Percutaneous Embolization of Varicocele in Children: A Canadian Experience

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Background/Purpose: The importance of early treatment of varicocele, to prevent testicular damage is widely accepted. Surgical treatment of varicocele has been the standard method of therapy, but recently a less invasive procedure was introduced and utilized mostly in Europe. The authors reviewed their experience with percutaneous embolization and sclerotherapy to assess the feasibility and outcome of this approach in children.

Methods: The authors conducted a retrospective study including all patients who underwent percutaneous embolization and sclerotherapy for varicocele in the authors’ institutions for the last 10 years. Clinical data, investigation, pre- and postintervention management, and the technique of the procedure, including sedation and anesthesia when needed, were collected from the charts. Follow-up was obtained from the chart or by phone.

Results: Between 1991 and 2001, 41 patients underwent 43 percutaneous interventions. The median age was 14 years (range, 10 to 20 years). All but 2 were injected with a sclerosing agent; in 26 cases coils were added. All procedures except one were done under local anesthesia with sedation. Only 2 patients were admitted overnight, and 5 patients had minor complications. The average procedure time was 55 minutes. Follow-up data were obtained in 39 patients (95%), with a mean follow-up of 22 months. A total of 89.1% of those who were injected have satisfactory results (cured or improved) without the need for further procedures. Six patients required surgery post-percutaneous procedure, 4 because of persistent or recurrent varicocele and 2 because of technical failure.

Conclusions: Percutaneous embolization is a safe and effective treatment of varicocele in children with technical success in 95% and therapeutic success in 89%. It now is the authors’ first treatment modality for this disease.

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INDEX WORDS: Pediatric varicocele, spermatic venography, percutaneous embolization, spermatic embolization, spermatic coils.

The importance of early treatment in childhood varicocele to prevent testicular damage and infertility is widely accepted.1-4 Surgical treatment of varicocele is the standard method of therapy, but a less invasive procedure was introduced and utilized mostly in Europe. Experience with percutaneous embolization and sclerotherapy in North America is small and includes mostly an adult population. We reviewed our experience to assess the feasibility and results of this approach in children.

Materials and Methods

This is a retrospective study including 41 patients who underwent 43 percutaneous embolizations and sclerotherapy between 1991 and 2001. Clinical data, investigation, pre- and postintervention management, and the technique of the procedure, including sedation and anesthesia when needed, were collected from the charts. Follow-up data were obtained from the chart or by phone. The technical details are listed in Table 1.

Results

This review includes 41 patients who underwent 43 percutaneous interventions in our institution. The median age was 14 years (range, 10 to 20 years). The diagnosis was based on physical examination alone in 23 patients, whereas ultrasound evaluation was obtained in 18 patients to confirm the clinical impression. Two patients were not injected at all because of failure to visualize gonadal vessels. Two were reinjected, 1 for persistent disease after high ligation and 1 because of dyskinetic movements (as a side effect of one of the medications used for sedation) in a patient who was found to be epileptic. This had led to the postponement of the procedure, which was repeated eventually without any problem.

Angiography results showed venous anomalies or collaterals in 15 patients. Four of those had failed injection, 2 for technical reasons and 2 as a result of unsuccessful embolizations. In 26 patients, coils were added to sclerosing agents; 20 of them were cured. All procedures except one were done under local anesthesia with sedation. Only 2 patients were admitted overnight. The av-
The percutaneous approach now has become the preferred treatment modality for varicocele in children in our institution. In cases of persistent disease, the average procedure time was 55 minutes (range, 14 to 135 minutes), and the mean hospital stay was 5 hours (range 4 to 6.5 hours). Follow-up was obtained in 95% with a mean of 22 months (range 6 to 96 months). A total of 89.1% of those who were injected had satisfactory results (cured, 78.3% or improved, 10.8%) without the need for further procedures. Six patients required surgery post--percutaneous procedure, 4 because of persistent or recurrent varicocele and 2 because of technical failures.

Five patients (12%) had minor complications including pain, induration, extravasation of contrast, dyskinetic movement, and vasovagal attack. There were no major complications and no secondary hydrocele.

DISCUSSION

The introduction of minimally invasive management has added a new dimension to the treatment modality of varicocele. Many investigators have reported their experience with the percutaneous occlusion of varicocele and found that it is a simple and successful approach that could be performed without general anesthesia on an outpatient basis.5,6

Percutaneous occlusion was feasible in 39 of 41 patients (95%). This technical success compares favorably with other series.7,9 The average total procedure time was 55 minutes, which is comparable with previous reports.5 This indicates that it is relatively quick when compared with the time needed in the operating room with general anesthesia. Some investigators report their experience with the inguinal approach under local anesthesia with similar procedure time (56 ± 14 minutes) in adults.10 However, the advantage of the percutaneous approach over inguinal approach is the complete elimination of possible damage to the vas or the arterial supply of the testis. The mean hospital stay was 5 hours but this can be shortened based on the experience of the institution and the observation protocol.

In comparison with 11% to 15% complication rate reported with the surgical approach,5 12% of our group had only minor complications. Two patients required admission overnight, 1 because of persistent scrotal pain and 1 because of dyskinetic movement secondary to the sedative that was used.

Of the 4 patients who had persistent disease, three did not have coils added. For this reason coils have been added more recently in all of our patients. Seventy-eight percent of our group were cured, and 10.8% were improved to the point of not needing further procedure as decided by the patients and the treating physician. This is comparable with other series.6,11,12 All of those who improved were reported to have minimal residual disease shown only by valsalva maneuver (grade I). Treatment failure was observed in 10.8% of patients. This compares favorably with the series of open surgical approaches (16% to 28%),8,13-15 and similar to the results reported with percutaneous approaches (4% to 11%).11

Of the 4 cases in which sclerotherapy did not work, 3 underwent inguinal varicocoelectomies, and 1 had laparoscopic ligation of the gonadal vein and artery, which is our second option after unsuccessful percutaneous technique. Two patients had technical failure (4.8%) both caused by the presence of circumaortic renal vein.17 One of these 2 underwent successful inguinal renal vein and the other one persisted after high ligation.

In recurrent or persistent disease, the percutaneous approach was reported to be successful in 96% of those who had surgery as the primary procedure and in 61% of those who had had previous percutaneous injection.11,17,18 In our series, 2 patients had undergone surgical ligation before to the percutaneous embolization; one of them was cured and the other improved.

Testicular Doppler is not routinely used in the follow-up in our practice, and, as a result, we do not have a precise tool to report on the testicular volume. However, based on clinical evaluation and subjective evaluation by the patients, only 5 (12.8%) have smaller testes on the affected side. Semen analysis cannot be used routinely in children, but previous reports have documented similar or even better results in adults with the percutaneous technique in comparison with the different surgical approaches.17,19

Table 1. The Protocol for Percutaneous Embolization of Varicocele in Children and Adolescents

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
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<tbody>
<tr>
<td>1.</td>
<td>Intramuscular sedation with Toronto cocktail (lactargite, demerol, phenergan). 1 mL/kg maximum of 1.6 mL/kg.</td>
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<td>2.</td>
<td>Infiltration of the right groin with 1% xylocain without epinephrine, maximum 5 mg/kg.</td>
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<td>3.</td>
<td>Catheterization of the femoral vein with Seldinger technique.</td>
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<td>4.</td>
<td>Canulation of the renal vein and opacification of the gonadal vessel.</td>
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<tr>
<td>5.</td>
<td>Canulation of the gonadal vessel and passage of the catheter distally beyond the sacro-iliac joint with or without coaxial technique.</td>
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<tr>
<td>6.</td>
<td>Injection to verify the presence of collateral veins.</td>
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<tr>
<td>7.</td>
<td>Advancement of the catheter beyond any collateral and injection of 2 to 4 mL of 3% thrombovar (sodium tetradecyl sulfate).</td>
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<tr>
<td>8.</td>
<td>Embolization with one or more coils proximally.</td>
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<td>9.</td>
<td>Wait for 10 minutes then repeat venography to verify the occlusion of the vessels.</td>
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<td>10.</td>
<td>Remove all catheters and apply pressure for 10 minutes.</td>
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<td>11.</td>
<td>The patient is kept in the observation room lying flat for 2 hours with neurovascular signs checked each 30 minutes.</td>
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<td>12.</td>
<td>Removal of the dressing</td>
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<td>13.</td>
<td>Normal activity the first day postprocedure and no sports for 1 week.</td>
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<tr>
<td>14.</td>
<td>First follow-up directly with the referring surgeon in 2 months.</td>
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venogram is first reviewed to assess the feasibility of repeating the procedure or proceeding to laparoscopic ligation.

Percutaneous occlusion is a feasible, safe, quick, and a cost effective procedure with minimal morbidity for the treatment of varicocele in children.

REFERENCES