VTE in surgery
From risk assessment to appropriate thromboprophylaxis

Masterclass Series

Key Takeaways

CHEST® EXPERT

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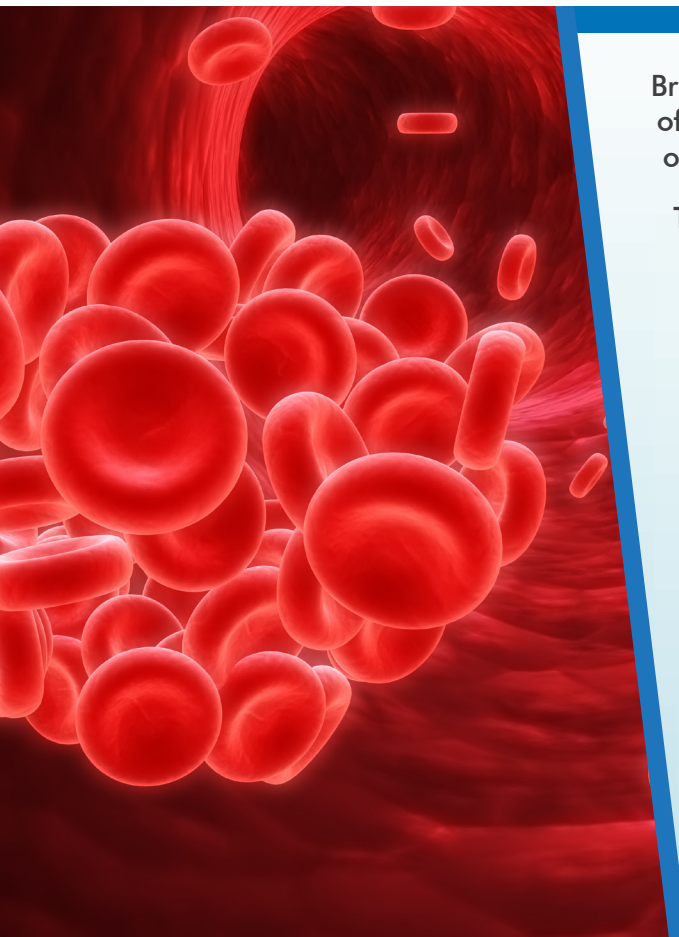


Breaking clinical inertia in VTE management is a continuous series of masterclass sessions brought to us from the American College of Chest Physicians (ACCP), supported by Sanofi.

The second session of this series was conducted on **VTE in Surgery: From risk assessment to appropriate thrombo-prophylaxis.**

It is accessible at: https://bcove.video/30CSFzx

Dr. Vinay K. Kapoor, Professor and Head, Department of Hepato-Pancreato-Biliary Surgery, Mahatma Gandhi Medical College and Hospital, Jaipur. He has immense experience in the field of hepato-pancreato-biliary surgery and venous thromboembolism and has published many articles in renowned international journals, editorials, and books on these topics.

He highlighted why it is important to be aware of the risk of venous thromboembolism (VTE), especially in patients undergoing surgery. Further, he mentioned that VTE occurred in India in significant numbers and the diagnosis has improved due to the better availability of diagnostic procedures. He also opined that VTE prevention is easier and cost-effective than treatment

CHEST EXPERT TALK

This talk was delivered by Dr David Jimenez - expert faculty from CHEST

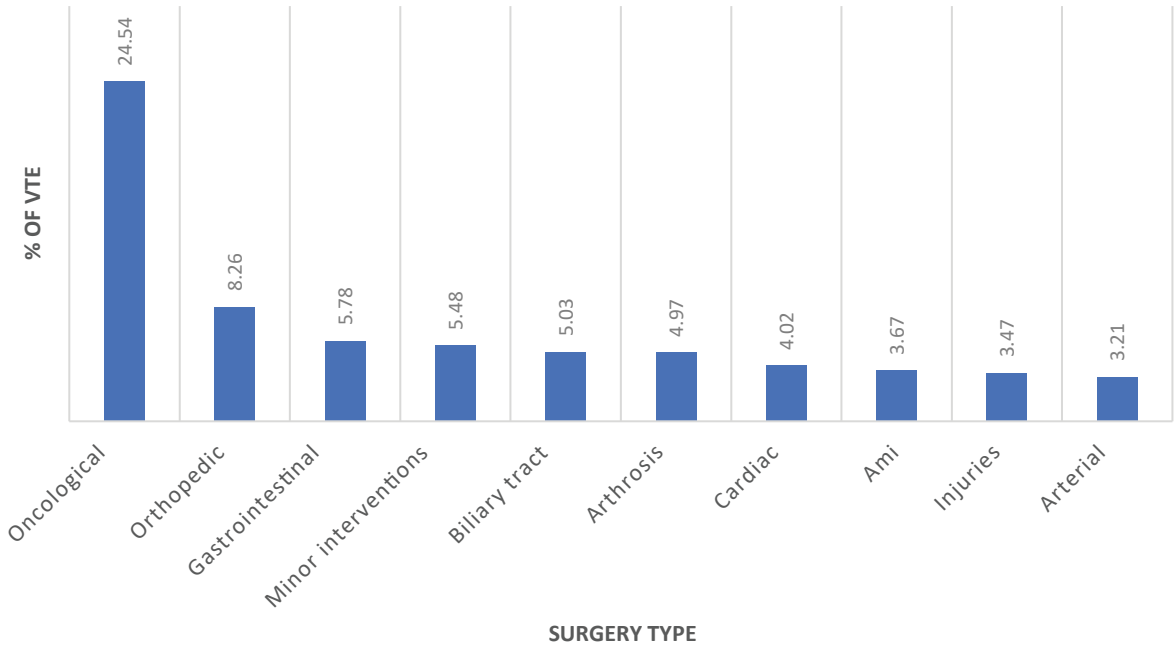
Dr David Jimenez is Associate Professor of Medicine, University of Alcala, Madrid. He is also the Chief of the VTE Program, Chief of Respiratory Department, Ramón y Cajal Hospital, Madrid, Spain. He has participated as Principal Investigator in several randomized trials on thromboembolic prophylaxis and treatment and has numerous publications in peer-reviewed journals on VTE. In addition, he has co-chaired the 10th edition of the Antithrombotic and Thrombolytic Therapy ACCP guidelines and co-authored the 2019 ESC Guidelines for the management of pulmonary embolism

Introduction

The risk of death after a diagnosis of pulmonary embolism has remained significantly high. VTE-related mortality is more than breast cancer, prostate cancer, and road traffic accidents together. The burden of disease is huge. Pulmonary embolism also leads to considerable morbidity by leading to chronic thromboembolic pulmonary hypertension, and nearly 30%–50% develop post-thrombotic syndrome.

Global incidence of VTE in patients undergoing surgery

Figure 1: Incidence of VTE in patients undergoing surgery



Cancer increases the risk of VTE. The VTE risk is particularly high in patients undergoing surgery for solid tumors and more so for those with pancreatic, stomach, or gynecological cancers (Figure 1). The rates of VTE are even higher in patients with metastatic cancers.

It is very important to assess and stratify the risk of VTE, and the Caprini Risk Assessment Model (Table 1) has been proven to be effective and is widely used.

Table 1: The Caprini risk assessment model

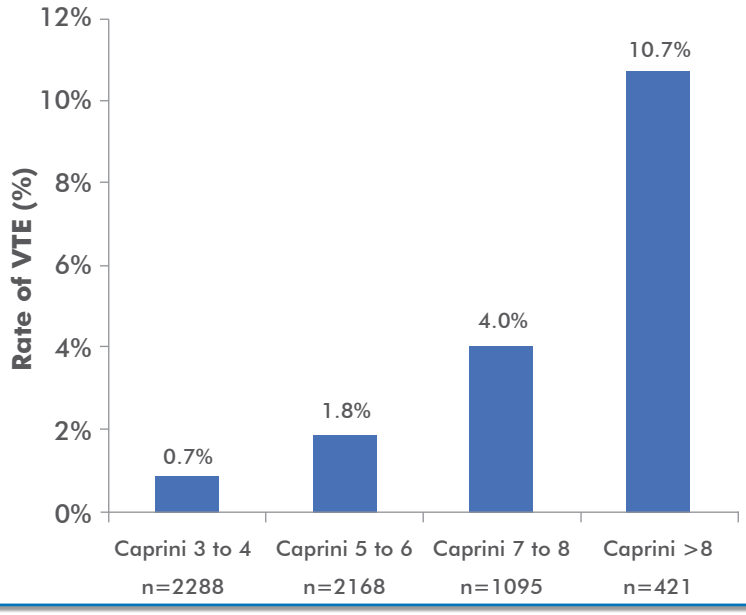
1 Point	2 Points	3 points	5 Points
Age 41–60 years	Age 61–74 years	Age ≥75 years	Stroke (<1 month)
Minor surgery	Arthroscopic surgery	History of VTE	Elective arthroplasty
BMI >25 kg/m^2	Major open surgery (>45 min)	Family history of VTE	Hip, pelvis, or leg fracture
Swollen legs	Laparoscopic surgery (>45 min)	Factor V Leiden	Acute spinal cord injury (<1 month)
Varicose veins	Malignancy	Prothrombin 20210A	
Pregnancy or postpartum	Confined to bed (>72 hours)	Lupus anticoagulant	
History of unexplained or recurrent spontaneous abortion	Immobilizing plaster cast	Anticardiolipin antibodies	
Oral contraceptives or hormone replacement	Central venous access	Elevated serum homocysteine	
Sepsis (<1 month)		Heparin-induced thrombocytopenia	
Serious lung disease, including pneumonia (<1 month)		Other congenital or acquired thrombophilia	
Abnormal pulmonary function			
Acute myocardial infarction			

Table 1: The Caprini risk assessment model (Continue)

1 Point	2 Points	3 points	5 Points
Acute myocardial infarction			
Congestive heart failure (<1 month)			
History of inflammatory bowel disease			
Medical patient at bed rest			

The rate of VTE increases with an increase in the total Caprini score (Figure 2). There has been the adaptation of the Caprini model by the ACCP 2012 guidelines.

Figure 2: Risk of VTE according to the Caprini score



Caprini scores ≤6

No significant reduction in VTE using prophylaxis

Suggest mechanical prophylaxis except in patients with hematologic risk factors

Minimize bleeding risk in these patients

Caprini scores >6

Statistically significant VTE risk reduction postoperatively with the use of anticoagulants

Stratification of VTE risk (in the absence of prophylaxis) in major general surgery, including gastro-intestinal procedures

VTE risk category	*Estimated baseline risk in the obsence of pharmacological or mechanical prophylaxis*	*Caprini score*	*Rogers score*
Very low	<0.5%	0	<7
Low	1.5%	1-2	7-10
Moderate	3%	3-4	>10
High	6%	≥5	N/A

N/A = Not available.

Higher Caprini score is a clear predictor of rising VTE risk

Mechanical thromboprophylaxis

Graduated compression stockings as an adjuvant to pharmaco-thromboprophylaxis in elective surgical patients (GAPS study): A randomized controlled trial

For patients who have elective surgery and are at moderate or high risk of VTE, administration of pharmaco-thromboprophylaxis alone is non-inferior to a combination of pharmaco-thromboprophylaxis and graduated compression stockings. These findings indicate that graduated compression stockings might be unnecessary in most patients undergoing elective surgery.

Thromboprophylaxis in cancer surgery

For patients with cancer undergoing a surgical procedure, the **American Society of Haematology (ASH) 2021** guideline panel suggests **using low molecular weight heparin (LMWH) or fondaparinux** for thromboprophylaxis rather than unfractionated heparin (UFH) [conditional recommendation, low certainty in the evidence of effects]. The panel did not make a recommendation on the use of vitamin K antagonists or direct oral anticoagulants in this setting because there were no studies available.

In patients who need extended thromboprophylaxis (continuing pharmacological thrombo-prophylaxis at home), the guideline panel suggests continuing the use of LMWH.

LMWH can be used with dose modification in patients with moderate renal impairment (creatinine clearance >30 mL/min). In patients with severe renal impairment (defined as creatinine clearance <30 mL/min), UFH is generally preferred over LMWH.

Preoperative vs postoperative thromboprophylaxis in cancer surgery

The ASH 2021 Recommendation

For patients with cancer undergoing a surgical procedure, the ASH guideline panel suggests using postoperative thromboprophylaxis over preoperative thromboprophylaxis (conditional recommendation, low certainty in the evidence of effects).

Remarks: The panel defined preoperative thromboprophylaxis as a dose of LMWH or UFH given 12 hours (or the evening) prior to the procedure and not the dose given at the time of the surgery (or on the operating table). The panel did not recognize any significant advantage to preoperative prophylaxis and took a precautionary approach because of the bleeding and logistical considerations with neuraxial anesthesia. **Patients with cancer already hospitalized prior to the surgery are suggested to receive preoperative thromboprophylaxis.**

All guidelines recommend UFH or LMWH as an agent of choice for initial VTE prophylaxis with/without mechanical prophylaxis. The recommendations of different institutions are given in Table 2.

Table 2: Guideline recommendations for initial VTE prophylaxis in surgical cancer patients

	Initial prophylaxis
ASCO 2020	All patients should be offered prophylaxis. Pharmacological thromboprophylaxis with UFH or LMWH unless contraindicated.
ACCP 2012	For general and abdominopelvic surgery patients at high risk for VTE who are not at high risk for bleeding, LMWH or UFH at high doses is recommended. Mechanical prophylaxis with stockings or intermittent pneumatic compression should be added.
ITAC 2019	Prophylaxis with LMWH OD or UFH TID is recommended. Use the highest prophylactic dose. Start 2–12 hours preoperatively.
NCCN 2015	Prophylaxis with LMWH, UFH, fondaparinux ± mechanical is recommended.
ASH 2021	Prophylaxis with LMWH or fondaparinux rather than UFH is recommended.

Most guidelines recommend extended prophylaxis in cancer patients undergoing surgery. The duration of VTE prophylaxis for surgical cancer patients, as recommended by different institutions, is given in Table 3.

Table 3: Guideline recommendations for the duration of VTE prophylaxis in surgical cancer patients

	Prolonged prophylaxis
ASCO 2019	Prophylaxis should be continued for at least 7–10 days postoperatively. Extended prophylaxis for up to 4 weeks is recommender after major open or laparoscopic abdominal and pelvic surgery in patients who have high-risk features: restricted mobility, obesity, history of VTE, or additional risk factors.
ACCP 2012	For high-VTE-risk patients undergoing abdominal or pelvic surgery who are not otherwise at high risk for bleeding, extended duration prophylaxis (4 weeks) with LMWH is recommended.
ITAC 2019	Continue for at least 7–10 days. Extended prophylaxis (4 weeks) after major laparotomy may be indicated in patients with cancer who have a high risk of VTE and low risk of bleeding. Recommendations are same for laparoscopic surgery. Cost issues
NCCN 2015	Recommended for up to 4 weeks post surgery (particularly for high-risk abdominal or pelvic cancer surgery): - Prolonged anesthesia - Previous VTE - Advance cancer stage - Immobility >4 days - >60 years
ASH 2021	For patients with cancer who had undergone a major abdominal/ pelvic surgical procedure, the ASH guideline panel suggests continuing pharmacological thromboprophylaxis post-discharge rather than discontinuing at the time of hospital discharge.

Risk factors for major bleeding complications in nonorthopedic surgical patients (ACCP 2012)

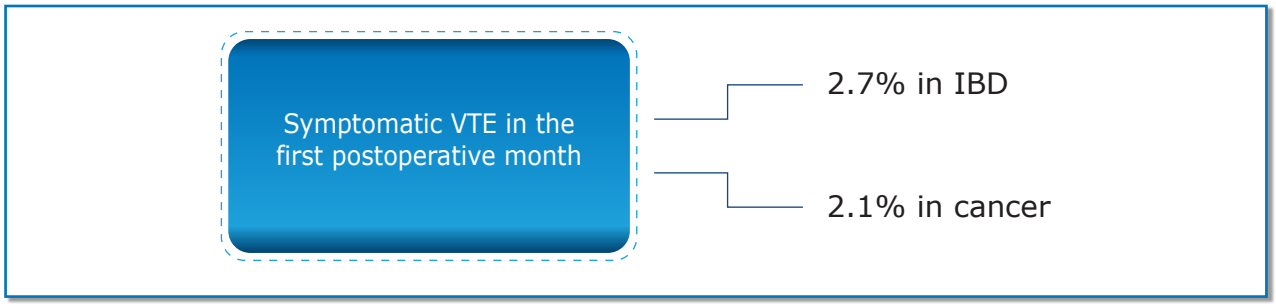
General risk factors
Active bleeding
Previous major bleeding
Known, untreated bleeding disorder
Severe renal or hepatic failure
Thrombocytopenia
Acute stroke
Uncontrolled systemic hypertension
Lumbar puncture, epidural or spinal anesthesia within previous 4 hr or next 12 hr
Concomitant use of anticoagulants, antiplatelet therapy or thrombolytic drugs

Risk factors for in-hospital or post-discharge VTE after colorectal resection

In-hospital VTE	Post-discharge VTE
- Older patients - Male - Emergency surgery - Prolonged operative time - Preoperative steroids - Poor functional status - Preoperative sepsis - **Inflammatory bowel disease (IBD)**	- Preoperative steroids - Poor functional status - Preoperative sepsis - **IBD** - Obesity - Postoperative complications - Laparoscopic surgery

IBD is a risk factor for developing both in-hospital and post-discharge VTE after colorectal resection.

Incidence of postoperative VTE in patients with IBD



The risk of VTE is higher in patients with IBD than in those with cancer, who are undergoing surgery for colorectal cancer. The incidence is more frequent in:

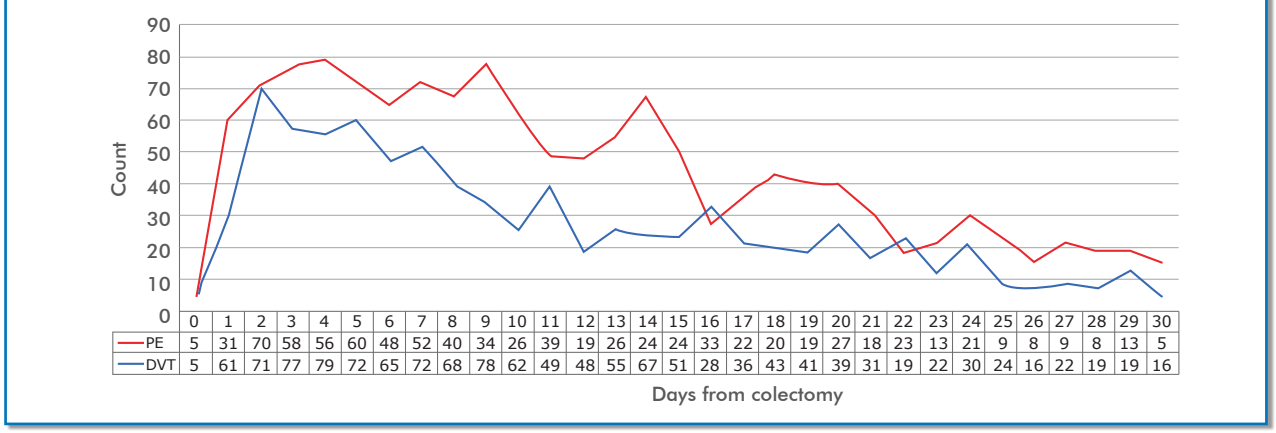
- Emergency colectomy versus elective surgery
- Ulcerative colitis versus Crohn's disease
- Open versus laparoscopic surgery
- Nongastrointestinal surgery

These populations have a high incidence of mesenteric vein thrombosis.

Natural history of postoperative VTE after colectomy

The incidence of deep vein thrombosis and pulmonary embolism is higher in the first 2 weeks after colectomy than the risk in third and fourth weeks (Figure 3).

Figure 3: Incidence of postoperative deep vein thrombosis and pulmonary embolism within 30 days after colectomy



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
PE	5	31	70	58	56	60	48	52	40	34	26	39	19	26	24	24	33	22	20	19	27	18	23	13	21	9	8	9	8	13	5
DVT	5	61	71	77	79	72	65	72	68	78	62	49	48	55	67	51	28	36	43	41	39	31	19	22	30	24	16	22	19	19	16

Time-course of postoperative VTE in patients with colon cancer and IBD

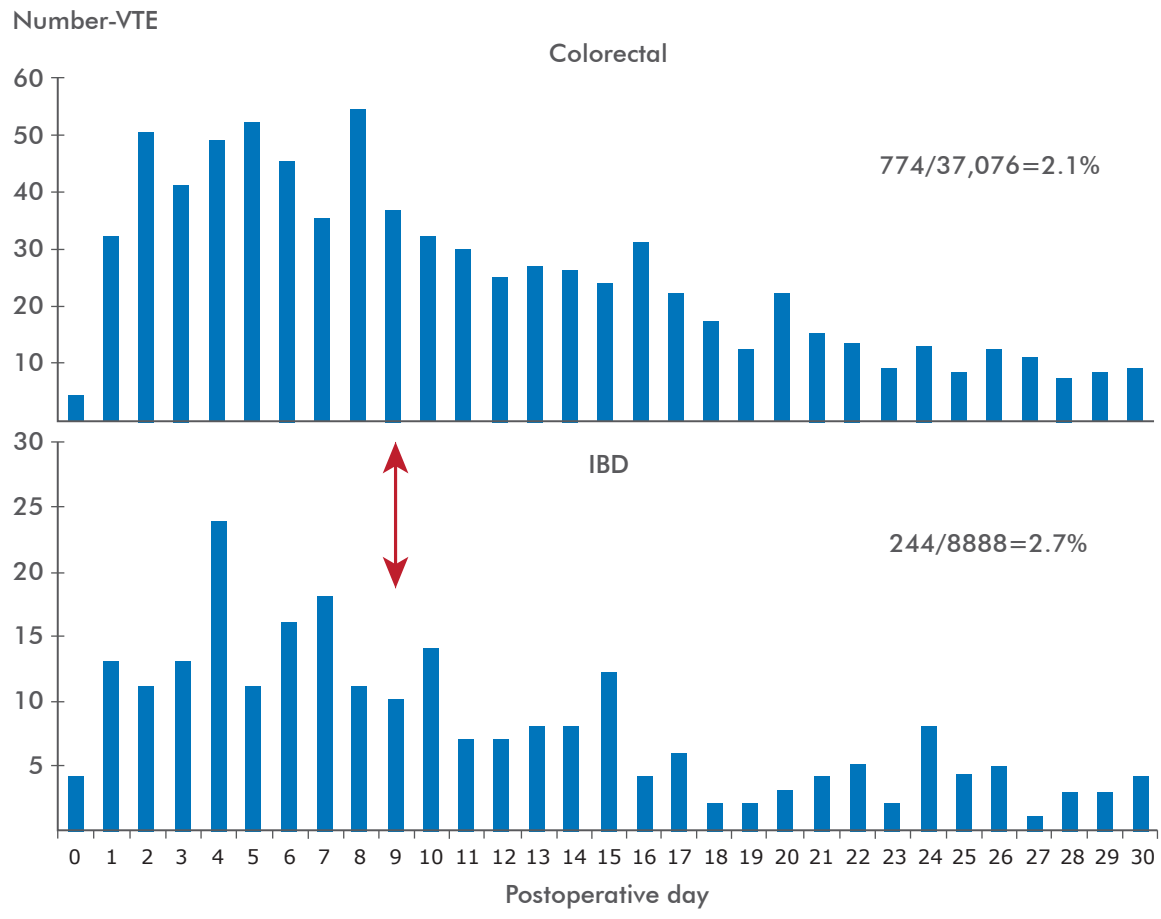
Percentage of patients with postoperative VTE detected after hospital discharge

- 38% in IBD
- 35% in cancer

Average hospital stay

- 9.0 days in IBD
- 8.8 days in cancer

Figure 4: Number of VTE incidence after colorectal and IBD surgery

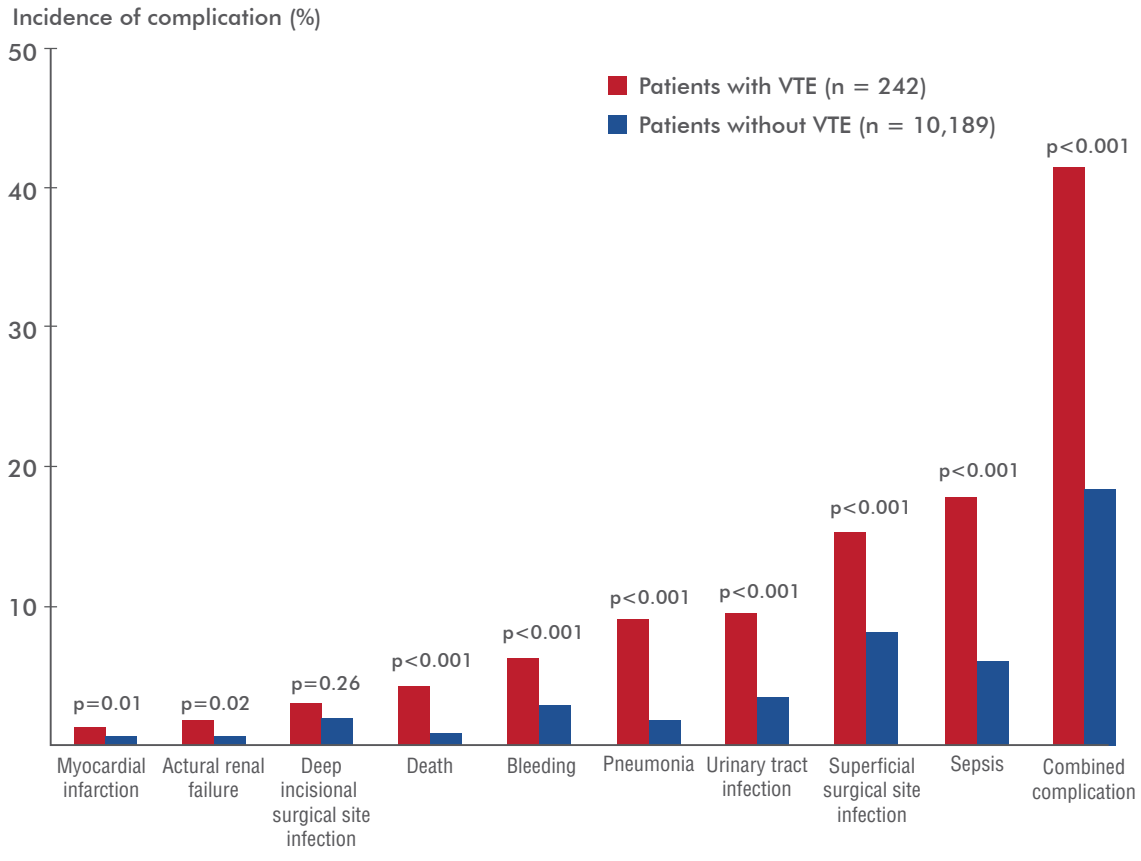


The incidence of postoperative VTE is 26% higher in patients undergoing IBD surgery than the ones undergoing colorectal cancer surgery.

Impact of postoperative VTE in patients with IBD

Patients with IBD are at increased risk of postoperative VTE and have worse postoperative outcomes (Figure 5).

Figure 5: Postoperative outcomes in patients with IBD with/without VTE



Patients with VTE have:

- Longer hospital stays: 18.8 versus 9 days
- More complications: 41% versus 18%
- Elevated mortality: 4% versus 0.9

The American Society of Colon and Rectal Surgeons Clinical Practice Guideline for the Prevention of Venous Thromboembolic Disease in Colorectal Surgery 2018 recommendations

1 The use of a VTE risk assessment model is recommended to guide VTE prophylaxis in patients undergoing colorectal surgery (Grade of Recommendation: Weak recommendation based on high-quality evidence, 2A).

2 Pharmacological thromboprophylaxis with either LMWH or low dose unfractionated heparin should typically be given to patients undergoing colorectal operations who are deemed to be at moderate or high risk for VTE, who are not identified as high risk for bleeding complications (Grade of Recommendation: Strong recommendation based on high-quality evidence, 1A).

3 Patients with IBD are at high risk for deep vein thrombosis, and select patients may benefit from extended prophylaxis (Grade of Recommendation: Weak recommendation based on very low-quality evidence, 2C).

Summary of Dr David Jimenez talk:

- The burden of VTE in surgical population is huge, and pulmonary embolism can be fatal.
- Use tools to assess the patient's VTE risk and bleeding risk after surgery.
- Pharmacological thromboprophylaxis is effective and, most of the times, safe.
- Develop local protocols to adapt to hospitals to reduce the burden of VTE.

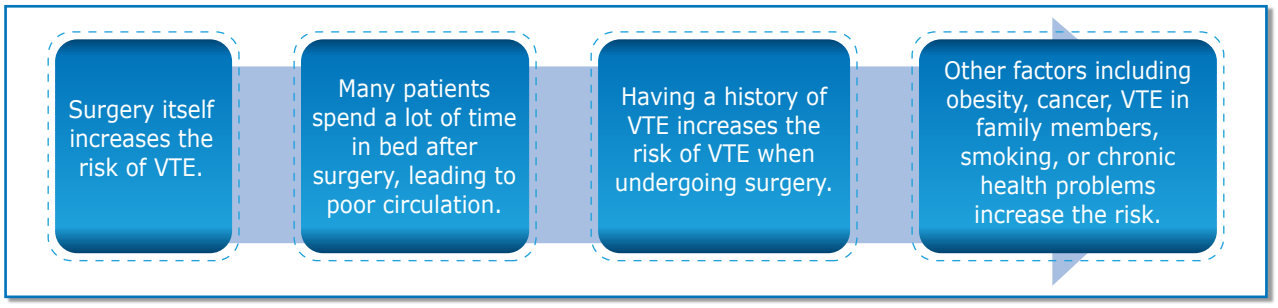
Indian Expert Talk

This talk was delivered by Dr Shailesh V. Shrikhande.

Dr Shailesh V. Shrikhande, Deputy Director, Head, Division of Cancer Surgery and Chief, Gastrointestinal and Hepato-Pancreato-Biliary Surgery, Professor, Department of Surgical Oncology, Tata Memorial Hospital, Mumbai, has done immense research and published numerous articles in leading journals. He is the first Indian cancer surgeon to be conferred Honorary Fellowship of the American Surgical Association (ASA).

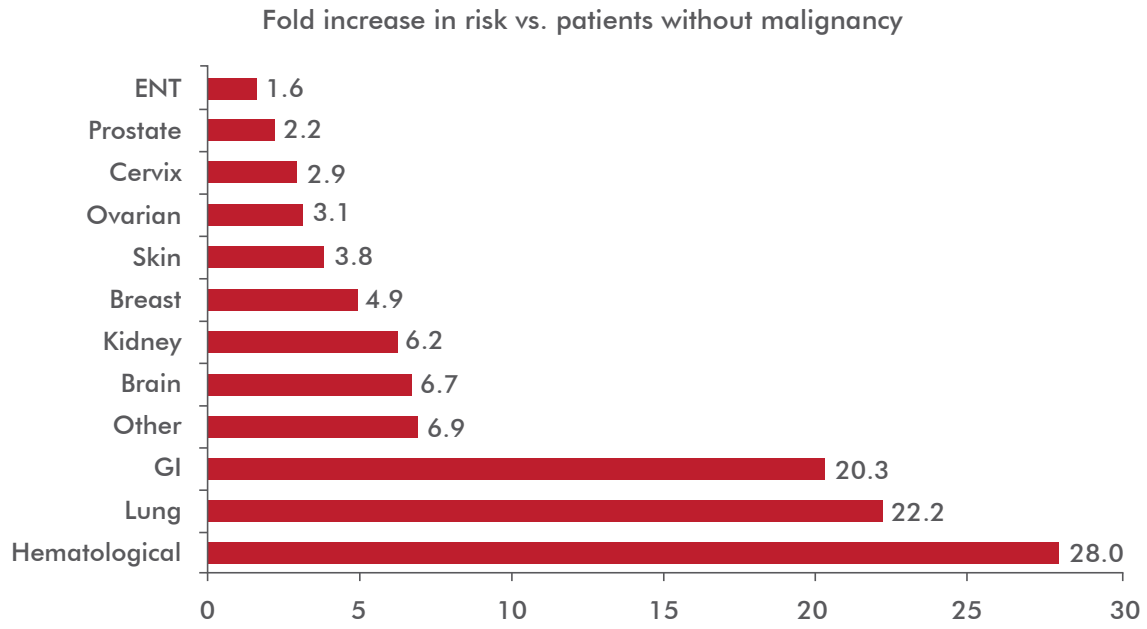
Role of surgery in VTE

VTE is a serious and preventable condition in patients who have undergone recent surgery.



VTE is common in all high-risk surgical populations. Patients with cancer undergoing surgery have been shown to have a two-fold or greater increased risk for fatal pulmonary embolism compared with those without cancer undergoing similar procedures (Figure 6).

Figure 6: Risk of VTE as per the type of malignancy



Risk assessment of VTE

Khorana risk score for VTE in patients with cancer

This score predicts the risk of VTE for patients with cancer depending on the type of cancer and other factors (Table 4).

Table 4: Khorana risk score for VTE assessment

Patient characteristic	Risk score
Site of cancer	
Very high risk (stomach, pancreas)	2
High risk (lung, lymphoma gynecologic, bladder, testicular)	1
Prechemotherapy platelet count ≥350 x 10^9 L	1
Hemoglobin level <100 g/L or use of red cell growth factors	1
Prechemotherapy leukocyte count >11 x 10^9L	1
BMI 35 kg/m^2 or more	1

0 points = low risk
1-2 points = intermediate risk
≥3 points = high risk

Other risk scores used in patients with cancer undergoing surgery are as follows:

PROTECHT score	Khorana score plus the following: • Use of platinum-based therapy/gemcitabine
CONKO score	• Tumor site of origin: Very high risk for stomach, pancreas; High risk for lung, lymphoma, gynecologic, bladder, testicular • Prechemotherapy platelet count ≥350 × 10^9/L • Hemoglobin level <10 g/dL or use of erythropoiesis-stimulating agents • Prechemotherapy leukocyte count >11 × 10^9/L • WHO performance status ≥2
COMPASS-CAT score	• Breast, lung, ovarian, or colorectal cancer only • **Cancer-related risk factors:** - Anthracycline or anti-hormonal therapy in women with breast cancer - Time since cancer diagnosis ≤6 months - Central venous catheter - Advanced cancer tage • **Predisposing risk factors:** - Cardiovascular risk factors (≥2 of peripheral artery disease, ischemic stroke, coronary artery disease, hypertension, hyperlipidemia, diabetes, obesity) - Recent hospitalization for acute medical illness - Personal history of VTE - Prechemotherapy platelet count ≥350 × 10^9/L

Rate of thromboprophylaxis in cancer patients undergoing abdominal or pelvic surgery

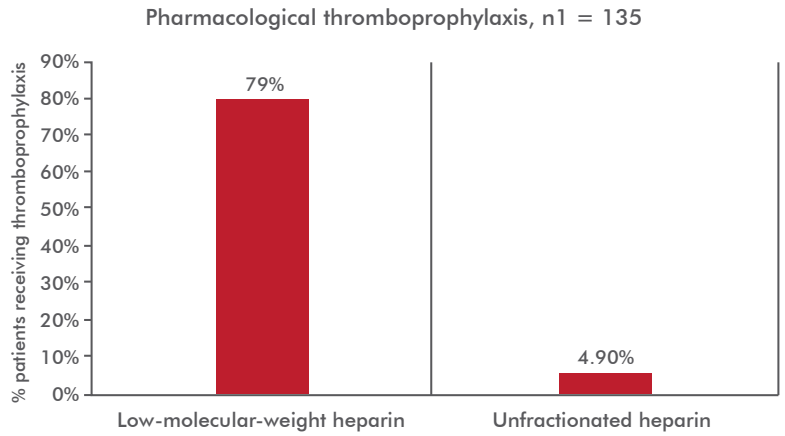
A study was conducted by Shrikhande *et al*. (2021) to determine the proportion of patients receiving thromboprophylaxis among those undergoing surgery for malignant abdominal or pelvic tumors. This prospective, multicenter, observational study included 300 patients. The mean age and duration of cancer were 53.2 and 1.2 years, respectively.

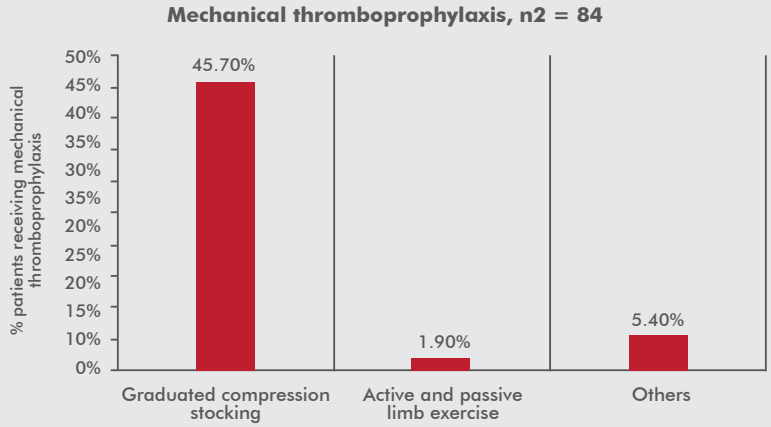
Thromboprophylaxis was received by approximately half of the patients.

Types of thromboprophylaxis

- Pharmacological thromboprophylaxis - 48.1%
- Mechanical thromboprophylaxis - 16.7%
- Both pharmacological and mechanical thromboprophylaxis - 35.2%

Figure 7: Rate of pharmacological and mechanical thromboprophylaxis





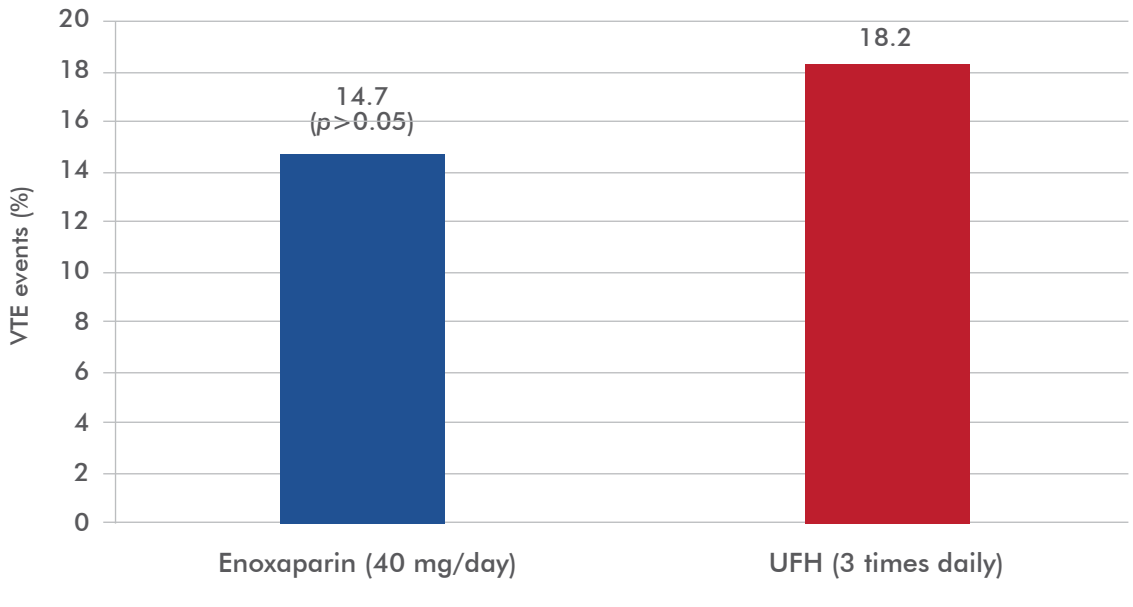
LMWH (79.0%) and graduated compression stockings (45.7%) were the most used pharmacological and mechanical thromboprophylaxis, respectively, in patients with cancer undergoing abdominal or pelvic surgery (Figure 7).

Patients with cancer undergoing surgery have a very high risk for developing VTE, and thromboprophylaxis is crucial in preventing VTE-related events.

VTE Thromboprophylaxis: LMWH versus UFH in patients with cancer undergoing abdominal/pelvic surgery

- ENOXACAN study group: A double-blind, randomized multicenter trial with venographic assessment
- Patients: 1,115 patients (>40 years of age and undergoing planned elective curative abdominal or pelvic surgery for cancer)
- Comparison: LMWH (enoxaparin 40 mg/day) versus UFH (3000 U, three times daily) for 7 to 10 days postoperatively
- Follow-up: 3 months

Figure 8: VTE events after LMWH and UFH



Low VTE events by enoxaparin than UFH in patients with cancer undergoing abdominal/pelvic surgery (Figure 8).

Thromboprophylaxis with LMWHs (enoxaparin 40 mg/day) safely prevented postoperative VTE events in cancer patients undergoing major abdominal/pelvic surgery.

Factors to consider while tailoring anticoagulation in patients with cancer undergoing surgery

Factors	Clinical highlights
Efficacy and safety	• LMWHs are recommended over vitamin K antagonists. • Direct oral anticoagulants are non-inferior to LMWHs.
Risk of bleeding	• There is a higher risk of major bleeding complications with direct oral anticoagulants versus LMWHs. • Edoxaban and rivaroxaban have a higher risk of bleeding vs. LMWH in gastrointestinal/genitourinary cancers.
Drug interactions	• All direct oral anticoagulants have high drug-drug interactions.
Patient preference	• LMWHs can improve treatment adherence
Body weight	• LMWHs preferred over direct oral anticoagulants in patients with BMI > 40 kg/m^2 or weight >120 kg; a higher dose of LMWH is considered.
Renal impairment	• LMWHs adjusted to anti-XA level or UFH followed by vitamin K antagonists in patients with creatinine clearance <30 mL/min can be considered.
Gastrointestinal surgery or absorption disorders	• Consider LMWH for patients with impaired gastrointestinal absorption.

Other factors
- Burden of cancer/VTE
- Pre-existing conditions and co-medication

Recommended dosages for VTE prophylaxis in cancer patients undergoing surgery

Anticoagulant	Dosage
Enoxaparin	40 mg 2–4 hours preoperatively or 10–12 hours preoperatively and 40 mg once daily thereafter
Dalteparin	2,500 U 2–4 hours preoperatively and 5,000 U once daily thereafter
UFH	5,000 U 2–4 hours preoperatively and every 8 hours thereafter • The first prophylactic dose of UFH should be administered no sooner than 1 hour after needle/catheter placement. In patients receiving preoperative prophylactic low-dose UFH, neuraxial puncture/catheter manipulation or removal should not occur within the first 4–6 hours after UFH administration. • Subsequent UFH administration may occur no earlier than 1 hour after catheter removal. In patients receiving preoperative therapeutic UFH (>15,000 U/24 hours), neuraxial block/catheter removal or manipulation should not occur within 12 hours after UFH administration.
Fondaparinux	2.5 mg once daily beginning 6–8 hours postoperatively

Summary:

- VTE is common in surgical populations.
- The risk of VTE depends on the type of surgery and on type of malignancy among patients with cancer.
- Pharmacologic thromboprophylaxis can significantly reduce VTE risk in emergency surgery patients.
- Thromboprophylaxis with LMWH prevents postoperative VTE events in cancer patients undergoing major abdominal/pelvic surgery.
- Extended (4 weeks post surgery) instead of short-term (2 weeks) thromboprophylaxis is recommended for high-risk cancer surgical patients and patients undergoing major general/abdominal surgery.

Question and answer session

Q1 What are the proven methods of VTE thromboprophylaxis?

Ans Ambulation, mechanical and pharmacological methods are proven methods. Estimate the risk of thromboembolism from the outpatient itself. If the patient is a smoker, advise to give up smoking a few weeks before planned surgery and ask the patient to ambulate. If it is a young lady on OCPs or an elderly woman on HRT, offer alternatives. Always screen patients on admission for risk.

Q2 Should tranexamic acid be used to stop bleeding?

Ans No, tranexamic acid should not be used to stop bleeding.

Q3. How do we handle COVID-19 related coagulopathy as it causes both arterial and venous thrombosis?

Ans The incidence of VTE increases in patients hospitalized with COVID-19. The overall incidence of VTE is 17% in patients hospitalized with COVID-19. The risk is much higher in critical patients admitted to ICU compared with patients admitted to wards. All patients admitted with COVID-19 should receive pharmacological prophylaxis for VTE unless contraindicated. It is still not clear if these patients might benefit from therapeutic anticoagulation. Some guidelines suggest therapeutic anticoagulation in patients admitted to wards, while other guidelines recommend standard prophylaxis. It is important to provide pharmacological prophylaxis to patients with COVID-19 admitted to the hospital.

Q4. What are the cut-off levels for using thromboprophylaxis in a patient with cancer-associated thrombocytopenia?

Ans In patients with platelet count <50,000/mm3, use LMWH and not a direct oral anticoagulant. Use half the recommended dose for LMWH.

In patients with platelet count <25,000/mm3, pharmacological prophylaxis or treatment with anticoagulant is absolutely contraindicated. Mechanical thromboprophylaxis and treatment with inferior vena cava filter should be considered.

Q5. Patients with jaundice with deranged INR are expected to have natural anticoagulation. What will be the recommendation for thromboprophylaxis in such cases?

Ans Do not rely on INR in this subgroup of patients. Standard anticoagulation for prophylaxis or treatment is effective and safe in these patients as per data.

Q6. How to plan thromboprophylaxis in elderly patients on aspirin/clopidogrel for cardiac reasons? Do these agents protect against venous thrombosis?

Ans In orthopedic surgery, there is an ongoing debate on the role of aspirin for thromboprophylaxis. But for cancer surgery, use standard pharmacological thrombo-prophylaxis with LMWH most of the time and not with antiplatelet therapy.

If the patient is on antiplatelet therapy, which is the only bleeding risk factor in such patients, we still provide pharmacological thromboprophylaxis with LMWH. If the patient has additional risk factors for bleeding, such as liver disease or renal disease, and there is an absolute contraindication to pharmacological prophylaxis, mechanical prophylaxis is recommended.

In major abdominal surgeries such as vascular resections that have more arteries involved than veins, add low dose aspirin, in addition to LMWH, when patients are going home.

Q7. Despite prophylaxis, you cannot entirely prevent thrombosis or embolism. How should a clinician suspect if a patient still has VTE or PE?

Ans There should be a high index of suspicion from the time a patient comes to the clinic. If the patient is at low risk of VTE, such as patient with appendicitis, still there can be problems. Factors to be considered postoperatively are how well the patients are mobilized. Many hospitals, especially ICUs, have "Enhance active recovery programs after surgery," which have dedicated nurses and physiotherapists for mobilization and are well documented daily.

Furthermore, it is important to examine and differentiate the patients who are at low risk and who are at high risk. Patients at high risk should not neglect symptoms, such as edema, pain, or calf muscle pain. We often detect these events as sudden events because symptoms were missed, and the window of opportunity is missed in the critical perioperative period in high-risk patients.

Therefore, in high-risk cases, pay attention to details in patients with long-duration surgery, patients who are obese, and those with lack of mobility, calf muscle pain or tenderness, or diabetes. If there is the smallest worry, scan them and investigate actively. Doppler ultrasound can be used for detection.

Q8. Is the D-dimer test useful in the above patients?

Ans Practically, the D-dimer test is not used for every single case. If there is a challenging case with a lot of bleeding problems and other concerns, only then the emphasis is given on the D-dimer value. In the COVID-19 era, D-dimer is given much attention.

Additionally, D-dimer has a good negative predictive value in postoperative scenarios. If the D-dimer value is normal, it is less likely to cause thrombosis. The D-dimer value is the same in postoperative and nonoperative patients. Therefore, the clinical utility, ie, the number of CT scans avoided due to negative D-dimer values, is much lower, about 30% in nonoperative patients and 5% in postoperative patients. Thus, it is not recommended to use the D-dimer test in suspicion of VTE.

Q9. What is the risk of bleeding in postoperative phase with thromboprophylaxis?

Ans There is a misconception about the bleeding risk due to thromboprophylaxis. LMWH is not associated with bleeding risk. If a patient is preoperatively worked up well, there are low chances of bleeding risk postoperatively.

Postoperative hemorrhage/bleeding in the first 48 hours of surgery is primarily due to surgical failure with exceptions and not due to LMWH. Moreover, LMWH should be started early, especially in abdominal and pelvic surgery.

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