ENDOVASCULAR

CRITICAL LIMB ISCHEMIA

CRT-200.02

Therapeutic Window of Clopidogrel and Ticagrelor in Patients with Critical Limb Ischemia

Joshua Perese, Jared Cline, David Shavelle, Vincent Rowe, Jorge Caro, Leonardo C. Clavijo
University of Southern California, Los Angeles, CA

BACKGROUND Critical limb ischemia (CLI) is associated with increased risk of amputations, cardiovascular events and mortality. Antiplatelet therapy is a crucial component of CLI treatment. High on-treatment platelet reactivity (HPR), defined by a platelet reactivity unit (PRU) score above 208 on the VerifyNow P2Y12 Assay, is associated with increased risk of ischemic events. Low on-treatment platelet reactivity (LPR), defined by a PRU score below 85, is associated with increased risk of bleeding events. The goal of the current study is to investigate a therapeutic range (TR) of clopidogrel and ticagrelor defined by PRU scores between 85 and 208.

METHODS In a retrospective analysis, data from the "Switch To Ticagrelor in Critical Limb Ischemia Anti-Platelet Study 'STT-CLIPS'" study was used to assess the therapeutic window of 48 CLI patients. Data included four measurements of platelet reactivity using the VerifyNow P2Y12 Assay: baseline (before daily dose) and steady state (6 hours after daily dose) while taking clopidogrel 75 mg daily for at least two weeks, and two weeks after switching to ticagrelor 90 mg twice daily.

RESULTS At baseline, 47.9% of patients on clopidogel were within TR (37.5% HPR, 14.6% LPR) compared to 10.2% on ticagrelor (2.1% HPR, 87.5% LPR; $p< 0.001$). At steady state, 43.8% of patients on clopidogel were within TR (31.3% HPR, 25.0% LPR) compared to 10.2% on ticagrelor (2.1% HPR, 87.5% LPR; $p< 0.01$). HPR was more common on clopidogrel compared to ticagrelor at baseline (37.5% vs. 2.1%; $p< 0.0001$) and at steady state (31.3% vs. 2.1%; $p< 0.001$). LPR was more common in ticagrelor compared to clopidogrel at baseline (87.5% vs. 14.6%, $p< 0.0001$) and at steady state (87.5% vs. 25%, $p< 0.0001$).

CONCLUSION With only 42.9% of patients on clopidogrel (at steady state) being in the therapeutic range of platelet inhibition, there is a reasonable concern for either bleeding or ischemic complications. Though ticagrelor has been proposed as an antiplatelet alternative in patients with CLI, this study observes an excess of platelet inhibition, warranting concern for bleeding complications.

CRT-200.03

Frailty in Patients With Critical Limb Ischemia

Jared Cline, Joshua Perese, David Shavelle, Vincent Rowe, David Armstrong, Jorge Caro, Leonardo Clavijo
University of Southern California, Los Angeles, CA

BACKGROUND Critical limb ischemia (CLI) is an advanced stage of peripheral arterial disease in which insufficient blood flow to an affected extremity results in ischemia, frailty, and adverse outcomes. Frailty is increasingly used to preoperatively risk-stratify patients and has become an important prognostic marker for mortality in cardiovascular (CV) patients. The aim of this study was to assess the utility of the Vascular Quality Initiative (VQI) and modified Frailty Index (mFI) frailty scales in patients with CLI by correlating frailty indices to adverse in-hospital events.

METHODS This study retrospectively examined frailty in 494 patients with CLI who presented to LAC+USC (January 2012-June 2017). Patients were analyzed on 15 criteria unique to the VQI and mFI scales and separated into 10 and 11 categories respectively. The frailty index was calculated by scoring 1 point for a positive category, summing up the positive value categories and dividing by 10, yielding a ratio between 0 and 1. The index was classified as a VQI-derived frailty index ≥ 0.3 = "frail", FI ≤ 0.08 = "non-frail" and $0.08 \leq$ FI ≥ 0.3 = pre-frail. The mFI scale was performed in the same manner and patients were separated: mFI ≤ 0.08 = "non-frail", those with mFI ≥ 0.25 = "frail", $0.08 \leq$ mFI ≥ 0.25 = "pre-frail". Once these patients were separated, the indices were correlated to rates of death, amputation, and CV endpoints using Chi Square, ANOVA and Student t-tests.

RESULTS Using the mFI, planned amputations occurred in 19.5% of frail versus 2.5% of pre-frail patients ($p = 0.008$). Frailty status calculated with the VQI index correlated with death and planned amputation: frail patients experienced 23% planned amputations versus 4% in non-frail and 16% in pre-frail ($p = 0.025$). Death only occurred in frail patients ($p = 0.034$). Unplanned amputation showed no correlation in either index.

CONCLUSION The VQI frailty index is more efficacious in amputation and mortality risk stratification than the mFI. The VQI may be used as a screening tool to identify patients who are at high risk for amputation and death. It is a tool that can assist with informed decision-making in patients with CLI.

CRT-200.04

Outcomes of Split Thickness Skin Grafting for Foot and Ankle Wounds in Patients With Peripheral Arterial Disease

Iram Naz, Elliot T. Walters, Karen K. Evans, Paul J. Kim, Cameron M. Akbari, Christopher E. Attinger
MedStar Georgetown University Hospital, Washington, DC

BACKGROUND Tissue ischemia resulting from arterial insufficiency is a major contributing factor to lower extremity wound healing in patients with peripheral arterial diseases (PAD). Rapid wound closure provides a barrier to further infection and limb loss. Split thickness skin grafting (STSG) is relatively common and easy to perform, but outcomes data are scant in the post-endovascular intervention population. In this study, we evaluated factors predictive for complete wound healing following endovascular intervention for PAD.

METHODS We retrospectively reviewed all patients with PAD and wounds of the foot and ankle who underwent STSG between January 2014 and December 2016 at MedStar Georgetown University Hospital. Lower extremity revascularizations, percent take rate of STSG, and amputation rate were of particular interest. Wounds with 100% take rate were defined as fully healed.

RESULTS Thirty-five patients with 48 wounds underwent STSG. There were 21 males and 14 females with a mean age of 64 years. Revascularization was performed in 24 patients (33 limbs) for non-healing wounds and abnormal pedal pulses before STSG. The most common endovascular intervention was balloon angioplasty for tibial lesions. A total of 9 patients had endovascular intervention for SFA and popliteal chronic total occlusion. The presence of a patent pedal arch showed improved wound healing at one month ($p<0.05$). Initial wound surface area at presentation ($20.3cm^2$ vs. $41.8cm^2$) was also significant for complete healing at one month ($p<0.05$). However, at 90 days of follow-up, the initial wound size lost significance. Additionally, at 90 days of follow-up 18 wounds were fully healed, five required revision, 15 were unhealed, and 9 did not return for follow up. Ultimately, a total of 6 limbs had major amputations at an average of 502 days. During this period, 23 wounds eventually healed and the remaining had some degree of breakdown that required both conservative treatment or reoperations for limb salvage and wound closure.

CONCLUSION These results show the importance of a patent pedal arch to the healing potential of the foot and ankle wound with STSG and limb salvage efforts in this high-risk patient population.

CRT-200.05

High On-treatment Platelet Reactivity to Aspirin and Clopidogrel Increases the Risk of Cardiovascular Events in Patients with Critical Limb Ischemia

Wesley Ghasem, Noor Al-Asady, Joshua Perese, Jorge Caro, David Shavelle, Ray V. Matthews, Vincent Rowe, Leonardo Clavijo
University of Southern California, Los Angeles, CA

BACKGROUND Critical limb ischemia (CLI) is associated with increased risk of adverse cardiovascular and limb events. This study aims to determine if high on-treatment platelet reactivity (HPR) to aspirin (HPRA) and/or clopidogrel (HPRC) is associated with increased risk of adverse cardiovascular or limb events.

METHODS This is a prospective study of 100 CLI patients from LAC+USC Medical Center and Keck Hospital from June 2014 to November 2016. All patients were on aspirin (81 mg daily) and clopidogrel (75 mg daily) for at least two weeks, and underwent VerifyNow ASA and P2Y12 platelet reactivity assays. HPRA was defined as aspirin reaction units (ARU) >550, and HPRC was defined as P2Y12 reactive units (PRU) >208. Major adverse cardiovascular events (MACE) included myocardial infarction, stroke, and death. Major adverse limb events (MALE) included repeat revascularization and unplanned amputation.

RESULTS Patients with HPRA+HPRC had numerically higher rate of MACE compared to those with appropriate platelet inhibition (API) to both drugs (11.1% vs. 2.0%, p = 0.28). Patients with HPRA had an increased rate of myocardial infarction compared to API to aspirin (11.8% vs. 2.7%, p=0.04). MACE occurred in 12.5% of HPRC patients compared to 4.48% in API to clopidogrel (p=0.4). HPRC was not a predictor of major adverse limb events (p=0.29).

CONCLUSION CLI patients with HPR to aspirin and clopidogrel are at increased risk of adverse cardiovascular events, particularly myocardial infarction in patients resistant to aspirin.

OTHER

CRT-200.06

Steerable Catheters For Intravascular Foreign Bodies: You Can Get There From Here

James W. Hansen, Thomas Piemonte, Gautam Gadey
Lahey Hospital and Medical Center, Burlington, MA

BACKGROUND Intravascular foreign bodies (IVFB) are a well-described complication of endovascular procedures with significant morbidity and mortality. Retrieval of the IVFB is indicated if at all possible. Retrieval of IVFBs can be complex based on the location and cumbersome nature of the embolized device. Technological advancements are already assisting with IVFB retrieval. Steerable catheters represent an advancement in the field of IVFB retrieval. In our lab, we have adopted the Dexterity steerable catheter (Spirus Medical, Bridgewater, MA, USA). We present three cases of IVFB retrieval using a steerable catheter.

METHODS Case 1: A 54-year-old male with a history of idiopathic pulmonary embolism on indefinite anticoagulation who required spinal surgery underwent inferior vena cava filter. During retrieval, the filter embolized into the pulmonary artery. The patient was referred to our facility for attempt at retrieval. Pulmonary angiography confirmed that the IVC filter was in the distal left lower pulmonary artery. The steerable catheter was directed toward the filter and successfully snared.

Case 2: A 54 y/o male suffered embolization of two self-expanding femoral venous stents. Snares were advanced from an internal jugular sheath and a femoral steerable catheter. The two overlapping stents were captured by the opposing snares and pulled apart. One stent was then snared at opposite ends. Traction was applied, which forced the stents to elongate and narrow to the point of fitting inside the steerable catheter, and the stent was removed. The process was repeated for the second stent.

Case 3: A 21 y/o female with no prior medical history underwent placement of a subcutaneous birth control device. Shortly after the procedure, she could no longer feel the device beneath her skin. Radiography showed that the device had embolized to a right subsegmental pulmonary artery. A steerable catheter was advanced into the right segmental pulmonary artery. A snare was advanced and the device was captured without vascular injury.

RESULTS Successful retrieval of 3 intravascular foreign bodies without vascular injury or major bleeding.

CONCLUSION Steerable catheters may represent a significant advancement over fixed-shape catheters in endovascular therapy, specifically retrieval of IVFBs, as shown in these cases.

CRT-200.08

Methamphetamine Use Is Associated With Increased Risk of Stroke and Sudden Cardiac Death: Analysis of the Nationwide Inpatient Sample Database

Jai D. Parekh,[1] Vishal Jani,[1] Urvish Patel,[1] Gaurav Aggarwal,[2] Abhishek Thandra,[1] Rohit Arora[3]
[1]Creighton University Medical Center, Omaha, NE; [2]Armed Forces Medical College, Pune, India; [3]University of Chicago School of Medicine, Chicago, IL

BACKGROUND Methamphetamine use continues to increase in the United States and remains one of the most commonly used illicit drugs worldwide. It has been linked to worse cardiovascular outcomes. We aimed to assess the association of methamphetamine abuse with stroke and sudden cardiac death using the National Inpatient Sample (NIS) Database.

METHODS We performed a population-based retrospective analysis of the NIS database (year 2014) using the ICD-9-CM codes 305.7x and 304.4x. Patients were divided into two groups - those who had a diagnosis of methamphetamine abuse or dependence and those who did not. Weighted univariate analysis by chi-square test and multivariate survey logistic regression analysis were performed to calculate odds ratios.

RESULTS A total of 35,354,148 patients were included in the analysis, out of which 184,039 patients had a diagnosis of methamphetamine abuse or dependence. After multivariate analysis adjusting for various demographic factors and co-morbidities, there was a significant increase in the risk of stroke (OR: 1.19, 95% CI: 1.10-1.28; p<0.001) and sudden cardiac death (OR: 1.27, 95% CI: 1.12-1.44; p<0.001) in patients with methamphetamine abuse.

CONCLUSIONS In our study we found increased risk of stroke and sudden cardiac death with methamphetamine use. With increasing use of methamphetamine nationwide, potential cardiovascular and cerebrovascular effects need to be further investigated.

CRT-200.09

Preoperative Use of Statins in Carotid Artery Stenting: A Systematic Review and Meta-analysis

Anil Kumar K. Jonnalagadda,[1] Pavlos Texakalidis,[2] Stefanos Giannopoulos,[3] Ehrin J. Armstrong,[4] Damianos G. Kokkinidis[4]
[1]MedStar Washington Hospital Center, Washington, DC; [2]Division of Neurosurgery, Emory University, Atlanta, GA; [3]Division of Vascular Surgery, 251 Air Force Hospital of Athens, Greece; [4]Division of Cardiology, Denver VA Medical Center, University of Colorado, Denver, CO

OBJECTIVE Carotid artery stenting (CAS) is a reliable alternative to carotid endarterectomy for carotid artery stenosis but can be associated with periprocedural adverse events. Our objective was to investigate whether the preoperative administration of statins before CAS can decrease perioperative and 30-day adverse events.

MATERIALS & METHODS This study was performed according to the PRISMA and MOOSE guidelines and eligible studies were identified through a comprehensive search of PubMed, Scopus and Cochrane Central until August 19, 2017. A meta-analysis was conducted with the use of random effects model. I-square was used to assess for heterogeneity.

RESULTS Eleven studies involving 4088 patients overall were included. Patients who received statins prior to CAS had a significantly lower risk for stroke (OR: 0.39; 95% CI: 0.27 - 0.57; I^2=0%) and death (OR: 0.30; 95% CI: 0.09 - 0.95; I^2=0%). Statin use was not associated with reduced risk of transient ischemic attack (TIA) or myocardial infarction (MI).

CONCLUSIONS Statin therapy prior to CAS confers protection for perioperative stroke and death without decreasing TIA or MI rates. Additional randomized trials are needed to reach safer conclusions on this topic.