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Hospital Medicine

Evidence-Based Information for Hospitalists Intensivists, and Acute Care Physicians [ALERT]

Balancing The Pros and Cons of Central Venous Catheterization Sites

By Deborah J. DeWaay, MD, FACP

Associate Professor, Medical University of South Carolina, Charleston, SC

Dr. DeWaay reports no financial relationships in this field of study

SYNOPSIS: Intravascular central venous catheterization placed in the subclavian vein was less likely to cause deep vein thrombosis and line infections, but more likely to cause pneumothorax.

SOURCE: Parienti J, Mongardon N, Mégarbane B et al. Intravascular Complications of Central Venous Catheterization by Insertion Site. *N Engl J Med* 2015; 373:1220-1229

There are three primary locations for placing a central venous catheter (CVC): subclavian vein, internal jugular (IJ) vein and femoral vein. The placement of a CVC at any of these sites can lead to a deep vein thrombosis (DVT) or a blood stream infection. Subclavian and IJ lines can lead to a pneumothorax.

There is controversy over the risk of DVT from central lines, however, there is always the risk of pulmonary embolism from such a clot. This trial, cleverly titled 3SITES, was a randomized, controlled, multi-centered study. It was performed in 10 ICUs from four university hospitals and five community hospitals in France between 2011 and 2014. The patients enrolled in the study were age 18 and over, admitted to the ICU, required placement of a CVC and had at least two out of three locations (subclavian, IJ or femoral) suitable for an insertion site.

In patients where all three sites were suitable, the site of insertion was randomized on a 1:1:1 basis. In patients where only two sites were suitable, the randomization was 1:1. The patient was excluded if only one site was eligible. All ICUs used French and American guidelines to prevent catheter-associated blood stream infections.

All procedures were performed with appropriate sterile technique and none of the catheters contained antiseptic or antibiotic coatings. All lines were placed under ultrasound guidance or by the use of anatomical landmarks

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[INSIDE]

Hospital Medicine [ALERT]

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as a guide. The physicians in charge of the patients' care independently determined when the catheters could be removed. The catheter tips were sent for culture. Ultrasounds were performed at the site of insertion 48 hours after removal to assess for the presence of DVT.

7559 catheter insertions were screened, 4088 were excluded because only one site was available. Of the patients included, 843 received subclavian lines, 845 received IJ lines, and 844 received femoral lines. Symptomatic deep-vein thrombosis had a 0.5%, 0.9% and 1.4% occurrence rate in the subclavian, IJ, and femoral line sites respectively (P= 0.02 by the log-rank test). Blood stream infections had a 0.5%, 1.4% and 1.2% occurrence rate in the subclavian, IJ, and femoral line sites respectively (P= 0.02 by the log-rank test. Pneumothoraces (grade ≥ 3) had a 2.1%, 1.4% and 0.7% occurrence rate in the subclavian, IJ, and femoral line sites respectively (P= 0.047 by the chi-square test).

Insertion at the site of the subclavian vein was associated with fewer blood stream infections when compared to the femoral site, which has been previously described. However, the subclavian site was also associated with fewer infections compared to an IJ site. Understandably, but unfortunately, subclavian lines were associated with more pneumothoraxes.

The authors offer several reasons for their findings. First, there is a lower bacterial burden over the subclavian area. Second, the subclavian catheter is longer. Third, the dressing over the subclavian line is in an area where it is less likely to be disrupted. However, when all complications to CVCs are considered, there is a roughly equal overall risk for complication with any of the three sites.

■ COMMENTARY

Hospitalists place many CVCs or request their placement via interventional radiology or vein teams and thus choose the location of the site. Although this study was performed in the ICU, it has relevance to all hospitalized patients since CVC placement is a procedure that is performed in a standardized way.

Hospitalists should keep this information in mind when choosing a site in a particular patient. For example, if a patient with COPD needs a CVC, perhaps a subclavian site should not be used because a pneumothorax could be devastating.

However, in a patient without lung disease but who is colonized with VRE and MRSA, a subclavian line might be used since the risk of a catheter associated bloodstream infection with an antibiotic-resistant organism would be higher.

It is important to note that over half of the patients could not be randomized because they only had one possible insertion site. This illustrates the difficulties faced with finding line sites in ill patients and why we must be diligent to only place these lines when absolutely necessary in order to preserve access for the future and decrease risk of complications.

There were several limitations to this study. There was a large amount of missing data regarding DVTs. Additionally, daily chlorhexadine dressings and daily chlorhexadine bathings were not used to prevent infection, therefore, the authors could not comment on how the use of these might change the results of this study. But the lack of randomization of ultrasound-guided placement may be the biggest limitation of this study. Further studies should be done to see if the use of ultrasound changes the risk profile of a given location to make it more favorable.

Despite the limitations to the study, the findings are consistent with some earlier, smaller trials and support the premise that subclavian lines have a lower risk of infection and DVT but a higher risk of pneumothorax, while IJ and femoral lines have a lower risk of pneumothorax but a higher risk of infection.

Femoral lines have the highest risk of symptomatic DVT. These findings should be taken into consideration when choosing the site for a central line in any given patient. ■

ABSTRACT & COMMENTARY

Role of Transthoracic Echo in Staph Bacteremia

By Michael Crawford, MD, Editor

SOURCES: Showler A, et al. Use of transthoracic echocardiography in the management of low-risk *Staphylococcus aureus* bacteremia: Results from a retrospective multicenter cohort study. *JACC Cardiovasc Imaging* 2015;8:924-931.

Kaasch AJ, Michels G. *Staphylococcus aureus* bloodstream infection: When is transthoracic echocardiography sufficient? *JACC Cardiovasc Imaging* 2015;8:932-933.

Bacteremia due to *Staphylococcus aureus* (Staph) can be associated with infective endocarditis (IE). Transthoracic echo (TTE) may be falsely negative early in IE, so transesophageal echo (TEE) is often recommended. However, the role of TTE in diagnosing IE in patients with Staph bacteremia is unclear. Thus, investigators from Toronto conducted a retrospective cohort study of 833 hospitalized patients with Staph bacteremia from seven hospitals over a 3-year period between 2007 and 2010. Echoes were performed at the discretion of their primary physician. The primary outcome was diagnosis of IE within 90 days of Staph bacteremia. The 536 patients who received a TTE within 28 days of bacteremia were randomly assigned to derivation and validation cohorts. Multivariate analysis was used to identify high-risk criteria for developing IE in the derivation group, which were then applied to the validation group. Bacteremia was community-acquired in 28%, healthcare-associated in 37%, and nosocomial in 34%. Within 28 days of the first positive blood culture, 54% of the total population had a TTE, 11% TTE and TEE, and 3% had a TEE alone. TTE was normal in 69%, met criteria for IE in 22%, and was indeterminate in 9%. Four clinical criteria predicted IE: indeterminate or positive TTE; community-acquired bacteremia; IV drug use; and the presence of a high-risk cardiac condition. The presence of any one of these criteria in the validation group had a sensitivity of 97% and a specificity of 52%. The negative predictive value was 99% and the positive 25%. The authors concluded that in patients without community-acquired Staph bacteremia, a high-risk cardiac condition, or IV drug use, a negative TTE excluded IE.

■ COMMENTARY

Staph bacteremia is frequent in hospitalized patients and often raises concerns for IE. All guidelines recommend echocardiographic imaging in these cases, but differ in their recommendation for employing TEE. The Infectious Diseases Society of America recommends TEE in all, but various American and European cardiac societies recommend the selected use of TEE. This study addresses this issue and demonstrates that clinical plus TTE data can identify a low-risk group that does not need TEE because the incidence of subsequent IE is < 1%. In their series, using these criteria would decrease TEE use by half. The sensitivity of their criteria for IE was 97% with a negative predictive value of 99%. Specificity and positive predictor values were lower (52 and 25%), but this is probably because of the strict criteria they used for a negative TTE. Not only did the echo have to lack any major Duke Criteria (oscillating mass, perivalvular leak, or abscess), it also lacked nonspecific abnormalities, such as valve thickening, new regurgitation, or non-mobile masses. Also, their clinical criteria excluded patients with any cardiac-foreign material, congenital heart disease, cardiac transplant, valve disease, or a history of IE. Additionally, 15% of the patients had more than one TTE performed. Consequently, none of the patients who would not have needed TEE developed IE in the 90-day follow-up period. Finally, the study is biased toward patients more likely to have IE, since 32% of the total population did not get an echocardiogram. These patients were more likely on a surgical service and less likely community-acquired or associated with IV drug use. So despite being a retrospective observational study, the results are robust and agree with the recommendation of cardiac societies to use TEE selectively in Staph bacteremia.

In this study with an IE prevalence of 14%, TEE would have been indicated in 55% of the patients by their criteria. Interestingly, TEE was performed in only 21% of the 566 patients that had any echo performed, and only 5% had only a TEE performed. Thus, their criteria would actually increase the number of TEEs performed in these seven hospitals. It would appear that TEE is underutilized in practice and few are following the Infectious Disease Societies' recommendation that all Staph bacteremia patients should have TEE. In the absence of better data, we should employ these new, more selective criteria, which are skewed toward higher sensitivity, since Staph IE is such a serious disease with a high incidence of morbidity and mortality. ■

ABSTRACT & COMMENTARY

Could High-flow Oxygen Therapy Impact Acute Respiratory Failure Management?

By Richard Kallet, MS, RRT, FAARC, FCCM

Director of Quality Assurance, Respiratory Care Services, San Francisco General Hospital

Mr. Kallet reports no financial relationships relevant to this field of study.

SYNOPSIS: Managing acute hypoxemic respiratory failure with high-flow nasal cannula (HFNC) significantly reduced intubation rates compared to standard oxygen (O_2) mask delivery and non-invasive ventilation among patients whose arterial O_2 tension to inspired O_2 fraction ratio (PaO_2/FiO_2) was < 200. Among all study patients, hospital mortality was lower in the HFNC group.

SOURCE: Frat JP, et al. High-flow oxygen through nasal cannula in acute hypoxemic respiratory failure. *N Engl J Med* 2015;372:2185-2196.

This multicenter, randomized, controlled trial posited that heated, humidified high-flow nasal cannula (HFNC) standard oxygen (O_2) at 40-60 L/min provides a high stable FiO_2, reduces upper airway dead space, and creates continuous positive airway pressure (CPAP). This would reduce minute ventilation demand and work of breathing, thereby reducing the need for invasive mechanical ventilation (MV).

The study enrolled 313 patients who met these criteria: 1) PaO_2/FiO_2 < 300 breathing face mask O_2 > 10 L/min, 2) respiratory rate > 25 breaths/min, and 3) arterial carbon dioxide tension < 45 mmHg. Patients with chronic lung disease, cardiogenic pulmonary edema, neurologic injury, severe neutropenia, hemodynamic instability, or limited care were excluded. Patients were randomized to HFNC at 40-60 L/min, face mask O_2 at > 10 L/min, or NIV with inspiratory pressure titrated to achieve a tidal volume of 7-10 mL/kg with a CPAP of 5 cm H_2O for at least 8 hours/day. For all treatment arms, FiO_2 was titrated to keep O_2 saturation > 92%. Baseline physiology, demographics, and comorbidities were not different between the treatment arms.

Overall, the primary outcome of need for invasive MV was not significantly different between the treatment groups. However, in a post hoc analysis of those with an initial PaO_2/FiO_2 < 200, there was a significant difference in the need for invasive MV in favor of the HFNC group (35% for HFNC vs 53% for standard O_2 therapy and 58% for NIV; P = 0.009). Neither the time interval to intubation nor the underlying cause necessitating invasive MV were different between therapies. The HFNC cohort had a significantly higher number of ventilator-free days (24 ± 8 days) compared to those receiving standard O_2 therapy (22 ± 10 days), and those on NIV (19 ± 12 days) (P = 0.02). The hazard ratio (HR) for death at day 90 was significantly higher in the standard O_2 and NIV groups compared to the HFNC group (HR, 2.01; 95% confidence interval [CI], 1.01-3.99; HR, 2.50; 95% CI, 1.31-4.78, respectively; P = 0.02). Those treated with HFNC also experienced greater improvement in dyspnea compared to those receiving standard O_2 and NIV (76% vs 42% vs 58%, respectively; P < 0.001).

■ COMMENTARY

The FLORALI (High-Flow Oxygen Therapy for the Resuscitation of Acute Lung Injury) study suggests we reconsider our initial management approach in select patients with acute hypoxemic respiratory failure. The concern, however, is that misapplication of HFNC O_2 therapy may lead to delayed intubation that paradoxically worsens outcomes. It is essential to target appropriate candidates while clearly specifying early discontinuation.

FLORALI and other studies provide practical guidelines for appropriate patient selection.[1] HFNC is contraindicated in those with acute hypercapnia because it signifies either respiratory muscle fatigue or depressed respiratory drive, both of which necessitate invasive MV. Likewise, profound tachypnea and accessory muscle use not readily reversed with HFNC (e.g., within < 30 min) requires invasive MV. In addition, HFNC is not indicated for patients who are either hemodynamically unstable or manifest signs of acute neurologic deterioration.

HFNC therapy should be terminated quickly in favor of invasive MV when exclusion criteria develop after therapy commences: a sustained respiratory rate > 35 breaths/min, lack of improvement in respiratory distress/dyspnea, sustained O_2 saturation < 90%, arterial pH < 7.35, decreased systolic (< 90 mmHg) or mean (< 65 mmHg) arterial blood pressure despite fluid boluses and/or vasopressors, or when either definitive airway control is indicated or with the presence of copious pulmonary secretions.[1]

In considering HFNC, NIV can provide some guidance. The principle indications for NIV also apply to

HFNC, namely situations where the cause of respiratory failure can be readily reversed. In contrast, clinical conditions such as acute respiratory distress syndrome (ARDS) are not ideal for NIV and, likewise, HFNC. This condition often resolves more slowly, frequently requiring several weeks of MV. Moreover, ARDS is associated with an elevated minute ventilation and severely impaired pulmonary mechanics, both of which greatly increase WOB.[2] As a result, NIV failure rates in ARDS typically exceed 50% and delayed intubation is associated with heightened mortality risk.[3] Similarly, in those failing HFNC O_2 therapy, ICU mortality was markedly lower (39% vs 67%) when invasive MV was instituted within 48 hours (median of 10 hours).[1]

The apparent success of HFNC over NIV requires comment. NIV was used only 8 hours/day, which likely limited its efficacy. Also, in patients with pneumonia (the primary diagnosis among FLORALI subjects), HFNC was as effective as CPAP of 5 cm H_2O in reducing inspiratory effort.[4] Although HFNC reduced the work of breathing in these pneumonia patients, the baseline spontaneous work of breathing was not markedly elevated compared to the spontaneous work of breathing measured in patients with ARDS.[2] Moreover, the mortality in the NIV group is consistent with the NIV literature and likely signifies complications associated with invasive MV rather than pre-intubation management, per se. The FLORALI study did not explicitly state whether protocol managed invasive MV. Therefore, the significance of mortality differences reported in the FLORALI study remains uncertain.

In summary, current high-level evidence supports using HFNC as the primary O_2 delivery method for patients in acute respiratory failure from pneumonia without hypercapnia and who exhibit hemodynamic and neurologic stability. ■

REFERENCES

1. Kang BJ, et al. Failure of high-flow nasal cannula therapy may delay intubation and increase mortality. *Intensive Care Med* 2015;41:623-632.
2. Kallet RH, et al. The spontaneous breathing pattern and work of breathing in patients with acute respiratory distress syndrome and acute lung injury. *Respir Care* 2007;52:989-995.
3. Antonelli M, et al. Predictors of failure of noninvasive pressure support ventilation in patients with acute hypoxemic respiratory failure: A multi-center study. *Intensive Care Med* 2001;27:1718-1728.
4. Vargas F, et al. Physiologic effects of high-flow nasal cannula oxygen in critical care subjects. *Respir Care* 2015 May 5 [Epub ahead of print].

ABSTRACT & COMMENTARY

Using Procalcitonin to Differentiate Bacterial from Viral Meningitis

By Richard R. Watkins, MD, MS, FACP

Division of Infectious Diseases, Akron General Medical Center, Akron, OH; Associate Professor of Internal Medicine, Northeast Ohio Medical University, Rootstown, OH

Dr. Watkins reports that he has received research support from Forest Laboratories.

SYNOPSIS: A meta-analysis based on nine studies found an elevated serum procalcitonin to be an accurate test for differentiating bacterial from viral meningitis in adults.

SOURCE: Vikse J, et al. The role of serum procalcitonin in the diagnosis of bacterial meningitis in adults: A systematic review and meta-analysis. *Intern J Infect Dis* 2015;38:68-76.

Differentiating bacterial from viral meningitis is a frequent clinical conundrum. Usually, broad-spectrum antibiotics are administered when meningitis is suspected until cerebrospinal fluid (CSF) cultures are negative for at least 48 hours. This common practice exposes patients with viral meningitis to antibiotics unnecessarily, which raises costs, increases risk for adverse drug events, and propagates antibiotic resistance. Therefore, rapid non-culture based testing would be a great benefit in the diagnosis of meningitis.

Vikse and colleagues sought to determine if procalcitonin (PCT), a serum biomarker that is increased in serious bacterial infections, could accurately differentiate bacterial from viral meningitis. Several studies have been published on the topic, but they produced mixed results. Thus, there is no current consensus on the diagnostic utility of PCT in meningitis. PCT is an attractive test in this setting because it is rapid (i.e., results back in less than 24 hours) and has become widely available. Moreover, studies on bacterial meningitis have shown PCT to be elevated even if the blood was

drawn following initiation of antibiotic therapy.

A total of nine studies were included in the meta-analysis (n = 725 patients). Of these, two were retrospective and seven were prospective. Different assays were used, and the cut-off for PCT ranged between 0.25 ng/mL to 2.13 ng/mL. Seven of the studies also measured C-reactive protein (CRP) as a biomarker. The sensitivity for PCT for detecting bacterial meningitis was 0.90 (95% confidence interval [CI], 0.84-0.94), specificity was 0.98 (95% CI, 0.97-0.99), and the diagnostic odds ratio was 287.0 (95% CI, 58.5-1409.0). CRP was far less accurate; the sensitivity for bacterial meningitis was 0.82 (95% CI, 0.75-0.88), specificity was 0.81 (95% CI, 0.77-0.84), and diagnostic odds ratio was 22.1 (95% CI, 12.7-38.3). However, significant heterogeneity was found for the diagnostic odds ratio for PCT (I2 = 66.2%), which the investigators attributed to variation in the types of serum PCT assays used in the studies. Finally, a funnel plot was constructed to detect publication bias, which was asymmetrical, indicating that this type of bias may have been present in the studies included in the meta-analysis.

■ COMMENTARY

The meta-analysis conducted by Vikse and colleagues showed that PCT has a high specificity (i.e., 98%) for bacterial meningitis, making it a highly accurate biomarker for ruling in this serious infection, as well as a high sensitivity (90%). This result is similar to a previous study, which found that PCT had a sensitivity of 95%, a specificity of 100%, a negative predictive value of 100%, and a positive predictive value of 97% at a diagnostic cut-off level of 0.28 ng/mL (AUC, 0.99; 95% CI, 0.99 to 1) in distinguishing bacterial from viral meningitis in adults.[1] Moreover, using PCT with cut-off value > 2 ng/mL showed sensitivity, specificity, positive predictive value, and negative predictive value of 100%, 66%, 68%, and 100%, respectively, for the diagnosis of bacterial meningitis in children.[2] The use of PCT to rapidly rule out bacterial meningitis has the potential to reduce the costs of unnecessary hospitalization and adverse effects from antibiotics. Another potential benefit is that PCT may provide information about prognosis. In a recent study, children with higher serum levels of PCT were found to have prolonged clinical courses and increased mortality.[3]

One of the limitations to the meta-analysis by Vikse et al. is that the overall number of studies included is small. Thus, the risk of publication bias is increased, especially since the funnel plot was asymmetrical. Another limitation is that the investigators excluded studies conducted on children, a group for whom meningitis is a frequent and serious infection. Clearly the ability to differentiate bacterial from viral meningitis in these patients is highly important.

Should serum PCT be ordered routinely in cases of meningitis? There is good quality evidence that PCT can accurately distinguish bacterial from viral meningitis. In my opinion, when the clinical suspicion for bacterial meningitis is low and the PCT is normal, I would likely stop antibiotics, especially if there is a lymphocyte predominance in the CSF and the Gram stain is negative. However, if the PCT is elevated, I would wait for CSF culture results for at least 48 hours before stopping antibiotic therapy. Whether PCT testing will be included in the next Infectious Diseases Society of America clinical guidelines on meningitis is an open question. ■

REFERENCES

1. Viallon A, Desseigne N, Marjollet O, et al. Meningitis in adult patients with a negative direct cerebrospinal fluid examination: Value of cytochemical markers for differential diagnosis. Crit Care 2011;15:R136.
2. Alkholi UM, Abd Al-Monem N, Abd El-Azim AA, et al. Serum procalcitonin in viral and bacterial meningitis. J Glob Infect Dis 2011;3:14-18.
3. Hu R, Gong Y, Wang Y. Relationship of serum procalcitonin levels to severity and prognosis in pediatric bacterial meningitis. Clin Pediatr (Phila) 2015 Feb 3. [Epub ahead of print.]

ABSTRACT & COMMENTARY

Valve Disease and Thromboembolic Risk

By Michael Crawford, MD, Editor

SOURCES: Philippart R, et al. Prognostic value of CHA_2DS_2-VASc score in patients with 'non-valvular atrial fibrillation' and valvular heart disease: The Loire Valley Atrial Fibrillation Project. *Eur Heart J* 2015;36:1822-1830.

Breithardt G, Baumgartner H. Valvular heart disease among non-valvular atrial fibrillation: A misnomer, in search of a new term. *Eur Heart J* 2015;36:1794-1797.

The CHA_2DS_2-VASc score (CVS) for the prediction of stroke and other thromboembolism risk in patients with atrial fibrillation (AF) has been validated in patients with non-valvular AF (*see Table 1*). AF patients with mitral stenosis or a prosthetic left

Table 1. The CHA_2DS_2-VASc Score

Factor	Points
Congestive heart failure	1
Hypertension history	1
Age 65-74 years	1
Age > 74 years	2
Diabetes	1
Stroke, TIA thromboembolism	2
Vascular disease history	1
Sex, female	1
Scores >1 favor anticoagulant therapy.	

heart valve are known to have a high risk of thromboembolism, and vitamin K antagonists are recommended for them regardless of their CVS.

However, little data are available on how to manage AF patients with native, non-rheumatic valve disease. Thus, investigators from France and the United Kingdom tested the hypothesis that the CVS would work well in such patients. The hypothesis was tested in the echocardiography database of a large hospital in Tours, France, to identify 8053 AF patients without valve disease (n = 6851) and those with either aortic stenosis (AS) or regurgitation (AR) and mitral regurgitation (MR) (n = 1202) between 2000 and 2010.

Thromboembolic events were identified after a mean follow-up of 868 days in 627 patients. The AF patients with valve disease (61% MR, 24% AR, 32% AS) had a higher risk of events (hazard ratio [HR], 1.39; 95% confidence interval, 1.14-1.69; *P* = 0.001), even after adjustment for anticoagulant and antiplatelet use. The severity of valve disease was not associated with more events, but patients with aortic valve disease had higher event rates than those with MR. The event rate per year increased with increasing CVS in those with and without valve disease, and the predictive value of the CVS was the same in both groups.

Comparing a CVS of 0-1 to 2-3, the event rate/year not on anticoagulants increased from 1.62% to 6.19% in AF patients without valve disease and from 1.90% to 5.98% in those with valve disease. The authors concluded that in "non-valvular AF" patients with (no mitral stenosis or valve prostheses) the presence of left ventricular valve disease increased the risk of thromboembolic events and that this result correlated with higher CVS scores.

■ COMMENTARY

Almost all the research on anticoagulants and AF has been in so-called "non-valvular AF." It is now clear that this terminology was imprecise. What was really meant was "AF patients with no other high-risk condition for thromboemboli," such as rheumatic mitral stenosis and prosthetic valves. The latter patients had clear indications for anticoagulation if they developed AF. Patients with non-rheumatic mitral valve disease and patients with aortic valve disease fell into a gray zone in which there wasn't much data. Thus, this retrospective observational study focusing on AF patients with and without gray zone valve disease is of interest. In their traditional non-valvular AF patients, 22% had left heart valve disease (LHVD), 60% of which was non-rheumatic MR. This LHVD subgroup of the "non-valvular" AF patients had a higher incidence of thromboembolic events. However, they were older and had more comorbidities than the group with absolutely no valve disease, which was reflected in higher CVSs. On multivariate analysis, only age, female sex, and the CVS were predictive of events. Of course, the first two are included in the CVS. In fact, in this study the CVS had the same predictive value in both groups, which suggests that it can be used for all AF patients without rheumatic mitral stenosis or a prosthetic valve.

These distinctions are important for choosing an oral anticoagulant. We know that the new oral anticoagulants (NOAC) are at least as good as vitamin K antagonists (VKA) in "non-valvular AF," but not in prosthetic valves. There are no comparative data in mitral stenosis, but most would favor VKA in these patients. Can we use NOACs in the AF patients with non-rheumatic, non-prosthetic LHVD? This study suggests that if we use the CVS we can. Other studies comparing the NOACs to VKAs have included some LHVD patients (e.g., ROCKET AF), and the results were similar. Thus, the available data suggest NOACs are adequate in LHVD patients with AF.

Clearly, the term "non-valvular AF" is confusing. The American College of Cardiology/American Heart Association/European Society of Cardiology guidelines define "non-valvular AF" as the absence of rheumatic disease, mitral stenosis, prosthetic valves, or valve repair. That leaves a lot of LHVD on the table. Perhaps we need new terminology in this area as the editorial accompanying this article suggests. The immediate practical conclusion of this study is that the CVS score can be used to determine who needs oral anticoagulant therapy in "non-valvular AF" patients with LHVD with confidence. ■

CME INSTRUCTIONS

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CME QUESTIONS

1. Which of the following is not a common or likely complication of CVC placement in the femoral region?

a. Deep vein thrombosis

b. Retroperitoneal hemorrhage

c. Pneumothorax

d. Bloodstream infection

e. Hematoma

2. According to the study by Showler and colleagues, a transthoracic echocardiogram can safely exclude infective endocarditis in patients with staphylococcal bacteremia as long as they don't have which of the following criteria:

a. Injection drug use

b. A high-risk cardiac condition

c. Community-acquired staphylococcus

d. All of the above

3. The study by Frat, et al., demonstrated that the use of high-flow nasal cannula in patients with acute respiratory failure led to which of the following outcomes compared to standard nasal oxygen and non-invasive ventilation?

a. Decreased need for mechanical ventilation in all patients

b. Decreased need for mechanical ventilation only in patients with a PaO2/FiO2 ratio of less than 200.

c. Improved sensation of dyspnea

d. Improved survival in patients with an acute COPD exacerbation

e. B and C

CME OBJECTIVES

Upon completion of this educational activity, participants should be able to:

- discuss pertinent safety, infection control and quality improvement practices;
- explain diagnosis and treatment of acute illness in the hospital setting; and;
- discuss current data on diagnostic and therapeutic modalities for common inpatient problems.

[IN FUTURE ISSUES]