenospermia with elevated FSH level. He was managed surgically showing postoperative normal sperm motility although sub-normal count of 17 million/ml.

On comparing the outcomes in groups B1 & B2, we found significantly better catch-up growth in the surgically managed patients (74% versus 50% of cases in B1 & B2, respectively) (p value < 0.05). However, there was no statistically significant difference in the mean testicular volume at the last follow-up visit.

Discussion

Adolescent varicocele is usually a progressive disease with a possible duration-dependent decline in testicular function and hence fertility potential. The incidence over time of varicocele-related testicular atrophy was reported to increase from 0% in affected children younger than 11 years to 7.3% in affected males between 11 and 14 years, then 9.3% in 15–19 year olds [5].

Managing adolescent varicoceles is still not standardized with reported series for both conservative and surgical management. In this study, we report the long-term outcome of 2 groups of patients managed surgically and conservatively.

In order to have symmetrical groups of patients, comparative analysis only included patients with unilateral varicocele and size discrepancy <20%.

Table 3 Catch-up growth in group B1 patients.

Size discrepancy	Patients with size discrepancy at presentation		Patients showing catch-up growth after surgical treatment	*P* value
27/60	G III	15	11/15 (73.3%)	>0.05
	G II	12	9/12 (75%)	
Total	27	27	20/27 (74%)	

Table 4 Catch-up growth in patients managed conservatively (group B2).

Size discrepancy	Patients with size discrepancy at presentation		Patients showing catch-up growth after conservative treatment	*P* value
28	G III	15	7 (40%)	<0.05
	G II	13	8 (61.5%)	
Total	28	28	14 (50%)	

Patients with bilateral varicoceles and those with testicular size discrepancy >20% were managed surgically from the start.

Paduch and Skoog summarized the indications for surgical intervention to be testicular growth arrest of more than 2 mL difference between left and right testicles, abnormal semen analysis, symptomatic varicocele and bilateral varicoceles [10].

Many surgical techniques have been described to ligate the varix veins, either retroperitoneally as described by Palomo [11] or inguinally at the internal inguinal ring according to the technique of Ivanissevich [12] or subinguinally as popularized by Goldstein et al. [13]. Additionally, sclerosing or embolizing the afflicted vessels can be used for management [14].

In our series, inguinal varicocelectomy with loupe magnification was chosen to manage our patients. This technique allows easy and rapid access to the spermatic cord structures and enables ligation of both internal and external spermatic veins. Although minimally invasive with a low risk of testicular atrophy, quick recovery, and minimal pain, percutaneous sclerotherapy was not preferred to manage our patients due to the relatively high recurrence rates of 9%—26% in addition to testicular radiation exposure and high cost [14,15].

Sheynkin et al. recommended the inguinal approach in prepubertal boys because the artery is so small, and suggested the subinguinal approach in postpubertal adolescents [16]. Gontero et al. also recommended an inguinal rather than subinguinal approach when a magnifying loupe is used due to easier preservation of the artery and a reduced incidence of persistent pathologic vein reflux [17].

Loupe magnification allows meticulous dissection of the spermatic cord structures to ligate all internal and external spermatic veins while sparing the testicular arterial blood flow and lymphatic channels. Loupe was chosen as the modality of magnification as it is more familiar to urologists with no need for microsurgical experience or surgical microscope. Hsieh et al. stated that loupe magnification is sufficient for reliable identification of the testicular artery and lymphatic system, as well as visualization and dissection of small branches of the internal spermatic veins and vasal veins [18].

Testicular catch-up growth was found in about 70% of the surgically managed patients. The rate of catch-up growth was not significantly different when correlated to the preoperative varicocele grade. In agreement with our findings, Seo et al. [19] and Zampieri et al. [20] independently reported catch-up growth in 65% and 80% of their patients, respectively, demonstrated 18—24 months postoperatively.

Group B2 patients were managed conservatively and they were meticulously observed for evidence of disease progress. Testicular catch-up growth was reported in 50% of cases, being significantly better in G II versus G III patients. Similarly, Skoog et al. [21], Steeno et al. [22] and Paduch et al. [23] all independently noticed a smaller ipsilateral testis in boys with high-grade varicocele.

Testicular size reduction was observed in 2 G III patients while varicocele upgrade was observed in 1 case. These 3 cases were shifted to surgical treatment. Preston et al. could demonstrate physiological testicular "catch-up" growth in only 7 out of 14 adolescent boys with varicoceles and considerable testicular size discrepancy, and they recommended surgical intervention in patients showing increasing size discrepancy on follow up [8].

Semen analysis and FSH level were normal in all group A & B1 patients while oligoasthenospermia and a raised FSH level were reported in one of the group B2 patients. Lenzi et al. also reported significantly higher seminal parameters after early left adolescent varicocelectomy as compared to controls who still had varicocele [6]. However, it was impossible to prove that surgical management has improved semen analysis parameters due to a lack of pre-management data.

In our series, pregnancy data are still not available and a longer follow-up period is needed to report paternity outcomes among our patients. In their interesting study presented at the EUA (European Urologic Association) meeting 2012, Orye et al. reported no difference in paternity between operated and un-operated boys [24]. We think more studies are necessary to correlate between paternity and line of management in patients with adolescent varicoceles.

Conclusion

After adolescent varicocelectomy, a higher percentage of patients are expected to show testicular catch-up growth than after observational treatment, although the mean testicular volume may remain not significantly different. Further studies are still needed to define the correlation between the line of management and paternity among those patients.

Conflict of interest

None.

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