Medical audit

Retrograde embolisation of varicocele in the paediatric age group: a review of 10 years' practice

C Sivanathan, LJ Abernethy

Department of Radiology, Royal Liverpool Children's Hospital, Liverpool, UK

Objective: To review the 10 years' practice of retrograde embolisation of varicoceles in the paediatric age group.

Patients and Methods: 40 boys (age range, 6–16 years), with varicocele diagnosed both clinically and sonographically, were referred to the radiology department for embolisation. Data of these patients were collected and analysed retrospectively. Patients' age, side, treatment, complications, and outcome were noted. The follow-up ranges from 2 months to 6 years (mean, 1.1 years).

Results: In 24 patients (60%), embolisation was successful at the first attempt and 11 procedures (27.5%) were technical failures; 4 patients (10%) after venography were considered non-embolisable. One patient (2.5%) is yet to be seen in the clinic. Recurrence occurred in 4 patients (10%) of whom 3 had successful repeat embolisation. One patient with a recurrent varicocele did not wish further treatment. Out of the 11 failures, 5 underwent repeat embolisation with success in 3 patients and failure in two. Four patients had successful surgical ligation and 2 patients were treated conservatively. All who were non-embolisable were treated successfully by surgery. Our overall success rate was 65% ($n = 26$).

Conclusions: These results suggest that embolisation is valuable as a first line of treatment for paediatric varicoceles provided a skilled interventional radiologist is available. This procedure is less invasive, avoids general anaesthetic, involves minimal postoperative pain, and allows an earlier return to normal activities. However, 35% of patients did eventually require conventional surgery for primary failure of embolisation or late recurrence.

Key words: Varicocele – Therapeutic embolisation – Outcome

Conventional treatment of varicoceles is by surgical ligation. Multiple techniques have been advocated including varicocelectomy, low ligation, high ligation, and laparoscopic ligation. Over the past two decades, the trend has moved towards embolising the varicocele as a primary treatment. Retrograde embolisation of varicocele is a safe and minimally invasive procedure that can be done as a day-case with very low morbidity. The results are very much comparable to surgery. Venography helps to determine the anatomical reason for varicocele. It is either due to

incompetent valve with venous reflux into internal spermatic vein or due to aberrantly fed vessels (anomalous veins), in which case venous reflux may not be present.

Patients and Methods

A total of 40 boys, age ranging from 6–16 years (mean, 13.06 years), have been treated for symptomatic varicoceles at the Royal Liverpool Children's Hospital by retrograde embolisation using coils by a single interventional radiologist over a

Correspondence to: LJ Abernethy, Consultant Radiologist, Royal Liverpool Children's Hospital, Alder Hey, Liverpool L12 2AP, UK
Tel: +44 151 252 5007; Fax: +44 151 252 5533; E-mail: laurence.abernethy@rlch-tr.nwest.nhs.uk

period of 10 years (1992–2001). Data were collected and analysed retrospectively. Patient's age, side, clinical presentation, treatment, complication, follow-up and outcome were noted. All of them had left-sided varicocele, confirmed by pre-operative Doppler ultrasonography, which showed typical blood flow on Valsalva manoeuvre. All of them underwent venography of left renal vein to check the retrograde filling into internal spermatic vein. Through the right femoral vein, a Cobra II catheter was introduced and contrast injected after manoeuvring into left renal vein. Those who demonstrated retrograde filling into the internal spermatic vein had embolisation done using complex helical platinum coils (Target Coils, Boston Scientific, St Albans, UK), introduced through a tracker microcatheter. Patients who did not demonstrate retrograde filling were not embolised. Patients were followed up from a period of 2 months to 6 years (mean, 1.1 years).

Results

Embolisation is deemed successful in patients who became symptom-free and/or in whom a reduction in size of the varicocele was demonstrated. Out of 40 patients, 24 (60%) had successful embolisation in the first attempt and 6 patients were considered success after repeat embolisation (out of 6 patients, 3 were recurrence from primary successful embolisation).

Of the total, 11 patients (27.5%) were considered unsuccessful: 5 underwent repeat embolisation with 3 successes, 4 had successful surgical ligation, and 2 patients were treated conservatively.

Four patients (10%) were declared non-embolisable after spermatic venography; none of them demonstrated venous reflux. One had a complex venous anomaly in addition, making selective catheterisation of the spermatic vein impossible. All of them underwent surgical ligation, which was successful in 2 and one was a failure. One patient's follow-up details were not available. One patient (2.5%) is yet to be seen in the clinic.

Four patients (10%) had recurrence: 3 of them had successful repeat embolisation and one patient declined further treatment. Recurrences occurred over the period of 2 months to 3 years (mean, 1.7 years). In our study group, the reasons for recurrences are either due to collateral formation, which bypasses the emboli or due to recanalisation.

Complications were noted in 3 patients (7.5%).

1. Migration of coil to right atrium which was captured and removed immediately by amplatz snare.
2. Right leg pain (femoral puncture done on that side) during follow-up. Venogram and Doppler ultrasonography done subsequently were normal. Pain resolved spontaneously over a few days.
3. One patient developed abdominal pain during the procedure, probably due to spasm of spinal veins. The procedure was abandoned and rescheduled.

Discussion

Embolisation of varicocele is a safe procedure, which can be done under local anaesthesia as a day-case. The results are very much comparable to surgical ligation. It avoids general anaesthesia and postoperative surgical morbidity. The patient can go back to normal day-to-day activities the next day and use of analgesics is less. Hence, it is more cost effective.

Retrograde blood flow in the internal spermatic vein can be caused by either incompetent valves or increased pressure in left renal vein. This increased pressure is due to partial obstruction of renal vein or compression of vein between aorta and superior mesenteric artery.² Venous reflux can occur despite competent valve due to the presence of bypassing anastomosis. This is called aberrantly fed varicocele and it occurs in 17–19% of varicoceles.⁴ Embolisation of this is done, usually, successfully, but not as reliably as normally fed varicocele. Most of the recurrences and treatment failures (surgical or radiological) are due to either collaterals or venous anomalies. Selective venography offers a good demonstration of anatomy. This makes the treatment more effective and accurate. A non-invasive method (varicocele scintigraphy) using radioisotopes to identify the spermatic venous reflux has been reported,⁵ but not widely used.

Embolisation is being carried out through competent internal spermatic veins as well, in some centres,³ for patients with varicocele. In adults, infertility is one of the main reasons for treatment, others being dragging pain and cosmetic reasons. Many papers have compared the pre- and post-treatment sperm analysis and fertility rates. They have concluded that there has been an improvement in these parameters with treatment. In the paediatric age group, the main indications for treatment are symptomatic and cosmetic reasons. In infertile patients with varicocele, the issue of early treatment and its benefits are still debatable. The long-term effects of paediatric varicocele on subsequent fertility remain uncertain.

References

1. Feneley MR, Pal MK, Nockler IB, Hendry WF. Retrograde embolisation and the causes of failure in primary treatment of varicocele. *Br J Urol* 1997; **80**: 642–6.
2. Rivilla F, Casillas JG, Gallego J, Lezana AH. Percutaneous venography and embolisation of the internal spermatic vein by spring coil for treatment of the left varicocele in children. *J Paediatr Surg* 1995; **30**: 523–7.
3. Rooney MS, Gray RR. Varicocele embolisation through competent internal spermatic veins. *Can Assoc Radiol J* 1992; **43**: 431–5.
4. Marsman JW. The aberrantly fed varicocele: frequency, venographic appearance and results of transcatheter embolisation. *AJR Am J Roentgenol* 1995; **164**: 649–57.
5. Prenen JA, Van Dis P, Feijen HL. Varicocele scintigraphy: a simplified screening method for detection of spermatic vein reflux. *Clin Nucl Med* 1996; **21**: 921–7.
6. Clarke SA, Agarwal M, Reidy J. Percutaneous transfemoral testicular vein embolisation in the treatment of childhood varicocele. *Paediatr Radiol* 2001; **31**: 515–7.