Adolescent Varicocelectomy—Is the Potential for Catch-Up Growth Related to Age and/or Tanner Stage?

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Purpose: Adolescent varicocelectomy is associated with a 70% incidence of postoperative catch-up growth in boys with ipsilateral testicular hypotrophy. We determined whether preoperative patient age and Tanner stage were related to subsequent catch-up growth. In other words if patients are followed with a period of observation, will a window of opportunity be lost for achieving catch-up growth?

Materials and Methods: We studied a total of 163 boys (mean age 15.1 years, range 10 to 24) with left or bilateral varicoceles who demonstrated 10% asymmetry or greater preoperatively, and had preoperative and postoperative testicular volume measurements available (using either ring orchidometer or ultrasound). Of these patients 59 also had preoperative Tanner stage recorded.

Results: Of the patients with preoperative left hypotrophy 69% had achieved catch-up growth at last followup (mean followup 28 months). When treated as a continuous variable, or when divided into general prepubertal vs postpubertal groupings, age at surgery was not significantly associated with catch-up growth. Similarly, there was no significant difference in catch-up growth associated with grade of varicocele, duration of postoperative followup or presence of unilateral left vs bilateral varicocele. No association with Tanner stage was found, although the patient numbers were too small to draw any statistically significant conclusions.

Conclusions: The prevalence of testicular catch-up growth after varicocelectomy is high, even for patients in their early 20s. Among males 10 to 24 years old there is no specific age or Tanner stage that offers the best opportunity for catch-up growth.

Key Words: adolescent; spermatic cord; testis; urologic surgical procedures, male; varicocele

VARICOCELES occur in 15% to 20% of adolescent boys, and in approximately 70% of affected adolescents there is associated ipsilateral testicular hypotrophy.[1–7] Additionally, up to 40% of subfertile men have a varicocele and less than half will achieve paternity following varicocelectomy.[8,9] In adults with varicoceles those with ipsilateral hypotrophy are more likely to have abnormal semen parameters.[10]

The relationship between varicoceles, testicular hypotrophy and patient age at time of varicocelectomy has not been clearly elucidated. Akbay et al found that varicocele related testicular atrophy was higher in 11 to 19-

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year-olds than in younger children.[7] From these results they concluded that varicocele is a progressive condition, and its deleterious effects on ipsilateral testicular volume may peak at the time of puberty. Although past studies have demonstrated up to an 80% incidence of catch-up growth following varicocelectomy in adolescents, the association between catch-up growth according to age or Tanner stage has not been well described.[11,12]

We examined the prevalence of catch-up growth in adolescents following varicocelectomy as a function of age as well as Tanner stage at surgery to determine whether there is a critical period after which catch-up growth following varicocelectomy is reduced.

MATERIALS AND METHODS

With internal review board approval our adolescent varicocele registry was reviewed for patients who underwent varicocelectomy for the indication of 10% or greater preoperative testicular asymmetry, with left larger than right. To be included in the study, preoperative and postoperative measurements at a minimum of 6 months following surgery were required using the same modality (ie Takihara ring orchidometer or ultrasound). Measurement with orchidometer was more common earlier in the series, while the majority of patients evaluated later in the series had ultrasonographic measurements available. When both modalities were available for preoperative and postoperative assessment the ultrasound values were used for analysis. If ring orchidometry was used as the only preoperative volume assessment, for the purposes of this study the postoperative ring orchidometry volume was also used for analysis.

A total of 163 boys (mean age 15.1 years, range 10 to 24) fulfilled the study criteria. Percentage of asymmetry was determined by the formula, [(right testis volume − left testis volume)/right testis volume] × 100. Data such as laterality and grade of varicocele, age at surgery and surgical technique were also recorded. Varicoceles were defined as grade I—difficult to palpate but confirmed by Valsalva or decreased cord size when supine, grade II—easily palpable and grade III—visible.[13] Of the patients 58 also had preoperative Tanner stage recorded, and were included in the overall analyses as well as in a separate subset. No serum hormone levels or semen specimens were collected.

Varicocelectomy was performed by 1 pediatric urologist (KIG) using either a laparoscopic or open Palomo or Ivanissevich approach. Loop magnification was used during open procedures. Mean followup was 27 months (range 5 to 102) and consisted of history, physical examination and testicular volume measurement. The latter was obtained by scrotal ultrasound and/or Takihara ring orchidometer. The first postoperative volume measurement was performed at 6 months and subsequent measurements were taken every 1 to 2 years thereafter. Postoperative catch-up growth was defined as achieving a size differential between testes of less than 10% using the same measurement tool as used preoperatively.

Logistic regression was used to analyze the association between the dependent variable of achieving catch-up growth and various independent variables, including age at surgery, Tanner stage, unilateral vs bilateral varicocelectomy and laparoscopic vs open surgery. All statistical analyses were done using Excel® and SAS® statistical software.

RESULTS

Table 1 details preoperative patient characteristics and the associated prevalence of catch-up growth after varicocelectomy. Mean patient age was 15.1 years (range 10.1 to 23.7). Of the 163 patients 67% underwent unilateral left varicocelectomy and 33% underwent surgery on both sides. The majority of patients (71%) had a grade III varicocele. Of the patients 80% underwent laparoscopic varicocelectomy and the remainder underwent open surgery. Mean followup was 27 months (range 6 to 102).

At their last followup more than 69% of patients had achieved catch-up growth. None of the preoperative and postoperative variables listed in table 1, including age at surgery, months of postoperative followup, operative technique, varicocele laterality, grade, degree of preoperative asymmetry and Tanner stage, was significantly associated with catch-up growth on multivariate analysis. As outlined in table 2, patients undergoing unilateral vs bilateral varicocelectomy had similar prevalence of mean preoperative asymmetry (30.8% vs 26%), as well as similar catch-up growth postoperatively (68% vs 71.7%).

As shown in figure 1, when examined on an annual basis there was no significant difference in catch-up growth according to age at time of surgery. In addition, when ages were collapsed into various groups (eg younger than 13, 13 to 16 and older than 16 years) again no statistically significant difference was found.

As shown in table 1, of the 58 patients with recorded preoperative Tanner stage 72% were stage III or greater. Figure 2 illustrates the prevalence of catch-up growth postoperatively by Tanner stage group. There appears to be peaking of catch-up growth for patients undergoing surgery at Tanner stage III. However, assuming a 20% difference in catch-up growth between patients with Tanner stage I to III vs stage IV or V, patient numbers were too small to detect whether a statistically significant difference existed.

DISCUSSION

Varicocelectomy has become a common and safe procedure with few associated complications.[14] The goal of this procedure is to prevent further