

Association of the Risk of Venous Thromboembolic Event in Emergency Vs Elective General Surgery

Article

Ross SW, Kuhlenschmidt KM, Kubasiak JC, *et al.* Association of the risk of a venous thromboembolic event in emergency vs elective general surgery. *JAMA Surg.* 2020 Jun 1;155(6):503–511. Doi: 10.1001/jamasurg.2020.0433.

Key Points Addressed

Do patients undergoing emergency general surgery have a higher risk of venous thromboembolism (VTE) than those undergoing elective surgery?

Study Objectives

- To investigate if emergency case status is independently associated with VTE as compared to elective case status.
- To evaluate the theory that emergency cases have a higher VTE risk than elective cases.

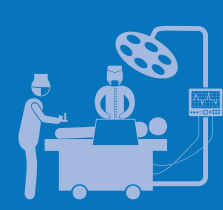
Study Design

This study was a retrospective cohort study that included the following:

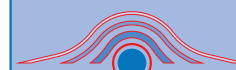
The American College of Surgeons National Surgical Quality Improvement Program database from January 1, 2005, to December 31, 2016, was used for all cholecystectomies, ventral hernia repairs (VHR), and partial colectomies (PC).



The three surgical procedures included in the study were selected to provide a list of cases commonly performed by both general surgeons and acute care surgeons and had both emergency and elective counterparts.



The consequences of emergency physiology and inflammatory etiologies were evaluated on the same surgery type.



If a patient had more than one of the three procedures, the patient was coded for the more invasive and potentially complicated procedure (the order of greatest to least severity was PC, VHR, and cholecystectomy).



The primary outcome was VTE at 30 days. In addition, a multivariable analysis controlling for age, sex, body mass index, bleeding disorder, disseminated cancer, laparoscopy approach, and surgery type was performed.



Results

Overall findings

- 12-year study period with 604,537 adults
- Mean (SD) age: 53.3 (16.6) years (61.4% women)
- **256,726** laparoscopic and **37,311** open cholecystectomies; **33,630** laparoscopic and **128,513** open VHRs, and **62,366** laparoscopic and **98,944** open PCs

Operative details by emergency status

The rates of laparoscopic surgeries were higher among the patients with elective status versus those with emergency status (58.8% versus 53.7%, $P < 0.001$). In addition, there was a greater rate of elective case mix for all surgery types and a higher rate of laparoscopy use for each type of procedure among the patients with elective status.

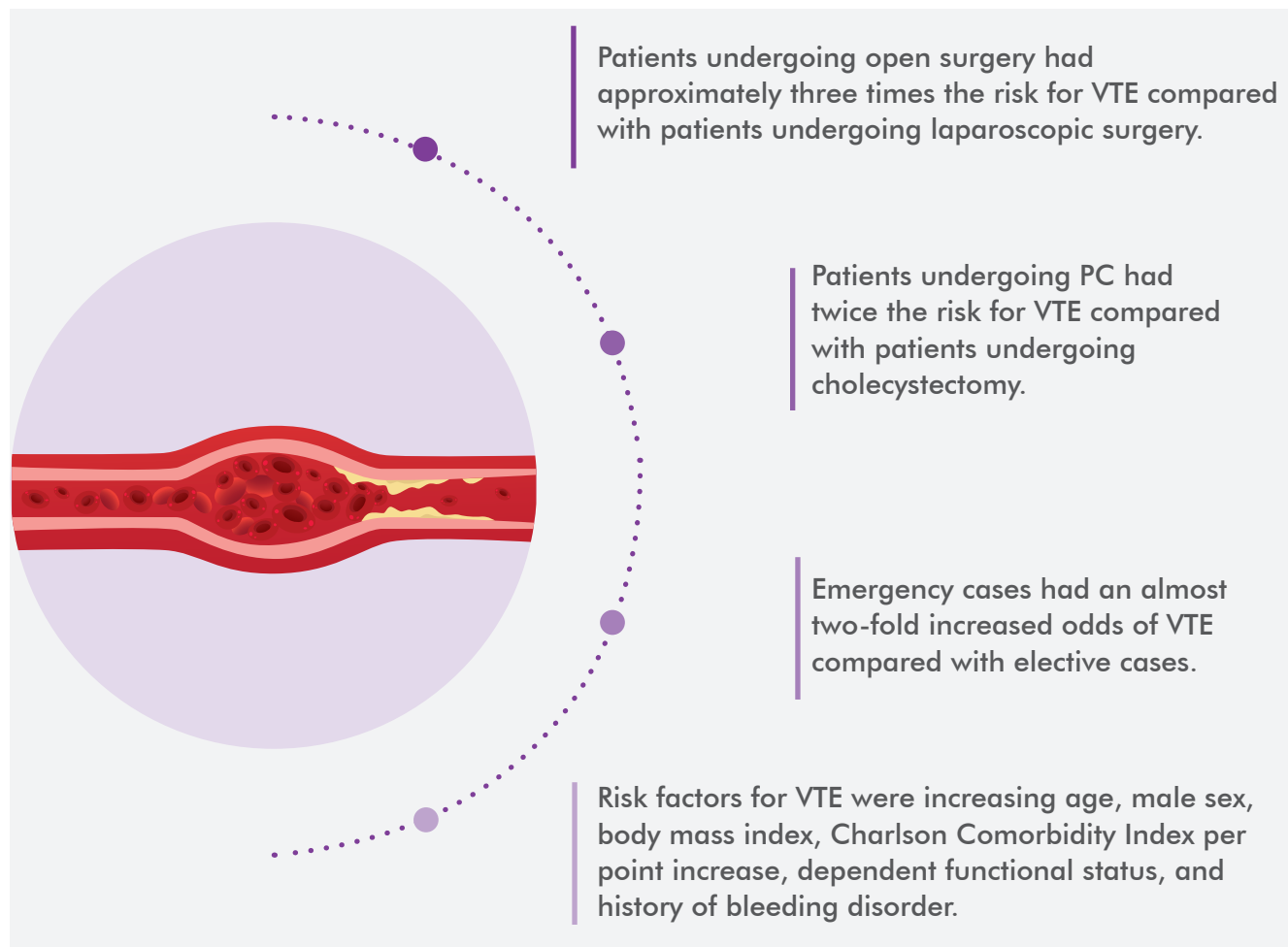
VTE outcomes by emergency status within 30 days

Open surgery versus laparoscopic surgery

- VTE rates were higher in open surgery within each stratum of the procedure.
- VTE rate in open cholecystectomy was 8.3 times higher than that in laparoscopic cholecystectomy.
- Open PC had the highest rate of VTE within 30 days, with 3.2% having deep vein thrombosis (DVT) or pulmonary embolism (PE).
- Laparoscopic cholecystectomy had the lowest rate of VTE within 30 days at 0.3%.
- A total of 6,624 VTE events (1.1%) occurred in the cohort.
- The rate of VTE within 30 days was higher in the patients with emergency status versus those with elective status (1.9% versus 0.8%, $P < 0.001$).
- The rates of DVT and PE were higher in patients with emergency status, and the time to diagnosis of DVT was shorter in these patients by almost 1.5 days.
- Reoperation and readmission rates were higher in patients with emergency status than those with elective status.
- 30-day mortality was nine times higher in patients with emergency (3.6%) versus elective status (0.4%) ($P < 0.001$).

Multivariate analysis by emergency status

On multivariable analysis:



Conclusion

Emergency surgery and increased invasiveness are independently associated with VTE compared to elective surgery.

Comments and Clinical Relevance

This study showed that:

Emergency general surgery (EGS) is independently associated with VTE and doubles a patient's risk compared with elective surgery.

The risk of VTE increases proportionally to the invasiveness of the procedure, with laparoscopic procedures having lower rates of VTE than open procedures and PCs having higher rates of VTE than cholecystectomies.

VTE risk continues to be high even after hospital discharge, with more than 30% of VTE events in the EGS population occurring after admission and contributing to readmission.

The independent risk factors for VTE included age, obesity, immobility, male sex, and history of bleeding disorder.

The rates of DVT and PE were higher in patients with emergency status, and the time to diagnosis of DVT was shorter in these patients by almost 1.5 days. However, the time to diagnosis of PE was similar in both groups. This discrepancy may be due to the overt clinical signs of a PE, which make diagnosis much more apparent compared with the more subtle signs of a developing DVT.

There should be a call to action for surgeons and hospitals to promote research and quality improvement processes aimed at patients undergoing EGS to prevent and mitigate VTE.

Evidence has also shown an increased relationship between missed doses and DVT.

One study showed that only 47% of patients with DVT received VTE prophylaxis regimens. Greater inflammation resulting from the illness may also be associated with a hypercoagulable state in the EGS population.

Implementation of clinical decision-making tools in the electronic medical record is another important way to increase adherence to and early initiation of VTE prophylaxis and has been found to increase the odds of correct ordering by 2.35 times. A multidisciplinary approach is required to:



- Decrease missed prophylaxis dosing.
- Initiate measures for identifying VTE prophylaxis.
- Adjust to higher prophylaxis dosing or other medications.
- Alleviate effects of VTE when it occurs.

Suggested Readings

1. Yang M, Murphy PB, Allen L, *et al.* Venous thromboembolism in emergency general surgery patients: A single-centre retrospective cohort study. *Can J Surg.* 2020 Feb 26;63(1):E80–E85. Doi: 10.1503/cjs.006318.
2. DeWane MP, Davis KA, Schuster KM, *et al.* Venous thromboembolism-related readmission in emergency general surgery patients: A role for prophylaxis on discharge? *J Am Coll Surg.* 2018 Jun;226(6):1072–1077. Doi: 10.1016/j.jamcollsurg.2018.03.021.
3. Murphy PB, Vogt KN, Lau BD, *et al.* Venous thromboembolism prevention in emergency general surgery: A review. *JAMA Surg.* 2018 May 1;153(5):479–486. Doi: 10.1001/jamasurg.2018.0015.
4. Tadesse TA, Kedir HM, Fentie AM, *et al.* Venous thromboembolism risk and thromboprophylaxis assessment in surgical patients based on Caprini risk assessment model. *Risk Manag Healthc Policy.* 2020 Nov 10;13:2545–2552. Doi: 10.2147/RMHP.S272852.

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