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## Varicocele embolization with glue and coils: A single center experience

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### KEYWORDS

Varicocele;  
Percutaneous embolization;  
Male infertility;  
Glue;  
Metallic coil

### Abstract

**Purpose:** The purpose of this study was to compare metallic coils and glue (n-butyl-2 cyanoacrylate) for varicocele embolization, regarding immediate technical and clinical success, procedure time, complications and recurrence rates.

**Materials and methods:** A retrospective analysis of a consecutive series of varicocele embolization procedures performed between July 2012 and July 2015 was undertaken. A total of 129 procedures were performed, 26 using glue (20.2%; 26 men with a mean age of 32.6 years) and 103 using coils (79.8%; 103 men with a mean age of 32.3 years). Demographic data, indications, technique, procedure time, complications and outcomes were compared.

**Results:** A total of 89 procedures (69%) were motivated by infertility (glue = 20, coils = 69) and 40 (31%) by testicular pain (glue = 6, coils = 34). The mean procedure time was  $35.58 \pm 13.44$  (SD) min for glue and  $45.97 \pm 17.46$  (SD) min for coils ( $P = 0.0054$ ). Immediate technical success rate was 100% using glue and 99% using coils ( $P = 1.0000$ ). A single minor complication was observed after coil embolization (0.97%). Both materials showed significant improvement of semen parameters, with similar clinical success rates. For patients referred for testicular pain, clinical success rate was 66.67% using glue and 88.24% using coils ( $P = 0.2147$ ). Recurrence rate was 11.54% with glue and 5.83% with coils ( $P = 0.4000$ ). Procedure time was significantly shorter with glue ( $P = 0.0054$ ).

**Conclusion:** Glue and coils are both safe and effective for varicocele embolization. However, the use of glue yields shorter procedure time.

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Varicocele is a fairly common condition, with a reported incidence of 15% in the general male population and most frequently left-sided [1–3]. The World Health Organization (WHO) has reported a higher incidence of 25% in men with abnormal sperm analysis in a large study and varicocele is regarded as an important, treatable cause of subfertility [2,4,5]. It is also a frequent cause for chronic testicular pain and discomfort [5].

Surgical ligation and percutaneous embolization of the internal spermatic vein are the main therapeutic options for men with varicocele. By comparison with surgical ligation, percutaneous embolization is a cheaper and less invasive method, requiring only local anesthesia and allows visualization of the internal spermatic vein and possible collaterals [6–9]. Several embolic materials have been used, with coils being the most widely used and glue being increasingly accepted as an alternative [7–10]. However, studies that compared different embolic materials for embolization of varicocele are scarce [9].

The purpose of this study was to compare coils and glue (n-butyl-2 cyanoacrylate) for varicocele embolization, regarding immediate technical and clinical success, procedure time, complications and recurrence rates.

## Materials and methods

A retrospective analysis of a consecutive series of varicocele embolization procedures performed from July 2012 to July 2015 was made. Demographic data, indications, embolization technique, procedure duration, complications, clinical and analytical outcomes were recorded. The institution clinical records and procedure reports were searched for information. Patients without sufficient records were excluded, including those with loss of follow-up. This work followed the principles stated in the Helsinki declaration and IRB approval was not required in our institution for this retrospective research.

## Patients

All procedures were performed on patients with left-sided varicoceles, confirmed by the results of Doppler ultrasound studies, which were referred in the context of infertility or persistent testicular pain. Ultrasound criteria for the diagnosis consisted in dilated pampiniform plexus veins (caliber > 3 mm) in the supine position with reflux assessed by Doppler evaluation, using the Valsalva maneuver if not spontaneous [11,12]. The simultaneous presence of vein dilatation and reflux was required for diagnosis of varicocele. The patients treated for infertility attended several appointments with an institution's urologist for evaluation, performed sperm analysis and showed no significant changes in the sperm analysis with the usual diet and lifestyle changes, prior to the procedure. The patients treated in the context of testicular pain also attended several appointments with an institution's urologist for evaluation prior to the procedure. Three of the latter patients had previously undergone surgery for varicocele and presented with varicocele recurrence.

## Procedure details

After right-sided common femoral vein puncture, a J-shaped 0.035 inch hydrophilic guide wire (Terumo Corporation, Tokyo, Japan) and a 4-F cobra catheter (Cordis Johnson-Johnson Company<sup>®</sup>, Miami Lakes, FL, USA) were used under fluoroscopic guidance for the selective catheterization of the left internal spermatic vein, proximal to the pampiniform plexus. Diagnostic phlebography was then performed, allowing identification of the dilated pampiniform plexus, internal spermatic vein and possible collaterals. The choice of embolic material was made according to operator experience and preference. The embolic materials used were metallic coils (Nester<sup>®</sup> Platinum coils, Cook Medical, Bloomington, IN, USA) (Fig. 1) and glue (n-butyl-2 cyanoacrylate, Glubran 2<sup>®</sup>, GEM, Viareggio, Italy) (Fig. 2). The size of coils was determined by the vein caliber, using a coil 40% larger than the vein (for example, an 8 mm coil for a 6 mm vein). Additional coils were used until satisfactory occlusion (mostly between 3–6). Glue was first mixed with ethiodized oil (Lipiodol<sup>®</sup>, Guerbet, Roissy-Charles de Gaulle, France) with 1 mL of each in a 1:1 ratio. Afterwards, glue was injected immediately following an injection of a 5% dextrose solution to prevent glue polymerization in the catheter lumen. Post-procedure venography was performed when using coils to evaluate immediate technical success, but not when using glue, where fluoroscopic visualization of the contrasting glue was used to confirm correct glue deployment.

Procedure time was measured from the moment when the patient was lying on the angiography table and the interventional radiologist started preparing the procedure material, to the moment when the catheter was removed and the patient exited the room for performing compression of the entry site.

## Follow-up

Between 3–5 months after the procedure, all patients attended another appointment with their institution's urologist. For patients referred because of testicular pain, complete absence of symptoms was considered as clinical success. Regarding patients treated for infertility, sperm analysis immediately before and at least 3 months after the procedure was performed. Sperm concentration, motility and morphology after the procedure were compared to those before the procedure. Values of 15 million of sperm/mL, 40% of motile sperm and 4% of morphological normal forms were used for considering normalization and clinical success [13]. Patients with pre-procedural normal sperm parameter values were excluded from the clinical success rate calculation. Patients with no sperm parameter improvement or pain relief were considered as having unsuccessful treatment. Varicocele recurrence was also assessed at long-term follow-up with Doppler ultrasound studies, for a period ranging from 10 months (for the most recent procedures) to 3 years (oldest procedures), using the same criteria as those used for the initial diagnosis.

## Statistical analysis

Statistical analysis was performed using Microsoft Office Excel 2010<sup>®</sup> and Graphpad Prism 6<sup>®</sup> software. Student *t* test

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