



SIT (seated immobility thromboembolism) syndrome: a 21st century lifestyle hazard

Richard Beasley, Patricia Heuser, Nigel Raymond

Abstract

The association between prolonged seated immobility and venous thromboembolism (VTE) is well recognised in relation to travel. In this case series, we report the occurrence of deep vein thrombosis (DVT) or pulmonary embolism (PE) following prolonged sitting in relation to work and/or recreation. The cases were characterised by the considerable length of time the individuals sat, the extensive nature of the VTE events in young individuals without other recognised risk factors, and the lack of recognition by the attending doctors of seated immobility as the likely major risk factor. While recognising that the association may be coincidental rather than causal, we propose the acronym 'SIT' (seated immobility thromboembolism) syndrome to encompass all forms of seated immobility associated with VTE.

The risk of developing VTE following sitting for prolonged periods at a computer (termed 'eThrombosis') has recently been recognised.¹ This report generated considerable interest and raised several related issues—including whether this case was an isolated event; in what other situations were people at risk; and whether this association is recognised by the medical profession. These issues have been considered through review of a number of additional cases which have been brought to the attention of the authors as a result of the initial publication. In all cases, the relevant details were obtained by review of the hospital medical records and patient interviews.

Methods

Patients were included in this case series if they met the following inclusion criteria:

- Hospital discharge diagnosis of deep vein thrombosis (DVT) and/or pulmonary embolism (PE),
- Age <40 years,
- History of regular seated immobility of at least 8 hours, and
- No other recognised risk factors (including past or family history of VTE, gross obesity, recent surgery or trauma, long distance travel, immobility related to illness, oral contraceptive use, or underlying thrombophilia state).

The clinical diagnosis of DVT or PE required radiological confirmation by one of the following: positive compression Doppler ultrasound; positive venography; high or intermediate probability V/Q scan; positive helical CT with pulmonary angiography; or pulmonary angiography.

Results

The clinical characteristics of the five cases which met the inclusion criteria are shown in Table 1.

Table 1. Characteristics of subjects

Case	Age (yr)	Sex	Occupation	Average (max.) time seated (hr)	Max. time seated without getting up (hr)	Diagnosis	Complications	Recognition of association by doctor
1	24	M	Chef	8 (14) †	6	DVT (CFV, SFV, PV)	Extension to EIV	No
2	31	M	Computer worker	8 (14)	4	PE ^a	Nil	Yes
3	39	M	Graphic designer	15 (15)	5	PE ^b	Nil	No
4	33	F	Manager, with computer work	8 (8)	3	DVT (SFV, PV) PE ^a	Recurrent DVT	No
5	28	M	Computer Programmer	8 (30)	5	DVT (SV, AV)	Nil	No

AV: axillary vein CFV: common femoral vein PV: popliteal vein SFV: superficial femoral vein

EIV: external iliac vein PE: pulmonary embolism DVT: deep vein thrombosis SV: subclavian vein

† recreation, seated at computer

^a Ventilation perfusion scan – high probability with multiple bilateral unmatched perfusion defects

^b CT pulmonary angiography – large thrombi L and R lower lobe pulmonary arteries; pulmonary infarction

The presentations of the venous thromboembolic events were striking in terms of the site of the venous thrombosis (proximal, including one case of axillary and subclavian vein thrombosis), the life-threatening nature (including bilateral lobar PE), and complications (including both a subsequent extension and recurrence of a proximal lower limb DVT). In four cases, the immobility related to prolonged periods of sitting at work—whereas in one case, the subject sat for long periods at the computer at home, independent of work.

In the weeks prior to the VTE event, the average length of time per 24 hours spent seated at work and/or recreation ranged from 8 to 15 hours. The maximum number of hours in which the subjects spent seated at work or recreation prior to the VTE ranged between 8 and 30 hours. The subjects reported being seated between 3 to 6 hours at a time without getting up to stand or walk around.

In four of the five cases, the role of prolonged seated immobility was not recognised by the attending doctors, despite the possibility being proposed by the patient in three of the cases.

Discussion

This case series indicates that individuals who sit for prolonged periods in relation to their work and/or recreation may be at risk of developing a VTE. We previously termed this disorder 'eThrombosis', due to the prolonged periods the initial case spent seated in front of a computer.¹ However, in view of the different occupations and recreations associated with seated immobility, we have renamed this disorder the 'seated immobility thromboembolism' (SIT) syndrome. The SIT syndrome would also encompass other forms of seated immobility that are associated with VTE such as distance air, train or car travel.^{2,3}

The cases were characterised by the considerable length of time the individuals sat and the extensive nature of the VTE events in young individuals without other recognised risk factors. The other striking feature was the lack of recognition by the attending doctors of seated immobility as the most probable risk factor for the VTE event, in some cases despite the possibility being raised with the doctor by the patient and the lack of alternative risk factors.

The likelihood of a young adult without underlying risk factors developing a proximal DVT or PE would be considered to be extremely low,^{4,5} suggesting the importance of immobility as a provoking factor in these subjects. Because this was not a prospective study and subjects were predominantly identified by self-referral, it was not possible to determine the relative frequency of seated immobility in cases of VTE in young adults.

We acknowledge that the association between prolonged seated immobility and VTE may be coincidental rather than causal, given the sedentary nature of many people's lives. However, in recognising the accepted role of immobility as a risk factor for VTE, we propose the term 'SIT syndrome' to encompass all forms of seated immobility that are associated with VTE. This syndrome would include immobility associated with long distance travel (air, train, road), prolonged computer use at work or in recreation, and other situations associated with seating in cramped conditions such as the theatre.¹⁻³

Hopefully the acronym 'SIT' will facilitate the recognition by doctors of the role of seated immobility as a risk factor for VTE.

Author information: Richard Beasley, Director, Medical Research Institute of New Zealand, Wellington and Visiting Professor, University of Southampton, UK; Patricia Heuser, Research Nurse, Medical Research Institute of New Zealand, Wellington; Nigel Raymond, Consultant Physician, Wellington Hospital, Wellington

Correspondence: Professor Richard Beasley, Medical Research Institute of New Zealand, PO Box 10055, Wellington. Fax: (04) 472 9199; email: richard.beasley@mrinz.ac.nz

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