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Commentary

The Impact of Caprini Risk Score on Venous Thromboembolism Prevention in Total Joint Replacement Patients

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DESCRIPTION

Venous Thromboembolism (VTE) is a serious complication following total joint replacement procedures. A variety of risk assessment protocols have appeared to reduce this complication by suggesting prophylaxis based on the level of risk [1]. The current publication by Qiao L et al. reports the largest analysis of the use of the Caprini Risk Score (CRS) following joint arthroplasty incorporating preoperative and postoperative duplex scanning of the legs. This enabled the authors to have a more precise estimate of the number of VTE events in the study population [2]. The CRS was developed in 1986 and refined with input from numerous experts over the years. This tool consists of 40 questions which are assigned weights based on their propensity to be associated with a thrombotic event [3]. The combination of the number of risk factors and their weights results in a score. The score increases in nonlinear fashion with the incidence of venous thromboembolism. A 42-year-old patient with 3 risk factors: Age, birth control medication, and BMI of 28, would have a score of three since each of these risk factors is worth one point. Patients with a score of 3 have a very low VTE risk and do not need anticoagulant prophylaxis. Compare that to another patient with 3 risk factors: 76 years old male (3 points), with a history of thrombosis (3 points), and a history of cancer (2 points). The CRS is 8 and associated with a high risk of VTE in most populations, despite the presence of only three risk factors, indicating the need to use anticoagulant prophylaxis. Thrombosis risk assessment is more precise using this combination of risk factors and their weights compared to a simple list of risk factors alone. Originally a set point of five plus was thought to be associated with a 6% incidence of thrombosis based on a few publications a decade ago. Naturally the orthopedic community ignored the CRS for total joint patients since the procedure itself was scored as five points. While total joint replacements represent a high-risk procedure, the CRS using a cutoff of 5+ was not helpful. Since that time over 300 publications have appeared using the score in various clinical situations. The CRS set point for various populations and type of surgery varies widely as documented in a recent meta-analysis of 4,207,895 patients [4]. Anticoagulant prophylaxis is routinely used following total joint replacement. The primary issue remains whether to administer aspirin or a traditional anticoagulant. Aspirin is efficacious, safe, and inexpensive, and has been shown to be effective in a variety of patients undergoing total joint replacement while being associated with a low risk of bleeding [5]. However, there is continued debate regarding the suitability of aspirin as a prophylactic choice for all patients [6].

Investigators found that using the CRS can identify those who would benefit from a traditional anticoagulant based on their level of risk. The best data came from studies by the orthopedic group at Northwell Health in New York. The updated 2013 version of the CRS was validated by this group in 2019. They compared the existing classification used by the orthopedic surgeons to this validated CRS. The study included 1078 patients. Eight patients developed symptomatic VTE. Seven of the 8 events were correctly identified as high-risk with a CRS of 10 or greater, while the same 7 study patients were considered low-risk by the department protocol [1]. In 2019, Northwell Health began enrolling all arthroplasty patients in a registry that included the CRS with scores updated when appropriate during hospitalization. Patients were followed by a phone survey 2-3 months postoperatively to capture VTE events. In a cohort of 873 THA and TKA patients classified as low-risk (CRS 9 or lower), oral Enteric-Coated Aspirin (ECASA) 81 mg twice daily for 6 weeks was prescribed. High-risk (CRS 10 or higher) THA patients received oral apixaban 2.5 mg twice daily for 5 weeks; high-risk TKA patients received oral apixaban 2.5 mg twice daily for 12 days followed by oral ECASA 81 mg twice daily for 4 weeks [7]. The overall rate of VTE in this series was 0.2%, including 2 VTE events (both DVT) in low- risk patients (0.38% incidence) and no events in the high-risk group. Prior to the implementation of the CRS-guided thromboprophylaxis

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program, the overall rate of VTE had been 0.78%. The rate of symptomatic DVT after TKA was 0.35%(2/569); both clots were distal, and they occurred on postoperative days 74 and 77. One DVT was thought to be due to noncompliance because the patient stopped taking thromboprophylaxis after less than 4 weeks and did not pursue outpatient physical therapy. No patient developed a DVT or PE after THA. Bleeding episodes were minimal and minor, and included 2 patients in the ECASA group and 3 patients in the apixaban group. The Northwell team continues to employ the CRS to identify high-risk patients who require more robust chemoprophylaxis to prevent postoperative thrombosis after arthroplasty. Despite the interesting nature of these data, the small number of patients involved prevented widespread adoption of the program, awaiting further confirmation in a larger clinical study. The current publication by Qiao L et al. provides compelling data to support the results from the Northwell Health group. The study cohort included 3807 patients including 432 individuals with VTE and 3375 patients without thrombosis. All the patients in this cohort underwent face to face interrogation which the investigators deemed provided more accurate results than relying on the electronic medical record. One important aspect of this study involved objective screening of every patient with duplex ultrasonography before and after the surgical procedures. Using this methodology identified a large number of asymptomatic thrombosis (10.51%) and 0.84% incidence of symptomatic events. The significance of these asymptomatic events may be questioned since most of them involved clotting in the muscular branches of the calf. One may argue that these events are indeed important since potentially they could lead to extended thrombosis or embolization and label the patient as "thrombosis prone" [8]. Although routine surveillance for DVT provided complete and accurate assessment of patients in this study, it does not represent real world patient care. Both the American Academy of Orthopedic Surgeons (AAOS) and American College of Chest Physicians (ACCP) guidelines do not recommend routine screening for DVT after arthroplasty [9,10]. The use of preoperative ultrasound screening in these patients detected 357 individuals with existing thrombosis. We were not told what the CRS numbers were in these patients, nor if these patients underwent arthroplasty or fracture repair. Existing data found individuals with the CRS of 11 or more admitted with femoral fracture have a 16% incidence of thrombosis preoperatively [11].

CONCLUSION

This finding deserves further investigation to identify a level of CRS that would justify preoperative screening. The incidence of thrombosis increased in a nonlinear fashion with increasing CRS values. The author suggests that because of these findings more intense anticoagulation may be provided in the future to those with higher CRS values. Further investigations will be required to identify these variables. The current publication emphasizes the importance of the CRS in patients undergoing total joint arthroplasty and provides further evidence for the documentation of highest risk where traditional anticoagulants may be best used.

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