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Skip the compression stockings following DVT

Although commonly used, compression stockings do not effectively prevent post-thrombotic syndrome.

PRACTICE CHANGER

Do not recommend elastic compression stockings (ECS) to decrease the incidence of post-thrombotic syndrome (PTS) after deep vein thrombosis (DVT).[1]

STRENGTH OF RECOMMENDATION

B: Based on a large, randomized controlled trial

Kahn SR, Shapiro S, Wells PS, et al; SOX trial investigators. Compression stockings to prevent post-thrombotic syndrome: a randomised placebo-controlled trial. *Lancet*. 2014;383:880-888.

ILLUSTRATIVE CASE

A 56-year-old man comes to your clinic 3 days after receiving a diagnosis of lower extremity deep vein thrombosis (DVT). He was prescribed warfarin, 5 mg/d, with enoxaparin bridging, 120 mg/d. He has read about post-thrombotic syndrome (PTS) online and is very concerned about this possible side effect. He is asking about using elastic compression stockings (ECS). What should you tell him?

PTS can be a frustrating, debilitating condition. Its clinical features range from minor limb swelling to severe edema and pain, irreversible skin changes, and leg ulcerations.[2] It occurs in 25% to 50% of patients after DVT.[3] Because current PTS treatments are not very effective, prevention is essential [4,5]

Patients are frequently encouraged to wear ECS after DVT to reduce the incidence of PTS by reducing venous hypertension and reflux. These stockings are expensive and uncomfortable. Prior studies suggested that using ECS can cut the incidence of PTS in half.[6,7] However, these were small, single-center studies, and they were not placebo-controlled.[6,7]

STUDY SUMMARY

RCT sets aside a common practice

Kahn et al[1] conducted a randomized, placebo-controlled trial of active vs placebo ECS in patients from 24 centers in the United States and Canada who'd had an ultrasound-confirmed proximal DVT (in the popliteal or more proximal deep leg vein) within the previous 14 days. Most patients received standard anticoagulation therapy to treat their DVT (5-10 days of heparin and 3-6 months of warfarin). Patients were excluded if they had received thrombolytics, had arterial claudication, had a life expectancy of <6 months, were unable to put on ECS due to physical disabilities or allergy, or were unable to participate in follow-up visits.

Patients were randomly assigned to wear active (30-40 mm Hg graduated) ECS or identical-looking placebo ECS with <5 mm Hg compression at the ankle for 2 years. Providers, study personnel and statisticians, and patients were all blinded to treatment allocation. Patients were asked to wear the stocking on the affected leg each day from when they woke until they went to bed.

Participants were followed at one, 6, 12, 18, and 24 months. The primary outcome was the cumulative incidence of PTS diagnosed at 6 months or later using Ginsberg's

criteria of ipsilateral pain and swelling of at least 1 month's duration.[8] Secondary outcomes included severity of PTS, presence of leg ulcers, recurrence of venous thromboembolism (VTE), death, adverse events, venous valvular reflux, and quality of life (QOL). Outcomes were measured objectively using a validated scale (the Villalta scale) for PTS severity and the 36-item Short Form Health Survey (SF-36) and the Venous Insufficiency Epidemiological and Economic Study Quality of Life (VEINES-QOL) questionnaire to measure QOL.[9-11]

There were 409 patients in the ECS group and 394 in the placebo group. Baseline characteristics, including body mass index (BMI), VTE risk factors, and anticoagulation treatment regimens, were similar between groups. The average age was 55.4 years in the study group (standard deviation [SD] ± 15.3 years) and 54.8 years (SD ± 15.8 years) in the placebo group. Men comprised 62.4% of the active group and 57.9% of the placebo group. Approximately 90% of the participants in both groups were white.

At one month, approximately 95% of participants in both the active and placebo groups used the stockings; at 24 months, a little less than 70% of the participants in both groups continued to use the stockings. The percentage of people who used the stockings for at least 3 days a week was similar across both groups.

The cumulative incidence of PTS during follow-up was 14.2% in the active group vs 12.7% in the placebo group, with a hazard ratio of 1.13 (95% confidence interval [CI], .73-1.76; *P*=.58). There were no differences in any of the secondary outcomes. Prespecified subgroup analyses found that age, BMI, and severity of DVT had no effect on the outcomes. There was a marginal benefit for ECS for women (*P*=.047) over men, but this does not likely reflect a true difference because the CIs surrounding the hazard ratios for men and women overlapped and crossed the null value.

WHAT'S NEW

New evidence contradicts previous studies

Two prior studies showed that using 30 to 40 mm Hg ECS decreased the incidence of PTS after proximal DVT.[6,7] However, these were smaller, open-label, single-center studies. This study by Kahn et al[1] was the first placebo-controlled, randomized, multicenter study that used validated instruments to measure PTS and QOL. It found no benefit in using ECS, thus contradicting the results of the prior studies.

There are currently no guidelines or consensus statements for or against the use of ECS after DVT.

CAVEATS

High nonadherence rates might have affected the results

In both groups, adherence to the assigned intervention diminished throughout the study. Overall, approximately 95% of patients reported wearing their stockings at one month; this dropped to just under 70% by 2 years. Theoretically, this could have affected efficacy outcomes. However, the decrease was similar in both groups and represents what is observed in clinical practice. A prespecified per protocol analysis of patients who wore their ECS more regularly found no benefit.

It is possible that a "placebo effect" could explain the lack of difference between groups. However, the placebo stockings provided virtually no compression, and the 2-year cumulative incidence of PTS in both the treatment and placebo groups was similar to that seen in control groups in prior studies.[6,7]

Finally, the incidence of PTS in this study was much lower than the 25% to 50% incidence reported in previous studies. Kahn et al[1] suggested that this was because they used more stringent and standardized criteria for PTS than was used in previous research.

CHALLENGES TO IMPLEMENTATION

There are no barriers to ending this practice

We see no challenges to implementation of this recommendation. JFP

This placebo-controlled randomized trial found no benefit in using compression stockings to prevent post-thrombotic syndrome.

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References

1. Kahn SR, Shapiro S, Wells PS, et al; SOX trial investigators. Compression stockings to prevent post-thrombotic syndrome: a randomised placebo-controlled trial. *Lancet*. 2014;383:880-888.
2. Kahn SR, Shrier I, Julian JA, et al. Determinants and time course of the postthrombotic syndrome after acute deep venous thrombosis. *Ann Intern Med*. 2008;149:698-707.
3. Prandoni P, Lensing AW, Cogo A, et al. The long-term clinical course of acute deep venous thrombosis. *Ann Intern Med*. 1996;125:1-7.
4. Cohen JM, Akl EA, Kahn SR. Pharmacologic and compression therapies for postthrombotic syndrome: a systematic review of randomized controlled trials. *Chest*. 2012;141:308-320.
5. Henke PK, Comerota AJ. An update on etiology, prevention, and therapy of postthrombotic syndrome. *J Vasc Surg*. 2011;53:500-509.
6. Brandjes DP, Büller HR, Heijboer H, et al. Randomised trial of effect of compression stockings in patients with symptomatic proximal-vein thrombosis. *Lancet*. 1997;349:759-762.
7. Prandoni P, Lensing AW, Prins MH, et al. Below-knee elastic compression stockings to prevent the post-thrombotic syndrome: a randomized, controlled trial. *Ann Intern Med*. 2004;141:249-256.
8. Ginsberg JS, Hirsh J, Julian J, et al. Prevention and treatment of postphlebitic syndrome: results of a 3-part study. *Arch Intern Med*. 2001;161:2105-2109.
9. Villalta S, Bagatella P, Piccioli A, et al. Assessment of validity and reproducibility of a clinical scale for the post-thrombotic syndrome. *Haemostasis*. 1994;24:158a.
10. McHorney CA, Ware JE Jr, Raczek AE. The MOS 36-Item Short-Form Health Survey (SF-36): II. Psychometric and clinical tests of validity in measuring physical and mental health constructs. *Med Care*. 1993;31:247-263.
11. Kahn SR, Lamping DL, Ducruet T, et al; VETO Study Investigators. VEINES-QOL/Sym questionnaire was a reliable and valid disease-specific quality of life measure for deep venous thrombosis. *J Clin Epidemiol*. 2006;59:1049-1056.

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