Surgical treatment of moderate-to-severe post-thrombotic syndrome
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CRD summary
This review concluded that despite limitations, the evidence suggested that surgical treatment for moderate-to-severe post-thrombotic syndrome could be effective where conservative and medical treatments had failed. Given the limitations of the evidence and the shortcomings in the review processes, the authors' conclusions may not be generalisable and the reliability of their findings remains unclear.

Authors' objectives
To assess the effectiveness and safety of surgical and endovascular interventions for moderate-to-severe post-thrombotic syndrome.

Searching
PubMed was searched for articles from 1980 to June 2010, published in English or French; search terms were reported. Reverse citation searching was performed in Web of Science and Scopus, and articles were identified by topic experts.

Study selection
Eligible for inclusion were clinical studies assessing the safety and effectiveness of one surgical or endovascular procedure for patients with confirmed post-thrombotic syndrome (including the Clinical, Etiologic, Anatomic, and Pathophysiologic – CEAP – Classification, and the Kistner classification).

In the included studies, where reported, the mean age of patients ranged from 52 to 61 years (range 15 to 88 years). Previous deep vein thrombosis was diagnosed using various methods, and the definition for post-thrombotic syndrome varied. The duration of symptoms ranged from one month to 27 years. Conservative treatment had failed for most patients. Interventions were percutaneous (balloon dilation, followed by stent), bypass grafting, endophlebectomy and reconstruction, valve reconstruction or transplant, and division of incompetent perforator veins. Surgical procedures were designed to correct obstruction in five studies, and to correct reflux in seven studies. Some patients received additional mechanical or drug interventions. Various anatomical and clinical outcomes were assessed, including treatment success, measures of pain, and ulcer healing.

The authors did not state how many reviewers screened studies for inclusion.

Assessment of study quality
The authors did not state that they systematically assessed study quality, but they did report some potential sources of bias in the individual studies.

Data extraction
The authors did not state how the data were extracted and by how many reviewers.

Methods of synthesis
Due to the diversity between studies, the data were presented in tables and as a narrative synthesis, grouped by type of intervention.

Results of the review
Twelve uncontrolled cohort studies (349 patients; range 13 to 81) were included in the review; nine were prospective and three were retrospective. Seven studies were conducted at one centre, and five were conducted at two centres. Where reported, the mean follow-up ranged from 10 months to 5.3 years (range 1.25 months to 11 years).

Effectiveness: Eleven of the 12 studies reported improvements in anatomical or clinical outcomes after surgical intervention, and these improvements continued over the follow-up period. Seven of these studies reported improvements in all anatomic measures, three reported anatomical improvements in valve competence and patency, but no haemodynamic improvements, and one reported no anatomical improvement. One study discussed the clinical
outcomes, but did not present any figures on anatomical outcomes. Four of the five studies assessing pain reported reduced pain after surgery, and three of five studies of swelling reported a reduction. All 12 studies reported ulcer healing (50% to 100%) after surgery.

**Safety outcomes**: Eight studies (264 patients) reported safety outcomes. There were no deaths, and no deep vein thromboses, pulmonary embolisms, and limb losses. The most frequently reported complications were haematoma or seroma formation (seven studies) and wound infection (four studies). Other safety outcomes were discussed.

**Authors' conclusions**
Despite limitations, the evidence suggested that surgical treatment of moderate-to-severe post-thrombotic syndrome to reduce venous valvular reflux or improve venous obstruction, or both, could be effective where conservative and medical treatments had failed.

**CRD commentary**
The review question and supporting inclusion criteria were broadly stated. The literature search was restricted by publication date, language, and the number of databases searched, and no attempts appear to have been made to identify unpublished studies; potentially relevant data may have been missed. The authors did not state whether study selection and data extraction were performed by two people, which means that reviewer error and bias cannot be ruled out.

Given the diversity across studies, and sometimes incomplete reporting, a narrative synthesis was appropriate. The authors reported some potential sources of bias in the individual studies, including a lack of blinding, lack of controls, and use of previous interventions. They highlighted the lack of randomised controlled trials, small samples, variation, and short follow-up.

The authors discussed the limitations of the evidence and sometimes poor study methods, and their conclusions seem cautious. Given these limitations and the potential for bias and missed evidence in the review, the authors' conclusions may not be generalisable and the reliability of their findings remains unclear.

**Implications of the review for practice and research**
**Practice**: The authors did not state any implications for practice.

**Research**: The authors stated that well-conducted randomised controlled trials, comparing surgical with medical treatment, and studies to develop and test new, safe and effective surgical procedures, were required.

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