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REVIEW

Editor's Choice – A Systematic Review of Endovenous Stenting in Chronic Venous Disease Secondary to Iliac Vein Obstruction

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WHAT THIS PAPER ADDS

This review demonstrates that quality of evidence behind the use of deep venous stenting to treat obstructive chronic venous disease is weak. However, the consistent effects and marked changes to disease course mean that it should be considered as an acceptable treatment. This review intended to influence clinical practice so vascular teams are aware of this, and it will serve to guide the future research that is needed.

Objectives: Deep endovenous stenting to relieve chronic venous disease (CVD) secondary to post-thrombotic or non-thrombotic iliac vein obstruction is becoming increasingly well described. However, current and adequately reported systematic reviews on the topic are lacking. This report aimed to produce a systematic review and meta-analysis of the available data, reported to the Preferred Reporting Items for Systematic reviews and Meta-Analyses guideline.

Methods: MEDLINE, EMBASE, and the Cochrane Central Register for Controlled Trials databases and key references were searched.

Results: Sixteen studies were included (14 before-and-after studies, 1 controlled before-and-after study, and 1 case series) encompassing successful deep venous stenting in 2,373 and 2,586 post-thrombotic or non-thrombotic limbs and patients respectively. The data were too heterogeneous to perform a meta-analysis. There were significant improvements in validated measures of the severity of CVD and venous disease-specific quality of life. Persistent ulcer healing rates ranged from 56% to 100% in limbs that had often already failed conservative management. Primary and secondary stent patency ranged from 32% to 98.7% and 66%–96% respectively. The major complication rate ranged from 0 to 8.7% per stented limb. A GRADE assessment demonstrated the quality of the evidence for five outcomes to be "Very Low" and one to be "Low" (ulcer healing).

Conclusions: The quality of evidence to support the use of deep venous stenting to treat obstructive CVD is currently weak. The treatment does however appear promising and is safe and should therefore be considered as a treatment option while the evidence base is improved.

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INTRODUCTION

Chronic venous disease (CVD) is common and is defined as a "morphological or functional abnormality of the venous system of long duration"[1] with signs and symptoms ranging from mild leg pain to skin changes, venous claudication, or ulceration. CVD can result from primary or secondary causes, for example where CVD occurs after deep vein thrombosis (DVT), it is known as the post-thrombotic syndrome (PTS),[1] and from extrinsic iliac vein compression, it is known as non-thrombotic iliac vein lesions (NIVLs).

PTS is the most frequent chronic complication of DVT, affecting up to half of patients despite adequate anticoagulation,[2,3] and carries significant negative impacts on quality of life (QOL)[4] and on the economy.[5] The pathophysiology of PTS is thought to be due to venous hypertension from residual obstruction and deep venous reflux

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secondary to valve damage.[6] Only 20–30% of iliac vein DVTs fully recananalise[7,8] and residual obstruction following iliofemoral DVT is associated with severe CVD.[9] Surgical bypass of occluded veins has now been largely superseded by endovenous stenting to treat severe obstructive venous disease.[10,11]

When symptomatic, the pulsatile compression of the left common iliac vein by the right common iliac artery on the fifth lumbar vertebra is referred to as the May–Thurner syndrome.[12] Several other anatomical variants have been described in the literature, such that these lesions are now collectively referred to as (NIVLs). NIVL may present as a DVT or with CVD. For those presenting with CVD, endovascular stenting is rapidly becoming the treatment of choice over traditional surgical repair.[13]

Despite the widespread recommendation[10,11] of endovascular stenting for CVD related to outflow obstruction from post-thrombotic changes or NIVL, the one systematic review dedicated to the topic[14] was not reported to recognised standards[15] and was conducted over 2 years ago. This report aims to present an updated systematic review and meta-analysis of the available data regarding the efficacy and safety of venous stenting in CVD due to post-thrombotic or NIVL obstruction.

MATERIALS AND METHODS

The Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines[15] were followed. The aims of the study, eligibility criteria, and outcomes were predefined in a protocol.

Ethics approval was not required.

Eligibility criteria

All observational and randomised studies, as defined using the *Cochrane Handbook* 'List of study design features',[16] were eligible except cross-sectional studies. Participants of all ages suffering from CVD related to post-thrombotic or NIVL obstruction, confirmed on imaging, were included if they received endovenous iliac vein stenting with or without extension of the stent stack (group of adjacent overlapping stents) into the inferior vena cava (IVC) or common femoral vein (CFV) and more caudally or with or without the use of concurrent superficial venous procedures. A minimum of 20 eligible stented limbs and 6 months' follow-up was required. Studies were excluded if they did not report on any of the defined outcomes, if stenting was performed within 6 months of DVT in the stented segment, or if the study populations had CVD related only to obstruction from other causes, for example malignancy. No restriction was made on publication type, language, or date. The primary outcome was any change in severity of CVD as determined by validated measures or scores such as the clinical component of the clinical, aetiology, anatomy, and pathophysiology classification (C of CEAP),[17] the Venous Clinical Severity Score (VCSS),[18] or validated measures of PTS severity such as the Villalta score.[19] Secondary outcomes were validated CVD-specific QOL scores such as the Chronic Venous Insufficiency Questionnaire (CIVIQ)[20] and revisions thereof, the Venous Disability Score (VDS),[18] the Venous Insufficiency Epidemiological and Economic Study instrument (VEINES-QOL/Sym),[21] or generic QOL scores such as the 36-Item Short Form Health Survey (SF-36);[22] rates of ulcer healing; reports on other signs or symptoms of CVD such a pain or oedema; primary, assisted-primary (AP) and secondary stent patency and complications. A complication was considered major if an event led to surgery or medical management with likely significantly prolonged hospitalisation or it led to further endovascular intervention. Owing to suspected heterogeneity in what complications were reported, the complications have been presented as described in the reports, expressed as a percentage rate per limb stented.

Information sources and search strategy

On July 2, 2015, the Ovid portal (1946 to present) was used to search the MEDLINE and EMBASE databases. The Cochrane Central Register of Controlled Trials was searched simultaneously. The references of included studies and other important publications were hand searched for additional reports.

Study selection

All articles located in the initial search strategy had their abstracts and titles independently screened by two authors (M.S. and A.B.) with any discrepancies resolved by discussion. M.S. and A.B. subsequently reviewed the selected full citations to see if they met the eligibility criteria and handsearched references for further studies. If only an abstract had been published, the authors were contacted for full methodology and results. If this could not be provided, the study was excluded. To avoid the inclusion of duplicate publications of the same data, the data were examined for similarities (e.g. identical start and end dates), and if necessary the authors contacted for clarification.

Data collection process and data items

Two authors (M.S. and A.B) extracted the data from the included studies in a predesigned proforma. Data were extracted for study design;[16] start and end dates; demographics; inclusion criteria; the aetiology of venous obstruction (post-thrombotic or NIVL); the number of patients and limbs where stents were attempted and successfully deployed; whether the lesion was stenotic or a chronic total occlusion (CTO) (i.e. requiring recanalisation); the presence of concurrent superficial or deep venous reflux; stent type, and stent site (above vs. below the inguinal ligament and extending stents into the IVC); the time of stenting after DVT (where applicable); the concurrent use of balloon angioplasty; the concurrent use of superficial venous procedures or other venous surgeries; the outcomes; the antithrombotic regimens used; and the number of withdrawals/loss to follow-up per study. For studies where not all of these data were available, the