

Postoperative Venous Thromboembolism in Asia: A Critical Appraisal of its Incidence

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OBJECTIVES: Venous thromboembolism (VTE) has historically been perceived to be a rare disorder in Asia. However, new evidence has emerged recently that contradicts this perception. The question of routine VTE prophylaxis has been hotly debated in Asia due to disagreement on its incidence. We reviewed and analysed studies on postoperative VTE in Asian patients to determine if the condition was indeed rare and if the routine prophylactic measures as recommended by internationally accepted guidelines should be adopted in Asia.

METHODS: A review of published reports, from 1966 to December 2002, on deep vein thrombosis (DVT) and pulmonary embolism (PE) in the Asian population was made. A literature search of studies published in English was conducted via a detailed MEDLINE search. Studies had to attain a minimum inclusion and quality criteria to be accepted for the review, including the diagnostic modality used for the diagnosis of VTE. The appraisal was carried out independently and accepted by at least two of the three authors. The study population was classified into orthopaedic and general surgical/colorectal groups.

RESULTS: Twelve orthopaedic publications reviewed revealed an incidence of postoperative DVT of 10% to 63%. Six general and colorectal surgical publications reported an incidence of DVT ranging from 3% to 28%. The incidence was slightly lower than the reported incidence of 40% to 80% following orthopaedic surgery and 28% to 44% following general surgical operations in studies reporting on Caucasian populations.

CONCLUSION: While there is a wide variation in the incidence of DVT and VTE as reported in the Asian population, these diseases are by no means rare. The wide variation could be due to the study designs, heterogeneity of the procedures performed and the application of different diagnostic criteria. Results based on prospective studies with objective diagnostic criteria confirm the incidence of VTE as common. Routine chemoprophylaxis must be seriously considered in high-risk patients. [*Asian J Surg* 2003;26(3):154–8]

Introduction

Venous thromboembolism (VTE) has been perceived to be a rare disorder in Asia. Initial anecdotal reports,^{1,2} retrospective reviews^{3–5} and postmortem reports⁶ have revealed a generally lower incidence of VTE in the Asian population than in the Caucasian population. The validity of these reports is doubtful as there is little objective evidence to support these views, and in recent times, they have been challenged by studies indicating that VTE is as common in the Eastern as it is in the Western hemisphere.^{7–10}

The low postmortem VTE rate in Asia should be interpreted with extreme caution due to cultural taboos and religious beliefs that render the conduction of postmortem studies, and hence interpretation of the incidence of VTE-associated mortality, difficult. We analysed data on the incidence of postoperative VTE from published studies to ascertain if this condition is indeed rare in the Asian population.

Materials and methods

A retrospective review was made of the published reports on

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deep vein thrombosis (DVT) and pulmonary embolism (PE) in the Asian population. A literature search was performed using MEDLINE. The search heading was “VTE, DVT, DVT and PE, PE, autopsy and PE”. The search was then repeated with “DVT and Malaysia”, “DVT and Hong Kong”, “DVT and Thailand”, and so forth, to also include Singapore, China, Vietnam, Japan, Korea, Taiwan, India and Pakistan. All studies on DVT and/or PE in the Asian population were included.

Due to the paucity of papers, sample size and the quality of studies, we excluded neurosurgical, spinal, and gynaecological studies, as well as those that comprised mixed general surgical and patients of other disciplines. Obstetric studies were also excluded as there might be confounding factors in pregnancy, antenatal care and home-delivery that make the interpretation of incidence difficult. Only studies in orthopaedic surgery and general surgical/colorectal disciplines were included. These studies were assessed for the minimum quality criteria, including prospective study, sample size of at least 50 patients, diagnostic criteria using venography, duplex ultrasonography or iodine-fibrinogen scan, or a combination of the three diagnostic criteria. Each of these papers was reviewed independently and the quality and criteria were accepted by at least two of the three authors before inclusion in the study. The study population was classified into orthopaedic and general surgical/colorectal groups. The nature of the original study, sample size and diagnostic modality were recorded.

Results

Orthopaedic group

Twelve publications were analysed¹¹⁻²² (Table 1). All 12 consisted of prospective studies performed in the last 2 decades. The studies were conducted primarily on patients undergoing high-risk surgery on the proximal hip and knee. Venography or duplex ultrasonography were used in the diagnosis or confirmation of DVT. One of the studies was a randomized controlled trial on the use of low molecular weight heparin (LMWH) for the prophylaxis of VTE in patients undergoing total knee replacement.¹⁷ Another randomized trial reported on the incidences of DVT in total hip replacement using LMWH as prophylaxis compared with no prophylaxis.¹⁶ The incidence of VTE varied from 10% to 63% in those without prophylaxis and was lower in comparison to the figures for Caucasian patients, for whom the reported incidence was 40% to 80%.²³⁻²⁵

General surgical/colorectal group

Six publications in the general surgical/colorectal group (Table 2) were analysed.²⁶⁻³¹ Only two studies had utilized duplex ultrasonography or venography as the diagnostic criteria. The incidence of postoperative DVT varied from 3% to 28%. This rate was lower than that of studies performed on Caucasian patients that yielded a DVT rate of 28% to 44%.³²⁻³⁴

Table 1. Studies reviewed in the orthopaedic group

Author, country (year)	Patients n	DVT n (%)	Symptomatic PE n	Diagnostic criteria
Mok, Hong Kong (1979)	53	26 (53.1*)	0	Venography
Kim, Korea (1988)	146	14 (9.6)	0	Venography
Mitra, Singapore (1989)	72	7 (9.7)	0	Venography
Dhillon, Malaysia (1996)	88	55 (62.5)	1	Venography
Lee, Hong Kong (1996)	100	39 (39.0)	0	Duplex
Yoo, Korea (1997)	100	17 (17.0)	4	Venography
Fong, Singapore (1998)†	280	14/100 (14.0)	1	Duplex
Kim, Korea (1998)‡	150	10/50 (20.0)	NR	Venography
Kew, Hong Kong (1999)	78	29 (37.2)	0	Duplex
Wang, Taiwan (2000)	102	64 (62.7)	0	Venography
Ruban, Singapore (2000)	100	14 (14.0)	1	Duplex
Kim, Korea (2002)	227§	46/111 (41.4) 97/232 (41.8¶)	0	Venography

DVT = deep vein thrombosis; PE = pulmonary embolism; Duplex = duplex ultrasonography; NR = not recorded. *Based on 49 venograms done on injured limbs. †One hundred patients in this study were controls and were not given prophylactic heparin. ‡Fifty patients in this study were controls and were not given prophylactic heparin. §Of the 227 patients, 111 underwent unilateral and 116 underwent bilateral knee arthroplasty. ¶Based on 232 venograms done in 116 patients.

Table 2. Studies reviewed in the general surgical/colorectal group

Author, country (year)	Patients n	DVT n (%)	PE	Diagnostic criteria
Cunningham, Malaysia (1974)	68	8 (11.8)	NR	I-Fibrinogen
Nandi, Hong Kong (1980)	150	4 (2.7)	NR	I-Fibrinogen & venography
Shead, India (1980)	50	14 (28.0)	NR	I-Fibrinogen
Inada, Japan (1983)	256	49 (15.3*)	NR	I-Fibrinogen & venography
Kum, Singapore (1993)	107	5 (4.7)	3/5	Clinical & venography
Ho, Singapore (1999)	320	5/169 (3.0)	3/5	Duplex

DVT = deep vein thrombosis; PE = pulmonary embolism; NR = not recorded; I-Fibrinogen = 125 iodine-fibrinogen scan; Clinical = clinical examination; Duplex = duplex ultrasonography. *Calculated percentage is 19.1%, but it is reported by the author as 15.3%.

Discussion

VTE is considered to be an important cause of death in hospitalized patients, especially in those undergoing major surgical procedures. Whilst routine prophylaxis for VTE is being increasingly utilized in Western medical practice, clinicians in the East use routine prophylaxis at a lower rate, based on the belief that VTE is rare amongst their patients. There are serious limitations with this belief, as support based on autopsy-proven PE rates are lacking in the medical literature from Asian countries due to the lower number of autopsies performed.

There have been a few postulations as to why the incidence of DVT and PE is lower in the Asian population, including environmental and dietary factors, and more importantly, a slower and lesser degree of decreasing levels of antithrombin III in Asians compared to Caucasians.^{35,36} Studies on VTE from Asian institutions have been unconvincing to date, primarily due to the lack of prospective randomized trials incorporating large cohorts of patients. Our aim in this study was to collectively review the Asian published studies and obtain a general perspective as to whether or not the incidence of postoperative VTE is rare in Asia.

The results of our review indicate a wide variation in the incidence of VTE reported in Asian patients. The sample sizes, nature of the studies, diagnostic criteria and types of surgeries were important factors that contributed to this finding. The clinical diagnosis is unreliable for detecting DVT and must be supplemented with other diagnostic means, notably venography, which is the gold standard, or duplex ultrasonography, which is the non-invasive investigation of choice. Both of these methods were employed in all of the orthopaedic studies reviewed.

When we used these diagnostic criteria for studies in the

general surgical/colorectal surgery group, only two recent studies were eligible for analysis.^{30,31} The older studies, done in the 1970s and 1980s, had utilized the fibrinogen-labelled uptake test, which is acceptable in its sensitivity in diagnosing DVT, but lacks specificity.³⁷ However, this has been offset by confirmatory venograms in most of the studies. Hence, all of the three diagnostic criteria were acceptable in the analysis of general surgical/colorectal patients. Of these studies, most were performed in more affluent countries such as Japan, Taiwan, Hong Kong and Singapore. If they were to reflect an increase in the actual incidence of DVT, improved health care, higher standard of living and changes in diet might have been factors that contributed to such an increase, apart from increasing clinical vigilance.

In orthopaedic practice, the reported incidence of DVT varied from 10% to 63%.¹¹⁻²² This latter figure is only slightly lower than the incidence of 40% to 80% quoted in the Western medical literature pertaining to Caucasians.²³⁻²⁵ The reported incidence of PE was very low among Asians. This must be interpreted with caution because not all patients were subjected to routine ventilation-perfusion lung scans to look for PE. In studies where the PE incidence was quoted, the patients were symptomatic and subsequently underwent ventilation-perfusion scans to confirm the diagnosis. There remains a substantial proportion of patients who may have suffered from silent PE and who were undiagnosed.

In the general surgical group, which included patients undergoing colorectal surgery, the reported incidence of DVT varied from 3% to 28%.²⁶⁻³¹ The wide variation in incidence could be secondary to the wide variety of surgery performed in this group, from high-risk colorectal surgery to lesser-risk upper abdominal surgery. The incidence was generally lower than that reported in the Caucasian population,³²⁻³⁴ which has a VTE incidence of 28% to 44%. It is difficult to compare the

actual VTE incidence in this group, because there are few quality papers with adequate sample size undergoing homogenous surgical procedures and using established VTE diagnostic criteria available for analysis. More randomized, controlled trials must be performed to validate this finding.

To further establish that postoperative VTE is not rare, we reviewed all published autopsy studies. Using a MEDLINE search, all autopsy studies carried out in Asian countries from 1966 to December 2002 were reviewed. Only four studies (Table 3) were available for analysis.^{6,38-40} The mortality rate due to PE ranged from 0.08% to 4.7%. This rate was much lower than the 5% to 24% of postoperative deaths reported in the Western literature.⁴¹⁻⁴⁴ The low incidence reported in Asia could be due to the 21% to 47% postmortem rate, which is too low for any meaningful comparison. Interestingly, Chau et al, in their study of PE deaths in Hong Kong from 1975 to 1989 and from 1990 to 1994,^{38,40} noticed an increase in the reported incidence of VTE-related deaths from 0.58% to 4.7%. There was no corresponding increase in their postmortem rate over the 2 decades. This could be a direct reflection of an actual increase in the incidence of VTE.

The perception that VTE is uncommon in Asian patients should be dispelled to prevent unnecessary morbidity and mortality associated with this condition. The majority of the prospective studies reviewed showed an incidence of DVT of 10% to 63% after proximal hip and knee surgery and from 3% to 28% after general and colorectal surgery. There is no evidence to suggest that the incidence is low in hospital admissions and in postmortem studies as these are retrospective studies that lack objective criteria in patient selection and diagnosis.

Thromboprophylaxis should be taken seriously. It is particularly indicated in high-risk surgical patients. Guidelines on VTE prophylaxis that are well accepted in the West should be adopted based on the currently available objective data from a number of prospective studies incorporating patients from various surgical disciplines. Further prospective studies would reinforce this view, especially if supported by results

from postmortem studies, which hopefully may increase in Asian countries in the future.

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Table 3. Autopsy studies reviewed

Author, country (year)	No. of PE/total autopsy	Postmortem rate (%)	Incidence of PE (%)
Hwang, Singapore (1968)	29/36,176	46.5	0.08
Vathesatogkit, Thailand (1989)	12/4,896	NS	0.24
Chau, Hong Kong (1991)	191/10,348	30.0	1.8 (0.58-2.08)*
Chau, Hong Kong (1997)	111/2,423	21.0	4.7

PE = pulmonary embolism; NS = not stated. Postmortem rate = percentage of deaths subjected to postmortem examination. *Overall incidence of 1.8, which ranged from 0.58 to 2.08 (from the first 5 years to the last 5 years, from 1975 to 1989).

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