TECHNICAL REPORT

The Technique of Transilluminated Powered Phlebectomy – A Novel, Minimally Invasive System for Varicose Vein Surgery

M. Arumugasamy, G. McGreal, A. O’Connor, C. Kelly, D. Bouchier-Hayes and A. Leahy*

Department of Vascular Surgery, RCSI, Beaumont Hospital, Dublin

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Introduction

Varicose veins (VV) are a common indication for surgery, and most operations can be performed as day cases.1,2 Hook phlebectomy has been the mainstay for VV avulsion for many years. This procedure is not only time consuming, but also requires multiple stab incisions. Furthermore, the procedure can often be blind with no confirmation of total removal of vein clusters.

Transilluminated powered phlebectomy (TIPP) offers a minimally invasive alternative to hook avulsions for VV. The TriVex system (Smith and Nephew Inc., MA, U.S.A.) incorporates three technologies, which facilitate dissection. Hydrodissection and direct visualisation of VV by transillumination allows for removal of the veins using a powered endoscopic tissue dissector.3 This paper discusses the techniques of this novel procedure and reports the prospective, non-comparative results of our initial experience of the Trivex system, for safety and efficacy.

The Operative Procedure

The sapheno-femoral junction and corresponding tributaries are disconnected in the conventional manner. The saphenous vein is then stripped to below the knee. The endoscopic transilluminator is then introduced through the incision by which the saphenous vein was extracted (Fig. 1). This device has two channels. One is used to distribute tumescent anaesthesia along the subcutaneous tissue planes both on either side and just below the varicosities. The second channel provides light from a 45-degree illuminator to transilluminate vein clusters under the skin. Tumescent anaesthesia is obtained by an infusion of 1000 ml of 0.9% normal saline with 50 ml of 1% lidocaine and 2 ml of 1:1000 epinephrine. This is delivered by using a pressurised infusion set connected directly to the endoscopic channel.

The operating theatre lights are then dimmed and varicose clusters are transilluminated against the skin by passing the endoscopic illuminator deep to the veins. The VV are outlined as dark strips against the bright subcutaneous tissue beneath them. A separate stab incision is then made to introduce the Smith and

Fig. 1. The TriVex endoscopic illuminator distributes tumescent anaesthesia and transilluminates varicosities under the skin. (Smith & Nephew, Inc.)
Technique of Transilluminated Powered Phlebectomy

Nephew EP-1 endoscopic powered tissue dissector. This device contains a rotating tubular blade, encased in a protective sheath, that faces a lateral cutting window. The tissue dissector is introduced on a plane just deep to the veins, and slowly withdrawn along the course of varicosities whilst the skin is stretched between the operators left index finger and thumb (Fig. 2). The window of the tissue dissector is directed along the varicosities that are subsequently digested under direct vision. The products are immediately aspirated into the system by a suction device connected to the back of the instrument. Transillumination allows one to confirm that the veins are entirely removed. The blade rotation can be clockwise, counter clockwise or used in an alternating fashion with speeds ranging from 800–2000 revolutions per min (rpm). The most frequent setting used in this study was an alternating mode at 1000 rpm. The placement of the endoscopic instruments can be alternated through either stab incision to allow for maximal ablation through fewer incisions.

Following vein extraction, tumescent solution is then infiltrated liberally along the paths of excised varicosities to discourage haematoma formation and aid in postoperative analgesia. Once completed, incisions are closed by Steri-strips. An occlusive, graduated compression dressing of wool and crepe is then applied from toe to thigh for 24 h. The patients subsequently wear graduated compression stockings for 4 weeks.

Patients

Twenty patients underwent TIPP, 16 women and four men with an average age of 55 and 60 respectively. Following discharge from the hospital, all patients were reviewed in the outpatient department at 1 and 6 weeks. At 6 weeks, the patients were asked to complete a satisfaction score, scaled from zero to 10. A score of zero signified complete satisfaction and a score of 10 described the worst possible outcome.

Results

The average time taken to perform powered phlebectomy was 12 min (range 5–25 min). The mean number of stab incisions required to perform TIPP was 3.6 (2–7). One (5%) patient had a 4 mm skin perforation in the thigh, treated by simple suture. No other intraoperative adverse events occurred. Subcutaneous haematomas or ecchymoses, present postoperatively in 19 (95%), had resolved within 1 week in 9 and within 6 to 12 weeks in 18 patients. One (5%) patient was admitted for elevation and bed rest due to increased swelling and bruising. There was no evidence of deep venous thrombosis. The patient was discharged one week later and was totally asymptomatic after a further 6 weeks. There were no cases of neuropraxia, wound infections or mortalities secondary to powered phlebectomy.

One (5%) patient was lost to follow-up and 19 patients completed the satisfaction score at week 6. The median score was zero (0–6).

Discussion

The overall score for patients for satisfaction was highly favourable following this minimally invasive technique. Both the endoscopic devices can be introduced through 3 mm stab incisions. Placing the endoscopic dissector at strategic locations on the leg allows for maximal removal using a minimal number of incisions. Spitz and colleagues have shown that TIPP was found to be significantly quicker, require fewer incisions, and result in less complications when compared with a retrospective group of traditional hook phlebectomy patients. The use of tumescent anaesthesia, developed originally for liposuction surgery, also adds to this procedure by aiding in postoperative pain relief. Klein has shown that lidocaine doses of up to 35 mg/kg has been safe when used in the form of tumescent solution mixed with epinephrine.

Brusing was seen in nearly all at 1 week, and this settled between 6–12 weeks later. This finding would not be uncommon following traditional hook phlebectomy. Mackay et al. reported a 66% incidence of perceived complications, including bruising, within the first 2 weeks following conventional surgery for varicose veins. Smith and colleagues have reported a higher incidence of haematomas following the use of tumescent anaesthesia for ambulatory phlebectomy. Their study suggested the use of appropriate concentrations of epinephrine to reduce this morbidity.

Our initial experience finds powered phlebectomy
is safe, quick and offers extensive dissection. This novel procedure is a useful adjunct to varicose vein surgery and facilitates the dissection of multiple small veins that need to be removed. As with any new procedure long term results and a cost benefit analysis are required and will have to be addressed. A randomised control trial between TIPP and conventional surgery and is warranted.

**References**


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