Western Trauma Association

PROGRAM

February 25 – March 1, 2024

Viewline Resort

Snowmass, Colorado

SAVE THE DATE

Western Trauma Association

54th Annual Meeting

March 2 - 7, 2025

Location to be announced at the Business Meeting

Western Trauma Association

53rd
ANNUAL MEETING

February 25- March 1, 2024
Viewline Resort Snowmass, Colorado

Dear Members, Friends and Guests:

Welcome to Snowmass for the 53rd Annual Meeting of the WTA. I am so happy you are here! Thanks to Carrie and Amy for all their hard work in putting our meeting together, overcoming some unforeseen challenges (yes, once again hotel room issues), and keeping us all in line.

I think you will agree that Laura Moore and the program committee put together an outstanding scientific program and to all of you who summitted your outstanding work to our meeting. As part of the 49 presentations, 17 are being presented by trainees for consideration for the Gene Moore and Earl Young resident prizes, as well as our first Tom Scalea New Member Research Award Participant. Good luck to all! There are four algorithms being presented by Deb Stein and our algorithms committee, two panels, one on Writing Winning Papers and the second on Defining the Impact of Disparities on Trauma, one family abstract and one case report, all not to be missed. This year the Founders Day Lecture will be presented by Shibani Pati, a dear friend and an amazing scientist, who will teach us about the regenerative properties of blood, and the Paint the Ceiling talk will be delivered by Ahmad Zeindeddin, a resident from Howard who I had the pleasure of working with in the lab, who will tell us about his personal story that got him to this point in his trauma journey.
With broken hearts we will say goodbye to two Past WTA Presidents, Bob Volz and David Feliciano. Mark Metzdorff will give a tribute to Dr Volz just prior to the Founders Basic Science Lecture that he started and Tom Scalea will give a tribute to Dr Feliciano, who also had his presidential meeting at Snowmass, on Monday afternoon.

There are some new fun activities at this year's meeting. Please sign up for "Ski with a WTA Friend," which is available for every level of skiing, and I'll lead a group on a snowshoe adventure. We will have a reception of all our initiates and newer members as well a resident's reception. You'll see few new twists to the Nastar Race thanks to Joe Fernandez and Laura Harmon, be sure to sign up. Our annual WTA banquet will an all-inclusive family, friends, and guests' event to share some great food in a casual setting and have a lot of fun at an adult and children's playground. Who will be first in the ball pit?? We will also try our first karaoke hour, so get your songs and voices ready! There will be a few prizes to get us started. Can't wait to see you all there.

Lastly, please don't forget to donate to the Western Trauma Foundation. They are so important to our success and help us to fulfill our mission. Thank you all for the true honor and privilege of serving as your president.

Sincerely,
Rosemary Kozar, MD, PhD
President

TABLE OF CONTENTS

CONTINUING MEDICAL EDUCATION CREDIT INFORMATION

Continuing Education (CE) Language

Western Trauma Association (WTA)
53rd Western Trauma Association Annual Meeting
Live February 25, 2024 – March 1, 2024
Enduring March 4 - June 1, 2024
Snowmass, CO and On-Demand

Joint Accreditation Statement

In support of improving patient care, this activity has been planned and implemented by Amedco LLC and Western Trauma Association. Amedco LLC is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

Physicians (ACCME) Credit Designation

Amedco LLC designates this live activity / enduring material for a maximum of **17.00** AMA PRA Category 1 CreditsTM. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Successful completion of this CME activity, which includes participation in the evaluation component, enables the learner to earn credit toward the CME requirements of the American Board of Surgery's Continuous Certification program. It is the CME activity provider's responsibility to submit learner completion information to ACCME for the purpose of granting ABS credit. Up to **17.00** CE.

CME INFORMATION

TO CLAIM CME

You will receive an email with instructions on completing the meeting evaluation to obtain your CME certificate. The certificate will be available immediately following the completion of the evaluation. These instructions will be sent to the email address used to register for the meeting. The website to complete the evaluation is https://wta.cmecertificateonline.com/

MEETING APP INSTRUCTIONS

Save the WTA Meeting App to your device to easily access CME information, schedule of events and more. Scan the QR code to access the APP.

LEARNING OBJECTIVES

The overall purpose of this activity is to enable the learner to:

- Understand optimal strategies for venous thromboembolism prophylaxis in the traumatically injured patient.
- Optimize patient outcomes through balanced resuscitation strategies in patients with hemorrhagic shock.
- Recognize the importance of trauma induced coagulopathy and understand treatment options.

2023-2024 LEADERSHIP

WTA MISSION STATEMENT

The Western Trauma Association is committed to the improvement of trauma care through research, education, sharing of clinical experiences, and the development of physicians of all specialties who are involved in the care of trauma patients. The goals of the Association are not only the intellectual growth attained through increased knowledge, but also the emotional growth attained through camaraderie and interaction with family and friends in an environment conducive to winter sports.

2023-2024 OFFICERS & COMMITTEE CHAIRS

Officers

President	Rosemary Kozar, MD, PhD
President-Elect	Richard Miller, MD
Vice President	Krista Kaups, MD
Secretary	Karen Brasel, MD
Treasurer	Nicholas Namias, MD
Immediate Past President	Walter L. Biffl, MD

Board of Directors	**Term Ends**
Walter L. Biffl, MD	2026
Kenji Inaba, MD	2025
Matthew Martin, MD	2026
Robert McIntyre, MD	2025
David V. Shatz	2024
Stephanie Savage, MD	2025
S. Rob Todd, MD	2024
Michael. S. Truitt	2026
Benjamin Zarzaur, MD	2024

Historian	**Term Ends**
David Livingston, MD	2028

Program Chair	**Term Ends**
Laura Moore, MD	2024

Publications Chair	**Term Ends**
Kevin Schuster, MD	2025

Multi-Center Trials Chair	**Term Ends**
Chad Ball, MD	2025

Algorithms Chair	**Term Ends**
Deborah Stein, MD	2026

Nominating Chair	**Term Ends**
Walter L. Biffl, MD	2024

Social Media Ad-Hoc Chair
Bellal Joseph, MD

Violence Prevention Ad-Hoc Chair
Rochelle Dicker, MD

2023-2024 COMMITTEES

Program Committee	Term
Laura Moore, MD, Chair	2022-2024
Jennifer Watters, MD	2023-2026
Bryan Collier, DO	2023-2026
Kimberly Davis, MD	2022-2024
Andrew Dennis, MD	2022-2024
Jasmeet Paul, MD	2023-2026
Erik Peltz, DO	2023-2025
Ed Rutherford, MD	2023-2026
Martin Schreiber, MD	2022-2024
Thomas Schroeppel, MD	2022-2024
Michaela West, MD	2023-2026
Kevin Schuster, MD, ex-officio	2024-2025
Deborah Stein, MD, ex-officio	2024-2026
Chad Ball, MD, ex-officio	2022-2025
Rosemary Kozar, MD, PhD, ex-officio	2023-2024

Publications Committee	Term
Kevin Schuster, MD Chair	2023-2026
Zsolt Balogh, MD	2022-2026
Allison Berndtson, MD	2023-2026
Thomas Carver, MD	2022-2026
Mitch Cohen, MD	2022-2025
Michael Cripps, MD	2022-2026
Christopher Dente, MD	2022-2026
Lawrence Diebel, MD	2023-2026
Ara Feinstein, MD	2022-2025
Joseph Galante, MD	2018-2025
Oliver Gunter, MD	2022-2026
Bellal Joseph, MD	2022-2025
Riyad Karmy-Jones, MD	2022-2026
Narong Kultvatunyou, MD	2023-2026
Robert Letton, MD	2016-2025
Eric Ley, MD	2023-2026
Alan Marr, MD	2022-2025
David Notrica	2023-2026
Susan Rowell, MD	2023-2026
Jack Sava, MD	2023-2026
R. Stephen Smith, MD	2023-2026

Algorithms Committee	**Term**
Deborah Stein, MD, Chair	2023-2025
Chasen Croft, MD	2023-2025
Charles Fox, MD	2023-2025
Jennifer Hartwell, MD	2020-2024
Natasha Keric, MD	2022-2025
Manuel Lorenzo, MD	2023-2025
Greg Magee, MD	2023-2025
Alicia Privette, MD	2022-2025
Morgan Schellenberg, MD	2023-2025
Kimberly Peck, MD	2023-2025
Matthew Martin, MD	2023-2024
Kevin Schuster, MD, ex-officio	2023-2026
Laura Moore, MD, ex-officio	2022-2024
Raul Coimbra, MD, ex-officio	

Nominating Committee	**Term**
Walter L. Biffl MD, Chair	2024
Robert McIntyre, MD	2024
David Shatz, MD	2024
Martin Schrieber, MD	2024
Ajai Malhotra, MD	2024

Multi-Center Trials Committee	**Term**
Chad Ball , MD, Chair	2022-2025
Stephany Berry, MD	2023-2026
Juan Duchesne, MD	2023-2026
David Kauvar, MD	2022-2025
Jennifer Mooney, MD	2023-2026
Lois Sayrs, PhD	2023-2026
Christine Waller, MD	2022-2025

Violence Prevention Ad-Hoc Committee

Rochelle Dicker, MD, Chair
Susan Biffl, MD
Kelley Bullard, MD
Brent King, MD
Loic Fabricant, MD
James Nielson, MD
Alexis Moren, MD
Lesley Osborn, MD
Rebecca Plevin, MD
Paul Reckard, MD
Keith Stephenson, MD
John Mark Vermillion, MD

Social Media Ad-Hoc Committee
Bellal Joseph, MD Chair
Alexis Moren, MD
Matthew Martin, MD
Lucy Kornblith, MD
Sarah Lombardo, MD
Dan Rossi, DO
Mark Seamon, MD

Western Trauma Foundation Board
David Livingston, MD, President
Susan Rowell, MD, MBA, Treasurer
Laura Moore, MD, Secretary
Enrique Ginzburg, MD
Brent King, MD
Rosemary Kozar, MD, PhD
Thomas Scalea, MD

WTA PRESIDENTS

Robert G. Volz, MD	1971	Vail
Robert G. Volz, MD	1972	Vail
Peter V. Teal, MD	1973	Vail
William R. Hamsa, MD	1974	Aspen
Arthur M. McGuire, MD	1975	Sun Valley
Lynn Ketchum, MD	1976	Snowmass
Fred C. Chang, MD	1977	Park City
Glen D. Nelson, MD	1978	Steamboat
Gerald D. Nelson, MD	1979	Snowmass
Kevin G. Ryan, MD	1980	Snowbird
David S. Bradford, MD	1981	Jackson Hole
Erick R. Ratzer, MD	1982	Vail
William R. Olsen, MD	1983	Jackson Hole
Earl G. Young, MD	1984	Steamboat Springs
Robert B. Rutherford, MD	1985	Snowbird
Rudolph A. Klassen, MD	1986	Sun Valley
Robert J. Neviaser, MD	1987	Jackson Hole
Robert C. Edmondson, MD	1988	Steamboat Springs
Ernest E. Moore, MD	1989	Snowbird
Stephen W. Carveth, MD	1990	Crested Butte
George E. Pierce, MD	1991	Jackson Hole
Peter Mucha, Jr., MD	1992	Steamboat

WTA PRESIDENTS

David V. Feliciano, MD	1993	Snowbird
R. Chris Wray, MD	1994	Crested Butte
David A. Kappel, MD	1995	Big Sky
Thomas H. Cogbill, MD	1996	Grand Targhee
G. Jerry Jurkovich, MD	1997	Snowbird
James B. Benjamin, MD	1998	Lake Louise
Herbert J. Thomas III, MD	1999	Crested Butte
Barry C. Esrig, MD	2000	Squaw Valley
Steven R. Shackford, MD	2001	Big Sky
James A. Edney, MD	2002	Whistler-Blackcomb
J. Scott Millikan, MD	2003	Snowbird
Harvey J. Sugerman, MD	2004	Steamboat Springs
Scott R. Petersen, MD	2005	Jackson Hole
Harold F. Sherman. MD	2006	Big Sky
Frederick A. Moore, MD	2007	Steamboat Springs
James W. Davis, MD	2008	Squaw Valley
Grace S. Rozycki, MD	2009	Crested Butte
Robert C. Mackersie, MD	2010	Telluride
M. Gage Ochsner, MD	2011	Big Sky
R. Lawrence Reed, MD	2012	Vail
Mark T. Metzdorff, MD	2013	Snowmass
David H. Livingston, MD	2014	Steamboat Springs
Christine S. Cocanour, MD	2015	Telluride
Thomas M. Scalea, MD	2016	Squaw Valley
Carl J. Hauser, MD	2017	Snowbird
Dennis W. Vane, MD	2018	Whistler
Roxie M. Albrecht, MD	2019	Snowmass
David V. Shatz, MD	2020	Sun Valley
Robert McIntyre, MD	2022	Big Sky
Walter L. Biffl, MD	2023	Lake Louise
Rosemary Kozar, MD, PhD	2024	Snowmass

NEW MEMBERS

Western Trauma Association Welcomed the Following New Members at the 2023 Annual Meeting

Marshall Beckman MD
Milwaukee, WI
Surgical Critical Care
Senior Member

Katie Bower MD, MSc, FACS
Roanoke, VA
Hospice/Palliative Medicine
Active Member

Michael Cripps MD
Denver, CO
Surgical Critical Care
Active Member

Anders Davidson MD
West Sacramento, CA
Vascular Surgery
Active Member

Bradley Dennis MD
Nashville, TN
Surgical Critical Care
Active Member

Andrew Doben MD
Hartford, CT
Surgical Critical Care
Active Member

Jay Doucet MD
San Diego, CA
General Surgery
Senior Member

Juan Duchesne MD, FACS, FCCP, FCCM
New Orleans, LA
Surgical Critical Care
Active Member

Kalev Freeman MD PhD
Burlington, VT
Emergency Medicine
Active Member

Ralph Layman MD
Richmond, VA
General Surgery
Active Member

David Leshikar MD
Sacramento, CA
Surgical Critical Care
Active Member

Kevin Luftman MD
Nashville, TN
General Surgery
Active Member

Matthew Moorman MD, MBA
Powell, OH
Surgical Critical Care
Senior Member

Anna Romagnoli MD, RPVI
Baltimore, MD
Vascular Surgery
Active Member

Mark Seamon MD
Philadelphia, PA
Surgical Critical Care
Active Member

M. Chance Spalding DO, PhD
Columbus, OH
General Surgery
Active Member

Andrew Tang MD
Tucson, AZ
Surgical Critical Care
Active Member

Jeff Ustin MD
Cleveland Heights, OH
General Surgery
Senior Member

WESTERN TRAUMA FOUNDATION DONORS

Current lifetime accumulation status based on 2023 year end

SUMMIT ($25,000 and above)

Barry Esrig
David Feliciano & Grace Rozycki
Eric Ley
Ernest Moore
Thomas Scalea
Robert Volz

EXTREME ($10,000 – $24,999)

Roxie Albrecht
Gregory Campbell
Christine Cocanour
Rosemary Kozar & Brent King
David Livingston
Andrew Michaels
Thomas Cogbill
James Davis

COULOIR SOCIETY ($5,000 – $9,999)

Karen Brasel
Kimberly Davis
K Dean Gubler
Gregory Jurkovich
Krista Kaups
David Kissinger
Manuel Lorenzo
Matthew Martin
Robert McIntyre, Jr.
Mark Metzdorff
J. Scott Millikan
Robert Neviaser
Kimberly Peck
Scott Petersen
R. Lawrence Reed
Steven Shackford
David Shatz
Herbert Thomas, III
Dennis Vane
Jennifer Watters

Double Black Diamond Club ($2,500 - $4,999)

John Adams
Bonny Baron
Denis Bensard
Allison Berndtson
Walt Biffl
Marilu Bintz
Carlos Brown
Marc de Moya
Lawrence Diebel
George Dulabon
Soumitra Eachempati
Charles Fox
Enrique Ginzburg
James Haan
David Kappel
Riyad Karmy-Jones
M. Margaret Knudson
Richard Leone
Robert Letton
Robert Mackersie
Ajai Malhotra
Frederick Moore
James McCarthy
Richard Miller
Steve Moulton
Nicholas Namias
Patrick Offner
Cassandra Reynolds
Anne Rizzo
Steven Ross
Susan Rowell
R. Stephen Smith
Keith Stephenson
Harvey Sugerman
Mark Tellez
S. Rob Todd
Michaela West

WESTERN TRAUMA FOUNDATION DONORS

BLACK DIAMOND CIRCLE ($1,000 – $2,499)

Michael Aboutanos
Hasan Alam
Scott Armen
Erik Barquist
Paul Beery
James Benjamin
Stephany Berry
Megan Brenner
Kelley Bullard
David Ciesla
Mitch Cohen
Raul Coimbra
Bryan Collier
Alain Corcos
Todd Costantini
Clay Cothren-Burlew
Rochelle Dicker
Doreen DiPasquale
Julie Dunn
Alexander Eastman
Matthew Eckert
Rajesh Gandhi
Carl Hauser
Stephanie Ireland Gordy
Laura Johnson
Dmitriy Karev
Natasha Keric
Andrew Kerwin
Guy Lanzi
William Long
Heather MacNew
John McGill
Barbara Mainville
Alicia Mangram
Alan Marr
Caleb Mentzer
Laura Moore
Margaret Morgan
M. Gage Ochsner
Keith O'Malley
Patrick O'Neill
Jasmeet Paul
Brianne & Erik Peltz
Samuel Prater
Soula Privolos
Peter Rhee
Stephanie Savage
Martin Schreiber
Thomas Schroeppel
Kevin Schuster
Aaron Scifres
Mark Shapiro
Harold Sherman
Ali Tabatabai
Desarom Teso
Brian Tibbs
Eric Toschlog
Michael Truitt
Gary Vercruysse
Steven Wald
Jordan Weinberg
Scott Welle
Robb Whinney
Libby Windell
Ben Zarzaur

BLUE TRAIL ASSOCIATES ($500 – $999)

Reanna Adams
Christopher Barrett
Howard Champion
Roy Cobean
Charles Cook
Michael Cripps
Alisa Cross
James Cushman
Jay Doucet
Brian Eastridge
Joel Elterman
Loic Fabricant
Bruce Ferris
Alfonso Fonseca
Richard Gamelli
Larry Gentilello
Oliver Gunter
Laura Haines
John Hall
David Hoyt
Olga Kaslow
Ryan Kennedy
Natasha Keric
Kerry Kole
Michael Krzyaniak
Matthew LaPorta
Ralph Layman
M. Ashraf Mansour
Lisa McMahon
Frank Nastanski
Raminder Nirula
Michael Norman
David Notrica
Kumash Patel
John Pender
J. Bradley Pickhardt
Basil Pruitt
Paul Reckard
Eugene Reilly

WESTERN TRAUMA FOUNDATION DONORS

BLUE TRAIL ASSOCIATES ($500 – $999) cont.

Nelson Rosen
Andrew Rosenthal
Henry Sagi
Henry Schiller
David Skarupa
Chance Spaulding
Deborah Stein
Ronald Tesoriero
George Testerman
Brian Thurston
R. Christie Wray, Jr
Amy Wyrzykowski

GREEN TRAIL ASSOCIATES (up to $499)

Benjamin Axtman
Christopher Baker
Marshall Beckman
Elizabeth Benjamin
Scott Brakenridge
Kimberli Bruce
Caitlin Burke
Saska Byerly
Michael Cain
Rachael Callcut
Matthew Carrick
Donald Carter
Thomas Carver
Amanda Celii
Rick Cirolli
Christine Ciszek
Martin Croce
Chasen Croft
Brandy Cross
Daniel Cullinane
Matthew Davis
Millard Davis
Andrew Dennis
Christopher Dente
Jody Digiacomo
Warren Dorlac
Mark Falimirski
Ara Feinstein
John Fildes
Catherine Fontecha
Kalev Freeman
Warren Gall
Andrew Gaugler
Ernest Gonzalez
Alok Gupta
Rajan Gupta
Mark Hamill
Paul Harrison
Jennifer Hartwell
Michael Hauty
James Hebert
Jeff Heisler
Brian Hoey
Darrren Hunt
Kenji Inaba
Jay Johanningman
Bellal Joseph
Michelle Junker
Frederick Karrer
Jeremy Kauffman
John Kepros
Tammy Kopelman
Stan Kurek
Barbara Latenser
David Leshikar
Charles Mains
Robert Maxwell
Sean Monaghan
Sarah Moore
Alexis Moren
Charlene Nagy
Todd Neideen
Jamison Nielsen
Robert O'Connor
Lindsay O'Meara
Cianna Pender
Peter Perakis
Laurens Pickard
George Pierce
Rebecca Plevin
Bruce Potenza
Dorothy Rowe
Edmund Rutherford
Jennifer Salotto
Jack Sava
Lois Sayrs
Carol Schermer
George Singer
Kurt Stahlfeld
Carrie Steffen
Ricard Townsend
Pascal Udekwu
Daniel Vargo
John Mark Vermillion
Charlie Wade
Amy Weber
Connor Wiles
Slate Wilson

IN MEMORIAM

Earl G. Young, MD — February 27, 1989

Gerald S. Gussack, MD — August 25, 1997

Peter Mucha, Jr., MD — August 9, 2006

W. Bishop McGill, MD — October 14, 2007

Ronald P. Fischer, MD — January 25, 2013

M. Gage Ochsner, MD — April 26, 2013

George Cierny, MD — June 24, 2013

R. Christie Wray, MD — November 18, 2013

Robert B. Rutherford, MD — November 22, 2013

Doreen DiPasquale, MD — January 7, 2014

Barbara Latenser, MD — June 15, 2015

Matthew L Davis, MD — September 3, 2015

Arthur M. McGuire, MD — January 28, 2016

Glen D. Nelson, MD — May 14, 2016

William R. Olsen — June 14, 2017

Erick R. Ratzer, MD — July 7, 2017

Stephen W. Carveth, MD — March 6, 2019

Basil A. Pruitt Jr., MD — March 17, 2019

IN MEMORIAM cont.

Peter V. Teal, MD — February 16, 2020

Robert C. Edmondson, MD — June 5, 2020

George E. Pierce, MD — June 18, 2020

Harvey J. Sugerman, MD — August 9, 2020

Michael A. Dubick, MD — November 13, 2020

Steven L. Wald, MD – January 12, 2021

Joseph C. Stothert, MD, PhD — March 5, 2021

James A. Edney, MD — August 7, 2021

Richard L. Gamelli, MD – May 3, 2022

Rudolph Klassen, MD – November 15, 2022

Thomas H. Cogbill, MD – December 31, 2022

Robert G. Volz, MD – December 17, 2023

David V. Feliciano, MD – January 4, 2024

ROBERT G. VOLZ, MD Tribute

Robert G. "Bob" Volz was an orthopedic surgeon of diverse accomplishments, which are best appreciated by reviewing his impressive obituary that was forwarded to the WTA membership in early January. (https://www.legacy.com/us/obituaries/tucson/name/robert-volz-obituary?id=54022646).

Of greatest importance to us is that Bob, along with his boyhood friend and lifelong colleague Peter Teal, M. D., was a founder, and the Founding President, of the Western Trauma Association in 1971. The two men conceived of a multi-disciplinary organization dedicated to the care of the trauma patient, based on an annual meeting with members required to be board-certified in their fields, and to present abstracts for review by the program committee at least once every three years to maintain active membership. Their unique insight was to stage the meeting at a western ski resort, which provided the opportunity not only for science, but also for family engagement and collegial fellowship, which naturally developed and strengthened the bonds of members over the ensuing decades. These are the core principles that define the WTA to this day.

Bob was honored at the 50th Anniversary Meeting in 2020 at Sun Valley, which he attended with his wife Ann. Throughout his later years in the WTA, Bob modestly discounted his role in the growth and development of the organization, giving credit to members Gene Moore, M. D., David Feliciano, M. D. and others, for improving the academic tenor of the meetings and establishing a relationship with the Journal of Trauma (now Journal of Trauma and Acute Care Surgery).

In recognition of the high-level science present in WTA programs, Bob's final major contribution to the WTA was to provide initial funding, through the Western Trauma Foundation, for the current Founder's Basic Science Lecture now given at each meeting. Despite his modesty, the fact remains that without Bob Volz' vision and initiative, the WTA as we know it would not have come into existence. The foundational principles that Bob and Peter instilled remain the heart and soul of the WTA to this day and will continue into the future.

Bob's was a long life well-lived, and he left an enduring legacy for those involved in the care of trauma patients.

David Feliciano, MD

On January 4, 2024, Dr. David Feliciano left this world. He leaves behind a record of clinical, educational, and research accomplishments that will not be equaled in the near future. The Western Trauma Association held a special place in David's heart. I attended my first WTA meeting in 1987 at Jackson Hole, Wyoming. It was a small meeting, but I remember David's presence then as he stood to discuss the paper or make a point. He told me the WTA was his favorite meeting of the year. He was a constant presence at the WTA, first, attending by himself, and later with his wife, Dr. Grace Rozycki. They would sit towards the back of the room together, and David would rise to go to the microphone. If I was on the podium, I knew how this would go. He would start with "Well, as you know, Tom....." and things would go downhill from there. I usually did not know some (many) of the important historical or clinical points he made, but I always was grateful for him, pointing those out in front of several hundred of my friends and colleagues. I am certain many others have some of those same David Feliciano memories.

The other reason David loved the WTA was the snow. David was a superb skier, and always competed in the Nastar competition. He did not win his age group every year, but he won many.

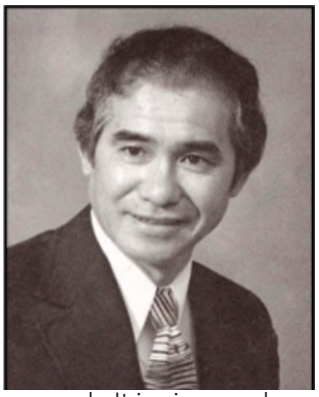
He took great pride in that. In 1993, Dave was the WTA President, and he held the meeting in Snowbird. He picked that location because of the snow. He thought Snowbird had the best powder and challenged him as a skier more than the other mountains. He always skied the double black diamond slopes. He just could not get enough.

David was a student of the history and science of injury care, but he really loved listening to good clinical science. He would tell me that is why he enjoyed the WTA meeting so much. He is responsible in a large part for improving the academic rigor of our society and its meeting. He was instrumental in establishing the WTA's relationship with the Journal of Trauma, now the Journal of Trauma and Acute Care Surgery.

David Feliciano was an icon in Surgery and leaves a legacy of excellence in his career, one we all should strive to emulate. Those of us who knew him at the WTA saw a different side of his greatness. While I appreciate all facets of him, today, I remember the WTA David and I celebrate his life.

Tom Scalea

EARL YOUNG RESIDENT PRIZE



Earl G. Young, MD
(1928-1989)

EARL YOUNG RESIDENT PRIZE FOR CLINICAL RESEARCH

The Earl Young Resident Prize for Clinical Research was established after the death of one of the Founding members of the Western Trauma Association. This prize is a continuation of Dr. Young's profound interest in the training of residents and his commitment to ongoing research. It is given each year to stimulate resident clinical research. Abstracts eligible for this award are submitted to the Program Committee for resident prize status and presentation at the annual meeting of the Western Trauma Association. A manuscript must be submitted to the Journal of Trauma and Acute Care Surgery in advance of the meeting for consideration of publication. The manuscript and presentation are judged with first and second place cash prizes and recognition given at the annual WTA annual banquet. The 1st place resident's name is listed in the annual meeting program book.

Dr. John Najarian characterizing Earl at a memorial service in his honor at the University of Minnesota:

Dr. Earl G. Young of Minneapolis was a founding member of the Western Trauma Association and its 14th President. He died of a myocardial infarction, Monday, February 27, 1989, while skiing at Snowbird during the 19th Annual Meeting of the Association.
Dr. Young received his medical degree from the University of Rochester, N.Y. and Ph.D. in surgery from the University of Minnesota. He completed advanced training in cancer research at Harvard, a fellowship in cardiovascular surgery at Baylor University in Houston and studied microvascular surgery at the University of California–San Diego.

EARL YOUNG RESIDENT

He was a clinical professor of surgery at the University of Minnesota Medical School, and a practicing general and vascular surgeon at the Park-Nicollet Clinic in Minneapolis from 1960. He was nationally known and was actively involved in research and education throughout his career. In 1988, one year before his untimely death, he received the Owen H. Wangensteen Award for Academic Excellence from the University of Minnesota Health Science Center. It was awarded by an unprecedented unanimous vote of all 72 surgical residents.
The Residents Paper competition was begun in 1991 as a tribute to Dr. Young's memory and his "spirit of inquiry, love of learning ... and commitment in service to mankind."

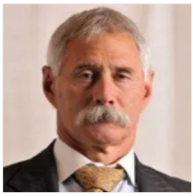
EARL YOUNG RESIDENT AWARD RECIPIENTS

Resident	Institution	Year
Joseph Schmoker, MD	University of Vermont	1991
Joseph Schmoker, MD	University of Vermont	1992
Charles Mock, MD	University of Washington	1993
Gino Travisani, MD	University of Vermont	1994
Phillip C. Ridings, MD	Medical College of Virginia	1995
David Han, MD	Emory University	1996
Preston R. Miller, MD	Wake Forest University	1997
Geoffrey Manley, MD,PhD	University of California, San Francisco	1998
James M. Doty, MD	Medical College of Virginia	1999
David J. Ciesla, MD	Denver Health/University of Colorado	2000
Ricardo J. Gonzales, MD	Denver Health/University of Colorado	2001
Scott C. Brakenridge, MD	Cook County Hospital	2002
Adena J, Osband, MD	UMDNJ-New Jersey Medical School	2003
Cindy Lee, MD	UMDNJ-New Jersey Medical School	2004

EARL G. YOUNG AWARD RECIPIENTS

Resident	Institution	Year
Keir J. Warner, MD	University of Washington	2008
T. W. Constantini, MD	University of California, San Diego	2009
C. Anne Morrison, MD	Baylor College of Medicine	2010
Marlin Causey, MD	Madigan Army Medical Center	2011
Phillip Letourneau, MD	University of Texas at Houston	2011
Gerard De Castro, MD	University of Maryland	2011
Matthew E. Kutcher, MD	University of California, San Francisco	2012
Kimberly Song, MD, MA	UMDNJ – New Jersey Medical School	2013
Lucy Kornblith, MD	UCSF/SFGH, San Francisco	2014
Hunter B. Moore, MD	Denver Health/University of Colorado	2015
George Black, MD	Madigan Army Medical Center	2016
Morgan Barron, MD	Madigan Army Medical Center	2017
John Kuckelman, MD	Madigan Army Medical Center	2018
Patrick Murphy, MD	Indiana University	2019
Alexandra Dixon, MD	Oregon Health & Science University	2020
Sabrinah Christie, MD	University of Pittsburgh	2022
Jeremy Kauffman, MD, MPH	Johns Hopkins University	2023

ERNEST E. MOORE RESIDENT PRIZE



ERNEST E. MOORE RESIDENT PRIZE FOR BASIC SCIENCE RESEARCH

ERNEST E. MOORE, MD, FACS, MCCM, FACN, FACEP (HON), FRCS ED (HON) FRCST(HON), FRCSI(HON), FEBS EM SURG (HON)... first attended the WTA in 1977 and was the first member to sponsor surgical residents.

Dr. Moore was the Chief of Trauma at the Denver General Hospital for 36 years, Chief of Surgery for 28 years, and is a Distinguished Professor of Surgery at the University of Colorado. Under Dr. Moore's leadership, Denver General became internationally recognized for innovative care of the injured patient, and its trauma research laboratory has been funded by the NIH for 35 consecutive years. In July 2018, the center was renamed the Ernest E Moore Shock Trauma Center at Denver Health.

Dr. Moore has served as president of ten academic societies, including the Society of University Surgeons, American Association for the Surgery of Trauma, International Association for the Trauma and Surgical Intensive Care, and the World Society of Emergency Surgery. His awards include the Robert Danis Prize from the Society of International Surgeons, Orazio Campione Prize from the World Society of Emergency Surgery, Philip Hench Award from the University of Pittsburgh, Florence Sabin Award from the University of Colorado, Medallion for Scientific Achievement from the American Surgical Association, and Lifetime Achievement Awards from the Society of University Surgeons, American Heart Association, American College of Critical Medicine, Shock Society, and International Association for Trauma and Surgical Intensive Care. He has honorary fellowships in the Royal College of Surgeons of Edinburgh, the Royal College of Surgeons in Ireland, and the Royal College of Surgeons of Thailand.

Dr. Moore is co-editor of the textbook Trauma, in its 9th edition, Surgical Secrets in its 7th edition, and Trauma Induced Coagulopathy, in its 2nd edition; he has >2000 publications and has lectured extensively throughout the world. He is married to Sarah Van Duzer Moore, M.D., an internist at the University of Colorado Denver, and they have two sons: Hunter, a liver transplant surgeon at UCD and Peter a pulmonary/critical care intensivist at UCD. Dr. Moore's additional interests include endurance sports, mountaineering, skiing, and wapiti pursuit. He lives by the principle to work hard you must play hard, with the understanding that family is the ultimate priority.

The Ernest E. Moore Resident Prize for Basic Science Research has been established to encourage residents to become surgical investigators. Abstracts eligible for this award are submitted to the Program Committee for resident prize status presentation at the annual meeting of the Western Trauma Association. A manuscript must be submitted to the Journal of Trauma and Acute Care Surgery in advance of the meeting. The manuscript and presentation are judged with first and second-place cash prizes and recognition given at the annual WTA banquet. The first-place resident's name is listed in the annual meeting program book and on the website.

ERNEST E. MOORE RESIDENT PRIZE FOR BASIC SCIENCE RESEARCH RECIPIENTS

Resident	Institution	Year
Anders Davidson, MD	University of California, Davis	2019
Zachary Matthay, MD	University of California, San Francisco	2020
Ahmad Zeineddin, MD	University of Maryland	2022
Otto Thielen, MD	University of Colorado	2023

THOMAS SCALEA NEW MEMBER RESEARCH AWARD

The Thomas Scalea New Member Research Award was designed to honor scholarly work done by a member within the first three years of membership in the Western Trauma Association.

Dr. Scalea has trained scores of trauma fellows in diverse disciplines including Surgery, Medicine, and Emergency Medicine, this diversity recognized in the WTA membership. He brought each one interested in the WTA to their first meeting and introduced them to the other members. Almost all joined and a number have now been placed in important roles in the WTA including the Board of Managers, and key committees. Recognizing that the future of the WTA lies in the diversity of those who will follow, Dr. Scalea helped to establish this prize for our new members.

NEW MEMBER RESEARCH AWARD

Eligibility:

1. A new Active member (as opposed to a new senior member or a member that turns senior within the "window")
2. "New" means elected to active membership within three years of the date of submission.
3. Must submit a manuscript.
4. Must personally present the work at the annual meeting▪

Process:

1. Eligible member; can be the only "new" member submitting (i.e., does not have to be a competition, but the prize is given on the merit of the work)
2. Oral and written presentations judged by the Publications Committee members.
3. No requirement that a Scalea Award be given every year.

PRESIDENTIAL ADDRESS

BUILDING ON THE PAST: THE FUTURE OF THE WTA

Tuesday, February 27, 5:00 pm – 6:00 pm

Rosemary Kozar, MD, PhD

Baltimore, MD

Dr. Rosemary Kozar is currently Professor of Surgery and Co-Director of the Shock Trauma Anesthesia Research (STAR) Center at the University of Maryland R. Adams Cowley Shock Trauma Center. She completed medical school at Temple University School of Medicine then surgical training and surgical critical care at the University of Texas Houston and Temple University, while also obtaining a PhD at Baylor College of Medicine. Dr. Kozar spent much of her career at the University of Texas Houston where she rose to a tenured faculty member and the James "Red" Duke Distinguished Professor in Surgery. In 2014, she joined the University of Maryland R. Adams Cowley Shock Trauma Center and is leading its extensive clinical and scientific efforts.

Her research interests are in nutrition in the critically ill and endothelial dysfunction after hemorrhagic shock. She has published over 250 peer-reviewed articles, and has served on multiple scientific grant reviews, including the National Institutes of Health Center for Scientific Review (NIH CSR) Surgery, Anesthesiology, & Trauma (SAT) Study Section. Dr. Kozar has been continuously funded by the NIH for over 20 years starting from a NIH National Research Service Award, to a K08, and now with broad R01 and T32 support, as well as multiple Department of Defense grants spanning translational sciences in trauma and hemorrhage sciences. She has served on multiple journal editorial boards and is currently a Deputy Editor for the Journal of Trauma and Acute Care Surgery and Associate Editor for Trauma Surgery Acute Care Open. She is also one of the new editors of the Trauma Textbook. Dr. Kozar had the privilege of serving on the Executive Committee of the American College of Surgeons Committee on Trauma (ACS COT), American Association for the Surgery of Trauma (AAST) Board of Managers, Chair of the Scientific Advisory Committee for the Coalition for National Trauma Research and served as the President of the Association of Women Surgeons (AWS) and the President of the Shock Society. She is proud to be serving as the current President of the Western Trauma Association (WTA).

"PAINT THE CEILING" LECTURESHIP

In 1997, Dr. Gregory "Jerry" Jurkovich delivered his Presidential Address entitled "Paint the Ceiling: Reflections on Illness". This was a personal account of his battle with non-Hodgkin's lymphoma. His deep insights were shared from a patient's perspective, even that of a stained ceiling that he observed while lying on his back. He proposed that future WTA Scientific Programs have some time "dedicated to our patients and to the Art of Medicine".

This lecture has become an annual invited lecture which is integral to the unique identity of the Western Trauma Association Annual Meeting. Unlike the scientific session program, this lecture focuses on the humanistic aspects of medicine and can be attended by all participants, guests, and their families. Past lectures have been personal, local, national, and global, covering topics such as first-person accounts of illness, social and societal aspects that affect all patient care, programs providing relief in troubled or impoverished areas, or personal reflections on delivering care in a humane, holistic fashion. A speaker is chosen annually by the current President of the WTA. The Western Trauma Foundation provides an honorarium and expenses for this lecture.

"PAINT THE CEILING" LECTURESHIP

Presenter	Year	Location
G. Jerry Jurkovich, MD	1997	Snowbird
John W. McGill, MD	1998	Lake Louise
William T. Close, MD	1999	Crested Butte
Jimmy Cornell	2000	Squaw Valley
Geoff Tabin, MD	2001	Big Sky
James H. "Red" Duke, MD	2002	Whistler
David V. Shatz, MD	2003	Snowbird
Susan and Tim Baker	2004	Steamboat Springs
Alex Habel, MD	2005	Jackson Hole
Andrew Schneider	2006	Big Sky
Ernest E. Moore, MD	2007	Steamboat Springs
Pamela Kallsen	2008	Squaw Valley
Sylvia Campbell, MD	2009	Crested Butte
William Schecter, MD	2010	Telluride
Jeff McKenney, MD	2011	Big Sky
Larry M. Gentilello, MD	2012	Vail
Neil L. Barg, MD	2013	Snowmass
Ziad Sifri, MD	2014	Steamboat Springs
Julie Freischlag, MD	2015	Telluride
Lewis Rubinson, MD, PhD	2016	Squaw Valley
Kenneth Waxman, MD	2017	Snowbird
Steven R. Shackford, MD	2018	Whistler
M. Margaret Knudson, MD	2019	Snowmass
MSgt Chris Willingham	2020	Sun Valley
Patrick J. Ireland	2022	Big Sky
Keegan Gallagher	2023	Lake Louise

"PAINT THE CEILING" LECTURE

SCALPELS, SHAWARMA, AND SECOND CHANCES: AN ASPIRING TRAUMA SURGEON'S ODYSSEY

Thursday, March 29, 5:20 pm – 6:00 pm

Ahmad Zeineddin, MD

Resident Physician - General Surgery

Howard University School of Medicine

Ahmad Zeineddin is a fourth-year general surgery resident at Howard University School of Medicine in Washington, DC. He was born and raised in Aleppo, Syria where he started his medical education. He transferred to the United States after leaving his country due to the war. He fell in love with trauma and critical care early on during his training and spent two years as a post-doctoral research fellow in Shock Trauma Center in Baltimore under the guidance of Dr. Rosemary Kozar. He has published over twenty manuscripts and presented in multiple national conferences.

FOUNDERS' BASIC SCIENCE LECTURE

This lecture was established by a founding member (Robert Volz, President 1971 & 1972) of the Western Trauma to enhance the academic mission and provide valuable basic science information that is relevant to the field of trauma. It is a scheduled part of the annual meeting in which an invited speaker is chosen to discuss a specific basic research topic that has clinical relevance to the care of the trauma patient. Honoraria and expenses are paid by the Western Trauma Foundation as part of its mission to support the academic endeavors of the Western Trauma Association. These surgeon/researchers are selected by the program committee for their specific expertise and contributions to the knowledgebase in the field of trauma. This lecture is often a combination of translational as well as basic science research.

Presenter	Year	Location
Raul Coimbra, MD	2009	Crested Butte
Lawrence Diebel, MD	2010	Telluride
Carl J. Hauser, MD	2011	Big Sky
Fred Moore, MD	2012	Vail
Steve Shackford, MD	2013	Snowmass
Hasan B. Alam, MD	2014	Steamboat Springs
Charles S. Cox, Jr. MD	2015	Telluride
Rosemary Kozar, MD	2016	Squaw Valley
Mitchell J. Cohen, MD	2017	Snowbird
Ernest "Gene" Moore, MD	2018	Whistler
Timothy R. Billiar, MD	2019	Snowmass
Martin A. Schreiber, MD	2020	Sun Valley
Elizabeth J. Kovacs, PhD	2022	Big Sky
Todd W. Costantini, MD	2023	Lake Louise

FOUNDERS' BASIC SCIENCE LECTURE

THE REGENERATIVE PROPERITES OF BLOOD IN TRAUMATIC INJURY

Wednesday, March 28

8:20 am – 9:00 am

Shibani Pati, MD, PhD

Professor Department of

Laboratory Medicine and Surgery

University of California San Francisco

Dr. Pati is currently at employed at the University of California San Francisco (UCSF) in the Department of Lab Medicine and is a Professor in the Departments of Lab Medicine and Surgery. She is the Director of the Center for Translational Research in Transfusion Medicine and Cellular Therapies. She is by training a cancer vascular biologist with an interest in the role of endothelial dysfunction and vascular compromise in the pathogenesis of human disease. Dr. Pati received her MD. PhD. from the University of Maryland and completed a post-doctoral fellowship in Physical Medicine and Rehabilitation at the Baylor College of Medicine and the University of Texas in Houston. Following her fellowship, Dr. Pati worked at the Center for Translational Injury Research (CeTIR) at the University of Texas Houston. Dr. Pati's specific areas of investigation involve the use of stem cells, blood products and novel resuscitative modalities that can mitigate endothelial dysfunction, inflammation and coagulation disturbances found in hemorrhage and traumatic injury, including traumatic brain injury. Her recent focus is in studying the regenerative properties and mechanisms of action of blood and novel blood derived products. Her lab aims to specifically understand the mechanisms of vascular compromise in injury and novel methods by which to mitigate it. Dr. Pati is nationally and internationally known for her work in the field and has published over a 100 peer reviewed papers.

NOTES

SUNDAY, FEBRUARY 25, 2024

1:00pm – 4:00pm **BEST COURSE (separate registration required)**
Viewline Conference Center – Valhalla Boardroom – Level 2

5:00pm - 7:30pm **REGISTRATION OPEN**
Viewline Conference Center – Level 1

5:00pm - 7:00pm **WELCOME RECEPTION**
Viewline Conference Center – Level 1

5:00pm - 7:00pm **KIDS WELCOME RECEPTION**
Viewline Conference Center - Ziegler Room – Level 2

MONDAY, FEBRUARY 26, 2024

6:00am - 9:00am **REGISTRATION & EXHIBITS OPEN**
Viewline Conference Center – Level 1

6:30am - 8:00am **ATTENDEE BREAKFAST**
Viewline Conference Center – Salon CDE

7:00am - 9:00am **SCIENTIFIC SESSION 1**
Moderator: Rosemary Kozar, MD, PhD
Viewline Conference Center – Salon AB
(EY) Indicates Earl G. Young Clinical Research Competition
(EM) Indicates Ernest E. Moore Basic Science Research Competition

7:00am - 7:20am	*1. OBSERVATION-FIRST VERSUS ANGIOEMBOLIZATION-FIRST APPROACH IN STABLE PATIENTS WITH BLUNT LIVER TRAUMA: A WTA MULTICENTER STUDY (EY)* *Peter Nguyen MD, WTA Multicenter Trial, Orange, CA*	Page 50
7:20am - 7:40am	*2. AN EXPLORATORY ANALYSIS OF TRAUMATIC ABDOMINAL AORTIC INJURIES-- RESULTS FROM THE AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA (AAST) VASCULAR TRAUMA REGISTRY: THE PROSPECTIVE OBSERVATIONAL VASCULAR INJURY TRIAL (PROOVIT) (EY)* *Joshua Crapps MD, Dell Medical School at UT Austin, Austin, TX*	Page 52
7:40am - 8:00am	*3. BEYOND THE VON WILLEBRAND FACTOR: TYPE O BLOOD EXHIBITS DOWNREGULATION OF THE LECTIN COMPLEMENT PATHWAY IN TRAUMA (EM)* *Benjamin Stocker MD, University of Colorado, Aurora, CO*	Page 54
8:00am - 8:20am	*4. MITIGATING THE RISE OF FIBRINOGEN AFTER POLYTRAUMA WITH SIRNA-LNP RESULTS IN DECREASED THROMBOSIS IN MICE (EM)* *Monica Seadler MD, Medical College of Wisconsin, Milwaukee, WI*	Page 56
8:20am - 8:40am	*5. MECHANISM MATTERS: DIFFERENTIAL BENEFITS OF COLD-STORED WHOLE BLOOD FOR TRAUMA RESUSCITATION FROM A MULTICENTER STUDY (EY)* *Joshua Dilday DO, WTA Multicenter Trial, Los Angeles, CA*	Page 58
8:40am - 9:00am	*6. QUANTIFYING THE BENEFIT OF WHOLE BLOOD ON MORTALITY IN TRAUMA PATIENTS REQUIRING EMERGENT LAPAROTOMY (EY)* *Daniel Lammers MD, University of Alabama at Birmingham, Birmingham, AL*	Page 60

7:30am - 9:00am **FRIENDS & FAMILY BREAKFAST**
Stark's Alpine Grill

MONDAY, FEBRUARY 26, 2024

3:30pm - 6:00pm	**REGISTRATION & EXHIBITS OPEN** *Viewline Conference Center – Level 1*	
4:00pm - 6:00pm	**SCIENTIFIC SESSION 2** Moderator: Jen Watters, MD *Viewline Conference Center – Salon AB* (EY) Indicates Earl G. Young Clinical Research Competition (EM)Indicates Ernest E. Moore Basic Science Research Competition	
4:00pm - 4:10pm	**DAVID FELICIANO MEMORIAL** Thomas Scalea, MD	
4:10pm - 4:30pm	*7. COST EFFECTIVENESS OF DIFFERENT SCREENING MODALITIES FOR PEDIATRIC BLUNT CEREBRO-VASCULAR INJURY: A DECISION TREE ANALYSIS* *Alexandra Campbell BS, Tulane University School of Medicine, New Orleans, LA*	Page 62
4:30pm - 4:50pm	*8. BUT DID YOU DIE? THE RESULTS OF IN-HOSPITAL CARDIAC ARREST AMONG TRAUMA PATIENTS (EY)* *Katia Kyriakoulis DO, Mission Hospital, Asheville, NC*	Page 64
4:50pm - 5:10pm	*9. PLASMA FROM SEVERELY INJURED TRAUMA PATIENTS INDUCES ENDOTHELIAL CELL MITOCHONDRIAL DYSFUNCTION (EM)* *William Hallas MD, University of Colorado, Aurora, CO*	Page 66
5:10pm - 5:30pm	*10. EXPOSURE TO STATIN THERAPY DECREASES INCIDENCE OF VTE AFTER TRAUMA (EY)* *Kelly Sanders DO, UTHealth Houston, Houston, TX*	Page 68
5:30pm - 5:50pm	*11. PLATELET RELEASATES MITIGATE THE ENDOTHELIOPATHY OF TRAUMA (EY)* *Lauren Gallagher MD, University of Colorado, Denver, CO*	Page 70
5:50pm - 6:10pm	*12. PROSPECTIVE OUTPATIENT FOLLOW-UP OF EARLY COGNITIVE IMPAIRMENT IN PATIENTS WITH MILD TRAUMATIC BRAIN INJURY AND INTRACRANIAL HEMORRHAGE (EY)* *Stephen Stopenski MD, University of California Irvine, Irvine, CA*	Page 72
6:10pm - 7:00pm	**WTA MULTICENTER TRIALS MEETING** *Viewline Conference Center – Salon AB*	
6:30pm - 7:30pm	**RESIDENT RECEPTION** *Viewline – Vista*	
6:30pm - 7:30pm	**NEW MEMBER/INITIATE RECEPTION** *Viewline Conference Center – Ziegler Room – Level 2*	
8:30pm - 9:30pm	**PAST PRESIDENTS' RECEPTION** *Viewline – Vista*	

TUESDAY, FEBRUARY 27, 2024

6:00am - 9:00am	**REGISTRATION & EXHIBITS OPEN** *Viewline Conference Center – Level 1*	
6:30am - 8:00am	**ATTENDEE BREAKFAST** *Viewline Conference Center – Salon CDE*	
7:00am - 9:00am	**SCIENTIFIC SESSION 3** Moderator: Richard Miller, MD *Viewline Conference Center – Salon AB* (EY) Indicates Earl G. Young Clinical Research Competition (EM) Indicates Ernest E. Moore Basic Science Research Competition	
7:00am - 7:20am	*13. THINKING OUTSIDE THE PILL BOX: PAIN, ANXIETY, AND STRESS REDUCTION IN TRAUMA PATIENTS THROUGH HOLISTIC MEDICINE (EY)* *Laurinda Jackson MD MPH, Scripps Mercy Hospital San Diego, San Diego, CA*	Page 74
7:20am - 7:40am	*14. DAILY QUETIAPINE AFTER SEVERE TBI IMPROVES LEARNING AND MEMORY UP TO TWO WEEKS AFTER INJURY (EM)* *Priyanka Bele MD, University of Pennsylvania, Philadelphia, PA*	Page 76
7:40am - 8:00am	*15. TEN THOUSAND REPETITIONS: GETTING VTE PROPHYLAXIS RIGHT (EY)* *Anna Mydlowska MD, UTHealth Houston, Houston, TX*	Page 78
8:00am - 8:20am	*16. ASSESSING THE ROLE OF TELEMEDICINE IN PREVENTING HIGHER LEVEL TRANSFERS FOR ISOLATED FACIAL TRAUMA (EY)* *Tyler Leiva MD, University of Oklahoma, Oklahoma City, OK*	Page 80
8:20am - 8:40am	*17. RADIATION THERAPY? EVALUATING THE UTILITY OF ROUTINE CXR AFTER CHEST TUBE REMOVAL (EY)* *Emily Johnson MD, UCHealth Memorial Hospital, Colorado Springs, CO*	Page 82
8:40am - 9:00am	*18. THE INVISIBLE HAND: HOW INSURANCE CARRIER INFLUENCES DISPOSITION IN TRAUMA PATIENTS WITH LOWER EXTREMITY FRACTURES (EY)* *Elizabeth Swezey MD, Nassau University Medical Center, East Meadow, NY*	Page 84
7:30am - 9:00am	**FRIENDS & FAMILY BREAKFAST** *Stark's Alpine Grill*	

TUESDAY, FEBRUARY 27, 2024

9:15am – 10:15am **STOP THE BLEED TRAINING**
Viewline Conference Center – Ziegler Room – Level 2

3:30pm - 6:00pm **REGISTRATION & EXHIBITS OPEN**
Viewline Conference Center – Level 1

4:00pm - 6:00pm **SCIENTIFIC SESSION 4**
Moderator: Martin Schreiber, MD
Viewline Conference Center – Salon AB

4:00pm - 4:50pm *19. PANEL: WRITING WINNING PAPERS FROM CONCEPTION TO PUBLICATION*
Moderator: Martin Schreiber, MD
Raul Coimbra, MD, PhD, FACS, Editor-in-Chief, The Journal of Trauma and Acute Care Surgery
John Holcomb, MD, University of Alabama at Birmingham
Shibani Pati, University of California San Francisco
Lucy Zumwinkle Kornblith, MD, FACS, University of California, San Francisco

4:50pm - 5:00pm **FAMILY ABSTRACT**
20. 2022 WINTER OLYMPICS: WELL, SORT OF
S. Rob Todd MD, Grady Health System, Atlanta, GA
Page 88

5:00pm - 6:00pm *21. PRESIDENTIAL ADDRESS: BUILDING ON THE PAST: THE FUTURE OF THE WTA*
Rosemary Kozar MD, PhD, Baltimore, MD

WEDNESDAY, FEBRUARY 28, 2024

6:00am - 9:00am	**REGISTRATION & EXHIBITS OPEN** *Viewline Conference Center – Level 1*	
6:30am - 8:00am	**ATTENDEE BREAKFAST** *Viewline Conference Center – Salon CDE*	
7:00am - 9:00am	**SCIENTIFIC SESSION 5** Moderator: Thomas Schroeppel, MD *Viewline Conference Center – Salon AB* (TS) Indicates Thomas Scalea New Member Research	
7:00am - 7:20am	*22. PREHOSPITAL TRANEXAMIC ACID IS ASSOCIATED WITH A SURVIVAL BENEFIT WITHOUT AN INCREASE IN COMPLICATIONS: RESULTS OF TWO HARMONIZED RANDOMIZED CLINICAL TRIALS* *Jack Donohue BA, University of Pittsburgh, Pittsburgh, PA*	Page 92
7:20am - 7:40am	*23. ARE TRAUMA CENTERS PENALIZED FOR IMPROVED PREHOSPITAL RESUSCITATION?: THE EFFECT OF PREHOSPITAL TRANSFUSION ON ARRIVAL VITALS AND PREDICTED MORTALITY* *Thomas Clements MD, FRCSC, UTHealth Houston, Houston, TX*	Page 94
7:40am - 8:00am	*24. EVERY MINUTE COUNTS: EXTENDING THE CONTINUUM OF CARE THROUGH EARLY PREHOSPITAL BLOOD ADMINISTRATION* *Juan Duchesne MD, FACS, FCCP, FCCM, Tulane University School of Medicine, New Orleans, LA*	Page 96
8:00am - 8:20am	*25. WHOLE BLOOD VERSUS BALANCED RESUSCITATION IN MASSIVE HEMORRHAGE: SIX OF ONE OR HALF DOZEN OF THE OTHER?* *Cassie Barton PharmD, FCCM, Oregon Health & Science University, Portland, OR*	Page 98
8:20am - 8:30am	*26. ACQUIRED FACTOR V DEFICIENCY FOLLOWING BLUNT GRADE V HEPATIC INJURY: A CASE REPORT* *Luke Shadiow DO, Ascension St Vincent Indianapolis, Indianapolis, IN*	Page 100
8:30am – 8:35am	**BOB VOLZ MEMORIAL** Mark Metzdorff, MD	
8:35am - 9:05am	*27. FOUNDERS BASIC SCIENCE LECTURE: THE REGENERATIVE PROPERTIES OF BLOOD IN TRAUMATIC INJURY* *Shibani Pati MD PhD, UCSF, San Francisco, CA*	

WEDNESDAY, FEBRUARY 28, 2024

7:30am - 9:00am	**FRIENDS & FAMILY BREAKFAST** *Stark's Alpine Grill*
10:00am - 11:30am	**WTA SKI RACE (PRE-REGISTRATION REQUIRED)** *Mountain*
11:00am - 2:00pm	**WTA MOUNTAIN PICNIC** *Basecamp Bar & Grill – Snowmass Village*
3:30pm - 6:00pm	**REGISTRATION & EXHIBITS OPEN** *Viewline Conference Center – Level 1*
4:00pm - 6:00pm	**WTA BOOK CLUB** *Viewline – Vista*
4:00pm - 6:00pm	**SCIENTIFIC SESSION 6** Moderator: Jasmeet Paul, MD *Viewline Conference Center – Salon CDE*
4:00pm - 4:20pm	*28. ALGORITHM 1: RESUSCITATIVE THORACOTOMY – UP DATE* *Ron Tesoriero MD, UCSF, San Francisco, CA*
4:20pm - 4:40pm	*29. ALGORITHM 2: DIAPHRAGM INJURY* *Morgan Schellenberg MD, Keck School of Medicine of USC, Los Angeles, CA*
4:40pm - 5:00pm	*30. THORACIC IRRIGATION FOR PREVENTION OF SEC ONDARY INTERVENTION AFTER THORACOSTOMY TUBE DRAINAGE FOR HEMOTHORAX: A WESTERN TRAUMA ASSO CIATION MULTICENTER STUDY* *Thomas Carver MD, WTA Multicenter Trial, Milwaukee, WI* Page 108
5:00pm - 6:00pm	*31. WTA BUSINESS MEETING: MEMBERS ONLY*
6:00pm – 7:00pm	**STOP THE BLEED TRAINING** *Viewline Conference Center – Ziegler Room – Level 2*
6:30pm – 8:30pm	**FAMILY MOVIE NIGHT (not a drop-off event)** **THE SUPER MARIO BROS. MOVIE** *Viewline Conference Center – Auditorium – Level 2*

THURSDAY, FEBRUARY 29, 2024

6:00am - 9:00am	**REGISTRATION & EXHIBITS OPEN** *Viewline Conference Center – Level 1*	
6:30am - 8:00am	**ATTENDEE BREAKFAST** *Viewline Conference Center – Salon CDE*	
7:00am - 9:00am	**SCIENTIFIC SESSION 7** Moderator: Erik Peltz, DO *Viewline Conference Center – Salon AB*	
7:00am - 7:20am	*32. ADDITION OF PLASMA TO PROLONGED DAMAGE-CONTROL RESUSCITATION DECREASES RESUSCITATION FLUID REQUIREMENTS AND IS NEUROPROTECTIVE IN A SWINE MODEL OF HEMORRHAGIC SHOCK AND TRAUMATIC BRAIN INJURY* *Hasan Alam MD, Northwestern University, Chicago, IL*	Page 112
7:20am - 7:40am	*33. DOES PREPERITONEAL PELVIC PACKING INCREASE VENOUS THROMBOEMBOLISM RISK AMONG TRAUMA PATIENTS? A PROSPECTIVE NATIONAL ANALYSIS OF 17 U.S. LEVEL I TRAUMA CENTERS* *Lisa Marie Knowlton MD, MPH, FACS, FRCSC, Stanford University Medical Center, Stanford, CA*	Page 114
7:40am - 8:00am	*34. THE FALLACY OF A ROADMAP CT AFTER AN ABDOMINAL GUNSHOT WOUND: A ROAD THAT LEADS NOWHERE* *Matthew Vasquez MD, R Adams Cowley Shock Trauma Center, Baltimore, MD*	Page 116
8:00am - 8:20am	*35. NO BENEFIT FROM THE ADDITION OF LOW-DOSE KETAMINE INFUSION TO STANDARD EVIDENCE-BASED CARE OF MULTIPLE RIB FRACTURES* *Chad Macheel CNP, North Memorial, Robbinsdale, MN*	Page 118
8:20am - 8:40am	*36. ALGORITHM 3: BCVI – UPDATE* *Gregory Magee MD, Keck School of Medicine of USC, Los Angeles, CA*	
8:40am - 9:00am	*37. ALGORITHM 4: DAMAGE CONTROL RESUSCITATION* *Chasen Croft MD, University of Florida Health, Gainsville, FL*	
7:30am - 9:00am	**FRIENDS & FAMILY BREAKFAST** *Stark's Alpine Grill*	
3:30pm - 6:00pm	**REGISTRATION & EXHIBITS OPEN** *Viewline Conference Center – Level 1*	

THURSDAY, FEBRUARY 29, 2024

4:00pm - 6:00pm	**SCIENTIFIC SESSION 8** Moderator: Bryan Collier, MD *Viewline Conference Center – Salon CDE*	
4:00pm - 4:20pm	*38. A MACHINE LEARNING BASED COAGULATION RISK INDEX PREDICTS ACUTE TRAUMATIC COAGULOPATHY IN BLEEDING TRAUMA PATIENTS* *Justin Richards MD, R Adams Cowley Young Shock Trauma Center, Baltimore, MD*	Page 124
4:20pm - 4:40pm	*39. PRESCRIBING A NEW PATHWAY: 4MS GUIDED MEDICATION MANAGEMENT IN GERIATRIC TRAUMA PATIENTS* *Tanya Anand MD MPH MT(ASCP) FACS, University of Arizona, Tucson, AZ*	Page 126
4:40pm - 5:20pm	*40. PANEL: DEFINING THE IMPACT OF DISPARITIES IN TRAUMA* *Moderators: Kimberly Davis, MD and Michaela West, MD* *Susan Cronn, DNP, RN, Medical College of Wisconsin, Milwaukee, WI* *Patrick Murphy, MD, Medical College of Wisconsin, Milwaukee, WI* *Leah Tatebe, MD, Northwestern University, Chicago, IL*	
5:20pm - 6:00pm	*41. PAINT THE CEILING LECTURE: SCALPELS, SHAWARMA, AND SECOND CHANCES: AN ASPIRING TRAUMA SURGEON'S ODYSSEY* *Ahmad Zeineddin MD, Howard University School of Medicine, Washington D.C.*	
6:30pm – 9:30pm	**AWARDS & FAMILY NIGHT** *Collective Snowmass – Snowmass Village*	

FRIDAY, MARCH 1, 2024

6:00am - 9:00am	**REGISTRATION & EXHIBITS OPEN** *Viewline Conference Center – Level 1*	
6:30am - 8:00am	**ATTENDEE BREAKFAST** *Viewline Conference Center – Salon CDE*	
7:00am - 9:00am	**SCIENTIFIC SESSION 9** Moderator: Laura Moore, MD *Viewline Conference Center – Salon AB*	
7:00am - 7:20am	*42. ALIVE AND KICKING: TRAUMA-INDUCED COAGULOPATHY PREVALENCE AND ASSOCIATION WITH MORTALITY PERSIST TWENTY YEARS LATER.* *William Teeter MS, MS, R Adams Cowley Shock Trauma Center, Baltimore, MD*	Page 132
7:20am - 7:40am	*43. USE OF HIGH-INTENSITY FOCUSED ULTRASOUND FOR COAGULATION OF LIVER PARENCHYMA* *Alexander Tam BS, Thomas Jefferson University, Philadelphia, PA*	Page 134
7:40am - 8:00am	*44. THE DILEMMA OF DOG BITE WOUNDS: PRIMARY VERSUS DELAYED CLOSURE* *Omar Hejazi MD, University of Arizona, Tucson, AZ*	Page 136
8:00am - 8:20am	*45. DIRECT EFFECT OF MECHANISM AND TYPE OF INJURY ON MORTALITY AMONG COMBAT CASUALTIES* *Jennifer Gurney MD, Joint Trauma System, Joint Base San Antonio-Fort Sam Houston, TX*	Page 138
8:20am - 8:40am	*46. TO PEG OR NOT TO PEG: TRENDS IN DURABLE FEEDING TUBE NEEDS IN PATIENTS REQUIRING TRACHEOSTOMY* *Jonas Karlsson MD, FACS, Mission Hospital, Asheville, NC*	Page 140
8:40am - 9:00am	*47. UNDERSTANDING FINANCIAL HARDSHIP AFTER INJURY: RESULTS FROM THE FINCH PROSPECTIVE COHORT STUDY* *Madhuri Nishtala MD, University of Wisconsin School of Medicine and Public Health, Madison, WI*	Page 142
9:00am - 9:20am	*48. IMPLEMENTATION SCIENCE TO DECREASE VARIATION & HIGH OPIOID ADMINISTRATION IN SICU PATIENTS* *Kyle Kalkwarf MD, UAMS, Little Rock, AR*	Page 144

FRIDAY, MARCH 1, 2024

9:20am - 9:40am	*49. CAN OCCULT TRAUMATIC HEMOPNEUMOTHORAX BE SAFELY OBSERVED?* *Abdul Hafiz Al Tannir MD, Medical College of Wisconsin, Milwaukee, WI*	Page 146
9:40am - 10:00am	*50. GERIATRIC FALLS: AN ENORMOUS ECONOMIC BURDEN COMPARED TO FIREARMS* *Bardiya Zangbar MD, Westchester Medical Center, Valhalla, NY*	Page 148
7:30am - 9:00am	**FRIENDS & FAMILY BREAKFAST** *Stark's Alpine Grill*	

NOTES

NOTES

Presentation # 1
Monday, February 26, 2024, 7:00am - 7:20am

OBSERVATION-FIRST VERSUS ANGIOEMBOLIZATION-FIRST APPROACH IN STABLE PATIENTS WITH BLUNT LIVER TRAUMA: A WTA MULTICENTER STUDY

P NGUYEN, J NAHMIAS, N ARYAN, M CRIPPS, J SAMUELS, H CARMICHAEL, R MCINTYRE, S URBAN, S BALLOW, R DIRKS, M SPALDING, A LARICCA, M FARRELL, D STEIN, M TRUITT, H VERNER, C MENTZER, T MACK, C BALL, K MUKHERJEE, G MLADENOV, D HAASE, H ABDOU, T SCHROEPPEL, J RODRIQUEZ, M BALA, N KERIC, M CRIGGER, N DHILLON, E LEY, T EGODAGE, J WILLIAMSON, T CARDENAS, V EUGENE, K PATEL, K COSTELLO, S BONNE, F ELGAMMAL, W DORLAC, C PEDERSON, C BURLEW, N WERNER, J HAAN, K LIGHTWINE, G SEMON, K SPOOR, C VELOPULOS, L HARMON, A GRIGORIAN
WTA Multicenter Trial
Orange, CA

Presenter: Peter Nguyen MD
WTA Sponsor: Thomas Schroeppel

Introduction: A prior multicenter investigation demonstrated that an observation-first strategy yields better outcomes for stable patients with traumatic liver injuries exhibiting contrast extravasation on imaging. A comprehensive analysis comparing observation-first and angioembolization-first (AE) approaches specifically in blunt liver trauma has not been done. This study aimed to investigate if an AE-first approach for blunt liver trauma with active extravasation is associated with increased liver-related complications (LRCs) without an increased risk of mortality.

Methods: A post-hoc analysis of a multicenter prospective observational study across 23 centers was conducted. Adult patients with blunt traumatic liver injuries and contrast extravasation undergoing observation or AE within 8 hours of arrival were included. The primary outcome was LRCs, defined as peri-hepatic fluid collection, bile leak/biloma, pseudoaneurysm, hepatic necrosis, and/or hepatic abscess. Secondary outcomes included mortality, LRC interventions, emergency department (ED) re-presentation, and hospital readmission. Multivariable logistic regression was performed.

Results: 128 patients presented with blunt liver trauma and contrast extravasation on imaging, with 71 (55.5%) undergoing observation-first and 57 (45.5%) undergoing AE-first management. Both groups were comparable in age, vitals, mechanism of injury, initial lactate, and shock index (all $p>0.05$). The AE group had a higher injury severity score (ISS; 29 vs. 22, $p=0.039$) and prevalence of AAST liver grade IV injury (51.0% vs 22.0%, $p= 0.002$). Additionally, the AE group had increased rates of overall LRCs (36.8% vs 12.7%, $p=0.038$). However, adjusting for age, ISS, and grade of liver injury, AE-first approach has similar rates of LRCs and mortality (OR=1.949, $p=0.219$) compared to observation-first. The AE group had higher rates of re-presentation to ED within 30 days (25.0% vs 10.0%, $p=0.025$), however had comparable rates of readmission and LRCs requiring readmission (all $p>0.05$).

Conclusions: For patients with blunt liver trauma and contrast extravasation, an observation-first approach has similar risk of LRCs and mortality compared to AE-first. This suggests that initial observation may be reasonable in hemodynamically stable patients with blunt liver trauma. Further prospective randomized trials are required to confirm these findings and determine optimal management for patients with blunt liver trauma.

Table 1: Outcomes of Patients with Blunt Liver Injury Undergoing Observation versus Angioembolization

Outcomes	Treatment		p-value
	Observation (N=71)	Angioembolization (N=57)	
Liver-related complications (LRCs)	9 (12.7%)	21 (36.8%)	**0.038**
Peri-hepatic fluid collection	5 (7.0%)	10 (17.5%)	0.066
Bile-leak/biloma	2 (2.8%)	8 (14.0%)	**0.019**
Pseudoaneurysm	1 (1.4%)	1 (1.8%)	0.087
Hepatic abscess	0 (0.0%)	1 (1.8%)	0.263
Hepatic necrosis	1 (1.4%)	1 (1.8%)	0.087
Mortality	4 (5.7%)	3 (5.3%)	0.912
Re-presented to ED within 30 days	7 (10.0%)	14 (25.0%)	**0.025**
Re-admitted within 30 days	3 (4.3%)	6 (10.7%)	0.164

ED - Emergency Department

NOTES

Presentation # 2
Monday, February 26, 2024, 7:20am - 7:40am

AN EXPLORATORY ANALYSIS OF TRAUMATIC ABDOMINAL AORTIC INJURIES--RESULTS FROM THE AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA (AAST) VASCULAR TRAUMA REGISTRY: THE PROSPECTIVE OBSERVATIONAL VASCULAR INJURY TRIAL (PROOVIT)

J CRAPPS, J EFIRD, M BACH, P TEIXEIRA, J DUBOSE, C BROWN, D FELICIANO
Dell Medical School at UT Austin
Austin, TX

Presenter: Joshua Crapps MD
WTA Sponsor: David Feliciano

Introduction: Historical surveys of traumatic injuries to the abdominal aorta have described a preponderance of penetrating injuries and a mortality of 65-92%. With improved imaging available for hemodynamically stable patients after blunt trauma, an extraordinary shift has occurred in the epidemiology of these uncommon injuries as well as improved survival.

Methods: The AAST Vascular Trauma Registry: PROOVIT was used to describe patients with an abdominal aortic injury who survived to reach the hospital. Data included patient demographics, admission vital signs, mechanism of injury, injury characteristics, Abbreviated Injury Scale (AIS), Injury Severity Score (ISS), and mortality.

Results: From 2013 to 2022, 5,463 total vascular injuries were submitted to the PROOVIT registry with 102 (1.9%) constituting injuries to the abdominal aorta. Blunt mechanisms accounted for 70.6%, (72/102) of injuries. The median age was 40 with a median ISS of 36.5 and median abdominal AIS of 4.0. The overall mortality rate was 16.7%, [penetrating injuries 37.9% (11/29); blunt 8.2% (6/73)]. In patients who underwent injury repair [44.1% (45/102)], open repair was the most common technique utilized [24.5% (25/102)] with 31.4% (32/102) diagnosed at the time of emergent abdominal exploration. In patients whose abdominal aortic injuries were diagnosed with imaging, management included nonoperative in 68.7% (46/67) with a mortality rate of 6.5% (3/46); open repair in 9.0% (6/67), with a mortality rate 16.7% (1/6); and endovascular repair in 23.9% (16/67) with a mortality rate of 0% (0/16).

Conclusions: Injuries to the abdominal aorta in patients who survive to reach the hospital are most commonly from blunt trauma. As the majority of such injuries are non-perforating, CT imaging allows for the diagnosis of intimal and/or partial wall injuries amenable to observation or endovascular stenting and explains the significant improvements in survival.

NOTES

Presentation # 3
Monday, February 26, 2024, 7:40am - 8:00am

BEYOND THE VON WILLEBRAND FACTOR: TYPE O BLOOD EXHIBITS DOWNREGULATION OF THE LECTIN COMPLEMENT PATHWAY IN TRAUMA

B STOCKER, C ERICKSON, L GALLAGHER, B RAMSER, O THIELEN, W HALLAS, E MOORE, A D'ALESSANDRO, K HANSEN, C SILLIMAN, M COHEN
University of Colorado
Aurora, CO

Presenter: Benjamin Stocker MD
WTA Sponsor: Mitchell Cohen

Introduction: Patients with type O blood have an increased risk of hemorrhagic complications and decreased risk of thrombotic disease states due to lower baseline levels of von Willebrand Factor (vWF) and factor VIII. In trauma patients with type O blood, there is an increased need for massive transfusion and mortality while other studies have shown no difference in outcomes. We hypothesized that trauma patients with type O blood have a differential response to trauma due to factors other than lower baseline levels of vWF and factor VIII alone.

Methods: Patients meeting the highest level of trauma activation criteria at a Level 1 Trauma Center were prospectively enrolled in this observational study. Plasma samples were collected either in the field or upon arrival to the emergency department prior to the transfusion of blood products. Patients with type O blood were compared to all other patients. Severe trauma was defined as admission base deficit ≥ 6 mmol/L and ISS ≥ 15. Proteomic and metabolomic analyses were performed using liquid chromatography-mass spectrometry. MetaboAnalyst was used for statistical analyses of omics data using univariate non-parametric comparisons. Analysis of clinical data was done with non-parametric Fisher Exact Test and Wilcoxon Rank Sum Test as appropriate. P-value ≤ 0.05 defined significance.

Results: Two hundred ninety-two patients with omics data were included in this study. One hundred forty-six (50%) had type O blood. Seventy-eight (27%) had severe trauma, of which 41 (53%) were type O blood. Demographic and injury characteristics including ISS, mechanism, arrival vital signs, and base deficit were not different between groups. Type O patients had an increased length of stay (7 vs. 5 days, $p = 0.019$) and decreased mortality (6.2% vs. 13.7%, $p = 0.049$). In the severe trauma subgroup, type O patients had an increased total length of stay (16 vs. 9 days, $p = 0.008$) and increased ICU length of stay (8 vs. 4 days, $p = 0.021$) but no difference in transfusion requirements or mortality. Type O patients had significantly decreased levels of mannan-binding lectin (MBL) 2 and MBL associated serine protease 1 and 2 which are required for the initiation of the lectin pathway of complement activation (Figure). Type O patients had decreased levels of adenosine, an inflammatory signaling mediator released in response to downstream complement activation. In the severe trauma subgroup, type O patients had decreased levels of MBL 2, decreased levels of downstream Complement 6, and increased levels of vWF.

Conclusion: Trauma patients with type O blood have a decreased ability to activate the complement system through the lectin pathway which may provide a survival benefit in the immediate period due to decreased levels of inflammation and resultant organ failure. The decreased levels of complement may later impair healing leading to longer lengths of stay. Future work will include investigating therapeutic targets within the lectin pathway to augment the response to trauma in the acute period as well as further defining the release and activity of vWF following trauma.

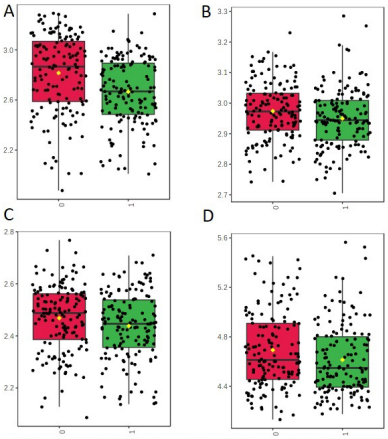


Figure: Normalized mass spectrometry concentrations of (A) MLB 2, (B) MASP1, (C) MASP2, and (D) Adenosine in trauma patients with non-type O blood (red) versus type O blood (green), $p < 0.05$ for all comparisons.

NOTES

Presentation # 4
Monday, February 26, 2024, 8:00am - 8:20am

MITIGATING THE RISE OF FIBRINOGEN AFTER POLYTRAUMA WITH SIRNA-LNP RESULTS IN DECREASED THROMBOSIS IN MICE

M SEADLER, F FERRARESSO, M BANSAL, A HAUGEN, M DE MOYA, M DYER, C KASTRUP
Medical College of Wisconsin
Milwaukee, WI

Presenter: Monica Seadler MD
WTA Sponsor: Marc de Moya, MD

Introduction: Polytrauma results in tissue injury and activation of the innate immune system resulting in a thromboinflammatory state that increases the risk of micro- and macrovascular complications that contribute to secondary organ damage. Venous thromboembolism (VTE) is a major complication contributing to morbidity and mortality post-injury. Fibrinogen, an already abundant protein in plasma circulating at 2-5 g/L, is an acute phase reactant that can rise to >10 g/L following severe inflammation, increasing the associated risk of thrombosis and VTE. Current VTE prophylaxis regimens, such as low molecular weight heparin, target factor Xa and thrombin without specifically targeting fibrinogen or inflammation. Despite adequate prophylaxis, nearly 3% of trauma patients experience VTE. Conversely, bleeding complications occur in 3-4% of trauma patients on VTE prophylaxis. We developed a novel approach that reduces the concentration of circulating fibrinogen using RNA silencing and clinically-relevant lipid nanoparticles (siFibrinogen), which did not increase bleeding in mice. We hypothesized that siFibrinogen could be used to mitigate the rise of fibrinogen after polytrauma and reduce the associated thromboinflammatory complications.

Methods: Mice underwent a model of blunt polytrauma consisting of liver crush and bilateral hindlimb pseudofracture. Within 30 minutes, mice then received an intravenous injection of siFibrinogen or siLuciferase (siLuc) as control. Fibrinogen concentration was quantified over 1 week using ELISA. A subset of mice was subjected to a thrombosis model of inferior vena cava (IVC) ligation 48 hours after polytrauma and venous thrombi were harvested 48 hours after IVC ligation.

Results: Fibrinogen decreased in the acute phase after trauma, reaching a concentration of 1.7 mg/mL and subsequently rose and peaked at 6.0 mg/mL after 24 hours. By 7 days post injury, fibrinogen returned to normal in mice. Administration of siFibrinogen after polytrauma resulted in a reduced peak concentration of fibrinogen of 0.3 mg/mL at 24 hours which was maintained through 7 days without worsening the drop in fibrinogen during the acute phase of injury (0-6 hours). In a post-trauma VTE model, fibrinogen was reduced to 0.3 mg/mL in mice treated with siFibrinogen compared to 5.7 mg/mL in mice given siLuciferase as control ($p < 0.0001$). siFibrinogen reduced thrombus burden compared to control with thrombi weighing 2.0 mg and 22.8 mg respectively ($p = 0.0009$).

Conclusion: The post-traumatic rise of fibrinogen can be mitigated using siRNA-LNP technology. Reduction of fibrinogen concentration after trauma results in decreased thrombus burden in a murine model of post-traumatic VTE. Attenuating the rise of fibrinogen represents an appealing novel target for VTE prophylaxis in trauma patients. Additional large animal studies are ongoing to determine the efficacy and bleeding risk of siFibrinogen.

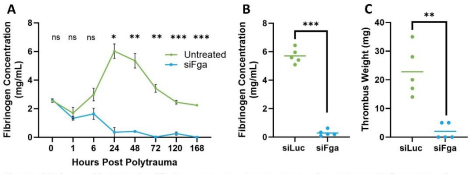


Figure 1. siFibrinogen mitigates the rise of fibrinogen and reduces thrombus burden after polytrauma (A) Concentration of fibrinogen after polytrauma in untreated mice and mice given siFibrinogen (siFga) (n = 3 mice per timepoint per group). (B) Concentration of fibrinogen 48 hours after IVC ligation in polytrauma mice treated with control (siLuc) or siFibrinogen (n = 5). (C) Weight of thrombus after IVC ligation in mice treated with control or siFibrinogen within 30 minutes after polytrauma (n = 5). * $P < 0.01$, ** $P < 0.001$, *** $P < 0.0001$. ns, no significant difference.

NOTES

Presentation # 5
Monday, February 26, 2024, 8:20am - 8:40am

MECHANISM MATTERS: DIFFERENTIAL BENEFITS OF COLD-STORED WHOLE BLOOD FOR TRAUMA RESUSCITATION FROM A MULTICENTER STUDY
J DILDAY, S GALLAGHER, K MATSUSHIMA, M SCHELLENBERG, K INABA, J HAZELTON, J OH, J GURNEY, M MARTIN
WTA Multicenter Trial
Los Angeles, CA

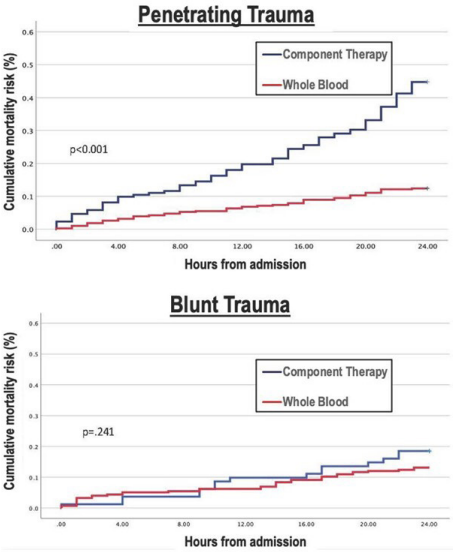
Presenter: Joshua Dilday DO
WTA Sponsor: Matthew J. Martin, MD, FACS, FASMBC

INTRODUCTION: Cold-stored whole blood (WB) for trauma resuscitation has increased over the past several years. Although military data using fresh WB has shown benefits, the few small civilian studies have reported conflicting results. In addition, there has been little analysis of specific subgroups who may benefit from WB resuscitation. We sought to compare outcomes between civilian patients receiving whole blood (WB) vs. component therapy (CT) after blunt (BL) and penetrating (PN) trauma.

METHODS: Secondary analysis of a prospective multicenter study of whole blood transfusion for trauma. Patients were grouped by mechanism of injury (BL vs PN). Demographics, physiologic parameters, injury characteristics, product utilization, and outcomes were compared. Multivariate analysis was performed to determine the effect of WB on outcomes in blunt and penetrating injuries. Primary outcome was mortality and secondary outcomes were acute kidney injury, venous thromboembolism, pulmonary complications, and bleeding complications. Additional analyses were performed on non-traumatic brain injury (TBI) patients and patients with severe torso injury. Odds of death was determined using a generalized estimated equations model with inverse probability of treatment weighting.

RESULTS: 1617 patients (BL 47% vs PN 54%) were identified; 1175 (73%) of which received WB. Following both BL and PN trauma, patients receiving WB were more commonly male (79% vs. 57%, 95% vs. 81%, respectively) and had a higher shock index (1.1 vs. 1.0; 1.1 vs. .94; respectively) compared to the CT group (all $p<0.05$) Among complications, only AKI was more common in the WB group after both BL and PN trauma (19% vs. 7% and 12% vs 6%, respectively; $p<0.05$). No overall mortality benefit was seen in WB use for BL trauma (32% vs. 28%; $p=.32$). Analysis of BL non-TBI and severe torso injuries also showed no difference in overall mortality between WB and CT groups. However, PN trauma patients receiving WB had improved survival compared to CT resuscitation (77% vs. 56%; $p<0.01$). Early survival was higher at 6 hrs (95% vs. 90%), 12 hrs (93% vs. 82%) and 24 hrs (87% vs. 62%) (all $p<0.05$) with WB in the PN group. Survival benefit with WB in the PN group was also seen following non-TBI (83% vs. 52%) and severe torso injuries (75% vs. 42%) (all $p<0.05$). After excluding TBI, WB was independently associated with decreased odds of overall death (.31 [CI .19-.49]; $p<0.001$) and 24hr death (.22 [.13-.36]; $p<0.001$) for PN trauma (see figure).

CONCLUSIONS: WB administration was independently associated with a significant decrease in early and overall mortality following penetrating trauma compared with CT alone. However, no early or overall mortality benefit of WB was seen following blunt trauma. Although WB offers logistical benefits in resuscitation in all patients, further analysis in blunt trauma is required to identify subgroups that may demonstrate a survival benefit.



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Presentation # 6
Monday, February 26, 2024, 8:40am - 9:00am

QUANTIFYING THE BENEFIT OF WHOLE BLOOD ON MORTALITY IN TRAUMA PATIENTS REQUIRING EMERGENT LAPAROTOMY

D LAMMERS, J MCCLELLAN, M ECKERT, J BINGHAM, P HU, S HURST, E BAIRD, Z HASHMI, J KERBY, J HOLCOMB, J JANSEN, R BETZOLD
University of Alabama at Birmingham
Birmingham, AL

Presenter: Daniel Lammers MD
WTA Sponsor: Richard Betzold

Introduction: Whole blood (WB) transfusions in trauma represent an increasingly utilized resuscitation strategy in both military and civilian settings. Previous reports suggest a mortality benefit associated with incorporating WB into early blood product-based resuscitation protocols; however, these analyses remain limited by their dichotomous use of WB and frequentist statistical methodologies. This analysis sought to assess the use of WB and quantify its impact during the early resuscitative period using Bayesian statistics from a single level 1 academic trauma center.

Methods: We performed a retrospective analysis of a prospectively collected database from an American College of Surgeons Level 1 academic trauma center between 2019-2022. Severely injured patients (ISS>15 without severe head injury) who required emergent laparotomy and met the critical administration threshold of receiving at least 3 units of red blood cell containing products (WB or packed red blood cells) within the first hour were assessed. Multilevel Bayesian regression analyses were performed to calculate the posterior probabilities, risk ratios (RR) and credible intervals (CrI) associated with WB use and WB-predominant resuscitation, i.e. more whole blood than balanced components transfused, with regards to 4-hour and 24-hour mortality.

Results: 266 patients met the inclusion criteria for this analysis (81% male, average age of 36 years old, 61% penetrating injury, average ISS of 29.6, and an average lactate of 7.6 on admission). The mortality was 11% at 4-hours and 14% at 24-hours. The posterior probability that receiving at least one unit of WB during the initial resuscitative efforts reduced 4-hour and 24-hour mortality compared to a balanced transfusion was 24% (RR 1.68; 95% CrI 0.54-5.7) and 42% (RR 1.12; 95% CrI 0.46-2.83), respectively. However, patients who initially received a WB-predominate resuscitation demonstrated a 99% (RR 0.12; 95% CrI 0.02-0.52) and a 99% (RR 0.22; 95% CrI 0.08-0.65) probability of decreased mortality at 4-hours and 24-hours, respectively, when compared to component-predominate strategies. Further, an associated high probability of benefit was demonstrated over a wide range of mortality RR thresholds with WB-predominate strategies (Table 1).

Conclusion: Preferential transfusion of WB during the initial resuscitation period demonstrated a 99% probability of being superior to component-predominate resuscitations with regards to 4-hour and 24-hour mortality in critically ill trauma patients. The low posterior probabilities associated with WB when used as a binary variable (i.e. patient received at least one unit of WB) indicates that evaluating how patients receive WB, as opposed to only assessing if they receive it, may prove to be a more meaningful metric for analyzing outcomes. This analysis suggests that WB-predominate resuscitation strategies are optimal for improving early mortality; however, prospective, randomized trials should be sought.

Table 1) Mortality Risk Ratio Thresholds Associated with Early Preferential WB Transfusions

	4 Hour		24 Hour	
Risk Ratio	**Probability, %**	**Level of Evidence[A]**	**Probability, %**	**Level of Evidence[A]**
< 1.0	99	Decisive	99	Decisive
< 0.9	99	Decisive	99	Very Strong
< 0.8	98	Very Strong	98	Very Strong
< 0.7	98	Very Strong	96	Strong
< 0.6	97	Very Strong	94	Strong
< 0.5	94	Strong	88	Substantial

[A] Level of Evidence based on Jeffrey Scale of Evidence via associated Bayes factor.

NOTES

Presentation # 7
Monday, February 26, 2024, 4:00pm - 4:20pm

COST EFFECTIVENESS OF DIFFERENT SCREENING MODALITIES FOR PEDIATRIC BLUNT CEREBROVASCULAR INJURY: A DECISION TREE ANALYSIS

A. CAMPBELL, D. XUAN, P. BALARAMAN, D. TATUM, B. YORKGITIS, D. YU, P. MCGREW, J. DUCHESNE, L. SHI, S. TAGHAVI
Tulane University School of Medicine
New Orleans, LA

Presenter: Alexandra Campbell BS
WTA Sponsor: Dr. Juan Duchesne

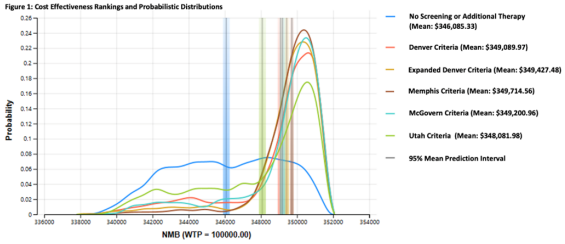
Introduction: Early identification of blunt cerebrovascular injury in the pediatric (< 16 years) population (pBCVI) is essential to minimize stroke. However, the most cost-effective screening strategy for pBCVI is unknown, and there is high variability in practice nationwide. We sought to identify the most cost-effective screening strategy for identifying pBCVI and hypothesized that McGovern criteria (MG) would be the most cost-effective.

Methods: A Decision Tree analysis model was used to compare the following BCVI screening strategies in pediatrics: (1) no screening (NS); (2) Denver criteria (DC); (3) Expanded Denver criteria (eDC); (4) Memphis criteria (MC); (5) MG; and (6) Utah criteria (UC). The base-case scenario modeled pediatric patients over a 5-year time horizon for cost and utility analysis. BCVI cases detected by screening modalities were assumed to be given antithrombotic therapy which mitigates the risk of stroke and mortality.

Results: MC was cost dominant compared to other testing modalities, followed by eDC and MG. MC resulted in the lowest amount of stroke, mortality, and cost across patients and generated the greatest net monetary benefit (Fig 1). Compared to the next closest screening criteria, MC was $250.35 cheaper. MC added the most QALY (3.547), followed by eDC (3.545), MG (3.541), DC (3.541), and UC (3.530). Compared to NS, MC was $2,165.36 cheaper and generated 0.03 more QALYs per average patient. When comparing eDC to MC directly, test specificity was the primary driver of cost effectiveness.

Conclusion: MC demonstrated superior cost-effectiveness compared to other screening modalities for pBCVI. Implementation of the Memphis criteria could lead to reduced healthcare costs, improved patient outcomes, and increased net monetary benefit. Further research is needed to confirm these findings and guide clinical decision-making in pBCVI screening.

Figure 1: Cost Effectiveness Rankings and Probabilistic Distributions



Testing Modality	NMB (95% CI Lower, 95% CI Upper)	Total Cost	NHB	ICER (vs No Screen)
Memphis	$350,490.90 ($349,612.24, $349,816.88)	$4,210.84	-$154,031.05	-$62,769.48
Expanded Denver	$350,077.99 ($349,296.59, $349,558.37)	$4,461.21	-$10,392.29	-$58,256.86
McGovern	$349,559.60 (349,047.61, $349,354.31)	$4,510.01	#DIV/0!	-$66,234.29
Denver	$349,537.14 ($348,929.66, $349,250.28)	$4,532.47	-$61,922.18	-$65,437.11
Utah	$347,760.89 ($347,889.18, $348,274.78)	$5,211.74	-$67,678.08	-$67,678.08
No Screening	$344,875.83 ($345,900.26, $346,270.41)	$6,376.20	Baseline	Baseline

NOTES

Presentation # 8
Monday, February 26, 2024, 4:20pm - 4:40pm

BUT DID YOU DIE? THE RESULTS OF IN-HOSPITAL CARDIAC ARREST AMONG TRAUMA PATIENTS

T KOPELMAN, K KYRIAKOULIS, P O'NEILL, A SLIVINSKI, J KARLSSON, J JACOBS
Mission Hospital
Asheville, NC

Presenter: Katia Kyriakoulis DO
WTA Sponsor: Tammy Kopelman

Introduction: Nearly 300,000 in-hospital cardiac arrests (IHCA) occur each year in the United States with approximately 15% achieving survival-to-discharge. Since trauma patients suffering non-hemorrhagic (NH) IHCA have not specifically been studied, limited evidence exists to support the efficacy of initiating cardiopulmonary resuscitation (CPR) measures. Further, when there is return of spontaneous circulation (ROSC), long-term outcomes remain unknown. The purpose of this study was to determine rates of survival-to-discharge and identify risk factors for in-hospital mortality despite initiating CPR among trauma patients who sustain NH IHCA after admission.

Methods: We conducted a retrospective, IRB exempt registry study of all trauma patients >/= 18 years of age presenting to a Level II Trauma Center over a 6-year time period identified as having a NH IHCA. Patients were excluded if a DO NOT RESUSCITATE (DNR) status was present at the time of initial NH IHCA. Charts were reviewed for patient demographics, CPR information, hospital course, discharge neurologic status, and mortality. Wilcoxon rank-sum test for continuous and Fisher exact or chi-squared test for categorial variables were performed with statistically significant set at <0.05.

Results: Total trauma patients having IHCA was 198 with 88 (44%) meeting inclusion criteria. Patients had an average age of 69 years (median 73; interquartile range (IQR) 62-83) and an ISS of 17 (median 14; IQR 9-26). While 69% of patients had ROSC at the time of initial NH IHCA, only 28% (25/88) survived to hospital discharge. At the time of the initial NH IHCA, almost all patients were monitored (91%), approximately half were intubated (49%), one-third were on vasopressors (34%), and the majority had a non-shockable rhythm (pulseless electrical activity/asystole; 88%). Patients that did not survive to discharge were older (72 [IQR 67-85] versus 62 years [IQR 48-76], p=0.028) and more frequently required vasopressor therapy prior to the event (p=0.024). Notably, no patient on vasopressor therapy for an indication other than neurogenic shock survived to discharge. All survival-to-discharge patients subjectively returned to pre-arrest neurological status. Among the subset of patients that had ROSC after the initial NH IHCA but failed to survive to discharge (n=36), 15 had a subsequent NH IHCA and expired (new DNR status, n=10; failure to achieve ROSC, n=5), 2 patients with severe TBI progressed to brain death, and the remaining patients (n=19) transitioned to comfort care.

Conclusions: In trauma patients, survival-to-discharge following NH IHCA was found to be 28%, surprisingly with a preservation of pre-arrest neurological status. Older patients or those requiring vasopressor support (other than for neurogenic shock) prior to NH IHCA were less likely to survive-to-discharge. Larger studies will be necessary to confirm and further identify patient subgroups that may not benefit from resource intensive CPR efforts.

NOTES

Presentation # 9
Monday, February 26, 2024, 4:40pm - 5:00pm

PLASMA FROM SEVERELY INJURED TRAUMA PATIENTS INDUCES ENDOTHELIAL CELL MITOCHONDRIAL DYSFUNCTION

W HALLAS, S MITRA, O THIELEN, L GALLAGHER, B RAMSER, B STOCKER, P HOM, C ERICKSON, E MOORE, A D'ALESSANDRO, C SILLIMAN, K HANSEN, M COHEN
University of Colorado
Aurora, CO

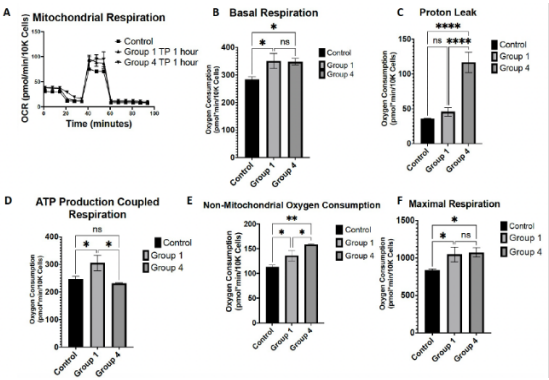
Presenter: William Hallas MD
WTA Sponsor: Mitchell Cohen

Introduction: Thromboinflammation after trauma is driven by endothelial dysfunction and coagulopathy. Our group has recently described a mitochondrial-based energy crisis that likely drives much of this dysfunction after injury, however, the specific pathways involved in this process remain unknown. We therefore hypothesized that the post-trauma milieu provokes mitochondrial dysfunction via increased oxidative stress.

Methods: Citrated plasma was collected upon arrival from trauma patients at a level 1 trauma center. Patients were divided by injury severity score (ISS) and base deficit (BD) (Group 1 ISS < 15 BD < 6, Group 4 ISS ≥ 15 BD >6. Human umbilical vein endothelial cells were grown to 80% confluence and incubated for 1 hour with 10% trauma patient ex-vivo plasma. A seahorse mitochondrial function assay was performed on these cells to evaluate for mitochondrial dysfunction (Agilent mito stress). An area under the curve analysis was performed followed by one-way ANOVA with Tukey's multiple comparisons test.

Results: There was increased proton leak and an increase in non-mitochondrial oxygen consumption in cells exposed to group 4 trauma plasma suggesting mitochondrial inefficiency and high oxidative stress ($p<0.0001$, Fig 1C and 1E). Conversely, when cells were exposed to non-injured plasma (group 1), there was increased ATP production coupled respiration ($p<0.05$, Fig 1D). The elevations in basal respiration as well as maximal respiration seen in the group 1 and group 4 trauma plasma groups are equal (Fig 1B and 1F).

Conclusion: Ex-vivo plasma from severely injured patients induced mitochondrial dysfunction as well as an overall state of higher oxidative stress in endothelial cells. The group 1 and group 4 treated ECs have equal basal respiration but with distinct metabolic functional changes. Our data suggests that mitochondrial dysfunction via proton leak and oxidative stress may be a key driver in the energy crisis resulting in thromboinflammation and poor outcomes after trauma. Future studies will identify the mechanisms and test therapeutics for the rapid correction of increased proton leak, enabling the mitochondria to efficiently produce ATP. This correction may represent a possible "resuscitation in a syringe" therapeutic to prevent and correct thromboinflammation for trauma patients in the future.


A
Mitochondrial Respiration
OCR (pmol/min/10K Cells)
Time (minutes)
Control
Group 1 TP 1 hour
Group 4 TP 1 hour
B
Basal Respiration
C
Proton Leak
D
ATP Production Coupled Respiration
E
Non-Mitochondrial Oxygen Consumption
F
Maximal Respiration
Oxygen Consumption (pmol/min/10K Cells)
Control
Group 1
Group 4
ns

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Presentation # 10
Monday, February 26, 2024, 5:00pm - 5:20pm

EXPOSURE TO STATIN THERAPY DECREASES INCIDENCE OF VTE AFTER TRAUMA

K SANDERS, S CUNNINGHAM, A MANKAME, J MICHAEL VAN GENT, E FOX, C WADE, B COTTON, J CARDENAS
UTHealth Houston
Houston, TX

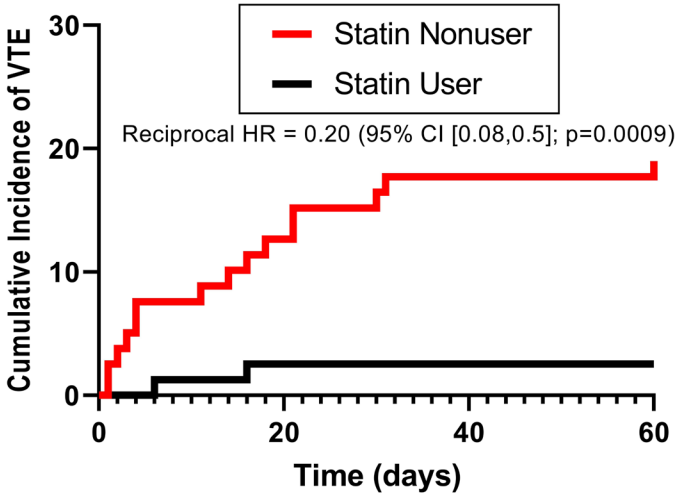
Presenter: Kelly Sanders DO
WTA Sponsor: Charles E Wade

Introduction: Venous thromboembolism (VTE) is a leading cause of morbidity and mortality in trauma patients, despite chemoprophylaxis. Recent data demonstrate that markers of endothelial activation and persistent inflammation are strongly linked with trauma-related VTE. Numerous trials that assess cardiovascular outcomes have demonstrated that statins are capable of acting upon the endothelium beyond merely lowering the lipids in circulation which precede vascular plaques. We hypothesized that exposure to statin therapy in the pre- or in-hospital setting would be associated with a decreased incidence of VTE when compared to patients with no exposure to statins.

Methods: We conducted a retrospective case control study of injured patients who did or did not receive statin therapy. Adult, highest-level trauma activation patients admitted between 1/2018 - 6/2022 were included. Patients on pre-hospital anticoagulants, history of inherited bleeding disorder, pregnancy, age<16 years old, and those who died within the first 24 hours were excluded. Statin use was defined as any statin therapy pre-hospital or in-hospital. Exact matching was performed based on candidacy for statin use: age, congestive heart failure (CHF), coronary artery disease (CAD), history of cerebral vascular accident (CVA), history of percutaneous coronary intervention (PCI) or major noncardiac vascular procedures, hyperlipidemia (HLD), injury severity, and body mass index (BMI). VTE was defined as a diagnosis of deep vein thrombosis (DVT) and/or pulmonary embolism (PE). VTE incidence, time to VTE, and time to in-hospital statin initiation were assessed. The observation period was 60 days. Differences between groups were determined by Mann-Whitney (continuous variables) and Chi square tests (dichotomous variables). Adjusted analyses included Mantel-Haenszel and multivariable logistic regression analyses.

Results: 3,062 patients met inclusion of which 79 were statin users that were matched to 79 statin nonusers. Overall VTE incidence was 10.8%. No differences in admissions demographics, vital signs, injury pattern, transfusion volumes, lengths of stay or mortality were identified between groups. Statin users had a higher incidence of hypertension (31% vs 22.2%; p=0.026). The incidence of VTE in statin users was significantly lower (1.3% vs 9.5%, respectively; p<.001). Exposure to statins was associated with an 80% decreased risk of developing VTE (Reciprocal HR = 0.2, 95% CI 0.08 – 0.5; p<.001). Multivariable logistic regression controlling for hypertension and diabetes showed a decreased risk of developing VTE among statin users (OR=0.14, 95% CI 0.03-0.64; p=.011).

Conclusions: In a retrospective analysis of matched trauma patients, statin exposure was associated with 80% less likelihood of VTE. Statins are regarded as relatively cheap with a low side-effect profile, but further research is needed to determine if they should be considered as adjunctive therapy for VTE chemoprophylaxis after traumatic injury.



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Presentation # 11
Monday, February 26, 2024, 5:20pm - 5:40pm

PLATELET RELEASATES MITIGATE THE ENDOTHELIOPATHY OF TRAUMA

L T. GALLAGHER, A T. FIELDS, S MITRA, B NUNEZ-GARCIA, K HERRERA-RODRIGUEZ, C CHOU, O THIELEN, W HALLAS, B RAMSER, B STOCKER, L Z. KORNBLITH, M J. COHEN
University of Colorado
Denver, CO

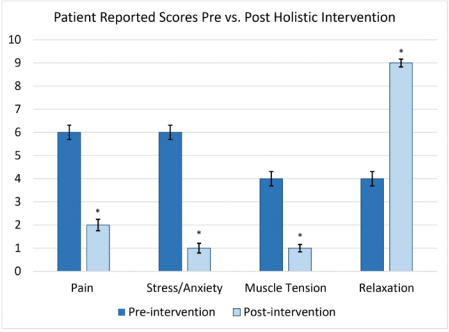
Presenter: Lauren Gallagher MD
WTA Sponsor: Mitchell Cohen

Introduction: Impaired hemostasis, altered endothelial barrier function, and dysregulated inflammation are all prime drivers of the thrombo-inflammatory complications after trauma. Although platelets are well known for their roles in hemostasis, they also play a key role in thrombo-inflammatory pathways as regulators of endothelial health by promoting endothelial barrier protection and stimulating angiogenesis. On activation, platelets degranulate releasing multiple active substances for promoting angiogenesis, accelerating healing, and mediating host defense. We hypothesized that the soluble environment formed by trauma platelet releasates attenuates thrombo-inflammation via mitigation of trauma induced endothelial permeability.

Methods: Trauma platelet releasates were prepared from calcium-activated human platelets that were isolated from injured patients and healthy donors. Trauma plasma was collected in parallel. Human umbilical vein endothelial cells were treated independently and with various combinations of trauma platelet releasate and with 10% ex vivo trauma plasma. The effect on permeability was assessed by Electric Cell-substrate Impedance Sensing (ECIS). Data collection was obtained via resistance measurement. Resistance data was plotted to create permeability curves and areas under the curve (AUCs) using GraphPad Prism Software.

Results: Ex vivo trauma plasma induced endothelial permeability when compared to untreated cells (control). Conversely trauma platelet releasate decreased endothelial permeability when compared to control. When trauma plasma and trauma platelet releasate from injured patients were mixed ex vivo, trauma platelet releasate mitigated trauma plasma induced permeability (Figure 1A), with significant increase in AUC when compared to trauma plasma alone (15.16 vs. 10.27 $p < 0.001$, Figure 1B). Overall, ex vivo trauma plasma resulted in decreased AUC and trauma platelet releasate resulted in significantly greater AUC of normalized transendothelial electrical resistance on ECIS compared to trauma plasma (Figure 1B).

Conclusion: Trauma platelet releasates provide endothelial barrier protection against ex vivo trauma plasma induced endothelial permeability. Our findings highlight a potential beneficial action of activated platelets on the endothelium in injured patients. Ongoing work in our lab is examining the molecular drivers and mechanisms of this effect. Clinical implications of this study suggest that the soluble contents from platelet degranulation may provide a transfusion product that mitigates the endotheliopathy of trauma, and that activated platelets may prove a promising therapeutic target in the complex integration of thrombosis, endotheliopathy, and inflammation in trauma.



All *p<0.001

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Presentation # 12
Monday, February 26, 2024, 5:40pm - 6:00pm

PROSPECTIVE OUTPATIENT FOLLOW-UP OF EARLY COGNITIVE IMPAIRMENT IN PATIENTS WITH MILD TRAUMATIC BRAIN INJURY AND INTRACRANIAL HEMORRHAGE

S STOPENSKI, A GRIGORIAN, E LASSO, C KUZA, S BLOOM, P RAO, L SWENTEK, C ALVAREZ, M JEBBIA, A DOBEN, M DOLICH, N NGUYEN, J NAHMIAS
University of California Irvine
Irvine, CA

Presenter: Stephen Stopenski MD
WTA Sponsor: Andrew R Doben

Introduction: Mild traumatic brain injury (mTBI) encompasses a spectrum of disability including early cognitive impairment (ECI). Recent recommendations including the Brain Injury Guidelines (BIG) suggest mTBI patients can be safely discharged from the Emergency Department. Although half of mTBI patients with intracranial hemorrhage (ICH) have evidence of ECI, it is unclear what percentage of these patients' ECI persists after discharge. We hypothesize a significant proportion of trauma patients with mTBI and ECI at presentation have persistent ECI at 30-day follow-up.

Methods: We performed a single center prospective cohort study including adult trauma patients admitted from 11/2020 to 7/2022 with radiographic evidence of an intracranial hemorrhage (ICH) or skull fracture plus a Glasgow coma scale (GCS) of 13-15 on arrival. Participants were screened for ECI using the Rancho Los Amigos Scale (RLA), and ECI was defined as a RLA < 8. We compared ECI and non-ECI groups with regard to demographics, associated injuries, computed tomography (CT) imaging (e.g., Rotterdam CT score) and outcomes with bivariate analysis. Also, 30-day follow up phone calls were performed to re-evaluate subjects using the RLA for continued ECI and concussion symptoms (i.e., headache or dizziness).

Results: From 62 patients with ICH or skull fracture and mTBI, 21 (33.9%) had ECI. Patients with ECI had a higher incidence of subarachnoid hemorrhage (85.7% versus 46.3%, p=0.003) and higher Rotterdam CT score (p=0.004) compared to those without ECI. On 30-day follow up, 6 of 21 patients (26.6%) had persistent ECI. In addition, 7 (33.3%) patients had continued concussion symptoms such as headache or dizziness.

Conclusion: Over one-third of patients with mTBI and intracranial hemorrhage had ECI. Over one fourth of these patients had persistent ECI and 33% had other persistent concussion symptoms at 30-day follow-up. This further highlights the importance of identifying ECI as a significant portion may have ongoing difficulties reintegrating into work and society.

NOTES

Presentation # 13
Tuesday, February 27, 2024, 7:00am - 7:20am

THINKING OUTSIDE THE PILL BOX: PAIN, ANXIETY, AND STRESS REDUCTION IN TRAUMA PATIENTS THROUGH HOLISTIC MEDICINE

L JACKSON, V BANSAL, A KRZYZANIAK, P GRIGG, A ROONEY, E PATEL, M SISE, K PECK
Scripps Mercy Hospital San Diego
San Diego, CA

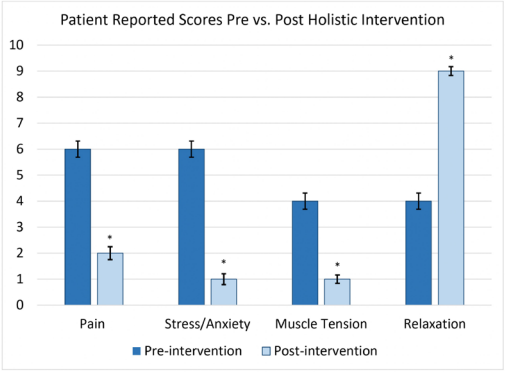
Presenter: Laurinda Jackson MD, MPH
WTA Sponsor: Kimberly A Peck

INTRODUCTION: In response to soaring opioid addiction rates, trauma centers should examine and adjust pain management strategies for acute trauma patients. Integrative care combines standard management with holistic therapy. We hypothesized that a holistic intervention would reduce pain, stress, and anxiety in trauma patients.

METHODS: Non-ICU trauma patients with the capacity to participate were offered a holistic healing session provided by a single, certified holistic nurse from December 2022 – March 2023 at a Level I trauma center. The session included Healing Touch, breathing and relaxation techniques, and aromatherapy. Data collected included demographics, hospital LOS, injury severity, mechanism of injury, and patient reported pre- and post-intervention ratings of pain, stress, anxiety, and relaxation on a Likert scale of 0 to 10. To assess the potential confounding influence of opioid medication, patients were then grouped based on receiving opioid medication on the same day as the intervention (OM) or not (NOM). Patient and provider satisfaction ratings were also obtained.

RESULTS: A total of 75 patients participated. Patients were mostly male (53%) with a median age of 42yr [IQR 28-65] and a hospital LOS of 6 days [IQR 3-13]. The primary injury mechanism was blunt trauma (85%) with a mean ISS of 10 [IQR 6-16]. Immediately following the intervention, pain levels were significantly reduced from an average of 6 (SD=2.7) to 2 (SD=1.8) ($p<0.001$), with the percentage of patients reporting "no pain" increasing from 4% to 29%. Injury severity was nearly identical in OM (n=44) and NOM (n=31) patients (both groups ISS=10 [IQR 6-16]). Both OM and NOM reported significantly lower pain, stress, and anxiety levels, and a higher level of relaxation after the intervention (all $p<0.001$) (Figure). Even though 89% of trauma providers had never previously prescribed holistic therapies, 83% reported improvements in pain, agitation, and sleep in their patients following the holistic intervention. Almost all (89%) trauma providers surveyed would offer this service to their patients again.

CONCLUSION: This study demonstrated that an integrative approach involving a holistic intervention for trauma patients significantly reduced pain, stress, and anxiety independent of opioid therapy. Patient well-being was enhanced, with both patients and providers reporting positive results. A randomized, prospective study to elucidate whether integrative care reduces in-patient opioid use in trauma patients is warranted.



All *p<0.001

NOTES

Presentation # 14
Tuesday, February 27, 2024, 7:20am - 7:40am

DAILY QUETIAPINE AFTER SEVERE TBI IMPROVES LEARNING AND MEMORY UP TO TWO WEEKS AFTER INJURY

A THAPLOO, P BELE, M COONS, M CULKIN, A GEORGES, E ANDERSON, K BROWNE, C JACOVIDES, P SANTOS, P MARTINEZ-QUINONES, D MEANEY, L KAPLAN, D SMITH, J PASCUAL
University of Pennsylvania
Philadelphia, PA

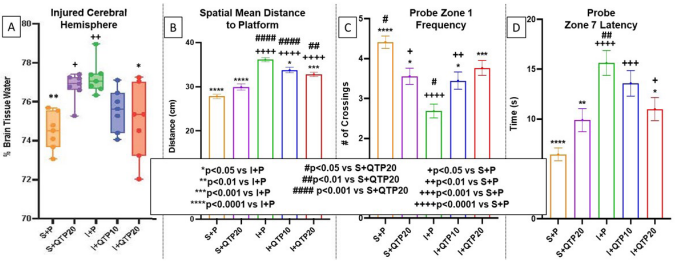
Presenter: Priyanka Bele MD
WTA Sponsor: Mark Seamon

Introduction: Traumatic brain injury (TBI) induces cognitive deficits driven by neuroinflammation and cerebral edema. Quetiapine (QTP), a commonly used atypical antipsychotic has recently been shown to reduce post-TBI microvascular penumbral leukocyte mobilization and blood-brain barrier permeability. We hypothesized that after severe TBI QTP would thereby also improve animal cognitive recovery for 2 weeks after severe TBI.

Methods: CD1 male mice (n=35) underwent severe TBI (controlled cortical impact, injury, I) or sham craniotomy (S), followed by BID saline (P, placebo) or QTP (10 or 20 mg/kg, IP) for 2 weeks; body weight was recorded daily. Animals underwent Morris Water Maze assessments to gauge spatial learning and memory. Evaluated parameters included time and distance traveled to reach the platform quadrant (Zone 1, Z1), the platform itself (Zone 5, Z5) or a 24cm-diameter concentric circular zone to the platform (Zone 7, Z7). All trials were digitally-recorded and analyzed using Ethovision software. On day 14, injured cerebral hemispheres were procured for edema determination (wet-to-dry ratio). Intergroup differences were evaluated with ANOVA with Bonferroni correction ($p<0.05$).

Results: On day 14, animal weight loss recovery was lowest in I+P (6.2±0.6%) compared to I+QTP20 (10.9±0.6%, $p<0.01$ vs I+P) and I+QTP10 (8.8±0.6%, $p<0.01$ vs I+P, $p=0.01$ vs I+QTP20). Cerebral edema was greatest in I+P, and only significantly decreased in I+QTP20 (Fig. A). Either QTP dose significantly improved spatial learning in animals with a shorter latency time to reach Z7 (I+QTP10: 14.1±1.1s, I+QTP20: 13.4±1.2s) than (I+P: 20.8±1.5s, $p<0.01$ vs either). Also mean travel distance to reach Z5 was shorter for both QTP doses (Fig. B). In probe memory trials, only I+QTP20 significantly increased crossings in Z1 (Fig. C) and reduced latency time to reach Z7 (Fig. D). Also, only I+QTP20 (6.3±1.0s) but not I+QTP10 significantly reduced Z1 latency time compared to I+P (9.6±1.0s, $p=0.02$ vs I+QTP20).

Conclusion: Post-severe TBI QTP results in sustained reductions in brain edema and improves spatial learning and memory with a potential dose dependence benefiting memory up to 14 days. These data suggest an unanticipated outcome benefit from QTP use following brain injury that should be specifically explored in injured patients.


A
Injured Cerebral Hemisphere
% Brain Tissue Water
B
Spatial Mean Distance to Platform
Distance (cm)
C
Probe Zone 1 Frequency
# of Crossings
D
Probe Zone 7 Latency
Time (s)
*p<0.05 vs I+P
**p<0.01 vs I+P
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Presentation # 15
Tuesday, February 27, 2024, 7:40am - 8:00am

TEN THOUSAND REPETITIONS: GETTING VTE PROPHYLAXIS RIGHT
A MYDLOWSKA, GE HATTON, M BLAKER, L HALEY, M MCNUTT, L KAO, D KIM, L MOORE
UTHealth Houston
Houston, TX

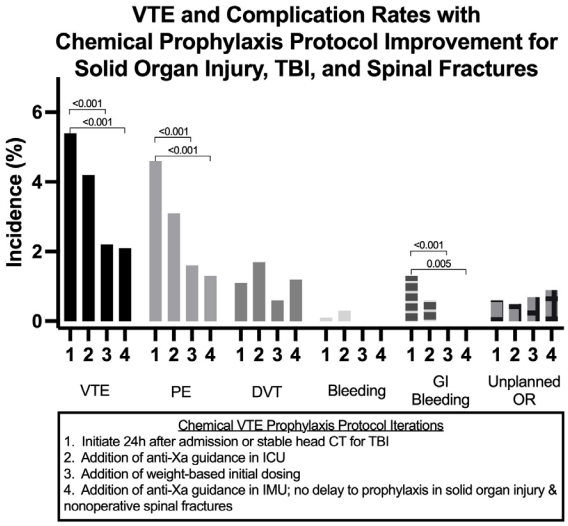
Presenter: Anna Mydlowska MD
WTA Sponsor: Moore Laura

Introduction: The optimal time to initiation and dosing strategy of chemical thromboprophylaxis (PPX) is unknown among patients at the highest risk of bleeding complications including those with solid organ injury (SOI), traumatic brain injury (TBI), and spinal fractures (SF). We hypothesized that the incidence of venous thromboembolism (VTE) would decrease among trauma patients with early PPX administration, initial weight-based dosing, and anti-Xa dosing adjustments without increasing complications.

Methods: This retrospective single institution cohort study included adults (≥16 years) admitted to the trauma service 7/2014–3/2023 with SOI, TBI or SF. All patients were started on low molecular weight heparin in accordance with institutional guidelines. The VTE protocols were tailored to injury pattern: SOI, TBI, and SF. During the study period, there were 4 iterations of the VTE protocols. Protocol 1 required PPX 24h after patient arrival for SOI and SF or 24h after a stable repeat head CT for TBI. PPX was initiated per surgeon request if SF were operative. Protocol 2 added anti-Xa measurement and dosing adjustment after the 3rd PPX dose in ICU patients. Protocol 3 added initial weight-based dosing. Protocol 4 added anti-factor Xa to intermediate unit patients, eliminated the delay to PPX for SOI and non-operative SF, and limited delay to PPX in operative SF to a maximum of 24h after surgery. The primary outcome was clinically evident VTE (deep vein thrombosis or pulmonary embolism). Secondary outcomes included bleeding complications (failure of non-operative SOI management, GI bleed, progression of TBI requiring intervention, hemorrhagic stroke, or development of spinal epidural hematoma requiring operation). Univariate and multivariable, multilevel models accounting for time were created to assess the relationship between protocol and outcomes of interest. Subgroup analyses were performed within the injury pattern groups.

Results:Of 12,796 patients, 67% were male and 92% injured by blunt mechanism. The median age was 42 (IQR 27-60) and ISS was 19 (13-29). Patients suffered SOI in 22%, TBI in 28%, and SF in 50%. Overall, 344 (2.7%) suffered VTE. Rates of VTE dropped with each protocol iteration (Figure 1). This was driven primarily by a decline in PEs. There were no increases in complications with subsequent protocol change. GI bleeding dropped from 1.3% to 0% in the 3rd and 4th iterations ($p<0.001$). There was no change in the rate of unplanned operative intervention. Multivariable analyses confirmed these associations.

Conclusion: Early initiation of chemical VTE PPX with initial weight-based dosing and anti-Xa monitoring significantly decreased PE rates and decreased GI bleeding among high-risk trauma patients. Despite increasingly aggressive time of chemical DVT PPX, bleeding complications did not increase over time. This approach should be considered the standard for VTE PPX in high-risk trauma patients.



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Presentation # 16
Tuesday, February 27, 2024, 8:00am - 8:20am

ASSESSING THE ROLE OF TELEMEDICINE IN PREVENTING HIGHER LEVEL TRANSFERS FOR ISOLATED FACIAL TRAUMA

T LEIVA, A PARIKH, K STEWART, Z SARWAR, K MCKINNEY, R ALBRECHT, A CROSS
University of Oklahoma
Oklahoma City, OK

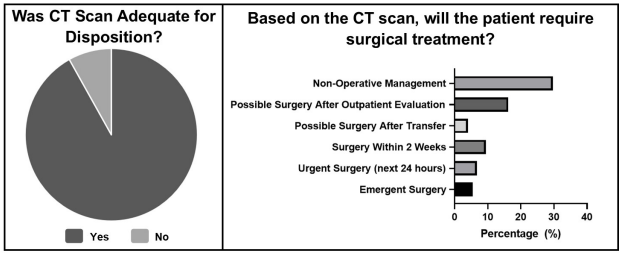
Presenter: Tyler Leiva MD
WTA Sponsor: Roxie Albrecht MD

Introduction: Interfacility transfers play a pivotal role in the care of trauma victims with critical injuries. In a recent study, from our institution, we revealed >30% of transfers were discharged from the ED and a majority of those were isolated facial injuries necessitating subspecialty evaluation. However, a number of these patients do not require urgent interventions and are subsequently discharged from the ED with outpatient follow up. Telemedicine and statewide image sharing have served as a useful adjunct in many populations to improve care of patients while keeping them close to home. We hypothesize that image sharing and telemedicine could prevent transfers for isolated facial trauma and decrease healthcare expenditure.

Methods: This is a retrospective study of patients who were transferred to our Level 1 facility as a trauma activation with an isolated AIS for facial trauma between January 1, 2020 and May 1, 2020. Computed Tomography (CT) scans and outside hospital ED records were then independently reviewed by Otolaryngology (ENT) and Ophthalmology faculty to assess facial fracture patterns, exams, and need for transfer. Patients were group into "need for transfer" if the CT scan alone was adequate to identify need for transfer or if there was information missing that might alter care, or "no need for transfer" if the CT scan alone or CT scan plus an exam from transferring provider was adequate to identify patients who did not need transfer. Data was condensed and frequency and percentage of each category was compared along with baseline characteristics.

Results: Seventy-four patients met inclusion and exclusion criteria and were analyzed. Blunt mechanisms were the most common mechanism of injury (76.1%). Transfer distance ranged from 0.7 miles to 265 miles with a median distance of 83.6 miles. The majority of patients were discharged from the ED after evaluation (73.0%) and only 5.4% (n=4) required emergent operative intervention. A CT scan was deemed adequate for identification of need for transfer in 82.3% of patients without further exam. ENT and Ophthalmology faculty concluded that 96.8% of transferred patients could have been evaluated and initially managed via telemedicine. 90.9% of transfer patients discharged from the ED needed follow up in 1 week and 4.6% in 24 hours.

Conclusion: Transfers, while sometimes necessary, pose both a time and financial burden on both the patients and hospital systems. Telemedicine has become an emerging method of evaluating patients and may eliminate the need for transfer for a certain subset of patients. The majority of patients transferred for facial trauma were found to have been suitable candidates for telemedicine. In this patient population, telemedicine proves to be a promising adjunct to interfacility transfer in a rural state to prevent unnecessary expense and resource utilization. Future directions include creation of CT scan protocols for transferring facilities and telemedicine platforms that allow for evaluation and management of these patients.



NOTES

Presentation # 17
Tuesday, February 27, 2024, 8:20am - 8:40am

RADIATION THERAPY? EVALUATING THE UTILITY OF ROUTINE CXR AFTER CHEST TUBE REMOVAL

E JOHNSON, N SCHMOEKEL, J LEE, V BROCKMAN, T SCHROEPPEL
UCHealth Memorial Hospital
Colorado Springs, CO

Presenter: Emily Johnson MD
WTA Sponsor: Thomas Schroeppel

Introduction: Obtaining a chest x-ray (CXR) after chest tube (CT) removal to rule out pneumothorax is common practice among trauma surgeons. Despite their ubiquity, CXRs are not benign. Additionally, when performed without clinical signs or symptoms, may yield results with uncertain clinical significance. There is limited literature exploring the utility of this practice in the trauma population. We sought to investigate the utility of routine post CT removal CXR among trauma patients. We hypothesized that in the absence of clinical changes, routine CXRs do not contribute to the identification of potential complications and associated interventions.

Methods: This is a retrospective review of trauma patients with CT placement at an urban level-1 trauma center from August 2019 to July 2022. Encounters were identified through an institutional trauma registry. Each CT removal event was categorized according to whether or not a routine post-removal CXR was performed, defined as a CXR occurring within 12 hours of CT removal in the absence of clinical changes warranting imaging. Patient demographics, CT placement details, and outcomes following removal were collected from the medical record. The primary outcome was an imaging finding following CT removal requiring change in clinical management, including repeat chest imaging, or CT replacement. Descriptive statistics were performed for the total population and for each group. Wilcoxon Rank Sum or Student's t-test was used for continuous variables and chi-squared or Fisher's exact test were used as appropriate. Multivariable logistic regression was performed for CT replacement.

Results: A total of 308 patients met inclusion criteria over the 36-month study period. The study population was predominantly blunt trauma (table). The majority of events received a routine post CT removal CXR. Between the groups, there were no differences in age, female sex, blunt trauma mechanism, or chest tube size. Average time to follow up CXR was significantly shorter in the routine post-removal CXR group. Additionally, there were no differences between groups in unplanned transfer to ICU or unplanned operation. Notably, the incidence of radiographic findings was higher in the post-removal CXR group, but there were no differences in CT replacement. Routine CXR was associated with a shorter hospital length of stay. Multivariable logistic regression demonstrated that routine post-CT removal CXR was not predictive of CT replacement.

Conclusion: Despite no specific protocols at our institution, the majority of CTs removed were evaluated with routine CXR. These CXRs identified nearly twice as many radiographic findings but did not result in increased CT replacement. Most commonly, these findings were small or persistent pneumothoraces or pleural effusions in otherwise asymptomatic patients that did not require intervention suggesting that these findings were not clinically relevant. Optimizing value in the care of trauma patients requires scrutiny of common practices and dogma to eliminate waste.

	Total Study (n=308)	Post removal CXR (n=225)	No post removal CXR (n=83)	*p*
Age	47.6 (±18.4)	47.8 (±18.7)	46.8 (±17.6)	0.668
Female	79 (25.7%)	54 (24.0%)	25 (30.1%)	0.275
Blunt mechanism	248 (80.5%)	180 (80.0%)	68 (81.9%)	0.705
ISS	19.8 (±12.3)	18.8 (±12.3)	22.5 (±12.1)	0.018
Complication	81 (26.3%)	67 (29.8%)	14 (16.9%)	0.022
CT replace	20 (6.5%)	14 (6.5%)	6 (7.2%)	0.750
Hours to CXR	8.9 (±13.1)	5.4 (±3.5)	18.3 (±22.0)	<0.001
CT Size	20 (14,28)	24 (14,28)	20 (14,28)	0.335
Unplanned ICU	15 (4.9%)	9 (4.0%)	6 (7.2%)	0.243
Unplanned OR	10 (3.3%)	2 (2.4%)	8 (3.6%)	0.999
LOS (days)	7 (4,11)	6 (4,10)	8 (5,17)	<0.001
ICU LOS (days)	0 (0,3)	0 (0,3)	2 (0,5)	0.059

ISS, injury severity score; CT, chest tube; ICU, intensive care unit; OR, operating room; LOS, length of stay

NOTES

Presentation # 18
Tuesday, February 27, 2024, 8:40am - 9:00am

THE INVISIBLE HAND: HOW INSURANCE CARRIER INFLUENCES DISPOSITION IN TRAUMA PATIENTS WITH LOWER EXTREMITY FRACTURES

A DOBEN, E SWEZEY, V MEHTA, A JINNAH, M CHOWDHARY, E ONABOLU, E SZYDZIAK, L ANGUS, S CARDOZO-STOLBERG
Nassau University Medical Center
East Meadow, NY

Presenter: Elizabeth Swezey MD
WTA Sponsor: Andrew R. Doben

Introduction: Traumatic lower extremity fractures cause immobility and deconditioning. Efforts to reduce long-term morbidity are directed at rehabilitation and physical therapy. While post-discharge services are covered under most health insurance plans, many insurance companies require prior authorization, and if denied, alternate discharge services must be pursued. This study evaluates the impact insurance status has on the disposition of trauma patients with lower extremity fractures and identifies obstacles to optimal, medically indicated post-discharge services.

Methods: All trauma patients with lower extremity fractures at a single-institution level 1 Trauma Center were identified from 2016 to 2020. Data on demographics, injury characteristics, and disposition were collected. Discharge recommendations made by PT and PM&R teams were assessed. Exclusion criteria included head/neck AIS of three or more, death, penetrating mechanism, and isolated toe fractures. Patients were stratified based on insurance carrier. The primary outcome was discharge destination. A kappa coefficient was calculated to evaluate level of agreement between discharge recommendation (PM&R, PT) and discharge destination.

Results: A total of 1794 patients met inclusion criteria. Medicare patients most frequently had femur or pelvic fractures and were most often discharged to a rehab facility (93.1%). Medicaid and private insured patients most frequently had tibia-fibula fractures and were less likely to be discharged to a rehab facility (Privately insured: 41.6%, Medicaid: 20.7%). In a majority of patients, final discharge destination was consistent with recommendations from PT (67%) and PM&R (71.5%). Agreement between PT/PM&R recommendations and discharge to acute rehab was strongest in Medicare patients (PT-76.9%; PM&R-78.0%), and weakest in private insured (PT-58.3%; PM&R-53.1%) and Medicaid (PT-40.6%; PM&R-40.7%) patients. Agreement between PT/PM&R recommendations and discharge home was strongest in private insured (PT-79.6%; PM&R-78.2%) and Medicaid (PT-84.8%; PM&R-83.5%) patients, and weakest in Medicare patients (PT-28.6%; PM&R-27.2%). Multivariate analysis showed age, ISS, high comorbidity burden (>3) and female sex were independently associated with higher likelihood of discharge to a rehab facility. Medicaid or private insurance was independently predictive of a lower likelihood of discharge to a rehab facility.

Conclusion: Trauma patients with lower extremity fractures covered by Medicaid and private insurance have lower rates of discharge to a rehab facility than patients covered by Medicare, often despite discharge recommendations by physical therapy and rehabilitation physicians. This study demonstrates the influence insurance status and subsequent ability to provide financial support for discharge services has on optimal patient care and identifies a key area to reduce long-term care disparities in trauma patients with lower extremity fractures.

PT and PM&R discharge recommendations

	Acute Rehab	Subacute Rehab	Home	
Dispo agreed with PT (%)		67.0		Weighted Kappa: 0.56 95% Confidence Limits: 0.52-0.59 p <0.0001
Dispo agreed with PT (%)	69.6	82.0	76.6	
Dispo agreed with PT (%)				
Medicare	76.9	80.5	28.6	K=0.57, CL (0.51-0.62), p <0.0001
Medicaid	40.6	79.3	84.8	K=0.48, CL (0.39-0.58), p <0.0001
Private insurance	58.3	83.5	79.6	K=0.64, CL (0.60-0.68), p <0.0001
Dispo agreed with PMR (%)		71.5		Weighted Kappa: 0.58 95% Confidence Limits: 0.54-0.62 p < 0.0001
Dispo agreed with PMR (%)	67.7	80.5	74.3	
Dispo agreed with PMR (%)				
Medicare	78	84.9	27.2	K=0.57, CL (0.52-0.62), p <0.0001
Medicaid	40.7	63.0	83.5	K=0.56, CL (0.46-0.66), p <0.0001
Private insurance	53.1	77.3	78.2	K=0.67, CL (0.64-0.71), p <0.0001

NOTES

Presentation # 19
Tuesday, February 27, 2024, 4:00pm - 4:50pm

PANEL
WRITING WINNING PAPERS FROM CONCEPTION TO PUBLICATION

Panelists: Raul Coimbra MD, John Holcomb MD, Shibani Pati MD,PhD, Lucy Kornblith MD, Martin Schreiber, MD

NOTES

Presentation # 20
Tuesday, February 27, 2024, 4:50pm - 5:00pm

2022 WINTER OLYMPICS: WELL, SORT OF
R TODD, M BRENNER, S BRUNDAGE, M BURNS, C COCANOUR, L COLEMAN, A DANIEL, D DAVIS, R DICKER, C FONSECA, T GRACE, L MOORE, B KING, R KOZAR,
Grady Health System
Atlanta, GA

Presenter: S. Rob Todd MD
WTA Sponsor: S. Rob Todd

In honor of the 2022 Winter Olympics and in response to the below zero temperature outdoors, fifteen loyal Western Trauma Association (WTA) members, first time WTA attendees, spouses, and friends, hosted our own Olympic Games in conjunction with the WTA 52nd Annual Meeting in Big Sky, Montana. The mean participant age was 50.0 years and 73% were female. Participants averaged 21.8 years in medicine and attended a cumulative of 175 WTA Meetings dating back to 1992. The Olympic Games were held at a 25,000 square foot private residence (AKA: the Olympic Village) that housed the athletes. Included were an indoor heated pool (Jefferson Memorial Aquatic Center), indoor basketball court (Gold Medal Gym), billiard room (Fournier's Pavilion), and theater room for the opening and closing ceremonies (Endoscopy Center). The opening ceremony included the lighting of the Olympic torch, which remained lit for the duration of the games. Following the Opening Ceremony on February 20, 2022, participants competed in eight events, including basketball, cycling, swimming, snow shoeing, billiards, karaoke, shuffleboard (two participant team), and synchronized swimming (two participant team). The Closing Ceremony saw participants awarded gold, silver, and bronze medals for each event, with one participant being honored as the GOAT (most medal points). Overall, twelve of the fifteen participants medaled. More importantly, old friendships were strengthened, new ones were formed, and history was made in a true WTA moment.

NOTES

Presentation # 21
Tuesday, February 27, 2024, 5:00pm - 6:00pm

PRESIDENTIAL ADDRESS
BUILDING ON THE PAST: THE FUTURE OF THE WTA
Baltimore, MD

Presenter: Rosemary Kozar MD, PhD

NOTES

Presentation # 22
Wednesday, February 28, 2024, 7:00am - 7:20am

PREHOSPITAL TRANEXAMIC ACID IS ASSOCIATED WITH A SURVIVAL BENEFIT WITHOUT AN INCREASE IN COMPLICATIONS: RESULTS OF TWO HARMONIZED RANDOMIZED CLINICAL TRIALS

M MAZZEI, J DONOHUE, M SCHREIBER, S ROWELL, F GUYETTE, B COTTON, B EASTRIDGE, R NIRULA, G VERCRUYSSE, T O'KEEFFE, B JOSEPH, J BROWN, J SPERRY
University of Pittsburgh
Pittsburgh, PA

Presenter: Jack Donohue BA
WTA Sponsor: Jason L. Sperry

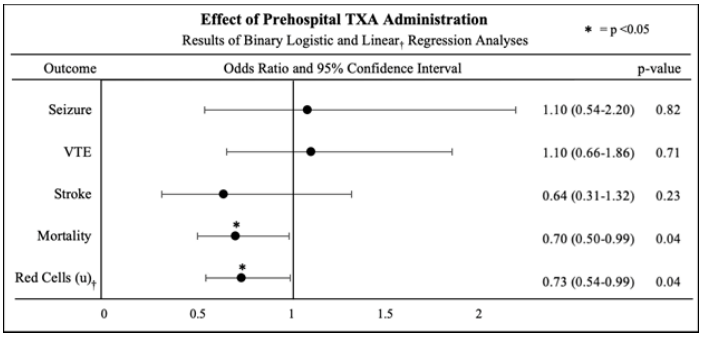
Introduction: Recent randomized clinical trials suggest that prehospital tranexamic acid (pTXA) administration following injury is safe and associated with outcome benefits. However, the effect of pTXA on survival, adverse events and transfusion requirements needs further elucidation. We hypothesized that pTXA is safe and associated with outcome benefits across a broad spectrum of injury characteristics from two large prehospital randomized clinical trials.

Methods: A secondary analysis was performed using harmonized data from two large, blinded, randomized trials which compared initiation of pTXA to placebo following traumatic injury. Outcomes, including 28-day mortality, pertinent adverse events, and 24-hour red cell transfusion requirements were compared between pTXA and placebo groups. Regression analyses were utilized to determine the independent associations of pTXA after adjusting for study enrollment, injury characteristics and shock severity across a broad spectrum of injured patients. Dose response relationships were similarly characterized based upon grams of pTXA administered.

Results: After trial harmonization, a total of 1744 patients were included in the current secondary analysis. The study cohort had an overall mortality of 11.2% and a median injury severity score of 16 (IQR 5-26). Patients who received pTXA (n=1016) as compared to those who received placebo (n=728) were similar in demographics, injury characteristics and shock severity. Patients receiving pTXA did have a higher abbreviated head injury severity score (2.10 vs. 1.78, p>0.01). Administration of pTXA was not associated with differences in adverse outcomes, including venous thromboembolism (VTE) (3.8 vs. 3.6%, p=0.80), seizures (2.3 vs. 1.8%, p=0.61), or stroke (1.9 vs. 1.8%, p=0.82), via univariate comparison. Logistic regression verified, after controlling for important confounders, no independent association of pTXA on VTE (odds ratio (OR): 1.10, p=0.71), seizure (OR: 1.08, p=0.82) or stroke (OR: 1.08, p=0.82). Linear regression demonstrated that patients who received pTXA had lower 24-hour red cell transfusion requirements (p=0.04). When accounting for the dosage of pTXA administered (0, 1 or 2 grams), a dose-response relationship between increasing pTXA dose and decreased red cell transfusion at 24 hours (p=0.03) was noted. The administration of pTXA was independently associated with a lower odds of death (OR: 0.70, 95% CI: 0.50-0.99, p=0.04). When the dosage of pTXA administered was further characterized, regression analysis

demonstrated a 24% lower odds of mortality for every gram of pTXA administered.[Figure]

Conclusion: In this secondary analysis of harmonized data from two large randomized interventional trials, pTXA administration across a broad spectrum of injured



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Presentation # 23
Wednesday, February 28, 2024, 7:20am - 7:40am

ARE TRAUMA CENTERS PENALIZED FOR IMPROVED PREHOSPITAL RESUSCITATION?: THE EFFECT OF PREHOSPITAL TRANSFUSION ON ARRIVAL VITALS AND PREDICTED MORTALITY

T CLEMENTS J VAN GENTC KAMINSKYM WANDLINGL MOOREB COTTON
UTHealth Houston
Houston, TX

Presenter: Thomas Clements MD, FRCSC
WTA Sponsor: Laura J Moore

Introduction: Prediction models in trauma rely on hospital arrival vital signs to generate survival probabilities. Hospitals are subsequently benchmarked on expected and observed outcomes. Prehospital (PH) blood transfusion is associated with improved mortality, which may affect survival prediction modeling. We hypothesize that, compared to non-blood product based resuscitation, the use of PH blood products increases the predicted survival derived from arrival vital signs probability models.

Methods: All trauma patients (>15 years of age) presenting to a level 1 trauma center and requiring emergency release blood transfusion from 01/2017 to 12/2021 were reviewed. Patients were grouped into those receiving PH blood transfusion (PHB) and those who did not (No PHB). Prehospital Trauma and Injury Severity Score (TRISS), hypotension (<90mmHg), shock index (SI) were compared with those on arrival. Univariate and multivariate analyses were performed using STATA MP.

Results: 2117 met criteria (1011 PHB, 1106 no PHB). PHB patients were younger (35 vs 40 years, p<0.001), more blunt mechanism (71 vs 65%, p=0.002), and more severely injured (ISS 27 vs 25, p<0.001), with higher rates of PH hypotension (44 vs 19%), higher SI (1.10 vs 0.87), and lower survival (68 vs. 76%); all p<0.001. PHB patients who were hypotensive in the field were more likely to convert to normotension on arrival (24 vs 7%), with greater improvements in TRISS (+0.09 vs -0.02) and SI (-0.10 vs +0.07) compared to prehospital metrics (all p<0.001). Among PHB patients, 9% converted from predicted deaths using PH TRISS metrics, to predicted survivors using ED arrival metrics, with 4% dying as unexpected deaths and 5% surviving as unexpected survivors (vs. 1 and 1%, respectively in No PHB); all p<0.001. Controlling for age, sex, mechanism, and ISS, PHB was associated with a 3.3-fold increase in unexpected survivors by PH TRISS, but only a 2-fold increase by arrival TRISS (TABLE).

Conclusion: The use of PH blood was associated with improved probability of survival and an increase in unexpected survivors. The use of hypotension, SI, and TRISS based on arrival metrics does not account for en-route hemostatic resuscitation causing patients to arrive with significantly improved vitals. Caution should be used when implementing survival probability calculations based on arrival vitals in centers with prehospital transfusion capability, and quality metrics should be adjusted accordingly.

	PHB (n=1,011)	No PHB (n=1,106)	p-value
PH TRISS (predicted survival)	0.57 (0.15, 0.94)	0.92 (0.59, 0.98)	<0.001
ED TRISS (predicted survival)	0.66 (0.21, 0.94)	0.90 (0.46, 0.97)	<0.001
ED TRISS unexpected survivors	15%	8%	<0.001
ED TRISS unexpected deaths	7%	10%	0.013
Unexpected survivors by Arrival TRISS (<50% predicted survival)			
	Odds ratio	95% C.I.	p-value
PH transfusion	1.97	1.48-2.61	<0.001
Unexpected survivors by Prehospital TRISS (<50% predicted survival)			
PH transfusion	3.28	2.23-4.60	<0.001

NOTES

Presentation # 24
Wednesday, February 28, 2024, 7:40am - 8:00am

EVERY MINUTE COUNTS: EXTENDING THE CONTINUUM OF CARE THROUGH EARLY PREHOSPITAL BLOOD ADMINISTRATION

J DUCHESNE, J BROOME, M MARINO, T DRANSFIELD, E NICHOLS, S TRAN, S CAPUTO, B MCLAFFERTY, S TAGHAVI, P MCGREW, K HARREL, L ELIZABETH, D TATUM, A SMITH, M PIEHL
Tulane University School of Medicine
New Orleans, LA

Presenter: Juan Duchesne MD, FACS, FCCP, FCCM
WTA Sponsor: Juan Duchesne

Introduction: Prehospital resuscitation with blood products is gaining popularity for patients with traumatic hemorrhage. The MEDEVAC trial data indicated a survival benefit exclusively among patients who received PRBCs or plasma within 15 minutes of air medical evacuation. In a fast-paced urban EMS system, mortality data based on the timing to first blood administration is scarce. We hypothesize a survival benefit in patients with severe hemorrhage when blood is administered within the first 15 minutes of EMS patient contact.

Methods: This was a retrospective analysis of a prospective database of prehospital blood (PHB) administration between 2021 and 2023 in an EMS system with 70,000 annual responses. PHB patients were compared to trauma registry controls from an era before prehospital blood utilization (2016-2019). Included were patients with penetrating injury and SBP<90mmHg at initial EMS evaluation that received at least one unit of blood product after injury. Excluded were isolated head trauma or prehospital cardiac arrest. Time to initiation of blood administration before and after PHB implementation and in-hospital mortality were the primary variables of interest.

Results: Included were 143 patients (PHB=61, controls=82): median age of 34 years, with no difference in demographics (A). Median scene and transport intervals were longer in the PHB cohort, with a 5-minute increase in total prehospital time. Time to administration of first unit of blood was significantly lower in the PHB vs. control group (8min vs 27min; $p < 0.01$). Overall, in-hospital mortality was lower in the PHB vs. control group (7% vs 29%; $p<0.01$). When controlling for patient age, NISS, tachycardia on EMS evaluation, and total prehospital time interval, multivariate regression revealed an independent increase in mortality by 11% with each minute delay to blood administration following injury (OR 1.11, 95%CI 1.04-1.19) (B).

Conclusion: Compared to patients who first received blood after hospital arrival, resuscitation with blood products was started 19 minutes earlier after initiation of a PHB program despite a 5-minute increase in prehospital time. A survival for early PHB use was demonstrated, with an 11% mortality increase for each minute delay to blood administration. Early interventions such as PHB may help minimize “dead zones” in trauma care by bringing effective resuscitation closer to the point of injury.

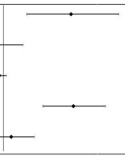
A. Univariate group comparison

Variable	Prehospital Blood (n=61)	Controls (n=82)	P-value*
EMS Characteristics			
SBP, mmHg	70 (62-87)	78 (58-86)	0.83
HR, bpm	110 (87-136)	112 (75-137)	0.80
Shock Index	1.4 (1.0-1.9)	1.4 (1.1-1.7)	0.78
NISS	18 (10-31)	22 (16-31)	0.13
Pre-hospital Time Intervals, mins			
Response	7 (5-11)	6 (4-9)	0.11
Scene	8 (6-10)	6 (4-7)	<0.01
Transport	10 (6-12)	7 (5-10)	0.01
Total	25 (20-31)	20 (14-24)	<0.01
Time to Blood Admin, mins	8 (6-9)	26 (24-30)	<0.01
In-hospital Mortality, n(%)	7 (11)	29 (35)	<0.01

*Mann-Whitney U for median, Chi Square for frequencies, Systolic Blood Pressure (SBP), Heart Rate (HR)

B. Adjusted Odds Ratio of In-Hospital Mortality

Variable	OR (95% CI)	P-value
Time to Blood Administration	1.11 (1.04-1.19)	<0.01
Total Prehospital Interval	0.97 (0.98-1.03)	0.40
EMS Heart Rate	0.99 (0.98-1.01)	0.23
NISS	1.12 (1.07-1.17)	<0.01
Age	1.01 (0.98-1.05)	0.49



Odds Ratio (OR), 95% Confidence Interval (95%CI) derived from multivariate logistic regression

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Presentation # 25
Wednesday, February 28, 2024, 8:00am - 8:20am

WHOLE BLOOD VERSUS BALANCED RESUSCITATION IN MASSIVE HEMORRHAGE: SIX OF ONE OR HALF DOZEN OF THE OTHER?

C BARTON, H OETKEN, T SUTTON, N HALL, E LEVINS, M KOLESNIKOV, M SCHREIBER
Oregon Health & Science University
Portland, OR

Presenter: Cassie Barton PharmD, FCCM
WTA Sponsor: Martin Schreiber

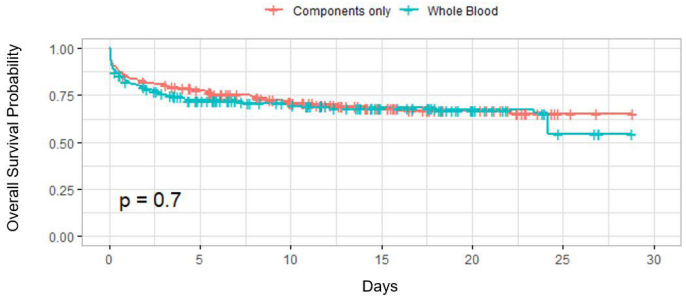
Introduction: Whole blood (WB) resuscitation is increasingly used at trauma centers for the resuscitation of hemodynamically unstable patients. Prior studies investigating outcomes in WB versus component-only (CO) resuscitation have been limited by small cohorts, low volumes of WB resuscitation, and unbalanced resuscitation in groups receiving component-based therapy. We aimed to address these limitations using data from our high-volume Level I Trauma Center, which adopted a WB-first resuscitation paradigm in 2018.

Methods: We performed a single-center, retrospective cohort study of adults presenting as a trauma activation from July 2016 through July 2021, utilizing our prospectively maintained institutional trauma registry. Receipt of 3 or more units of whole blood or packed red blood cells (RBC) within the first hour of resuscitation was required for inclusion in this analysis, consistent with the critical administration threshold (CAT). Patients receiving prior blood product resuscitation at an outside facility were excluded. Patients were grouped into WB versus CO resuscitation. Mortality was evaluated with Kaplan-Meier analysis, log-rank testing, and multivariable Cox proportional hazards modeling.

Results: There were 183 patients in the WB group and 170 patients in the CO group. Of the WB patients, 113 (62%) received only WB during the first 24 hours. The WB group received a median of 5.00 units (IQR 4.00-8.00) of WB and the CO group received a median of 6.00 units (IQR 4.00-11.75) of RBCs during the first 24 hours of resuscitation. Requirement for hemorrhage control procedures were similar between groups (WB 55% versus CO 59%, p=0.60). Groups were similar in terms of clinicopathologic characteristics including injury severity score (ISS), mechanism of injury, and age.
For the CO group, at 1, 3, and 24 hours the median RBC/fresh frozen plasma (FFP) ratio was 1.00 (IQR 1.00-1.50), 1.17 (IQR 1.00-1.65), and 1.25 (IQR 1.00-1.66), respectively; median RBC/platelet (PLT) ratio was 1.17 (IQR 0.67-1.56), 1.08 (IQR 0.83-1.39), and 0.99 (IQR 0.83-1.35), respectively, after accounting for 6 units RBCs/apheresis PLT unit.
Unadjusted survival was equivalent at 24 hours (p=0.56) and 30 days (p=0.70, Figure 1) between both groups on Kaplan-Meier analysis with log-rank testing. On multivariable Cox regression, WB resuscitation was not independently associated with improved survival after accounting for age, ISS, receipt of hemorrhage control procedure, and mechanism of injury (HR 0.85, 95% CI 0.61-1.19, p=0.34).

Conclusion: This study is unique in that only patients receiving massive transfusion by CAT criteria were included, patients in the WB group received a resuscitation dominated by WB, and CO patients received a truly balanced resuscitation. Balanced CO resuscitation is associated with similar mortality outcomes to that of WB based resuscitation.

Figure 1: Survival Probability For 30 Days



NOTES

Presentation # 26
Wednesday, February 28, 2024, 8:20am - 8:30am

ACQUIRED FACTOR V DEFICIENCY FOLLOWING BLUNT GRADE V HEPATIC INJURY: A CASE REPORT

L SHADIOW J BELCHOS
Ascension St Vincent Indianapolis
Indianapolis, IN

Presenter: Luke Shadiow DO
WTA Sponsor: Mark Falimirski

The majority of factor V deficiency cases involve the inherited form of the disease which affects only 1 in 1 million live births. Acquired factor V deficiency is a rare clotting disorder that may be associated with certain medications, autoimmune disorders or surgical exposure to bovine-based thrombin products during surgery. In the trauma population, the acquired factor V deficiency disorder may lead to hemorrhage and coagulopathy that is refractory to blood product resuscitation.

We report a case of a 19-year-old male who presented following an MVC with rollover and ejection. The patient was immediately taken for exploratory laparotomy with packing of a grade 5 liver injury and right retroperitoneal hematoma, primary repair of a portal vein injury and temporary abdominal closure with a negative pressure wound device. Following the initial procedure he underwent middle hepatic artery embolization and subsequently underwent additional exploration with liver packing with thrombin-based hemostatic products. Additionally, the patient required a course of VV ECMO for severe ARDS with successful decannulation. On hospital day 18, the patient acutely decompensated due to hemorrhagic shock with profound coagulopathy refractory to massive transfusion protocol and PCC administration. The patient's coagulation profile was not consistent with acute liver failure or disseminated intravascular coagulation. A full coagulation workup was performed given the patient's poor response to blood product resuscitation which showed his factor V level to be under 1%. Additionally, anti-factor V antibody levels were significantly elevated with a Bethesda Unit titer level of 19 consistent with acquired factor V deficiency. The patient was started on pulse dose dexamethasone 40 mg for four days with scheduled transfusion of 2 units of platelets twice daily as platelets contain factor V that is more resistant to antibody inhibition. The patient also received 700 mg of tranexamic acid (10 mg/kg) every 8 hours for a three-day course. Following pulse dose dexamethasone, the patient was transitioned to methylprednisolone starting at 62.5 mg daily which was tapered during the hospital course. The scheduled platelet transfusions were also tapered and ultimately discontinued. The patient's Bethesda Unit titers and factor V levels were serially monitored and returned to normal range. The patient was discharged to a rehab facility on hospital day 55 where he continued his steroid taper with prednisone 20 mg daily.

NOTES

Presentation # 27
Wednesday, February 28, 2024, 8:30am - 9:00am

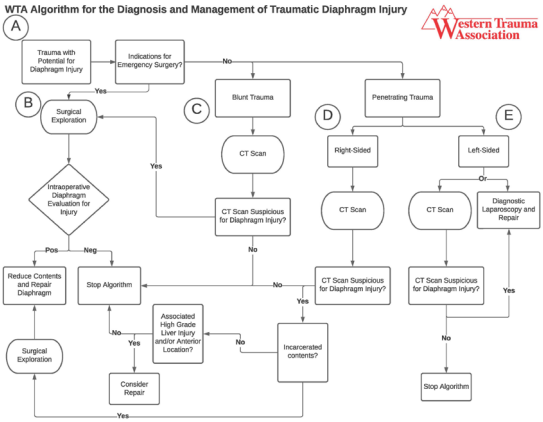
FOUNDERS' BASIC SCIENCE LECTURE
THE REGENERATIVE PROPERTIES OF BLOOD IN TRAUMATIC INJURY
UCSF

NOTES

Presentation # 28
Wednesday, February 28, 2024, 4:00pm - 4:20pm

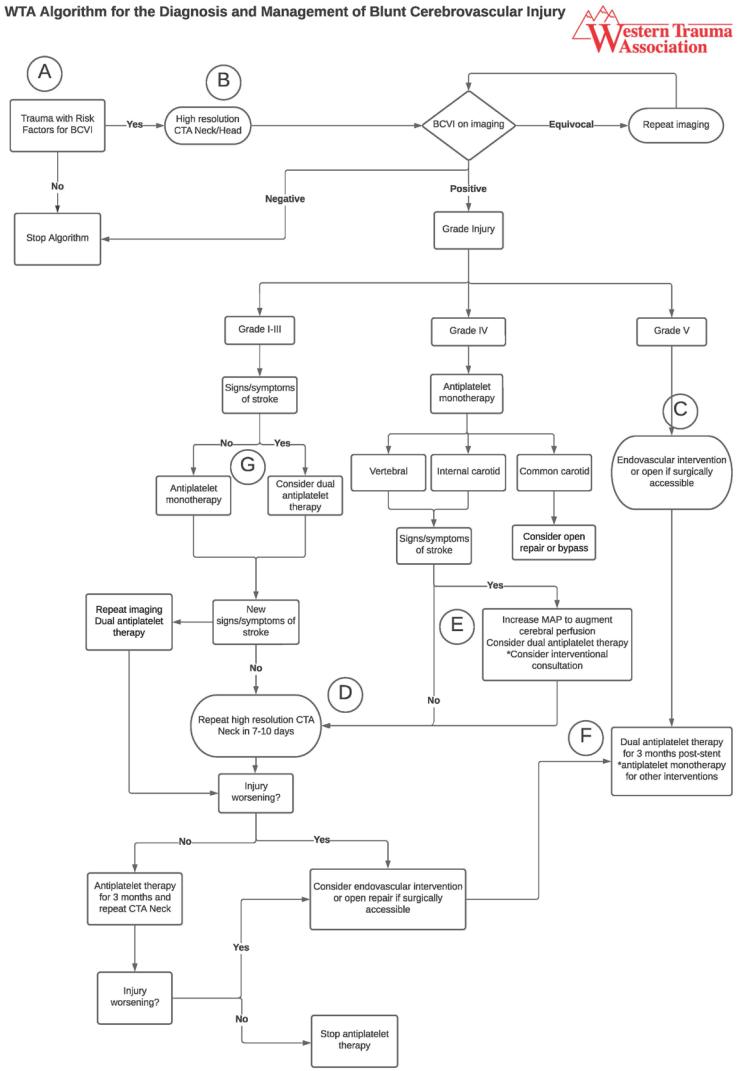
ALGORITHM 1: RESUSCITATIVE THORACOTOMY – UPDATE
Presenter: Ron Tesoriero MD

NOTES


WTA Algorithm for the Diagnosis and Management of Traumatic Diaphragm Injury
Western Trauma Association
A
Trauma with Potential for Diaphragm Injury
Indications for Emergency Surgery?
No
Yes
B
Surgical Exploration
C
Blunt Trauma
Penetrating Trauma
D
E
CT Scan
Right-Sided
Left-Sided
Or
Intraoperative Diaphragm Evaluation for Injury
Yes
CT Scan Suspicious for Diaphragm Injury?
CT Scan
CT Scan
Diagnostic Laparoscopy and Repair
Pos
Neg
No
Reduce Contents and Repair Diaphragm
Stop Algorithm
No
CT Scan Suspicious for Diaphragm Injury?
CT Scan Suspicious for Diaphragm Injury?
Yes
Yes
Associated High Grade Liver Injury and/or Anterior Location?
No
Yes
No
Incarcerated contents?
No
Surgical Exploration
Consider Repair
Stop Algorithm
Yes

Presentation # 29
Wednesday, February 28, 2024, 4:20pm - 4:40pm

ALGORITHM 2: DIAPHRAGM INJURY
Presenter: Morgan Schellenberg MD



NOTES

Presentation # 30
Wednesday, February 28, 2024, 4:40pm - 5:00pm

THORACIC IRRIGATION FOR PREVENTION OF SECONDARY INTERVENTION AFTER THORACOSTOMY TUBE DRAINAGE FOR HEMOTHORAX: A WESTERN TRAUMA ASSOCIATION MULTICENTER STUDY

T CARVER, A BERNDTSON, A MCNICKLE, K BOYLE, J HAAN, E CAMPION, W BIFFL, M SISE, J BURRIS, K BERNDT, T KOPELMAN, J BLANK, R MORRIS, J PESCHMAN, A SZABO, R CONRARDY, M DEMOYA
WTA Multicenter Trial
Milwaukee, WI

Presenter: Thomas Carver MD
WTA Sponsor: Marc deMoya

Introduction: Retained hemothorax requiring reintervention occurs in up to 20% of patients who undergo thoracostomy tube (TT) placement for a hemothorax. Thoracic irrigation at the time of TT placement has been shown in single center studies to decrease the need for secondary intervention in this patient group but carries the limitations associated with any single center practice. To further evaluate the effectiveness of thoracic irrigation, a multi-center study was conducted.

Methods: A multi-center, prospective, observational study was conducted between January 2018 and July 2023 through the Western Trauma Association Multicenter Trials Group. A total of 11 sites participated. Patients were included if they had a TT placed for a hemothorax and were excluded if they were <18 years old, had an initial chest tube placed solely for a pneumothorax, underwent a thoracotomy or VATS within 6 hours of TT placement, had TT placed >24 hours after injury, had removal of TT <24 hours, or died during their hospitalization. Performing thoracic irrigation and TT management were at the discretion of the participating institution. Each hemithorax was considered separately in patients with bilateral hemothoraces. The primary outcome variable was need for secondary intervention to address hemothorax related complications (retained hemothorax, recurrent effusion, or empyema), with secondary intervention defined as: placement of an additional TT, instillation of tPA, VATS, or thoracotomy. Patients undergoing additional interventions for isolated pneumothoraces were not counted as having a secondary intervention. Irrigated patients were compared to non-irrigated patients using a propensity score analysis with age, sex, mechanism of injury, abbreviated injury scale (AIS) chest and TT size as predictors.

Results: A total of 424 patients with 453 hemothoraces met criteria and were included in the analysis, of which 113 (24.9%) had undergone thoracic irrigation at the time of TT placement. There were no significant demographic differences between the irrigated and non-irrigated cohorts and no difference in empyema rates were found (Table 1). Forty-nine secondary interventions were performed, 8 (7%) and 41 (12%) in the irrigated and non-irrigated groups, respectively ($p = 0.03$). Propensity weighted analysis demonstrated a significant reduction in secondary intervention in the irrigated cohort (Odds Ratio 0.41; $p = 0.005$). Hospital LOS was significantly higher in those requiring a secondary intervention, 15 vs 8 days ($p = 0.02$).

Conclusion: The results of this multicenter, prospective observational study demonstrate that thoracic irrigation performed at the time of TT placement for drainage of a hemothorax results in a significant reduction in the utilization of a secondary intervention for complications related to a hemothorax. These findings confirm the beneficial role of thoracic irrigation in the care of patients with traumatic hemothoraces.

Table 1. Demographics and Outcomes

Characteristic	Irrigated N = 113	Non-Irrigated N = 340	Total N = 453	p-value
Age, Median (Q1, Q3)	40 (30, 59)	38 (29, 58)	30 (20, 59)	0.2
Gender, Male, N (%)	91 (81)	288 (85)	379 (84)	0.4
Penetrating Mechanism, N (%)	53 (47)	144 (42)	197 (43)	0.7
TT size < 24fr, N (%)	9 (18)	51 (15)	60 (13)	0.3
Empyema, N (%)	4 (3.5)	7 (2.1)	11 (2.4)	0.4
Secondary Intervention, N (%)	8 (7.1)	41 (12)	49 (11)	0.03
- VATS/Thoracotomy	6	19	25	1.0
- 2nd TT alone	1	20	21	0.04
- TPA alone	1	2	3	1.0

NOTES

Presentation # 31
Wednesday, February 28, 2024, 5:00pm - 6:00pm

WTA BUSINESS MEETING
MEMBERS ONLY

NOTES

Presentation # 32
Thursday, February 29, 2024, 7:00am - 7:20am

ADDITION OF PLASMA TO PROLONGED DAMAGE-CONTROL RESUSCITATION DECREASES RESUSCITATION FLUID REQUIREMENTS AND IS NEUROPROTECTIVE IN A SWINE MODEL OF HEMORRHAGIC SHOCK AND TRAUMATIC BRAIN INJURY

G JIN, JW HO, ZS DAWOOD, K CHTRAKLIN, D DIAZ, C UKACHUKWU, M LIGGETT, AND HB ALAM*
Northwestern University
Chicago, IL

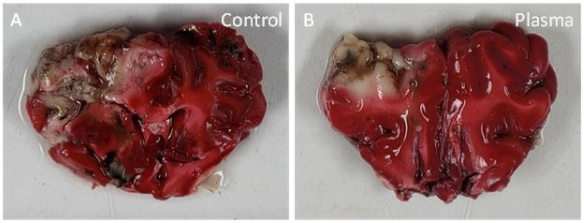
Presenter: Hasan Alam MD
WTA Sponsor: Hasan B. Alam

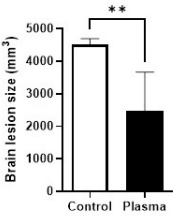
INTRODUCTION: Hemorrhage and traumatic brain injury (TBI) are the leading causes of death in trauma. Future military conflicts are likely to be in austere environments, where prolonged damage-control resuscitation (p-DCR) may be required for 72 hours before evacuation. This is specially challenging in the setting of polytrauma, where p-DCR goals of managing uncontrolled hemorrhage (limited resuscitation and permissive hypotension) must be balanced against TBI (liberal resuscitation to optimize cerebral perfusion). Previous studies have shown that fresh frozen plasma (FFP) is an effective resuscitation fluid with neuroprotective properties, which can be lyophilized for prolonged storage and battlefield use. We hypothesized that the addition of fresh frozen plasma (FFP) to a p-DCR protocol will decrease the total volume of resuscitation required for 72 hours, while also improving the neurological outcomes in a large animal model of combined hemorrhagic shock and TBI.

METHODS: Yorkshire female swine (40-45 kg; n=10) were subjected to TBI (controlled cortical impact) and 40% blood volume loss. After 2 hours of shock, they were randomized to either: 1) standard p-DCR, or 2) p-DCR + FFP (250 ml). The p-DCR protocol was based upon tactical combat casualty care (TCCC) guidelines and used isotonic crystalloid boluses to target a systolic blood pressure (SBP) within 90% of baseline. After 72 hours of p-DCR, packed red blood cells were transfused (simulating evacuation to higher echelons of care) to fully resuscitate the animals, and organs were harvested for evaluation. Brain lesion size, resuscitation fluid requirements, physiologic parameters, and neurological severity score [NSS; Range 0 (normal)- 32 (comatose)] were used to compare the groups.

RESULTS: All the animals survived the 72 hours of p-DCR. The degree of metabolic acidosis before the start of resuscitation period was the same in both groups (post shock lactate levels of 2.5 mmol/L vs 2.1 mmol/L, p=0.44 in the p-DCR+FFP and p-DCR groups, respectively) but the FFP treated animals needed significantly less volume (4540.0 ± 151.7 ml vs 974.0 ± 167.0 ml, $p < 0.01$) of normal saline to reach and maintain the target systolic blood pressure. FFP treated group also had significantly smaller brain lesion size (4517.0 ± 180.0 mm3 vs 2477.0 ± 1191.0 mm3, $p < 0.01$), and better neurological outcomes (post injury day 1 NSS of 24.30 ± 2.4 vs 16.5± 2.9, p= 0.0032; post injury day 3 NSS of 13.20 ± 2.4 vs 3.8 ± 1.6, p = 0.0002).

CONCLUSION: Addition of plasma to p-DCR protocol, in a large animal model of combined hemorrhagic shock and TBI, is associated with a significant decrease in resuscitation fluid requirements, a smaller brain lesion size, less neurological impairment and a faster recovery.





NOTES

Presentation # 33
Thursday, February 29, 2024, 7:20am - 7:40am

DOES PREPERITONEAL PELVIC PACKING INCREASE VENOUS THROMBOEMBOLISM RISK AMONG TRAUMA PATIENTS? A PROSPECTIVE NATIONAL ANALYSIS OF 17 U.S. LEVEL I TRAUMA CENTERS

LM KNOWLTON, A SAUAIA, EE MOORE, MM KNUDSON
Stanford University Medical Center
Stanford, CA

Presenter: Lisa Marie Knowlton MD, MPH, FACS, FRCSC
WTA Sponsor: Margaret (Peggy) M. Knudson

Background: Pelvic fractures are associated with a high risk of venous thromboembolism (VTE). In addition to the trauma-related VTE risk factors (prolonged immobilization, blood loss and coagulopathy), there is local hematoma formation and/or packing to tamponade bleeding. Among pelvic fracture treatment options, including pelvic angioembolization (PA), preperitoneal pelvic packing (PPP) and pelvic open reduction internal fixation (ORIF), PPP has been postulated as a risk factor for VTE. We aimed to characterize the risk of VTE among pelvic fracture patients receiving PPP, PA or ORIF.
Methods: We used prospectively collected observational data from 17 level I trauma centers, one of the largest U.S. collaboratives studying posttraumatic VTE. VTE was defined as either inferior extremity deep vein thrombosis (DVT), pulmonary embolism (PE), or pulmonary thrombosis (PT, a phenomenon of de novo lung clot with DVT). Inclusion criteria were ICU admission, age 18-40 years with at least 1 of the independent VTE risk factors. We selected patients with pelvic fractures and compared the outcomes of PPP, pelvic angioembolization, and pelvic ORIF (not including acetabular ORIF) to a reference group of no pelvic surgical/radiologic intervention. Our primary outcome was VTE during hospitalization. Confounders were chosen based on clinical importance or significant univariate association with VTE. A competing risk survival analysis was performed censoring for death with robust standard errors to account for facility clustering. Numerical data are presented as median.
Results: A total of 1,387 trauma patients with pelvic fractures were analyzed, where the incidence of VTE was 5.6% (2.7% PE, 2.7% DVT and 1.9% PT, with some patients having more than one VTE event). Compared to no VTE, VTE patients were more likely to be older, have lower admission systolic blood pressure and higher injury severity score as well more likely to require blood products (all $p<0.05$). ORIF patients were more likely to develop VTE (17.3%), compared to 2.1% with PPP and 1.0% who underwent PA in unadjusted, univariate analysis. However, after adjusting for confounders through multivariate, risk-competing analysis, none of the three treatment interventions (vs non-operative, non-angiographic intervention) for pelvic fractures were significantly associated with VTE (Figure 1). Cryoprecipitate transfusion was related to VTE, but very few patients (n=7) required it, limiting the generalizability of this association. Of note, initiation of VTE prophylaxis in the first 24 hours of admission independently halved VTE incidence (hazard ratio HR: 0.55, confidence interval CI: 0.33-0.91).

Conclusion: Pelvic packing, ORIF or embolization do not appear to be independent risk factors for VTE in our prospective study. Initiation of VTE pharmacoprophylaxis within the first 24 hours of admission remains critical to significantly decreasing VTE formation in this high-risk trauma population.

Figure 1. Multivariate, Competing-Risk Adjusted Analysis of Factors Associated with Venous Thromboembolism

Analysis of Maximum Likelihood Estimates with Sandwich Variance Estimate				
Parameter	Parameter Estimate	Standard Error	P-value	Hazard Ratio
Preperitoneal Pelvic Packing (PPP)	0.41	0.48	0.39	1.5
Pelvic ORIF	0.24	0.26	0.35	1.27
Pelvic Embolization	-0.75	1.34	0.58	0.47
Spinal cord injury	0.79	0.38	0.03	2.22
Major venous injury	0.69	0.28	0.01	1.99
Central line	1.09	0.36	0.002	3.00
Transfusion Cryoprecipitate in First 24 hours	0.03	0.01	0.02	1.03
VTE Prophylaxis Given in First 24 hours	-0.59	0.26	0.02	0.55

NOTES

Presentation # 34
Thursday, February 29, 2024, 7:40am - 8:00am

THE FALLACY OF A ROADMAP CT AFTER AN ABDOMINAL GUNSHOT WOUND: A ROAD THAT LEADS NOWHERE

M VASQUEZ, N DHILLON, D FELICIANO, T SCALEA
R Adams Cowley Shock Trauma Center
Baltimore, MD

Presenter: Matthew Vasquez MD
WTA Sponsor: Thomas Scalea

Introduction: The 2019 guidelines from the Western Trauma Association recommend an abdominopelvic CT (CTAP) in patients with a question of abdominal penetration after a gunshot wound (GSW). It is now common practice to obtain a CTAP to provide a roadmap to guide an operation or to potentially alter management, such as the use of catheter therapy even in patients who otherwise have a classic indication for laparotomy. The hypothesis for this study was that a CT for preoperative planning has no value in patients with an abdominal GSW.

Methods: This was a retrospective study from 2017-2022 of stable patients who had a preoperative CTAP after sustaining an abdominal GSW. CTAP's were performed based on attending surgeon preference. Data collected included demographics, admission vitals, exam findings, CT and operative findings, and in-hospital mortality. Admission hypotension (systolic blood pressure < 90 mmHg), abdominal pain and/or peritonitis, evisceration, and a transabdominal GSW were considered indications for laparotomy. CT and operative findings were compared to determine the concordance and if CT altered operative management.

Results: There were 149 patients (mean age 30 years and 92% male) with a mean ISS of 22.0 and overall mortality of 1.3%. Clear indication for laparotomy was present in 72.5% of patients and included 57.7% with abdominal pain, 17.4% with hypotension, 7.4% with peritonitis, and 18.8% with a clear transabdominal trajectory. No patients presented with evisceration. The most common CT findings were an enteric injury (68.5%) followed by liver (33.6%), and kidney (22.1%) injury. Operative interventions frequently included repair of the colon (45.6%), small bowel (36.2%), mesentery, (16.1%), and left diaphragm (16.1%). CT findings were concordant with operative findings in 63.8% of patients while CTAP missed injuries found at operation in 35.6% of patients, including 18.8% of all patients who had a small bowel injury not seen on CT. Based on CT, a diagnostic angiogram was performed in three (2.0%) patients. None required intervention. Three (2.0%) patients had a trial of nonoperative management after CT. All underwent laparotomy after a clinical change; one had a small bowel injury, one required a partial right hepatectomy, and one had no significant findings. Six (4.0%) patients had a non-therapeutic operation; all patients had findings suspicious for either a hollow viscous injury or a vascular injury on CT.

Conclusions: While a CT scan may help to define an intra-abdominal trajectory when the trajectory is unclear, it does not alter management in those with indications for operation. Additionally, CT missed injuries in a third of patients, contributed to all six nontherapeutic laparotomies, and was associated with increased cost. This study demonstrates that a preoperative CT has minimal value in patients who have indications for an operation.

NOTES

Presentation # 35
Thursday, February 29, 2024, 8:00am - 8:20am

NO BENEFIT FROM THE ADDITION OF LOW-DOSE KETAMINE INFUSION TO STANDARD EVIDENCE-BASED CARE OF MULTIPLE RIB FRACTURES

C MACHEEL, J FARHAT, J GIPSON, MA WEST
North Memorial
Robinsdale, MN

Presenter: Chad Macheel CNP
WTA Sponsor: Michaela A West

INTRODUCTION: Multiple rib fractures from blunt thoracic trauma cause significant morbidity. Optimal current management includes multi-modal analgesia, pulmonary hygiene, and early mobilization. Low-dose ketamine infusion (LDKI) has been proposed as an adjunctive analgesic in this setting. A prior study reported decreased pain scores with LDKI in severely injured patients with multiple rib fractures. We hypothesized that LDKI would decrease morphine milligram equivalents (MME) in patients with multiple rib fractures.

METHODS: A prospective randomized placebo-controlled trial was performed in adult (≥ 18y/o) patients with ≥3 rib fractures. Power analysis calculated a 90% chance of identifying a 10% decrease in MME with 50 subjects. The study was approved by the IRB and informed consent obtained in all subjects. Demographic (age, gender) and injury specific information (ISS, # rib fractures) was obtained. Subjects were randomized 1:1 to receive continuous LDKI (0.1 mcg/kg/hr) or placebo infusion (0.9% NaCl) for ≤48 hours. All patients received standard evidence-based multi-disciplinary protocol for rib fractures management. Primary outcome measure was MME use or pulmonary complications. Statistical comparison of LDKI vs placebo was performed using Student's t-test or Fisher's exact test.

RESULTS: All 50 enrolled subjects (25 placebo, 25 LDKI) received study drug infusion. The table shows that the two groups were well matched for age, ISS, and # rib fractures. We observed no differences in the Day 1 (p=0.785), Day 2 (p=0.5035), or total MME (p=0.903) between groups. Use of LDKI did not alter subsequent need for opiate analgesics post-infusion or pulmonary complications (data not shown).

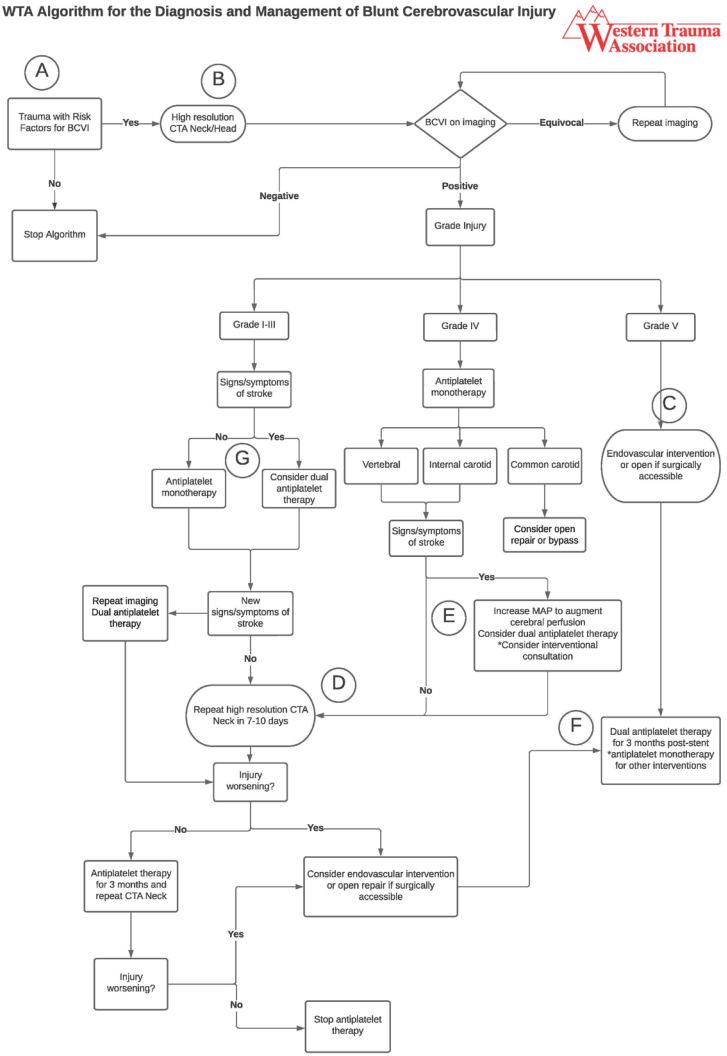
CONCLUSION: The addition of low dose ketamine infusion to an established multi-modal, evidence-based protocol for management of multiple rib fractures did not decrease opiate usage or impact pulmonary complications.

Table 1: Comparison of LDKI* vs Placebo in Patients with ≥ 3 Rib Fractures			
Parameter	Placebo	Low-Dose Ketamine	p-value
N	25	25	1.000
Age (years)	64.8 ± 2.2	60.6 ± 3.0	0.265
Males (%)/Females (%)	20 (80%)/5 (20%)	17 (68%)/8 (32%)	0.5202
Duration gtt (hours)	38.8 ± 2.4	40.6 ± 0.5	0.466
ISS*	11.4 ± 0.6	15.1 ± 3.1	0.247
# Rib Fx*	5.7 ± 0.4	6.7 ± 0.7	0.221
MME			
Infusion Day 1	36.4 ± 5.1	38.6 ± 6.2	0.785
Infusion Day 2	29.5 ± 6.0	24.3 ± 4.9	0.503
Total	64.7 ± 6.6	62.0 ± 13.1	0.903
D1 Post Infusion	34.3 ± 5.8	34.3 ± 6.0	1.000
D2 Post Infusion	25.4 ± 5.8	25.9 ± 7.5	0.958
* ISS: injury severity score, Fx: fractures, LDKI: low-dose ketamine infusion			

NOTES

Presentation # 36
Thursday, February 29, 2024, 8:20am - 8:40am

ALGORITHM 3: BCVI – UPDATE
Presenter: Greg Magee MD



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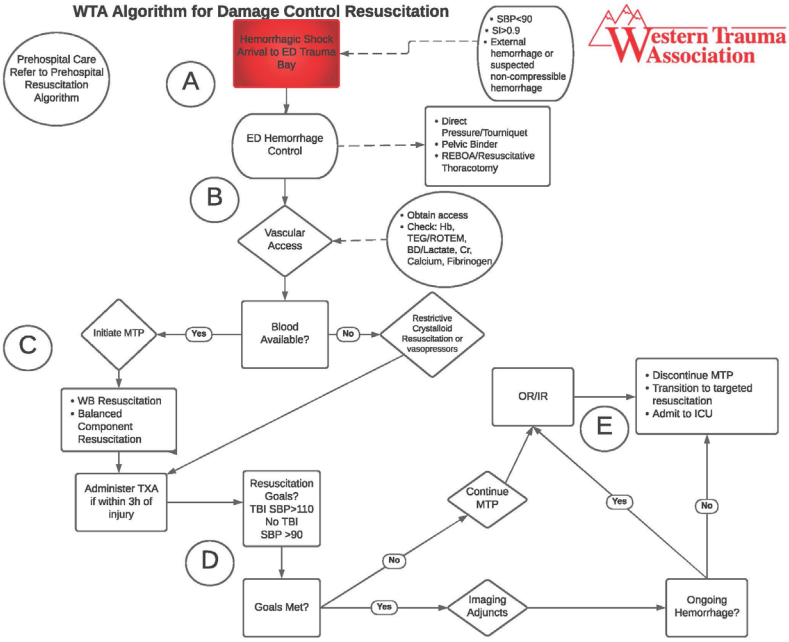
Presentation # 37
Thursday, February 29, 2024, 8:40am - 9:00am

ALGORITHM 4: DAMAGE CONTROL RESUSCITATION
Presenter: Chasen Croft MD



NOTES

Presentation # 38
Thursday, February 29, 2024, 4:00pm - 4:20pm

A MACHINE LEARNING BASED COAGULATION RISK INDEX PREDICTS ACUTE TRAUMATIC COAGULOPATHY IN BLEEDING TRAUMA PATIENTS

J RICHARDS, S YANG, T SCALEA, R KOZAR, P HU
R Adams Cowley Shock Trauma Center
Baltimore, MD

Presenter: Justin Richards MD
WTA Sponsor: Justin Richards

Introduction: Acute traumatic coagulopathy (ATC) is a well-described phenomenon that is known to begin shortly after injury. This has profound implications for resuscitation from hemorrhagic shock as ATC is associated with increased risk for massive transfusion (MT) and mortality. We describe a large-data machine learning based Coagulation Risk Index (CRI) to test the early prediction of ATC in bleeding trauma patients.

Methods: The CRI was developed utilizing continuous vital signs available during the first 15 minutes after admission at a single academic trauma center over 4 years. Included patients were age 18-89 years and transferred from the scene of injury. Patients that sustained a prehospital cardiac arrest, had a documented history of prehospital anticoagulant or antiplatelet use, or known bleeding disorder were excluded. The data to compute the CRI was derived from continuous features of photoplethymographic and electrocardiographic waveforms, oximetry values, and blood pressure trends. Two separate groups of patients considered at-risk for ATC were evaluated: patients that received a critical administration threshold (CAT+) consisting of ≥3u red blood cells (RBC) in the first hour of admission, and patients that received a massive transfusion (MT) defined as ≥10u RBC/24hrs. ATC was evaluated in separate models and defined as an INR >1.2 and >1.5 upon trauma center arrival. The CRI was developed using 2 years of cases for training and the other two years for testing. The accuracy of the models to predict the respective coagulopathy is described by area under the receiver operator curve (AUROC) with 95% confidence intervals (CI).

Results: A total of 17,567 patients were available for analysis with continuous vital sign data. 52.8% blunt trauma, 30.2% female, and mean age 44.6 (SD 18.9). The ability of CRI to predict ATC in CAT+ patients was excellent (Table 1). The true positive (TPR) and true negative (TNR) rates were 95.6% and 88.3%, and 94.9% and 89.2% for INR >1.2 and INR >1.5, respectively. The CRI also demonstrated excellent accuracy in predicting ATC in patients receiving MT (Table 1). The TPR and TNR were 92.8% and 91.3%, and 100% and 88.1% for INR >1.2 and INR >1.5, respectively, in patients with MT.

Conclusion: Utilizing continuous vital signs and large-data machine learning capabilities, the CRI accurately predicts early ATC in bleeding trauma patients. The clinical application may guide early hemostatic resuscitation. Extension of this technology in the prehospital setting could provide earlier recognition of post-traumatic coagulopathy.

Table 1: Accuracy of Coagulation Risk Index to Predict Acute Traumatic Coagulopathy			
	AUROC	95% CI	Odds
INR >1.2 in CAT+ Patients (training model)	0.983	0.978 - 0.988	454.84
INR >1.2 in CAT+ Patients (testing model)	0.973	0.964 - 0.982	163.47
INR >1.5 in Patients CAT+ (training model)	0.988	0.983 - 0.992	583.11
INR >1.5 in Patients CAT+ (testing model)	0.972	0.958 - 0.986	153.12
INR >1.2 in MT (training model)	0.982	0.974 - 0.991	345.31
INR >1.2 in MT (testing model)	0.967	0.954 - 0.980	135.00
INR >1.5 in MT (training model)	0.964	0.939 - 0.989	200.45
INR >1.5 in MT (testing model)	0.965	0.952 - 0.977	∞
AUROC: area under receiver operator curve, CI: confidence interval, INR: international normalized ratio, CAT: critical administration threshold, MT: massive transfusion			

NOTES

Presentation # 39
Thursday, February 29, 2024, 4:20pm - 4:40pm

PRESCRIBING A NEW PATHWAY: 4MS GUIDED MEDICATION MANAGEMENT IN GERIATRIC TRAUMA PATIENTS

T ANAND, M LUNDY, H HOSSEINPOUR, H EVERSMAN, N JONES, L MAGNOTTI, B JOSEPH
University of Arizona
Tucson, AZ

Presenter: Tanya Anand MD MPH MT(ASCP) FACS
WTA Sponsor: Bellal Joseph

Introduction: The Institute for Healthcare Improvement (IHI) 4Ms framework integrates principles of what Matters most, Medication, Mentation, and Mobility in caring for older adults. The role of 4Ms impact on medication management and the outcomes of these patients is unknown. The aim of this study was to assess the impact of integrating the 4M's framework on medication modifications and outcomes of geriatric trauma patients.

Methods: This is a prospective pre-post cohort study at an ACS Level I trauma center over 4 years (2019-2022). Frail geriatric trauma patients aged 65 to 79 years, and those aged 80 and above, regardless of frailty status, were included. Frailty was measured within 24 hours of admission using the Trauma-Specific Frailty Index (TSFI). Patients with a TSFI>0.25 were considered frail. Patients were stratified into PRE (before) and POST (after) implementation of 4Ms and were compared and analyzed. Our primary outcomes were the rates and types of medication modifications. The secondary outcomes measured included index admission mortality and morbidity, and 30-day post-discharge readmissions, and fall recurrence. Morbidity was defined as urinary tract infections, pneumonia, venous thromboembolism, acute kidney injury, myocardial infarction, and sepsis. Multivariable regression analyses were performed to identify the independent effect of 4M's framework on the outcomes, adjusting for potential confounding factors.

Results: A total of 128 geriatric trauma patients were enrolled (66 pre-4M, 62 post-4M). The mean (SD) age was 84 (8) years and 55% were female. Median [IQR] ISS was 9 [5-12] and the most common mechanism of injury was fall (74%). Pre-4M and post-4M groups were comparable in terms of patient demographics, admission vitals, injury parameters, operative interventions, and frailty status (p>0.05). Among the post-4M group (n=62), 87% had their medications assessed, of which 30% had pre-existing polypharmacy and 71% had their medications modified. NSAIDs (44%), followed by narcotics (43%) and muscle relaxants (11%) were the most commonly modified medications during the hospital course. Narcotics (20%), gabapentinoids (17%), sleep medications (13%) were the most commonly modified medications at discharge. Of note, narcotics were the most common medication to be decreased (41%) or discontinued (17.9%) and NSAIDs were the most common medication that were initiated (7.7%) or increased (7.7%). Overall, on univariate analysis, the post-4M group had lower rates of index admission morbidity, 30-day readmission, and fall recurrence, and higher rates of discharge to home (Table). After controlling

Conclusion: More than two-thirds of geriatric trauma patients had their medications modified following the integration of 4M's framework, with a significant decrease in narcotic medications. These modifications were associated with a significant decrease in post-discharge fall recurrence and readmissions. Our findings highlight the importance of incorporating frailty-specific care pathways in the management of geriatric trauma patients.

Table –Patient Outcomes Before (PRE) and After (POST) Implementation of 4M's

Outcome Measures	PRE (n=66)	POST (n=62)	p-value
Morbidity, n (%)	14 (21.2)	5 (8.1)	**0.037**
Mortality, n (%)	4 (6.1%)	1 (1.6%)	0.194
Discharge to Home, n (%)	25 (37.9)	35 (56.5)	**0.035**
Fall Recurrence, n (%)	15 (22.7)	4 (6.5)	**0.010**
Readmission, n (%)	20 (30.3)	9 (14.5)	**0.033**

NOTES

Presentation # 40
Thursday, February 29, 2024, 4:40pm - 5:20pm

PANEL: DEFINING THE IMPACT OF DISPARITIES IN TRAUMA
Moderators: Kimberly Davis, MD, and Michaela West, MD
Panelists: Susan Cronn DNP, RN, Patrick Murphy MD, Leah Tatebe MD

NOTES

Presentation # 41
Thursday, February 29, 2024, 5:20pm - 6:00pm

PAINT THE CEILING LECTURE: SCALPELS, SHAWARMA, AND SECOND CHANCES: AN ASPIRING TRAUMA SURGEON'S ODYSSEY
Presenter: Ahmad Zeineddin MD

NOTES

Presentation # 42
Friday, March 1, 2024, 7:00am - 7:20am

ALIVE AND KICKING: TRAUMA-INDUCED COAGULOPATHY PREVALENCE AND ASSOCIATION WITH MORTALITY PERSIST TWENTY YEARS LATER.

W TEETER, M NEAL, J BROWN, J MACLEOD, R VESSELINOV, R KOZAR
R Adams Cowley Shock Trauma Center
Baltimore, MD

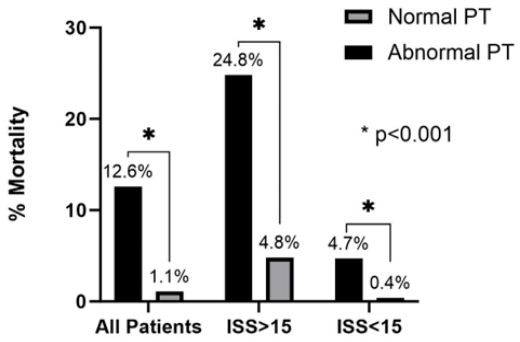
Presenter: William Teeter MD
WTA Sponsor: Rosemary Kozar

Introduction: A landmark study in 2003 identified the prevalence of early trauma-induced coagulopathy (TIC) at 28% with a strong association with all- cause mortality of 8.9%. Over the last twenty years there have been significant advances in the fundamental understanding of TIC and therapeutic interventions, both in the prehospital and in-hospital settings. Thus, we hypothesized modern TIC prevalence would be decreased but remain a predictor of poor outcome when present.

Methods: We performed a retrospective cohort study from 2018-2022 using prospectively collected institutional trauma registry data from two level 1 trauma centers with modern resuscitation practices. All patients ≥18 years of age with admission coagulation data were included. Demographics, laboratory data and clinical outcomes were obtained. To permit historical comparison, we utilized the same definition of coagulopathy as the 2003 study: prothrombin time (PT) or partial thromboplastin time (PTT) above normal range per each center's laboratory assays at first measurement. The independent samples t-test was used to compare means between groups for continuous variables. Chi-square test was utilized to assess the association between categorical variables. The significance level was set at $\alpha = 0.05$. Statistical analysis was performed using SAS 9.4, JMP 17, and SPSS 27 and Figure was created using GraphPad Prism (10.0).

Results: The cohort of 31,782 patients was 66% male, 85% blunt injury, mean age 50±21 years, median ISS 9 [4,14]), median GCS 15 [14, 15], median LOS 2 [0.7, 6] days, and unadjusted all-cause mortality of 3.8%. The prevalence of TIC remained high at 23.5% in patients with an abnormal PT (median 13.8 [IQR13.2, 14.7]s) and 7.1% with an abnormal PTT (27 [25, 30]s), for an overall combined prevalence of coagulopathy of 24.9%. Mortality data is shown in the Figure. As in 2003, coagulopathic patients had a higher mortality in both high and low ISS patients.

Conclusion: Though the all-cause mortality has decreased over time with modern resuscitation practices, twenty years later, the prevalence of early TIC has not markedly changed. Biomarkers associated with TIC remain strongly predictive of a poor clinical outcome regardless of anatomic injury severity and seemingly unchanged by twenty years of evolution of prehospital care.


Normal PT
Abnormal PT
% Mortality
30
20
10
0
*
*
*
* p<0.001
12.6%
1.1%
24.8%
4.8%
4.7%
0.4%
All Patients
ISS>15
ISS<15

NOTES

Presentation # 43
Friday, March 1, 2024, 7:20am - 7:40am

USE OF HIGH-INTENSITY FOCUSED ULTRASOUND FOR COAGULATION OF LIVER PARENCHYMA

A TAM, F FALL, K CONTRERAS, A MAXWELL, J LIU, F FORSBERG, J EISENBREY, G KOENIG
Thomas Jefferson University
Philadelphia, PA

Presenter: Alexander Tam BS
WTA Sponsor: Stan Kurek

Objective: Hepatic trauma is often managed with non-operative therapy, with severe injuries requiring angioembolization and/or operative management for hemorrhage control. Delay in intervention has been shown to increase mortality. We seek to develop a transdermal non-invasive modality to identify hemorrhage and treat liver lacerations at the bedside. This study aims to validate the use of high-intensity focused ultrasound for coagulation of liver tissue using in vitro, ex vivo, and in vivo models.

Methods: Two 1.8 MHz High-Intensity Focused Ultrasound (HIFU) elements were coupled to a diagnostic ultrasound scanner (Logi1 E10, GE Healthcare) utilizing a custom 3D printed enclosure for co-registered imaging and ablation. A novel target phantom was created from a polyacrylamide gel combined with a thermochromic ink whose color changes above biological ablative temperatures (60 °C). The HIFU wave was focused approximately 0.5 cm below the surface utilizing a 50% duty cycle generating 90 W for 20 s, 30 s, 40 s, 50 s, and 60 s. Experiments were repeated on ex vivo chicken livers at 20 s, 30 s, and linearly for 100 s. Lastly, the livers of 4 swine were treated transdermally using parameters optimized from in vitro work (50% duty cycle, peak positive pressure of 12 MPa, and treatment duration of 60 s).

Results: For thermochromic phantom testing, treatment times between 20 s and 60 s created ablation sizes from 0.016 cm3 to 0.4 cm3. The relationship between time and size was exponential (R2= 0.992). Ablation areas were also well visualized on the diagnostic ultrasound. In smaller lesions, there was a 47% decrease in the ablation size measured grossly compared to that measured on ultrasound. In more extensive lesions, the ultrasound-measured area only differed by 10%. The ex vivo liver ablation size at 20 s was 0.37 cm3, at 30 s was 0.66 cm3, and at 100 s was 5.0 cm3. For the swine experiments, the average ablation area measured 2 x 0.75 cm with a maximum of 3.5 x 1.5 cm.

Conclusion: These experiments demonstrate the feasibility of transdermal HIFU ablation in vivo and illustrate the time-dependent ablation size. The ablation lesions on ultrasound correlate to those on thermochromic ink and are translatable to treatment in vivo. Further customization of the housing and probes will allow for variable focus and depth variability. Future research will focus on refining the detection and localization of active bleeding and utilizing HIFU to coagulate hemorrhage from a liver laceration.

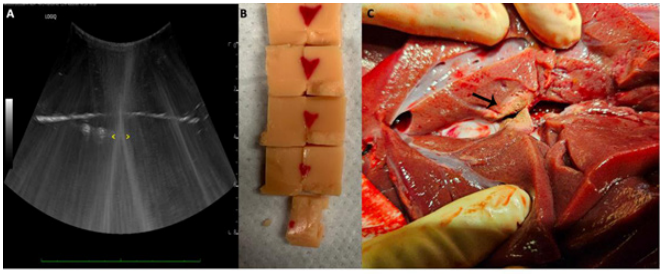


Figure 1: HIFU ablation of thermochromic phantom and swine liver transdermally
A: Diagnostic ultrasound image during HIFU ablation with focal target 0.5cm inferior to phantom edge
B: Cross-sectional slices of thermochromic phantom with ablation times from 60s, 50s, 40s, 30s, 20s, from top to bottom
C: Treated swine liver with ablation measuring 2 x 0.75cm grossly

NOTES

Presentation # 44
Friday, March 1, 2024, 7:40am - 8:00am

THE DILEMMA OF DOG BITE WOUNDS: PRIMARY VERSUS DELAYED CLOSURE

O HEJAZI, Q ALIZAI, T ANAND, H HOSSEINPOUR, C COLOSIMO, C STEWART, AL SPENCER, R FRIESE, LJ MAGNOTTI, B JOSEPH
University of Arizona
Tucson, AZ

Presenter: Omar Hejazi MD
WTA Sponsor: Bellal Joseph

Introduction: Dog bite wounds are a common emergency problem with a relatively high infection rate. The World Health Organization recommends delayed closure of bite wounds, despite controversial studies that advocate or prohibit this practice. The aim of this study was to compare the outcomes of primary versus delayed closure of dog bite wounds among pediatric patients.

Methods: This is a retrospective analysis of the trauma registry at an ACS-verified level I trauma center. Pediatric (<18 years) patients who presented to the trauma bay with dog bite wounds were included. These patients were stratified based on wound management into primary closure or delayed closure groups. Time to closure was defined as the time from injury to the suturing of the wounds. Primary outcomes were infectious complications, including fever, local abscess, local erythema (>2cm), edema, purulent discharge, and a WBC of >12000. Multivariable regression analyses were performed to identify the independent effect of primary vs. delayed closure on the outcomes, adjusting for potential confounding factors.

Results: A total of 86 pediatric patients were identified. The mean (SD) age was 8 (5) and 50% were male. Overall, 89.5% of the victims and 75.6% of the dogs were vaccinated and 87.2% of the dogs were known by the victims or family members. Head and neck were the most involved body region (80.2%), followed by upper extremities (16.3%), lower extremities (12.8%), and trunk (7%). The mean wound size was 4.8 (4.4) cm ranging from 0.1 to 26 cm, with 75.6% having a full-thickness wound depth. There was no difference in terms of wound size (p=0.744) and depth (0.243) between primary and delayed groups. Overall, 66.3% of patients received antibiotics on arrival and 75% were discharged on antibiotics. Among all patients, 54 (62.8%) underwent primary wound closure, of which 33% had their procedure performed under general anesthesia. The median time to closure for the primary and delayed group were 6 [3-14] and 84 [60-93] hours, respectively. Overall, 11.6% developed infectious complications, with no difference between study groups (primary closure: 11.1% vs. Delayed closure: 12.5%, p=0.846). After controlling for confounding factors, the time to closure was not associated with the odds of infectious complications (aOR 0.875, 95%CI [0.23-3.37], p=0.875).

Conclusion: Despite the current recommendations, there was no association between the timing of wound closure and infectious complications among pediatric patients presenting with dog bites, regardless of wound size and depth. Future efforts should focus on selected wounds that might benefit from delayed disclosure despite the purported risks of cosmetic effects.

NOTES

Presentation # 45
Friday, March 1, 2024, 8:00am - 8:20am

DIRECT EFFECT OF MECHANISM AND TYPE OF INJURY ON MORTALITY AMONG COMBAT CASUALTIES

J GURNEY, A STAUDT, J STALLINGS, J HOLCOMB,M SCHREIBER, P SPINELLA, D DEL JUNCO, A ROHRER, M MARTIN
Joint Trauma System
Joint Base San Antonio-Fort Sam Houston, TX

Presenter: Jennifer Gurney MD
WTA Sponsor: Matt Martin

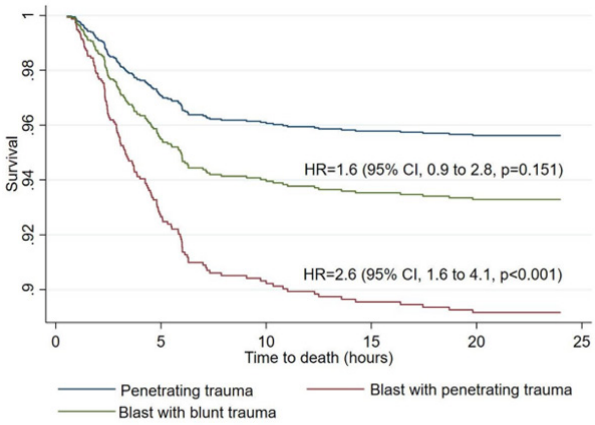
Introduction: Total body tissue damage in relation to endothelial dysfunction, coagulopathy and mortality is complex. Characterizing the severity of total body tissue damage is difficult with current severity scoring systems because they often lack specificity, vary according to body region, fail to capture injury complexity, and may not coincide with critical and dynamic physiological changes. The objective of this study was to identify the association of mechanism of injury and injury type with mortality adjusted for injury severity with current severity scoring systems among combat casualties injured from 2003 to 2020.

Methods: Retrospective analysis of combat casualties treated at forward US military medical treatment facilities who required blood transfusion from the Deployed HEROES Study. Cases were assessed by mechanism, type of injury, and exposure was defined by mechanism and type of injury: 1) penetrating trauma, 2) blast with penetrating trauma, and 3) blast with blunt trauma. The primary outcome was 24-hour mortality. Cox regression was adjusted for total fluids infused, age, gender, maximum abbreviated injury score in each body region, and polytraumatic injury. Additionally, a sensitivity analysis adjusted for time to first transfusion and rate of transfusion. Following the sensitivity analysis, a semi-parametric estimate of the survivor function was estimated using median values of the covariates.

Results: 2,168 patients were identified who were predominantly male (99%) with a median age of 24 years. 54.6% of penetrating trauma patients, 55.8% of blast with penetrating trauma patients, and 52.9% of blast with blunt trauma had polytraumatic injury. 41.8% of penetrating trauma patients, 42.6% of blast with penetrating trauma patients, and 48.6% of blast with blunt trauma had an admission INR of greater than 1.3. Overall, 24-hour mortality was 7.6%. 34 of 511 penetrating trauma patients (6.7%), 107 of 1,209 blast with penetrating trauma patients (8.9%), and 23 of 448 blast with blunt trauma (5.1%) died within 24 hours of injury. The adjusted hazard ratio for mortality associated with blast with penetrating trauma was 2.3 (95% CI, 1.5 to 3.5, $p<0.001$) and with blast with blunt trauma was 0.9 (95% CI, 0.5 to 1.5, $p=0.652$). In the sensitivity analysis among 1,876 patients with adjustment for additional covariates, adjusted hazard ratio for mortality associated with blast with penetrating trauma was 2.6 (95% CI, 1.6 to 4.1, $p<0.001$) and with blast with blunt trauma was 1.6 (95% CI, 0.9 to 2.8, $p=0.151$) (Figure 1).

Discussion: While it is well understood that mechanism of injury and injury severity impact mortality, the physiologic effects of blast injury on endothelial damage and resultant coagulopathy are likely underappreciated in standard trauma scoring systems. After adjustment for injury severity and resuscitation strategies including blood transfusion and transfusion timing, casualties with blast injury had higher mortality rates. Patients with blast and penetrating trauma were at greater risk for mortality as compared to penetrating trauma patients with covariate adjustment. The Abbreviated Injury Scale scoring system does not accurately characterize the severity of blast injuries which results in more diffuse tissue and endothelial damage. Researchers should consider the heterogeneity of blunt and blast injury when designing trauma studies, and resuscitation strategies should account for increase mortality of patients who sustain blast trauma.

Figure 1. Probability of surviving by mechanism of injury, n=1,876



Adjusted survivor functions were estimated by Cox regression modeling at the median value of each covariate. These values were set as no or less than severe head/neck injury, no or less than severe face injury, no or less than severe chest injury, no or less than severe abdominal/pelvic contents injury, no or less than severe extremities/pelvic girdle injury, no or less than severe external injury, 24 years of age, male, 3900 mL of total crystalloid volume, transfusion rate of 7.5 units per hour, 1.2 hours to first transfusion, and polytraumatic injury.

Abbreviations: HR- hazard ratio; CI- confidence interval

NOTES

Presentation # 46
Friday, March 1, 2024, 8:20am - 8:40am

TO PEG OR NOT TO PEG: TRENDS IN DURABLE FEEDING TUBE NEEDS IN PATIENTS REQUIRING TRACHEOSTOMY

J KARLSSON, MD, A SLIVINSKI, DNP, APRN, T KOPELMAN, MD, L HABEGGER, MD
Mission Hospital
Asheville, NC

Presenter: Jonas Karlsson MD, FACS
WTA Sponsor: Tammy Kopelman

Introduction: Over 80,000 tracheostomies are performed in the US yearly as a result of respiratory failure and subsequent invasive mechanical ventilation. This procedure is often combined with durable feeding tube (DFT) placement at or near the time of tracheostomy in an attempt to facilitate out-of-hospital placement. The benefits of early tracheostomy have been demonstrated in the literature, however the benefit of DFT versus nasally placed feeding tube has not been proven. DFT placement is not a benign procedure with a known complication rate of 13-40%. Many of these patients go on to pass swallow evaluations (SE) prior to hospital discharge, raising the question of the optimal timing of DFT placement. The purpose of this study is to assess how frequently a DFT is actually still indicated at the time of discharge in patients needing a tracheostomy for failure to wean off invasive mechanical ventilation.

Methods: This is a retrospective, IRB exempt case study of all patients that received a tracheostomy and DFT at a Level II Trauma Center over an 18-month period identified from tracheostomy ICD procedures codes and DRG. The need for DFT at time of discharge was defined as the inability to eat as demonstrated by a formal swallow evaluation or continued depressed mental status. Medical records were reviewed for patient demographics, admitting medical service, timing of tracheostomy, timing and type of DFT placement, time to passing a SE, time to tracheostomy decannulation, immediate discharge location, and length of stay. Descriptive statistics were used to describe trends.

Results: 160 patients from both the medical and surgical intensive care units met inclusion criteria with a wide range of diagnoses. Median hospital length of stay was 31 days with average time to tracheostomy of 16 days and a median of 17 days to oral diet after tracheostomy. DFT was placed at the time of tracheostomy in 35% of patients. Overall, only 16 patients (10.0%) required a DFT at the time of discharge. The remaining 144 patients either died/were discharged to hospice (n=37, 23.1%) or demonstrated the ability to eat by passing a swallow evaluation prior to discharge (n=107, 66.9%).

Conclusion: In patients requiring tracheostomy for failure to wean off invasive mechanical ventilation, only 10% actually needed DFT placement. Depending on institutional and regional capabilities, this study suggests that waiting to place a DFT is a reasonable approach in patients who need tracheostomy for failure to wean off invasive mechanical ventilation to prevent additional procedures and placement delays. Larger studies are needed to determine if medical or injury diagnosis is associated with higher likelihood of requiring DFT.

NOTES

Presentation # 47
Friday, March 1, 2024, 8:40am - 9:00am

UNDERSTANDING FINANCIAL HARDSHIP AFTER INJURY: RESULTS FROM THE FINCH PROSPECTIVE COHORT STUDY

M NISHTALA, B PATI, S ROBBINS, S SAVAGE, B ZARZAUR
University of Wisconsin School of Medicine and Public Health
Madison, WI

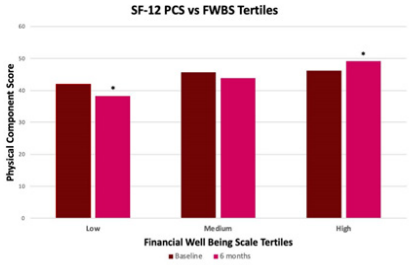
Presenter: Madhuri Nishtala MD
WTA Sponsor: Ben Zarzaur

Introduction: Hospitalization following injury imposes significant financial burdens on patients with up to 80% experiencing some form of hardship in the year after injury. The complex interplay between injury recovery and financial hardship and its effect on long-term physical and psychological wellbeing is poorly understood, largely due to the absence of research using validated scales. The purpose of this study is to quantify subjective and objective financial hardship using innovative techniques, as well as to better understand its relationship to Health-Related Quality of Life (HRQoL) in a prospective cohort of injury survivors.

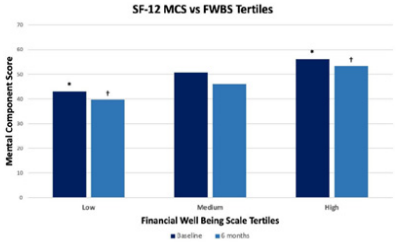
Methods: Patients aged 26 to 65 years with an Injury Severity Score (ISS) ≥ 9 and without a spinal cord or brain injury were enrolled at a Level 1 Trauma Center between 2020-2023. HRQoL was measured using the Short Form-12 with Physical Component Scores (PCS) and Mental Component Scores (MCS). Subjectively, financial hardship was measured using the Financial Well Being Scale (FWBS). Objectively, financial hardship was defined as referral for debt collection or documented need for financial assistance as determined from the hospital finance department. HRQoL surveys were obtained at time of hospitalization (Baseline) and 1-, 4-, and 6 months after discharge.

Results: One hundred twenty six patients were enrolled (69% Male, mean ISS 14.8), with 56% completing the 6-month surveys and 100% with information available for the objective financial hardship determination. At hospitalization, 3% were uninsured. Mean FWBS was 55 ± 13.1 at baseline increasing to 57.8±15.4 by 6 months. Compared to patients with the highest FWBS, patients with more pronounced subjective financial hardship had lower baseline PCS (42.0 ± 9.7 vs 46.2 ± 9.2, p=0.007) and lower PCS at 6 months (38.3 ±11.5 vs 49.2 ±9.5, p=0.003) (Figure). For MCS, compared to the highest FWBS group, those in the lowest FWBS group had significantly lower MCS at baseline (43.0 ±10.7 vs 53.3 ±8.6, p <0.001) and at 6 months (39.7 ± 9.9 vs 56.0 ±7.4, p<0.001) (Figure). By 6 months, 23% had objective financial hardship and 15.1% had scores indicating severe impairment of financial well-being (FWBS < 49). There was no relationship between subjective and objective evidence of financial hardship. The lost to follow-up cohort had higher baseline subjective hardship (40% with FWBS < 49) compared to those followed for 6 months (25%). Similarly, the lost to follow-up cohort had higher objective evidence of financial hardship at 6 months (29%) compared to those who completed 6 months of follow-up (18.3%).

Conclusion: Financial hardship is pervasive after injury. Though 97% of the cohort had insurance at the time of injury, nearly one quarter of all patients still had objective evidence of financial hardship at 6 months. Subjective assessment of financial hardship using a validated measure of financial well-being was associated with not only poor psychological recovery but also impaired physical recovery. Further, loss to follow-up may be a marker of financial hardship for injured patients. This prospective study indicates that addressing the objective and subjective experience of financial hardship could improve long-term outcomes of injured patients.



* p = .007 PCS for Low vs High FWBS Tertiles at 6 months



* p <0.0001 MCS for Low vs High FWBS Tertiles at Baseline
† P <0.0001 MCS for Low vs High FWBS Tertiles at 6 months

NOTES

Presentation # 48
Friday, March 1, 2024, 9:00am - 9:20am

IMPLEMENTATION SCIENCE TO DECREASE VARIATION & HIGH OPIOID ADMINISTRATION IN SICU PATIENTS

K KALKWARF, R BAILEY, A JENKINS, R SMITH, A WELLS, J GREER, R YEAGER, J MARGOLICK, M ROBERTS, N BRUCE, B DAVIS, M KIMBROUGH, M KOST, A PRIVRATSKY, G CURRAN
UAMS
Little Rock, AR

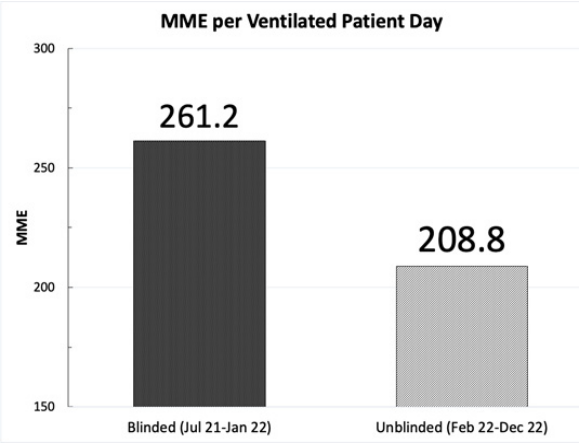
Presenter: Kyle Kalkwarf MD
WTA Sponsor: Richard Betzold

Introduction: High doses and prolonged duration of opioids are associated with tolerance, dependence, and increased mortality. Unfortunately, despite recent efforts to curb outpatient opioid prescribing because of the ongoing epidemic, utilization remains high in the intensive care setting, with intubated patients commonly receiving infusions with a potency 10-40-fold higher than doses that typically achieve pain control. We used an implementation science approach to develop and test a strategy to reduce high opioid prescribing in ventilated patients in our surgical ICU.

Methods: We conducted a prospective study investigating opioid administration in a closed SICU at an academic medical center over 18 months. A formative evaluation was conducted with surveys to assess readiness and barriers to implementation with clinical partners. The implementation strategy, co-developed with stakeholders, consisted of provider education, audit & feedback, and academic detailing. Commonly accepted conversions were used to aggregate daily opioid use for patients in the unit. Patients with a history of chronic opioid use and those being treated with an ICP monitor or drain, neuromuscular blockade, or ECMO were excluded. If the patient spent a portion of the day on a ventilator, that day's total was included in the "vent group." MMEs per patient were collected for each SICU patient and assigned to the on-call intensivist. Intensivists were blinded to the data for the first seven months. They were then provided with audit and feedback over the subsequent 11 months that demonstrated how opioid utilization during their time on call in the SICU compared to the unit average and a blinded list of the other attendings. Academic detailing was used to provide feedback via personal and group meetings, emails, and access to an electronic web-based dashboard demonstrating regular updates of each intensivist's MME per SICU patient day. Student's t-tests were performed to compare opioid utilization before and after providing the intensivists with regular feedback on MME per patient day while they were covering the SICU.

Results: Opioid utilization in patients on a ventilator decreased throughout the feedback period, with 20.1% less MME use after presenting audit and feedback data to the attending physicians ($p<0.001$). Several intensivists had high outlier prescribing months among vented patients during the blinded period. During the unblinded period, those same prescribers saw overall reductions and decreased variation, resulting in fewer high-outlier prescribing months. Opioid administration was not significantly different per attending physician for patients not on a ventilator.

Conclusion: Implementation science can be used to dramatically reduce variation in opioid prescribing, especially for high outliers in an SICU. This prevents over-sedation and may help reduce patient tolerance to and dependence on opioids.



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Presentation # 49
Friday, March 1, 2024, 9:20am - 9:40am

CAN OCCULT TRAUMATIC HEMOPNEUMOTHORAX BE SAFELY OBSERVED?

AH AL TANNIR, EA BIESBOER, CJ POKRZYWA, JF FIGUEROA, M TENTIS, J GELLINGS, J PESCHMAN, RS MORRIS, PB MURPHY, L SOMBERG, A ELEGBEDE, TW CARVER, MA DE MOYA
Medical College of Wisconsin
Milwaukee, WI

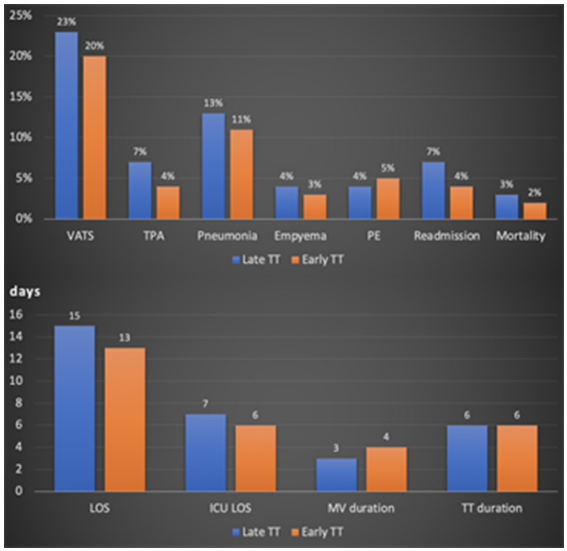
Presenter: Abdul Hafiz Al Tannir MD
WTA Sponsor: Marc de Moya

Introduction: The co-occurrence of a traumatic hemothorax (HTX) and pneumothorax (PTX) is extremely common. Prior work shows the safety of observing small HTX (≤300cc) and PTX (≤35mm) in isolation. Accordingly, we sought to assess the safety of observation of concurrent occult hemopneumothoraces (HPTX).

Methods: We conducted a single-center retrospective study from 2015-2021 at a Level I trauma center. Patients with a computed tomography (CT) scan confirmed HPTX were included in the study. Exclusion criteria included tube thoracostomy (TT) prior to CT scan, PTX>35mm, HTX>300cc, and death within 5 days of admission. The study group was stratified into either initial observation or early TT, defined as TT placement directly after initial CT scan. Primary outcome was observation failure, defined as TT placement after repeat imaging or worsening respiratory symptoms.

Results: A total of 359 patients met the inclusion criteria, of whom 267 (74%) were initially observed. Patients who received early TT were more likely to suffer from a penetrating injury (14% vs 7%, p=0.04), have a larger HTX (135 vs 89 cc, p<0.001), a larger PTX (13 vs 10 mm, p<0.001), and a higher ISS (23 vs 20, p=0.02). The early observation cohort had a shorter hospital (11 vs 13 days, p=0.04) and ICU (4 vs 6 days, p=0.02) length of stay (LOS). A total of 74 (28%) patients failed observation, with a worsening HTX on repeat imaging (42%) being the most common reason. The majority of patients (77%) who failed observation required a TT placement only. The mean time to observation failure was 36 hours. Compared to those who received an early TT, those who failed observation had a similar pulmonary morbidity, need for video-assisted thoracoscopic surgery, readmission, and mortality rates. Moreover, no difference in TT duration, hospital LOS, and ICU LOS was detected (Figure).

Conclusion: Initial observation of concurrent occult traumatic HPTX is safe. Further prospective studies are warranted to validate these results and to identify predictors of observation failure in occult HPTX.


25%
20%
15%
10%
5%
0%
23%
20%
7%
4%
13%
11%
4%
3%
4%
5%
7%
4%
3%
2%
VATS
TPA
Pneumonia
Empyema
PE
Readmission
Mortality
Late TT
Early TT
days
16
14
12
10
8
6
4
2
0
15
13
7
6
3
4
6
6
LOS
ICU LOS
MV duration
TT duration
Late TT
Early TT

NOTES

Presentation # 50
Friday, March 1, 2024, 9:40am - 10:00am

GERIATRIC FALLS: AN ENORMOUS ECONOMIC BURDEN COMPARED TO FIREARMS

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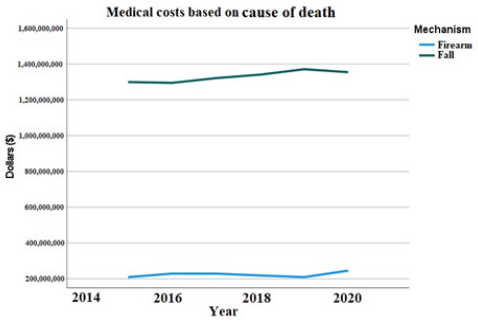
WTA Sponsor: Andrew Rosenthal

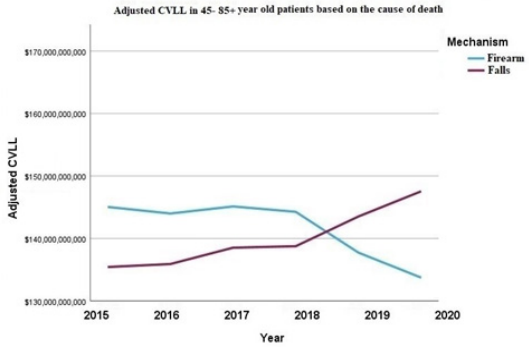
Introduction: In public opinion, fatal firearm injury represents a significant public health concern, the healthcare community is faced with the significant challenge of fatal falls, particularly in light of the elderly population growth. The aim of this study is to assess the medical costs, and combined value of the life lost (CVLL) in fatal firearm injury and fatal falls and report the trends during a 5-year period in the US.

Methods: We exported data from the Web-based Injury Statistics Query and Reporting System database for fatal firearm injury and fatal falls in patients between 15 and 85 years of age. Primary outcome was medical cost and secondary outcome was CVLL (medical costs and values of life lost). To account for the changes in prices over the time, we applied the research consumer price index for medical care for each year, using 2015 as the index year. CVLL estimates were calculated for each age groups reflecting the estimated value for individuals adjusted for older adults decreasing general life expectancy and baseline quality of life.

Results: The medical cost of fatal falls was significantly higher than fatal firearm injury in 2015 to 2020 in all age groups combined. The CVLL was significantly higher in fatal firearm injury for patients 45–85 before 2019. After 2019 the CVLL of fatal falls is significantly more than fatal firearm injury due to disproportionate aging population. During the period of 2015-2019, the percentage of fatal falls had a significant increase in all age ranges, with a rise in the slope in 2019 for patients older than 65. The annual percent change (APC) for the proportion of fatal falls increases from 2015 to 2020, there is a significant increase in the slope after 2019 (2.81% APC before 2019 vs. 6.95% after 2019).

Conclusion: Geriatric fatal falls has significantly higher medical costs compared to fatal firearm injury. The CVLL for fatal falls exceeded fatal firearm injury after 2019 which highlights the increasing socioeconomic burden with aging population. The importance of preventive and therapeutic strategies for geriatric patient needs to be emphasized.


Medical costs based on cause of death
Mechanism
Firearm
Fall
1,600,000,000
1,400,000,000
1,200,000,000
1,000,000,000
800,000,000
600,000,000
400,000,000
200,000,000
Dollars ($)
2014
2016
2018
2020
Year


Adjusted CVLL in 45- 85+ year old patients based on the cause of death
Mechanism
Firearm
Falls
$170,000,000,000
$160,000,000,000
$150,000,000,000
$140,000,000,000
$130,000,000,000
Adjusted CVLL
2015
2016
2017
2018
2019
2020
Year

NOTES

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