



**THIRTY-FOURTH
ANNUAL MEETING**



February 22 - February 27, 2004

Steamboat Springs, Colorado

WESTERN TRAUMA ASSOCIATION

34TH Annual Meeting
Steamboat Springs, Colorado
February 22 - 27, 2004

THE WESTERN TRAUMA ASSOCIATION GRATEFULLY
ACKNOWLEDGES UNRESTRICTED EDUCATIONAL GRANTS IN
SUPPORT OF THE PROGRAM FROM:

ASTRA - ZENECA

COOK CRITICAL CARE

KCI

NOVARTIS

PFIZER

US SURGICAL

CME sponsored by Gundersen Lutheran Medical Foundation

Gundersen Lutheran Medical Foundation Medical Disclosure statements have identified interests by the following companies:

The Program Committee gratefully acknowledges the assistance and support of Jill McHugh

**34th Annual Meeting
Steamboat Springs, Colorado**

2003-2004

OFFICERS:

Harvey J. Sugerman, MD	President
Scott R. Petersen, MD	President-Elect
Harold F. Sherman, MD	Vice-President
James W. Davis, MD	Secretary
Grace Rozycki, MD	Treasurer
R. Christie Wray, MD	Historian

BOARD OF DIRECTORS:

Robert C. Mackersie, MD
Steven L. Wald, MD
Christine S. Cocanour, MD
Dennis W. Vane, MD
Robert C. McIntyre, MD
Andrew Michaels, MD

TERM ENDS:

2004
2004
2005
2005
2006
2006

PROGRAM COMMITTEE:

R. Lawrence Reed, MD, Chairman
Lawrence N. Diebel, MD
Thomas F. Phillips, MD
Christine S. Cocanour, MD
Brent R. King, MD

Harvey J. Sugerman, MD
Frederick A. Moore, MD
M. Gage Ochsner, MD
Denis D. Bensard, MD
Steven L. Wald, MD

PUBLICATIONS COMMITTEE:

Frederick A. Moore, MD, Chairman
Denis D. Bensard, MD
Susan I. Brundage, MD
Kimberly A. Davis, MD
James C. Hebert, MD
Jay Johannigman, MD
David H. Livingston, MD
Robert C. McIntyre, MD
Richard S. Miller, MD
Edmund J. Rutherford, MD
David V. Shatz, MD
Steven L. Wald, MD

Roxie M. Albrecht, MD
Karen J. Brasel, MD
Roy A. Cobean, MD
Larry M. Gentilello, MD
Carl J. Hauser, MD
Krista L. Kaups, MD
Ted McAuley, MD
Andrew Michaels, MD
Preston Miller, MD
Martin Schreiber, MD
Dennis W. Vane, MD
John R. Zelko, MD

NOMINATING COMMITTEE:

J. Scott Millikan, MD, Chairman
Steve Shackford, MD
James Benjamin, MD

PAST PRESIDENTS

President	Year	Location
Robert G. Volz, M.D.	1971	Vail
Robert G. Volz, M.	1972	Vail
Peter V. Teal, M.D.	1973	Vail
William R. Hamsa, M.D.	1974	Aspen
Arthur M. McGuire, M.D.	1975	Sun Valley
Lynn Ketchum, M.D.	1976	Snowmass
Fred C. Chang, M.D.	1977	Park City
Glen D. Nelson, M.D.	1978	Steamboat
Gerald D. Nelson, M.D.	1979	Snowmass
Kevin G. Ryan, M.D.	1980	Snowbird
David S. Bradford, M.D.	1981	Jackson Hole
Erick R. Ratzer, M.D.	1982	Vail
William R. Olsen, M.D.	1983	Jackson Hole
Earl G. Young, M.D.	1984	Steamboat
Robert B. Rutherford, M.D.	1985	Snowbird
Rudolph A. Klassen, M.D.	1986	Sun Valley
Robert J. Neviasser, M.D.	1987	Jackson Hole
Robert C. Edmondson, M.D.	1988	Steamboat
Ernest E. Moore, M.D.	1989	Snowbird
Stephen W. Carveth, M.D.	1990	Crested Butte
George E. Pierce, M.D.	1991	Jackson Hole
Peter Mucha, Jr., M.D.	1992	Steamboat
David V. Feliciano, M.D.	1993	Snowbird
R. Chris Wray, M.D.	1994	Crested Butte
David Kappel, M.D.	1995	Big Sky
Thomas H. Cogbill, M.D.	1996	Grand Targhee
G. Jerry Jurkovich, M.D.	1997	Snowbird
James B. Benjamin, M.D.	1998	Lake Louise
Herbert J. Thomas III, M.D.	1999	Crested Butte
Barry C. Esrig, M.D.	2000	Squaw Valley
Steven R. Shackford, M.D.	2001	Big Sky
James A. Edney, M.D.	2002	Whistler-Blackcomb
J. Scott Milikan, MD	2003	Snowbird
Harvey J. Sugerman, MD	2004	Steamboat

**** The 2005 WESTERN TRAUMA ASSOCIATION Meeting will be:**

**Jackson Hole, Wyoming
February 27 – March 4, 2005**

WESTERN TRAUMA FOUNDATION DONORS

(Current Lifetime Accumulation Status)

Black Diamond Circle

Roxie Albrecht
Barry Esrig
Jerry Jurkovich
David Livingstone
Scott Millikan
Robert Neviaser
Scott Petersen
Steve Shackford
Harvey Sugerman
Dennis Vane

Blue Trail Associates

Grace Rozycki and David Feliciano
EE Moore
Anne Rizzo
R. Christie Wray

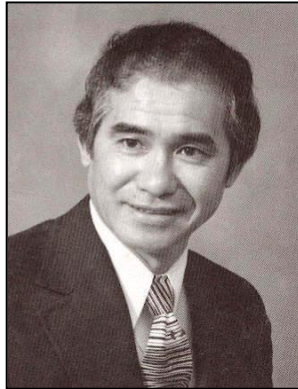
Green Trail Group

Christine Cocanour
Kimberly Davis
Dean Gubler
Carl Hauser
David Hoyt
David Shatz

Friends of the Western Trauma Foundation

Jody DiGiacomo
Jay Johannigman
Nicholas Namias
Basil Pruitt

**Earl G. Young, M.D.
(1928-1989)**



RESIDENT PAPER COMPETITION

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.

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. Wangenstein 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."* The award is given to the best resident paper presented at the Annual Meeting.

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

EARL G. YOUNG AWARD RECIPIENTS

<u>Resident</u>	<u>Institution</u>	<u>Year</u>
Joseph Schmoker, M.D.	University of Vermont	1991
Joseph Schmoker, M.D.	University of Vermont	1992
CharlesMock, M.D.	University of Washington	1993
Gino Travisani, M.D.	University of Vermont	1994
Phillip C. Ridings, M.D.	Medical College of Virginia	1995
David Han, M.D.	Emory University	1996
Preston R. Miller, M.D.	Wake Forest University	1997
Geoffrey Manley, M.D., PhD.	UC – San Francisco	1998
JamesM. Doty, M.D.	Medical College of Virginia	1999
D.J. Ciesla, M.D.	Denver Health Medical Center	2000
Ricardo J. Gonzales, M.D.	Denver Health Medical Center	2001
Scott C. Brakenridge	Cook County Hospital	2002
Adena J. Osband, M.D.	UMDNJ at Newark	2003

WESTERN TRAUMA ASSOCIATION

SCHEDULE

Sunday, February 22, 2004

4:00pm – 5:00pm	Nominating Committee Meeting	Aspen Board Room
4:30pm – 7:30pm	Registration	Foyer
5:00pm – 7:00pm	Welcome Reception	Sunshine Peak
5:00pm – 7:00pm	Children's Reception	Skyline
7:00pm	Past Presidents Meeting	Aspen Board Room

Monday, February 23, 2004

7:00am – 7:20am	Welcome Remarks - Dr. Sugerman	Storm Peak/Mt. Werner
7:20am – 9:00am	Scientific Session I	Storm Peak/Mt. Werner
3:00pm – 4:00pm	WTA Foundation Board Meeting	Aspen Board Room
4:00pm – 6:00pm	Scientific Session II	Storm Peak/Mt. Werner
6:00pm – 7:00pm	Board of Directors Meeting	Aspen Board Room

Tuesday, February 24, 2004

7:00am – 9:00am	Scientific Session III	Storm Peak/Mt. Werner
10:00am – 12:00pm	NASTAR Ski Race	Bashore Ski Race Area
12:00am – 1:00pm	BBQ Lunch on the Mountain	Bear River Deck
4:00pm – 5:00pm	Scientific Session IV	Storm Peak/Mt. Werner
5:00pm – 6:00pm	Presidential Address – Dr. Sugerman	Storm Peak/Mt. Werner
6:00pm – 7:30pm	WTA Multicenter Trials Meeting	Storm Peak/Mt. Werner

Wednesday, February 25, 2004

7:00am – 9:00am	Scientific Session V	Storm Peak/Mt. Werner
4:00pm – 5:00pm	Scientific Session VI	Storm Peak/Mt. Werner
5:00pm – 6:00pm	Business Meeting (members only)	Storm Peak/Mt. Werner

Thursday, February 26, 2004

7:00am – 9:00am	Scientific Session VII	Storm Peak/Mt. Werner
4:00pm – 5:00pm	Scientific Session VIII	Storm Peak/Mt. Werner
5:00pm – 6:00pm	"Paint the Ceiling" Lecture	Sunshine Peak
6:30pm – 11:30pm	Awards Banquet	Storm Peak/Mt. Werner
6:30pm – 11:30pm	Children's Party	Rainbow

Friday, February 27, 2004

7:00am – 9:00am	Scientific Session IX	Storm Peak/Mt. Werner
4:00pm – 6:00pm	Scientific Session X	Storm Peak/Mt. Werner
6:00pm	Adjourn	

**Monday – Friday: 0630 – 0700 – Attendee Breakfast, Foyer

**Monday – Friday: 0730- 0900 – Friends & Family Breakfast, Restaurant

Speaker Ready Room (Moonlight) – Available Sunday at 2:00pm through Friday at 6:00pm

WESTERN TRAUMA ASSOCIATION

IN MEMORIUM

Earl G. Young, MD
February 27, 1989

Gerald S. Gussack
August 25, 1997

Scientific Session 1

Monday AM, February 23

Moderator: Harvey Sugerman, MD

Location: StormPeak/Mt. Werner

Paper	Time	Title/Authors	Page
1	0720	Surgeon-Performed Bedside Organ Assessment With Sonography Following Trauma (Boast): A Pilot Study From The Wt A Multicenter Group GS Rozycki MD, MM Knudson MD, SR Shackford MD, R Dicker MD, and WTA Multicenter Trials Group	15
2	0740	Prospective Evaluation Of Reimbursement To Surgeons For Ultrasound From A Level I Trauma Center MG McKenney, N Namias, FA Habib, LH Blackbourne	17
3	0800	**Is There Value In A Repeat Ultrasound Exams In Blunt Trauma Patients? L Blackbourne, D Soffer, M McKenney, J Amortegui, C Schulman, B Crookes, F Habib, R Benjamin, P Lopez, N Namias, M Lynn, S Cohn	19
4	0820	**Does Serial Computed Tomography Of The Head Influence Management Of Traumatic Brain Injury? A Prospective Evaluation CV Brown MD, J Weng MS, D Oh MD, D Demetriades MD, GC Velmahos MD, P Rhee MD	21
5	0840	**The Effect Of Obesity On Outcomes Among Injured Patients MC Bymes MD, MD McDaniel, MB Moore, SD Helmer PhD, RS Smith MD	23

Scientific Session 2

Monday PM, February 23

Moderator: Christine Cocanour, MD

Location: StormPeak/Mt. Werner

Paper	Time	Title/Authors	Page
	1500	WTA Foundation Board Meeting Barry Esrig MD, Chairman	
6	1600	**Sphingosine Kinase Inhibition In Acute Lung Injury C Lee MD, E Feketeova MD, JK Yun PhD, DZ Xu MD, KB Kannan MD, EA Deitch MD, DH Livingston MD and CJ Hauser MD	25
7	1620	**Diagnosis Of Acid-Base Derangements And Mortality Prediction: The Physiochemical Approach M Martin MD, J Murray MD, T Berne MD, D Demetriades MD PhD, H Belzberg MD	27
8	1640	**Neutrophil Priming By Post Hemorrhagic Shock Mesenteric Lymph Exists Across Species EL Sarin MD, EE Moore MD, JB Moore MD, AC Cheng MD, JL Moore, A Banerjee MD, And CC Silliman MD PhD	29
9	1700	**Early Experience With Airway Pressure Release Ventilation In Traumatically Injured Patients At Risk For Acute Lung Injury Or Acute Respiratory Distress Syndrome BW Dart IV MD, CM Richart MD, RA Maxwell MD, DK Brooks RRT, DL Ciraulo DO, DE Barker MD, RP Burns MD	31
10	1720	**Lessons Learned From A Nightclub Fire: Part 1 - Institutional Disaster Preparedness EJ Mahoney MD, DT Harrington MD, WL Biffi MD, T Oka MD, and WG Cioffi MD	33
11	1740	**Epidemiology Of Suicide And The Impact On Western Trauma Centers TPV Steljes MD, L Fullerton-Gleason PhD, J Fildes MD	35
	1800	Board of Directors Meeting	

Scientific Session 3

Tuesday AM, February 24

Moderator: Denis Bensard, MD

Location: StormPeak/Mt. Werner

Paper	Time	Title/Authors	Page
12	0700	**Intimate Partner Violence And Alcohol Use Among Female Trauma Patients RL Weinsheimer MD, CR Schermer MD, LH Malcoe PhD, LM Balduf MD and LA Bloomfield MSW	37
13	0720	**Non-helmeted motorcyclists, a burden to society? A study from the NTDB J Hoth, P Kilgo, P Miller, J Hundley, M Chang, J Meredith	39
14	0740	**Hyperglycemia And Infections In Pediatric Trauma Patients A Kuhn, D Tuggle, S Jones, R Albrecht, C Mantor, N Puffinbarger	41
15	0800	High Rates Of PTSD Impact Quality Of Life Outcomes In Injured Adolescents: Mechanism And Gender Predict PTSD Risk TL Holbrook PhD, DB Hoyt MD, R Coimbra MD, B Potenza MD, M Sise MD, JP Anderson PhD	43
16	0820	Both Th1 And Th2 Type Cytokines Promote IgA Transport LN Diebel, MD, DM Liberati MS, E Hamamdjian, CA Diglio PhD, WJ Brown PhD	45
17	0840	Prevalence And Risk Factors For Acute Stress Disorder In Injured Children G Saxe MD, C Lopez MD, E Hall MA, J Kaplow PhD, K Koenen PhD, D Bartholomew BA, A Miller, MA, M Bosque PhD, I Erikson RN MS, L Allee MSW, S Moulton MD	47

Scientific Session 4

Tuesday PM, February 24

Moderator: Steve Wald, MD

Location: StormPeak/Mt. Werner

Time	Activity	Presenters
1600	Panel Discussion: "Threats to Trauma Center Survival: Actions and Reactions"	Moderator: Jerry Jurkovich MD Panelists: John Fildes MD Roxie Albrecht MD Scott Petersen MD Harvey Sugerman MD
1700	Presidential Address: "The Man in the Glass"	
1800	Multi-Institutional Trials Committee Meeting	Chair: Peggy Knudsen MD

Scientific Session 5

Wednesday AM, February 25

Moderator: Tom Phillips, MD

Location: StormPeak/Mt. Werner

Paper	Time	Title/Authors	Page
18	0700	Institutional Practice Guidelines On Management Of Pelvic Fracture Related Hemodynamic Instability: Do They Make Difference? Z Balogh, M Heetveld, S D'Amours, E Caldwell, G Schlaphoff, I Harris, M Sugrue	49
19	0720	Are Plain Radiographs Of The Spine Necessary During Evaluation After Blunt Trauma: Evaluation Of The Accuracy Of Screening Torso Computed Tomography In Thoracic/Lumbar Spine Fracture Diagnosis GE Berry MD, PR Miller MD, S Adams BS, M Harris MD, CA Boles MD, E Carroll MD, JJ Hoth MD, JW Meredith MD, MC Chang MD	51
20	0740	The Role Of Repeat Angiography In The Management Of Pelvic Fractures M Shapiro, A McDonald, D Knight, J Johannigman, J Cuschieri	53
21	0800	Unsafe At Any Age: A Retrospective Review Of ATV Injuries In Two Level I Trauma Centers 1995-2002 LM Smith MD, AB Marr MD, K Swan BS, G Caldito PhD, MA Pittman MD, R Vidal MD, WR Wise MD, and FA Moore MD	55
22	0820	Predicting Significant Torso Trauma In Motor Vehicle Crashes: A Tool To Facilitate Automatic Crash Notification Systems R Nirula, K Brasel, D Talmor	57
23	0840	Laparoscopy Is Sufficient To Exclude Occult Diaphragm Injury After Penetrating Thoracoabdominal Trauma R Friese MD, C Coln MD, and L Gentilello MD	59

Scientific Session 6

Wednesday PM, February 25

Moderator: Larry Diebel, MD

Location: StormPeak/Mt. Werner

Paper	Time	Title/Authors	Page
24	1600	Enteral Arginine, An Immune Enhancing Agent, Impairs Gut Barrier Function Following Mesenteric Ischemia/Reperfusion R Kozar, S Schultz, E Verner-Cole, R Bick, R DeSoignie, B Poindexter, F Moore	61
25	1620	Lipopolysaccharide-Induced Neutrophil Activation And Proinflammatory Mediator Synthesis Is Downregulated By Phosphodiesterase Inhibition: Role Of Pentoxifylline R Coimbra MD PhD, W Loomis BS, H Melbostad BS, DB Hoyt MD	63
26	1640	Medicare's Bundling Of Trauma Care Codes Violates Relative Value Principals R Reed MD, F Luchette MD, K Davis MD, T Esposito MD, S Poulakidas MD, J Santaniello MD, G Silver MD, K Pyrz, and R Gamelli MD	65
	1700	Business Meeting (Members Only) Harvey Sugerman MD, President	

Scientific Session 7

Thursday AM, February 26

Moderator: Brent King, MD

Location: StormPeak/Mt. Werner

Time	Activity	Presenters
0700	Panel Presentation: "Military Disaster Management: Surgical Experience During Operation Iraqi Freedom"	Moderator: Gage Ochsner MD Presenters: Thomas J Marshall Jr MD: "Combat Casualty Care: The Alpha Surgical Company Experience, Operation Iraqi Freedom 10 Feb-17 Apr 2003" Gregory S. Campbell MD: "Trauma Care During Disasters: Lessons Learned From A DeNovo Surgical Company During Operation Iraqi Freedom" James R. Dunne MD: "Operation Iraqi Freedom: Lessons Learned On Board USNS Comfort" Lowell W. Chambers MD: "Initial Experience Of US Marine Corps' Forward Resuscitative Surgical System During Operation Iraqi Freedom"
0800	Panel Presentation: "Management of Civilian Disasters, Natural and Unnatural"	Moderator: Walter Biffi MD Presenters: Michel Aboutanos MD MPH: "An Epidemiological Shift In Terrorism And Complex Disasters" Mauricio Lynn MD: "The Ten Commandments For The Management Of Urban Mass Casualties" William G. Cioffi MD: "Lessons Learned From A Nightclub Fire: Part II- Regional Disaster Preparedness" Christine Cocanour MD: "When Disaster Strikes Within--Flooding of the Texas Medical Center (How to Handle Your Patients When the Hospital Floats Away)"

Scientific Session 8

Thursday PM, February 26

Moderator: M. Gage Ochsner, MD

Location: StormPeak/Mt. Werner

Time	Activity	Presenters
1600	Panel of Experts: Interesting Case Presentations	Gene Moore MD Dave Feliciano MD Steve Shackford MD
1700	"Paint the Ceiling" Lecture: "Trauma in the US and Russia - Then and Now"	Dr. Susan and Tim Baker

Scientific Session 9

Friday AM, February 27

Moderator: Scott Petersen, MD

Location: StormPeak/Mt. Werner

Paper	Time	Title/Authors	Page
27	0700	Repair Of Duodenal Injuries With Elastin Biomaterial Heterografts In A Porcine Contaminated Abdominal Trauma Model P Cordts COL MC, M Mayfield CPT MC, J Freeman MD, M Sawyer MD, C Morrison LTC MC, R. Probst MAJ VC, P. Cordts COL AN, R McDonald MAJ AN, C Campbell MSC, K Gregory MD, C Uyehara PhD	67
28	0720	Families' Perception Of The Value Of Timed Daily "Family Rounds" In A Trauma ICU AJ Mangram MD, T McAuley MD, D Villarreal MD, J Berne MD, D Howard RN, A Dolly RN, S Norwood MD	69
29	0740	Shock Resuscitation: Is A 'Starling Curve' Beneficial For Non Responders? BA McKinley PhD, JH Selby MD JD, AB Marr MD, CS Cocanour MD, A Valdivia RN, RM Sailors PhD, RA Kozar MD PhD, FA Moore MD	71
30	0800	Neurologic Examination Can Be Misleading Following Gunshot Wounds To The Head KK Nagy MD, F Bokhari MD, KT Joseph MD, GC An MD, AJ Dennis DO, and RR Roberts MD	73
31	0820	Placement Of Intracranial Pressure (ICP) Monitors: Are "Normal" Coagulation Parameters Necessary JW Davis MD, LD Bennink BSN, IC Davis MS, SE Hyse II MD, BV Curtis MD, KL Kaups MD, MM Quilty BSN, JJ Kohut MD, JF Bilello MD, SN Parks MD	75
32	0840	The Rate Of Induction Of Hypothermic Arrest Determines The Outcome In A Swine Model Of Lethal Hemorrhage HB Alam MD, Z Chen MD PhD, H Kaneatsu MD, R Querol MD, E Koustova PhD, R Inocencio BS, A Jaskille MD, T Hancock BS, P Rhee MD MPH	77

Scientific Session 10

Friday 9M, February 27

Moderator: Larry Reed, MD

Location: StormPeak/Mt. Werner

Paper	Time	Title/Authors	Page
33	1600	Crushed By A Backhoe: One Approach To Multi-Vascular, Multi-Organ Trauma RS Ambay MD, SP Zietlow MD	79
34	1615	Gunshot Causing A Common Carotid – Internal Jugular Fistula Repaired By Endovascular Stenting: Case Report M Self MD, A Mangram MD, S Slonim MD, K Kollmeyer MD	81
35	1630	Diaphragmatic Transposition: An Elegant Treatment For Traumatic Chest Wall Defects T Cogbill MD, N Patel MD	83
36	1645	Those Who Live By The Sword....: Nonoperative Management Of Esophageal Perforation M Martin MD, P Mullenix MD, S Steele MD, W Long MD, S Izenberg MD	85
37	1700	Pneumatosis Intestinalis And Abdominal Compartment Syndrome Associated With Enteral Feedings After Gunshot Wound To The Abdomen And Splenectomy P Kougiass MD, GM Testerman MD, JR Hall MD	87
38	1715	Blunt Carotid Injury Resulting From A Horse Bite GR Dulabon MD, JJ Bednarski MD, JH Levine MD	89
39	1730	"Spontaneous" Splenic Rupture: The Masquerade Of Minor Trauma M Tataria MD, M Melcher MD PhD, RA Dicker MD, DA Spain MD, and SI Brundage MD MPH	91
40	1745	Endovascular Repair Of Retrohepatic Inferior Vena Cava Laceration M Buechler, W Shillinglaw, A Arrillaga	93

SURGEON-PERFORMED BEDSIDE ORGAN ASSESSMENT WITH SONOGRAPHY FOLLOWING TRAUMA (BOAST): A PILOT STUDY FROM THE WTA MULTICENTER GROUP

G.S. Rozycki, MD, M.M. Knudson, MD, S.R. Shackford, MD, R. Dicker, MD, and WTA Multicenter Trials Group

Presenter: Grace S. Rozycki, MD
 Senior Sponsor: Grace S. Rozycki, MD
 Atlanta, GA

Background: BOAST was developed to query for hemoperitoneum and to examine solid organ injuries (liver, spleen, and/or kidney) being managed nonoperatively.

Hypothesis: BOAST can identify: solid organ injury, an increase/decrease in hemoperitoneum, and organ-specific complications.

Methods: Patients managed nonoperatively following blunt solid organ injury were prospectively studied after an admission FAST and abdominal CT scan. BOAST was performed within 24 hrs. of admission and every 3-4 days to evaluate for an increase/decrease in hemoperitoneum [Ultrasound (US) heme score: from 0 = none to 3 = large], change in injury size, and organ-specific complications. BOAST results were compared with the radiologists' interpretation of the initial and follow-up CT scans, and with patient outcomes.

Results: From 11/01 -08/03, 126 patients (Age (mean) = 34± 14.8 yrs; ISS (mean) = 14.6 ± 8.4) sustained 135 solid organ injuries, 46 (34.1 %) of these were seen by BOAST (Error rate = 66%). Resolution or progression of the injury was noted by BOAST in 24/46 (52.2%) injuries seen. Serial US heme scores were useful in

Organ Injuries On BOAST /# Organ Injuries On Initial CT
 CT ORGAN GRADE

	I	II	III	IV	V	
ORGAN	LIVER	0/20=0%	8/26=31%	8/15=53.3%	6/10=60%	1/1=100%
	SPLEEN	0/8=0%	4/12=33.3%	11/20=55%	1/4=25%	NONE
	KIDNEY	0/6=0%	1/4=25%	3/5=60%	3/4=75%	NONE
	135 Organs	0/34=0%	13/42=31%	22/40=55%	10/18=55.5%	1/1=100%

predicting organ injury stability or progression in 45/126 (35.7%) patients. Serial US heme scores = 0 (no hemoperitoneum) were observed in 56 of 126 patients who had a combination of multi-system injury and a decrease in Hgb, indicating that there was no further bleeding from the injured organ(s). Surgeons detected 7 of the 10 complications that were confirmed later by conventional imaging: bilomas (#3), pseudoaneurysms (#2), and intra-abdominal abscesses (#2).

Conclusions: 1) BOAST has limitations in identifying solid organ injuries, especially lower grade; 2) The US heme score is a valuable adjunct to the clinical examination in following patients with high grade solid organ injuries and a dropping Hgb; and, 3) Although uncommon, select organ-specific complications may be identified using BOAST. Recommendation: BOAST should be considered part of the follow-up of patients with Grades III- V solid organ injuries who are being managed nonoperatively.

Notes

PROSPECTIVE EVALUATION OF REIMBURSEMENT TO SURGEONS FOR ULTRASOUND FROM A LEVEL I TRAUMA CENTER

MG McKenney, N Namias, FA Habib, LH Blackbourne
Ryder Trauma Center/University of Miami School of Medicine

Presenter: Mark G. McKenney, MD

Senior Sponsor: Nicholas Namias, MD

Miami, FL

Objective: Ultrasound is now routinely used by surgeons in the evaluation of the traumatized patient. Focused assessment with sonography for trauma (FAST) can be utilized to evaluate the peritoneal cavity, pleural cavity, and the retroperitoneum. Most surgeons do not seek reimbursement from insurance carriers for rendering this valuable service. We prospectively evaluated the reimbursement from insurance carriers for ultrasound.

Methods: The FAST examination is routinely used in our level I trauma center to evaluate both penetrating and blunt trauma. We prospectively developed a computerized data collection sheet to monitor ultrasound use, store results, and track CPT codes. This information is then combined with a second program that matches patient insurance status, generates a voucher that is sent electronically to the insurance carrier, and monitors reimbursement by patient, carrier, procedure, and surgeon. Because of delays in reimbursement by carriers we do not consider records finalized until 4 months after the procedure.

Results: Over a 6 month period ending in May 2003, 11 surgeons performed, evaluated and completed vouchers for 1,821 ultrasound scans in our trauma center. From the ultrasounds performed during this time period we collected \$61,200 (annualized collection estimated at over \$122,000). During this time period we utilized 3 CPT codes, 76700 (abdomen), 76604 (chest), and 76770 (retroperitoneum). Mean reimbursement was \$33 and ranged from \$13 to \$113 from 23 insurance carriers. Only 1 carrier did not reimburse for ultrasound. Three other carriers requested clarification and eventually reimbursed the surgeons after further information was provided.

Conclusion: Reimbursement from ultrasound can be a significant source of financial support. The vast majority of insurance carriers will reimburse professional fees to surgeons for evaluating ultrasounds.

Notes

IS THERE VALUE IN A REPEAT ULTRASOUND EXAMS IN BLUNT TRAUMA PATIENTS?

L Blackbourne, D Soffer, M McKenney, J Amortegui, C Schulman, B Crookes, F Habib, R Benjamin, P Lopez, N Namias, M Lynn, S Cohn
Ryder Trauma Center, Divisions of Trauma and Surgical Critical Care University of Miami
School of Medicine

Presenter: Lorne H. Blackbourne, M.D.

Senior Sponsor: Stephen Cohn, M.D.

Miami, Florida

Introduction: Abdominal ultrasound examination (US) is now widely used to evaluate the abdomen of blunt trauma patients. However, approximately one third of stable patients with significant intraabdominal injury do not have significant intraperitoneal blood evident on admission. We hypothesized that a repeat US study (Secondary Ultrasound --SUS) will reveal additional intra-abdominal injuries and hemoperitoneum.

Methods: We performed a prospective observational study of blunt trauma patients at our Level I trauma center from March 2003 to October 2003. Patients underwent an initial US, followed by SUS exam within 24 hours of admission. All US exams were performed and evaluated by surgical housestaff and surgical attendings.

Results: There were 435 patients who underwent SUS after an initial admission US. In this group 34/435 (7.8%) of SUS exams demonstrated different results. 19/417 (4.5%) patients with an initially negative US had a subsequent positive SUS for intraperitoneal fluid (mean hemoperitoneum ultrasound score [USS]=1.9). 5/19 (26%) of these patients went for exploratory laparotomy. In the 22 patients that had an initial positive US and did not require emergent surgery, the mean USS went from 1.6 on the initial US to 2.6 on the SUS (12/16 with different scores). 2/435 patients had an initial positive FAST exam and a negative SUS. None of the 394 patients with a negative SUS exam required exploratory laparotomy or had an intra-abdominal injury identified on clinical evaluation subsequently.

Conclusions: Repeated ultrasound exams can help identify clinically significant intraperitoneal fluid after an initial negative admission US study in blunt trauma patients. Repeat ultrasound examinations can show an interval increase in hemoperitoneum scores. A negative repeat ultrasound may be of clinical reassurance.

Notes

DOES SERIAL COMPUTED TOMOGRAPHY OF THE HEAD INFLUENCE MANAGEMENT OF TRAUMATIC BRAIN INJURY? A PROSPECTIVE EVALUATION

C.V. Brown, MD, J. Weng, MS, D. Oh, MD, D. Demetriades, MD, G.C. Velmahos, MD, P. Rhee, MD

Los Angeles County and University of Southern California Medical Center

Presenter: Carlos V.R. Brown, M.D.

Senior Sponsor: Peter Rhee, MD, MPH

Los Angeles, CA

BACKGROUND: Computed tomography (CT) of the head is the gold standard for diagnosing intracranial pathology following blunt head trauma. It is common practice to repeat head CT to evaluate any progression of injury. Recent retrospective reviews have challenged the need for serial head CT after traumatic brain injury (TBI). This study intends to prospectively examine the value of serial head CT after TBI.

METHODS: Consecutive adult blunt trauma patients admitted to an urban, level I trauma center from January 2003 to September 2003 were prospectively studied. Patients with an abnormal admission head CT were included. Exclusion criteria were death within 24 hours of admission and craniotomy directly after admission head CT. Variables collected include: initial head CT results, number of repeat head CT scans, and indication for repeat head CT (routine vs. clinical change).

RESULTS: Over the nine month period, there were 128 patients admitted with an abnormal head CT after sustaining blunt trauma. The 16 patients who died within 24 hours, and the 12 patients who went directly to craniotomy, were excluded. The remaining 100 patients make up the study population. Abnormal head CT findings were subarachnoid hemorrhage (47%), intraparenchymal hemorrhage (37%), subdural hematoma (28%), contusion (14%), epidural hematoma (11%), intraventricular hemorrhage (3%), and diffuse axonal injury (2%). Overall, 32 patients (32%) had only the admission head CT, while 68 patients (68%) underwent 92 repeat head CT scans; average 1.4 repeat head CT scans per patient (range: 1-4). Of the repeat head CT scans, 83 (90%) were performed on a routine basis without neurological change. The remaining 9 (10%) were performed for clinical change in exam of the patient: change in GCS (n=5), change in ICP (n=1), change in GCS and ICP (n=1), change in pupils (n=1), headache (n=1). Three patients (4%) had their care altered after repeat head CT, two underwent craniotomy and one was started on barbiturate therapy. All three patients first had a decline in their neurological status which prompted repeat head CT: change in GCS (n=2), change in ICP (n=1).

CONCLUSIONS: Serial head CT is common after TBI. Most repeat head CT scans are performed on a routine basis without neurological change. Only 4% of patients with TBI have their management altered after repeat head CT, and these patients have neurological deterioration prior to the repeat head CT. Routine serial head CT may not be necessary in the management of TBI.

Notes

THE EFFECT OF OBESITY ON OUTCOMES AMONG INJURED PATIENTS

M.C. Byrnes, M.D.; M.D. McDaniel; M.B. Moore; S.D. Helmer, Ph.D.; R.S. Smith, M.D.
Department of Surgery, University of Kansas School of Medicine – Wichita, and Via Christi
Regional Medical Center – St. Francis Campus

Presenter: Matthew C. Byrnes, M.D.

Senior Sponsor: R. Stephen Smith, M.D.

Wichita, Kansas

Introduction: Traumatic injuries are a common cause of morbidity and mortality. Injuries are the second most common cause of preventable disability and result in 98,000 deaths per year. Further, obesity is a national epidemic on par with cancer and heart disease. The intersection of these variables in individual patients remains poorly studied.

Objectives: (1) To evaluate the effect of obesity on morbidity and mortality among obese trauma patients. (2) To evaluate the effect of injury severity on outcomes among injured obese patients.

Methods: The medical records of all trauma patients evaluated at an ACS verified Level I Trauma Center over an 18-month period were reviewed. Variables were collected with the use of a standardized data collection sheet. Patients were classified according to their body mass index (BMI), which was calculated by Kg/m². Patients were excluded if BMI data was not available or their age was less than 18.

Results: There were 1,172 patients included in the study, of whom 55.4% were classified as overweight or obese. Overall mortality among patients with a BMI greater than 35 (obese patients) was 8.7% versus 3.7% for patients with a BMI of less than 35 (lean patients, $p < 0.05$). Among patients with an injury severity score of at least 15, the mortality for obese patients rose to 33% versus 14% for lean patients ($p < 0.05$). Overall complications were higher among the obese patients (26%) than the lean patients (17.5%, $p < 0.05$). Admission rate and intensive care unit admission rate were similar between the groups, but length of stay was higher among the obese patients (6.4 days versus 4.4 days, $p < 0.05$). No specific injury patterns were noted to be more common among obese patients.

Conclusions: Obese trauma patients suffered worse outcomes than their lean counterparts. This effect was more pronounced among patients with severe injuries. Obese patients suffered similar injuries to leaner patients, but were less capable of tolerating these physiologic insults. Complications were higher among obese patients, which indicates significant attention to pulmonary and renal status may be critical to improving outcomes among this group of patients.

Notes

SPHINGOSINE KINASE INHIBITION IN ACUTE LUNG INJURY

C Lee MD, E Feketeova MD, JK Yun PhD, DZ Xu MD, KB Kannan MD, EA Deitch MD, DH Livingston MD and CJ Hauser MD
UMDNJ-NJ Medical School

Presenter: C Lee MD

Senior Sponsor: CJ Hauser MD

Newark, NJ

Background: PMN activation depends on Ca^{2+} responses to G-protein coupled mediators. We have shown that PMN Ca^{2+} influx depends on the synthesis of sphingosine 1-phosphate (S1P), which couples depletion of cell Ca^{2+} stores to subsequent Ca^{2+} influx. We hypothesized that inhibition of S1P synthesis by the specific sphingosine kinase inhibitor SKI-2 would inhibit PMN activation and ameliorate lung injury.

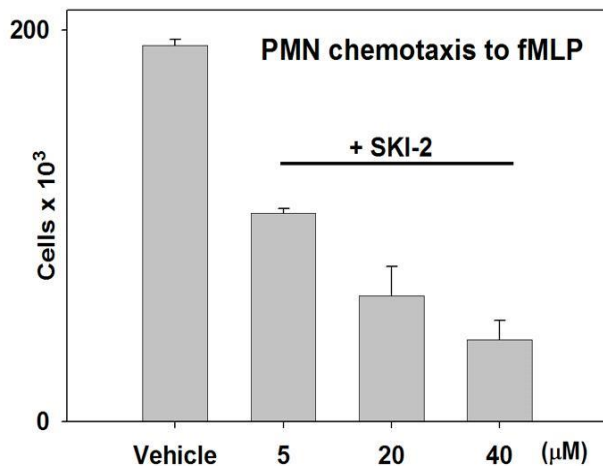
Methods: Human PMN chemotaxis (CTX) was studied in a Modified Boyden Chamber. CD11b expression and lung injury were studied in a rat model of trauma (laparotomy) and hemorrhagic shock (MAP 30-40mmHg x 90min) (T/HS) followed by resuscitation with shed blood only. SKI-2 (30microM) or vehicle were given IP at laparotomy. We assayed CD11b by flow cytometry and lung injury as % Evans Blue (EB) dye leak at 3 hours post-resuscitation.

Results: SKI-2 caused dose-dependent inhibition of CTX (figure) which was significant at 40mM (214 ± 70 vs $89 \pm 17 \times 10^3$ cells/well, $P=0.002$, $n=5-6$).

SKI-2 decreased post-shock CD11b from 322 ± 71 to 225 ± 18 units ($P<0.01$) and decreased lung permeability to EB (12.5 ± 7.2 vs $3.8 \pm 1.7\%$, $P=0.026$, $n=5-7$). No toxic or hemodynamic side effects of SKI-2 were detected.

Conclusions: Modulation of PMN Ca^{2+} entry via inhibition of sphingosine kinase inhibits PMN CTX and CD11b expression and ameliorates

T/HS induced lung permeability. Inhibition of S1P synthesis and effect are important candidate therapies for ALI.



Notes

DIAGNOSIS OF ACID-BASE DERANGEMENTS AND MORTALITY PREDICTION: THE PHYSIOCHEMICAL APPROACH

M. Martin, M.D., J. Murray, M.D., T. Berne, M.D., D. Demetriades, M.D., Ph.D., H. Belzberg, M.D.

Los Angeles County Hospital/USC Medical Center Division of Trauma and Critical Care
Presenter: Matthew J. Martin, M.D.
Senior Sponsor: James A. Murray, M.D.
Los Angeles, California

Introduction: Conventional measures such as anion gap and base deficit can be inadequate for assessing complex acid-base derangements. Physiochemical analysis is an alternative approach based on the principles of electroneutrality and conservation of mass, and may be more accurate for identifying the presence of acidosis and unmeasured anions. We compared the two approaches in a large cohort of trauma ICU patients.

Methods: We analyzed 2152 sets of laboratory values from 427 trauma ICU patients. Data included a blood gas with base deficit (BD), electrolytes, albumin, lactate, and a calculated anion gap (AG). Physiochemical analysis was used to calculate the albumin-lactate corrected anion gap (AGcorr), the apparent and effective strong ion differences, the strong ion gap (SIG), and the BD corrected for unmeasured anions (BDua). Analysis comparing AG and BD to the physiochemical measures was performed on all data and the subset of admission labs only (n=427).

Results: The mean age was 38.2 (+/-18.1) with a mean ISS of 23 (+/- 23). Unmeasured anions as defined by an elevated SIG were present in 92% of patients (mean SIG 5.9 +/- 3.3), while hyperlactatemia and hyperchloremia were present in only 18% and 21% respectively. The physiochemical approach yielded a different clinical interpretation of the acid-base status than the conventional approach in 597 (28%) of the data sets. Lactate was more strongly correlated with the physiochemical measures of SIG (r=0.48) and AGcorr (r=0.47) than with the conventional measures of AG (r=0.24) and BD (r=0.36, all p<0.01). Both admission BD and BDua were significantly elevated in nonsurvivors and logistic regression analysis for prediction of mortality revealed an area under the curve of 0.70 for BDua versus 0.65 for BD (p<0.01). AGcorr and SIG did not differentiate survivors from nonsurvivors in the group as a whole. However, analysis of patients with a normal admission lactate level (n=322) demonstrated a significant difference between survivors and nonsurvivors in SIG (7 vs 5, p=.009), BDua (-4.2 vs -2.0, p=.004) and AGcorr (21 vs 19, p=.04) while the conventional measures of BD and AG showed no significant difference.

Conclusion: Unmeasured anions are the most common component of metabolic acidosis in trauma ICU patients. The physiochemical approach can significantly alter the acid-base diagnosis compared with conventional measures. The SIG, AGcorr, and BDua may be particularly helpful in predicting acid-base derangements and mortality in patients with normal serum lactate levels.

Notes

NEUTROPHIL PRIMING BY POST HEMORRHAGIC SHOCK MESENTERIC LYMPH EXISTS ACROSS SPECIES

EL Sarin MD, EE Moore MD, JB Moore MD, AC Cheng MD, JL Moore, A Banerjee MD, And
CC Silliman MD, PhD
Denver General Health

Presenter: Eric L. Sarin, MD
Senior Sponsor: Ernest E. Moore, MD
Denver, CO

Rodent models have firmly established the role of post hemorrhagic shock mesenteric lymph (PHSML) in neutrophil (PMN) priming. However, concerns raised by the previous identification of the rodent-specific phenomenon of bacterial translocation initiated our interest in a large animal model of hemorrhagic shock (HS). We hypothesized that PHSML and post-shock plasma (PSP) would increase the priming effect of PMNs in a porcine model.

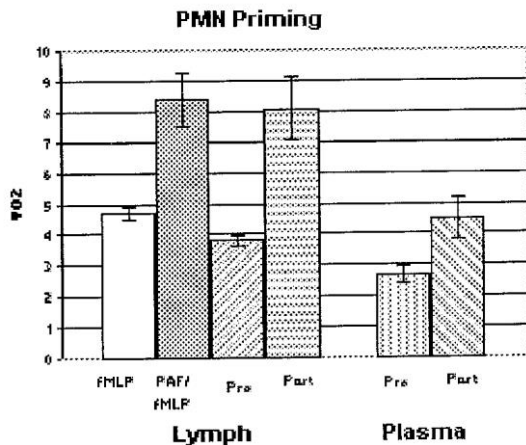
Methods: Adult Male Yorkshire pigs (40-40kg) underwent retroperitoneal cannulation of the cisterna chyli as well as cannulation of the right femoral artery and vein. HS to a MAP of 30mmHg was achieved by venous exsanguination and maintained for 45 minutes. The animals were resuscitated with 50% of the shed blood volume (SBV) and 4xSBV of normal saline over two hours. Priming activity of PHSML and PSP was ascertained by superoxide assay using both human and porcine PMNs.

Results: Treatment of human PMNs with PHSML produced a greater than two-fold increase in superoxide release when compared to PMNs treated with lymph collected prior to shock, 8.07 ± 1.05 nmol/10²/3.75x10⁵ cells/mL/min vs 3.79 ± 0.17 nmol/10²-/3.75x10⁵ cells/mL/min respectively (p=0.007).

Similarly, PSP treatment resulted in a near doubling of superoxide release when compared to control plasma, 4.49 ± 0.69 nmol/10²/3.75 x 10⁵ cells/mL/min vs 2.71 ± 0.27 nmol/10²/3.75 x 10⁵ cells/mL/min respectively (p=0.13). Additionally,

PHSML treatment of porcine PMNs dramatically increased superoxide release over preshock lymph, 4.51 ± 0.42 nmol/10²/3.75x10⁵ cells/mL/min vs 1.06 ± 0.28 nmol/10²/3.75 x 10⁵ cells/mL/min.

Conclusion: These data illustrate that the PMN priming effect of PHSML and PSP is not a species-specific phenomenon. Furthermore, the responsible agent(s) is/are active on both human and porcine PMNs.



Notes

EARLY EXPERIENCE WITH AIRWAY PRESSURE RELEASE VENTILATION IN TRAUMATICALLY INJURED PATIENTS AT RISK FOR ACUTE LUNG INJURY OR ACUTE RESPIRATORY DISTRESS SYNDROME

BW Dart IV, MD; CM Richart, MD; RA Maxwell, MD; DK Brooks, RRT; DL Ciraulo, DO; DE Barker, MD; RP Burns, MD

UT College of Medicine, Chattanooga Unit, Department of Surgery

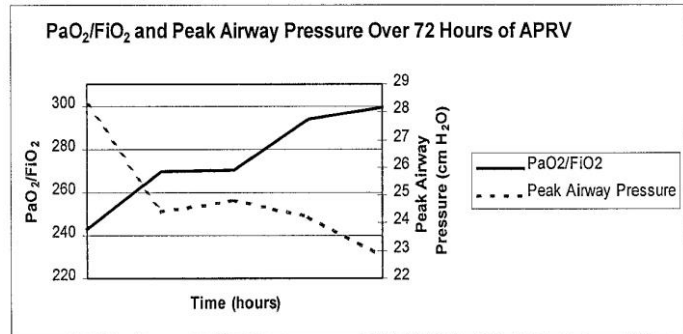
Presenter: BW Dart IV, MD

Senior Sponsor: RA Maxwell, MD
Chattanooga, TN

Background: Despite recommended ventilatory strategies designed to prevent pulmonary dysfunction, acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) remain a major source of morbidity in trauma patients. Optimization of ventilation-perfusion matching while limiting barotrauma can be difficult with conventional modes of positive pressure ventilation. Airway pressure release ventilation (APRV) offers an alternative method of oxygenating and ventilating patients while limiting airway pressures. The purpose of this study was to report our experience with early utilization of APRV in traumatically injured, ventilated patients. **Methods:** Since March, 2003, APRV has been used in randomly selected, intubated, adult, trauma patients with or at risk for ALI/ ARDS following a short period of conventional positive pressure ventilation. Data was obtained prior to and during the 72 hours after switching to APRV. A retrospective analysis of this data including ventilator settings, airway pressures, tidal volumes and arterial blood gases was then performed. Within group analysis of variance was performed with statistical significance set at $p \leq 0.05$ using SPSS version 10.0 (SPSS, Inc.).

Results: Our initial six-month experience included 60 patients ventilated with APRV for a total of 9,332 ventilator hours. Complete data was available on 46 patients (77%) for the first 72 hours of APRV. Prior to APRV, the average $\text{PaO}_2/\text{FiO}_2$ was 243 and the average peak airway pressure was 28 cm H₂O. Peak airway pressure decreased by 19% ($p=0.001$), $\text{PaO}_2/\text{FiO}_2$ improved by 23% ($p=0.017$), and release tidal volumes improved by 14% ($p=0.007$) over the course of the analysis. There was no significant change in the pCO_2 over time.

Conclusion: APRV significantly improved oxygenation by alveolar recruitment and allowed for a reduction in peak airway pressures thereby reducing barotrauma. This relatively new modality had favorable results and appears to be an effective alternative in traumatically injured patients at risk for ALI/ARDS.



Notes

LESSONS LEARNED FROM A NIGHTCLUB FIRE: PART 1- INSTITUTIONAL DISASTER PREPAREDNESS

E.J. Mahoney, M.D.; D.T. Harrington, M.D.; W.L. Biffl, M.D.; T. Oka, M.D.; AND W.G. Cioffi, M.D.

Rhode Island Hospital/Brown Medical School

Presenter: Eric Mahoney, M.D

Senior Sponsor: Walter L. Biffl, M.D.

Providence, Rhode Island

On February 20, 2003 a nightclub fire caused a multiple casualty disaster with 205 victims requiring treatment at area hospitals. In this report, we describe the events; the surgical response at our trauma center; and the lessons learned in disaster preparedness. Information regarding the fire itself was obtained from public access media and state governmental and hospital reports. Patient information was obtained through review of our Trauma Registry, patient records, and questionnaires sent to regional hospitals. Four hundred-twelve patrons were in the building at the time of the fire, of whom 96 died at the scene. One hundred ultimately died (24%). Two hundred-five patients were evaluated at area hospital: 68 at our trauma center and 137 at other area facilities. Ultimately, 93(45%) were treated and released and 112(55%) were admitted. Of the 68 patients evaluated at our trauma center, 17(25%) were treated and released, 43(63%) were admitted, and 8(18%) were transferred. Nineteen of the admitted patients (44%) were intubated for inhalation injury. Examination of available inpatient records identifying %TBSA burns(n=37) revealed 27(73%) with <20%, 8(22%) with 21-40%, and 2(5%) with >40%. The average age was 31 years old (range 18-43). Previous disaster planning drills facilitated a quick institutional response directed by a surgeon. The trauma floor of the hospital, which normally consists of a 10 bed Trauma ICU, an 11 bed step-down unit, and a 22 bed medical-surgical floor, was cleared of patients and converted into a burn unit with 21 ICU and 22 acute beds. Surgical residents were mobilized into teams assigned to the ED, intensive care units, and surgical floors. Surgical staff attendance was staggered initially to assure ongoing management of patients until a 24-hour in-house call schedule was created that allowed for 2 attendings to be on the burn ward at all times. Two operating rooms became dedicated burn rooms where 23 cases were performed the first week. In total, 43 operative procedures and 8 bedside tracheostomies were performed over 8 weeks. Several patients with relatively small TBSA burns required prolonged ventilatory support due to severe inhalation injury. Over the first four weeks, 120 bronchoscopies were performed for pulmonary toilet. There were no deaths.

In this report we describe the events during a multiple casualty disaster caused by a building fire. A concerted institutional commitment allowed for the proper deployment of disaster plans as well as optimal care of a large volume of injured patients.

Notes

EPIDEMIOLOGY OF SUICIDE AND THE IMPACT ON WESTERN TRAUMA CENTERS

T.P.V. Steljes, M.D., L. Fullerton-Gleason, Ph.D., J. Fildes, M.D.
University of Nevada School of Medicine

Presenter: Trina Steljes, M.D.

Senior Sponsor: John Fildes, M.D.

Las Vegas, NV

Background: Suicide represents the eleventh leading cause of death in the United States. Most suicides are a result of self-directed injury, and are commonly treated in trauma centers. The purpose of this article is to characterize the epidemiology of suicide in the Western Mountain states and to describe the impact of these injuries on trauma centers.

Methods: Data was accumulated from the National Trauma Data Base (NTDB), American Association of Suicidology (AAS), and the Center for Disease Control (CDC) Web-based Injury Statistics Query and Reporting System (WISQUARS). Variables analyzed included the epidemiology of suicide in relation to regional location, age, gender, mechanism of injury, mortality, operative procedures, Functional Independence Measure (FIM) score, and length of stay in intensive care versus hospital floors. Statistical analysis was performed on select data points to demonstrate relative significance. Several comparisons were made among intentional injuries directed at oneself, at others, and unintentional injuries with respect to the above variables.

Results: The Western region of the country maintains the highest suicide rates since 1990, with eight out of the ten Western Mountain states having rates twice as high as the national average. Approximately 88% of suicides presenting to trauma centers involve firearms, stabbings, or falls, usually causing injuries that lead to significant morbidity and mortality. Suicide attempts represent 2% of all admissions to trauma centers, with two-thirds of these patients dying while in the hospital. Average length of stay (LOS) in the intensive care unit and on hospital floors was 2.2 and 5.2 days, respectively, which was higher than the average LOS of either unintentional injuries or intentional injuries directed at others.

Conclusion: The Western Mountain states represent an endemic region for suicide. Due to the violent nature of these injuries they often require significant medical care and finances, usually provided by state governments. Suicides also contribute to the morbidity and mortality in a disproportionate manner when compared to other types of injuries. In conclusion, the Western region bears a larger burden than other regions in caring for this subset of patients with respect to medical and financial resources. Increased public awareness and preventative measures can aid in reducing not only the overall incidence of suicide, but also the patient load and costs that are incurred on this country's health care system.

Notes

INTIMATE PARTNER VIOLENCE AND ALCOHOL USE AMONG FEMALE TRAUMA PATIENTS

RL Weinsheimer MD, CR Schermer MD, LH Malcoe PhD, LM Balduf MD and LA Bloomfield MSW

University of New Mexico Department of Surgery and Division of Public Health

Presenter: Robert L. Weinsheimer MD

Senior Sponsor: Carol R. Schermer

Albuquerque, NM

Background: The lifetime prevalence of Intimate Partner Violence (IPV) among women in the US is reported between 18-30%. One-third of female homicide victims are killed by an intimate partner, and alcohol is often involved. Despite these figures, 77% of women have never been screened for IPV. Substance abuse in male partners is known to place women at risk. We questioned the role of female alcohol use on rates of IPV. Our hypotheses were: 1) the prevalence of IPV among women seen in trauma centers is greater than that found in national surveys 2) alcohol problems among abused women and their partners are greater than among non-abused women 3) female trauma center patients support domestic violence screening.

Methods: A survey of 70 consecutive adult female trauma patients admitted to a Level 1 Trauma Center was performed. The survey included questions about past-year and lifetime IPV, female and partner alcohol use, and willingness to participate in IPV screening and referral. The multivariate relationships of female and partner alcohol use and IPV were assessed with logistic regression.

Results: Over one-half of women (52%) reported a lifetime history of IPV with 24% experiencing IPV in the past-year. Drinking problems were identified in 63% of women screening positive for past-year IPV but in only 16% of those screening negative for past-year IPV ($p=.001$). Moreover, drinking problems were identified in 67% of abused women's partners versus only 14% of non-abused women's partners ($p=.001$). Multivariate analysis showed that female problem drinking and partner problem drinking were independent predictors of past year IPV. The majority of women (85%) with a history of IPV felt that it was appropriate for health care professionals to screen for IPV and 72% wished a previous healthcare provider had asked them about it.

Conclusions: Female trauma patients demonstrate a higher prevalence of IPV than the general population. IPV rates appear to be related to both female and partner alcohol misuse. Female trauma patients endorsed domestic violence screening and thus should be screened for domestic violence and alcohol use. Further research is needed to elucidate whether intervention for alcohol misuse has an impact on rates of IPV.

Notes

NON-HELMETED MOTORCYCLISTS, A BURDEN TO SOCIETY? A STUDY FROM THE NTDB

J Hoth, P Kilgo, P Miller, J Hundley, M Chang, J Meredith
Wake Forest University School of Medicine

Presenter: Jonathan Hundley, MD

Senior Sponsor: Michael Chang, MD

Winston-Salem, NC

Introduction: Helmet laws remain controversial despite studies showing a reduction in mortality and severity of closed head injuries after motorcycle accidents. Opponents feel negative findings are a result of biased statistical analyses that fail to account for the impact of alcohol or drugs. Nevertheless, non-helmeted motorcyclists are at high risk for severe injury. As such, the potential for increased resource utilization and financial burden for institutions that care for these patients are immense and represent a societal problem. In this study, we evaluated the effect that helmet use had upon outcome controlling for alcohol or drug use, resource utilization, financial burden, and reimbursement using the National Trauma Data Bank (NTDB). **Methods:** Patients involved in motorcycle accidents were identified using the NTDB over an 8 year period. Group differences were compared using nonparametric Wilcoxon tests for continuous variables and Fisher's Exact Test for dichotomous outcomes. To evaluate the effect that alcohol or drug use had on mortality, logistic regression models, adjusted for their presence, were created. A p value of <0.05 was considered significant.

Outcome	Helmet	No Helmet
Mortality	4.25%	7.07%*
Injury Severity Score	12.0	14.2*
Revised Trauma Score	7.3	6.6*
ICU LOS	1.8	2.4*
Hospital LOS*	6.4	7.0*
% Rehab	12.6	16.5*
Charges	\$32,113	\$34,564*
% Uninsured	15.6	21.0%*
% Alcohol	37.9	61.6*
% Drugs	21.6	28.1*

Results: A total of 9,769 patients were identified by the NTDB of which 6756 (69.2%) were helmeted and 3013 (30.8%) were non-helmeted. See Table (* = $p < 0.05$; LOS-Length of Stay; % Rehab-percent discharged to rehabilitation or nursing facility) When controlling for alcohol or drug use, increased mortality continued to be significantly associated with non-helmet use ($p = 0.004$ and < 0.0001 , respectively). **Conclusion:** Non-helmeted motorcyclists are more severely injured and have worse outcomes than their helmeted counterparts independent of the use of alcohol or drugs. Furthermore, they monopolize more hospital resources, incur higher hospital charges, and frequently require placement after discharge. As non-helmeted motorcyclists frequently do not have insurance, reimbursement in this group of patients is poor. Thus, the burden of caring for these patients is transmitted to society as a whole.

Notes

HYPERGLYCEMIA AND INFECTIONS IN PEDIATRIC TRAUMA PATIENTS

A. Kuhn, D Tuggle, S Jones, R Albrecht, Mantor, N Puffinbarger
University of Oklahoma College of Medicine

Presenter: Ann Kuhn MD

Senior Sponsor: David Tuggle MD

Oklahoma City, OK

Hyperglycemia has been associated with poor outcome and increased mortality in head injured and burned children. There has not been a correlation noted between hyperglycemia and infections in severely injured children.

The trauma registry (Tri-Analytics) of a Level I Trauma Center was queried for all injured children under 13 years admitted between July 1, 1999 and August 31, 2003. The records of the severely injured children (ISS > 15) were examined for survival, age, weight, ISS, infection, length of stay (LOS) and maximum glucose levels within the first 24-hours of injury (D1G). Infection was present if a positive culture was obtained. IRB approval was obtained. Statistics are expressed as mean SD and statistical analysis was performed using a t-test, Fishers Exact test, or Pearson's r correlation where appropriate (SPSS).

Eight hundred eighty eight children under 13 yrs of age were admitted. 109 children had an ISS >15, and 57 survived to discharge with measured D1G. Patients excluded were those who died <72hrs, or LOS <72hrs. The survivors were divided into high glucose (130 mg/dL; n=48) and normal glucose (<130mg/dL; n=9) D1G. There was no difference between the groups with respect to age, weight, incidence of head injury, and ISS (table I). CNS injury did not correlate with hyperglycemia (r=0.15) or infection (r=0.017). An elevated D1G correlated with an increased risk of infection (r=0.24; p<.05) and an increased LOS (r=0.35; p=.005). Elevated admission glucose levels were directly related to the incidence of infection (r=0.46; p<.001).

	n	Age	Weight	LOS	ISS	D1G	CNS Injury	Infections
High D1G	n=48	6.5 ±4.1	27.6±15.3	12.3±11	25.9±12.8	210±59	5	15
Normal D1G	n=9	5.8 ±4.6	25.5±19	4.1±1.2*	22.2±8.4	105±15*4		0*

* indicates p<0.05

These data suggest that severely injured children are often hyperglycemic in the first 24-hours after injury. Hyperglycemia in this study population correlated with an increased incidence of infection and increased length of stay. This suggests that strict control of hyperglycemia in injured children may be beneficial.

Notes

HIGH RATES OF PTSD IMPACT QUALITY OF LIFE OUTCOMES IN INJURED ADOLESCENTS: MECHANISM AND GENDER PREDICT PTSD RISK

T.L. Holbrook, Ph.D., D.B. Hoyt, M.D., R. Coimbra, M.D., B. Potenza, M.D., M. Sise, M.D.,
J.P. Anderson, Ph.D.

University of California, San Diego

Presenter: Troy L. Holbrook, PhD

Senior Sponsor: David B. Hoyt, M.D.

San Diego, CA

Introduction: Injury is the leading cause of death and functional disability in adolescent children. Little is known about quality of life and psychological outcomes after trauma in adolescents. The Trauma Recovery Project in Adolescents (TRP-A) is a prospective epidemiologic study designed to examine multiple outcomes after major trauma in adolescents aged 12 to 19 years, including quality of life (QoL) and psychological sequelae such as post-traumatic stress disorder (PTSD). The specific objectives of the present report are to examine early PTSD rates and the association of PTSD with QoL outcomes in injured adolescents.

Methods: 401 eligible trauma patients aged 12 to 19 years triaged to 5 participating trauma center hospitals in a regionalized trauma system were enrolled in the study (ISS \geq 4). QoL was measured using the Quality of Well-being scale (QWB) scale, a sensitive and well-validated functional index (range; 0 = death to 1.000 = perfect functioning). Early PTSD (before discharge) was diagnosed with the Impact of Events Scale Revised. Scores of 24+ were used to diagnose PTSD. Patient outcomes were measured at discharge, and at 3, 6, 12, 18 and 24 months after discharge.

Results: Early PTSD was diagnosed in 40% of adolescent trauma survivors. PTSD status was associated with large QoL deficits during follow-up.

QWB SCORE

	3-Month	6-Month	12-Month	24-Month
PTSD+	0.667**	0.704***	0.718**	0.725**
PTSD-	0.710	0.742	0.757	0.769

P < 0.01, *P < 0.001

Female gender and violent mechanism predicted PTSD risk (47% female vs. 36% male, Odds Ratio (OR) = 1.6, P < 0.05; Violence 54% vs. 38%, OR = 1.9, P < 0.01).

Conclusions: Adolescent trauma survivors have high rates of PTSD. PTSD severely impacts QoL outcomes and is associated with female gender and mechanism in adolescents. Early recognition and treatment of PTSD in seriously injured adolescents will improve outcomes.

Notes

BOTH TH1 AND TH2 TYPE CYTOKINES PROMOTE IGA TRANSPORT

LN Diebel, MD, DM Liberati, MS, E Hamamdjian, CA Diglio, PhD, WJ Brown, PhD
Wayne State University

Presenter: Lawrence N Diebel, MD

Senior Sponsor: Lawrence N Diebel, MD

Detroit, MI

Introduction

Secretory IgA (sIgA) is the first line of immune defense against antigens at mucosal surfaces. It is produced by plasma cells principally as a dimer (dIgA) which then binds to its receptor (pIgR) located at the basolateral surface of mucosal epithelial cells. It is then transcytosed through these cells and released at the apical surface as sIgA. Th2 type cells stimulate B cells to produce IgA, while Th1 type cells are not effective for production of IgA. The impact of Th1 and Th2 type cytokines on IgA transcytosis is unknown and was studied *in vitro*.

Methods

Human HT29 cell monolayers were established in a two-chamber cell culture system and exposed to interferon gamma (IFN- γ , Th1 cytokine), interleukin 4 (IL-4, Th2 cytokine), or both for 48 hours. Cells not exposed to either cytokine served as control. Dimeric IgA was then added to the basal chamber and allowed to maximally bind to the pIgR receptor. IgA transcytosis was determined by ELISA from apical chamber media. pIgR expression was determined by immunofluorescent staining.

Results	IgA transcytosis (mean + SD, $\mu\text{g/ml}$)		pIgR expression (%)
	3 hr	12 hr	
Control (n=10)	1.2 \pm 0.7	2.4 \pm 0.4	3.7
IFN- γ (n=10)	10.2 \pm 2.9*	21.4 \pm 3.1	66.3\$
IL-4 (n=3)	13.2 \pm 0.4*	16.3 \pm 0.6	23.7\$
IFN- γ /IL-4 (n=3)	16.5 \pm 0.5**	24.3 \pm 0.5#	71.5\$

*p < 0.001 vs. control, **p < 0.001 vs. all groups at 3 hrs,

#p < 0.001 vs. control, IL-4 at 12 hrs, \$p < 0.001 vs. control

Conclusions

Unlike the disparate effects of Th1 and Th2 type cytokines on IgA production, there was a synergistic effect of IFN- γ and IL-4 on pIgR expression and IgA transcytosis. Stimulation of mucosal T cell populations may increase luminal IgA levels and thereby protect against mucosal associated pathogens in the critically injured.

Notes

PREVALENCE AND RISK FACTORS FOR ACUTE STRESS DISORDER IN INJURED CHILDREN

G. Saxe, MD; C. Lopez, MD; E. Hall, MA; J. Kaplow, PhD; K. Koenen, PhD; D. Bartholomew, BA; A. Miller, MA; M. Bosque, PhD; I. Erikson, RN, MS; L. Allee, MSW; S. Moulton, MD
Boston University Medical Center

Presenter: Steven L. Moulton, M.D.

Senior Sponsor: James Davis, M.D.

Boston, MA

To assess the prevalence of and risk factors for Acute Stress Disorder (ASD) in injured children who are hospitalized.

Children hospitalized with one or more injuries were assessed with the Child PTSD Reaction Index, the Diagnostic Interview for Children and Adolescents (DICA), and the Child Stress Disorders Checklist (CSDC), amongst other measures of stress and psychopathology.

Assessments were conducted during the initial hospitalization, once each child was deemed medically stable. Children were excluded from the study if the child or primary caregiver did not speak sufficient English to understand the study materials or if the child had an admission Glasgow Coma Score < 7.

Forty-eight children (ages 7-18 years, mean 13 +/- 3) completed the acute interview; 72% were male. The mechanisms of injury were: 34% pedestrian struck, 21% MVC, 17% falls, 15% penetrating, 8% bike accidents, 2% suffocation, and 2% assaulted. The mean injury severity score was 8.7 +/- 7. The mean length of stay was 4.6 days (range: 1-26). Table 1 lists the percentage of participants who met DSM IV criteria for Acute Stress Disorder (ASD) and the various ASD symptom clusters.

Table 1

ASD Dx/Cluster	Percentage of Subjects	Number of Participants (N=48)
ASD Dx	23%	n = 11
Dissociation	65%	n = 31
Re-experiencing	73%	n = 35
Avoidance	58%	n = 28
Hyper-arousal	71%	n = 34

Risk factors for acute stress included parents' level of acute stress, the child's report of pain, and level of family stress. Injury Severity Score was not related to acute stress symptoms in this sample of injured children. Risk factors such as level of anxiety of caregiver, child's experience of pain and level of family stress correlated with the display of acute stress symptoms more than injury severity. Acute stress symptoms have been shown to be an important factor in the etiology of Posttraumatic Stress Disorder (PTSD). PTSD symptoms cause tremendous morbidity and may persist for many years. Further investigation and greater understanding of risk factors for Acute Stress Disorder may facilitate the design of acute interventions to prevent the long-term negative outcomes of traumatic

Notes

INSTITUTIONAL PRACTICE GUIDELINES ON MANAGEMENT OF PELVIC FRACTURE RELATED HEMODYNAMIC INSTABILITY: DO THEY MAKE DIFFERENCE?

Z Balogh, M Heetveld, S D'Amours, E Caldwell, G Schlaphoff, I Harris, M Sugrue
Trauma Department, Liverpool Hospital, Sydney, Australia

Presenter: Zsolt Balogh, MD

Senior Sponsor: Michael Sugrue, MD
Sydney, New South Wales, Australia

Background: The management of patients with hemodynamic instability related to pelvic fracture is a major challenge with high morbidity and mortality. Evidence based institutional practice guidelines (PG) were developed as a strategy to optimize the care of these patients. The aims of this study were to evaluate adherence to the new PG and compare the outcomes before and after their implementation.

Methods: Major blunt trauma patients (ISS > 15) with hemodynamic instability [initial base deficit (BD) > 6 mEq/L or received > 6 units of packed red blood cells (PRBC) during the first 12 hours] related to pelvic fracture were investigated. Patients presenting with ongoing hemorrhage from other body regions or with severe head injury [Glasgow Coma Scale (GCS) < 9] were excluded. The Pre-PG group (n=17) were of patients managed during the 18 months ending on December 31, 2001. The Post-PG group (n=14) consisted of patients managed during subsequent the 18 months. Demographics, ISS, shock severity, resuscitation and outcome data were prospectively collected. The adherence to the key steps of PG was evaluated retrospectively in the Pre-PG and prospectively in Post-PG including: abdominal clearance with diagnostic peritoneal aspiration/lavage or ultrasound (AC, < 15 min), non-invasive pelvic binding (PB, < 15 min), pelvic angiography (PA, < 90 min after admission) and minimal invasive orthopedic fixation (MIOF, < 24 hours). Data are presented as mean +/- SEM or percentages.

Results: demographics, injury and shock severity were similar in the Pre- and Post-PG groups.

Group	Age(yrs)	Male%	ISS	BD(mEq/L)	SBP(mmHg)	GCS	PRBC(U/12h)
Pre-PG	40 ± 4	71	39 ± 3	9 ± 1	116 ± 7	12 ± 1	9 ± 2
Post-PG	42 ± 6	71	37 ± 4	10 ± 1	112 ± 6	12 ± 1	9 ± 2

The compliance with the PG and outcomes are depicted below:

Group	AC%	PB%	PA%	MIOF%	PRBC U/24h	ICU LOS(days)	Mort%
Pre-PG	65	0	30	52	16 ± 2	6 ± 2	35
Post-PG	100	86*	93*	86	11 ± 1*	8 ± 1	7*

*Denotes p < 0.05 based on t-test or Chi-square test.

Conclusions: The adherence to the PG as a reflection of optimal management was significantly improved. PG focusing particular on timely hemorrhage control reduced the 24-hour transfusion requirements and the mortality rate in the post-PG group.

Notes

ARE PLAIN RADIOGRAPHS OF THE SPINE NECESSARY DURING EVALUATION AFTER BLUNT TRAUMA: EVALUATION OF THE ACCURACY OF SCREENING TORSO COMPUTED TOMOGRAPHY IN THORACIC/LUMBAR SPINE FRACTURE DIAGNOSIS

GE Berry, MD., PR Miller, MD., S Adams, BS., M Harris, MD., CA Boles, MD., E Carroll, MD., JJ Hoth, MD., JW Meredith, MD., MC Chang, MD.
Wake Forest University School of Medicine

Presenter: GE Berry, MD
Senior Sponsor: PR Miller, MD
Winston-Salem, NC

Introduction: Fracture of the thoracolumbar (TL) spine is reported in 8-15% of victims of blunt trauma. Current screening of these patients is done with conventional radiography. This may require repeated sets of films and take hours to days. It is imperative that these patients get timely, accurate evaluation to allow for treatment planning and early mobilization and alternatives to plain films would aid in this. The objective of this study is to determine if the data obtained from admission chest/abdomen/pelvis (CAP) CT scans after blunt trauma has utility in thoracolumbar spine evaluation

Methods: The records of all patients admitted to a Level 1 Trauma Center over a 2 month period who underwent CAP CT were reviewed for the presence of TL spine fracture, time to completion of plain film evaluation, and clinical course. Admission CT scans were reviewed by an attending radiologist who was blinded to any previously diagnosed spine fractures. The two tests were compared for diagnostic accuracy and their discriminatory ability was compared using receiver operating characteristic (ROC) curves. Significance was defined as $p < 0.05$.

Results: One hundred three patients were admitted from 1/1/03-2/28/03 and underwent CAP CT scan as part of their initial trauma evaluation. Of these, 26 (25%) had thoracolumbar fractures. 7 (27%) were not seen on plain x-rays taken during the trauma evaluation. Average time until plain film completion in this group was 8 hours (range 44 minutes -38 hours). All 26 (100%) patients with fractures, however, were diagnosed on CT scan performed shortly after admission. Of the remaining 77 patients, 2 (2.6%) were falsely read as positive for fracture on CT. Sensitivity and specificity of CT scan for thoracolumbar fracture were excellent at 100% and 96%, respectively, with a negative predictive value of 100%. Plain x-rays were 73% sensitive, 100% specific and had a negative predictive value of 92%. Area under the ROC curve for CT was 0.98, but for plain film was 0.86 ($p < 0.02$)

Conclusion: Admission CAP CT obtained as part of the routine trauma evaluation is more sensitive than plain x-rays for evaluation of the TL spine after blunt trauma. In addition it can be done faster. Omission of plain x-rays will expedite accurate evaluation allowing earlier treatment and mobilization.

Notes

THE ROLE OF REPEAT ANGIOGRAPHY IN THE MANAGEMENT OF PELVIC FRACTURES

M Shapiro, A McDonald, D Knight, J Johannigman, J Cuschieri
University of Cincinnati

Presenter: Mark Shapiro, MD
Senior Sponsor: Jay A. Johannigman
Cincinnati, Ohio

Introduction: Angiographic embolization has emerged as the treatment modality of choice for bleeding pelvic fractures. Recent studies have demonstrated sensitivities of pelvic angiography to be 90-95%. However, several non-therapeutic and false negative angiograms are performed. The purpose of this study is to identify potential indicators for ongoing pelvic hemorrhage despite initial therapeutic or non-diagnostic angiography.

Methods: The trauma registry of an urban Level I trauma center was used to identify patients with pelvic fractures between January 2000 and December 2002. Records were reviewed for demographics, severity of injury, hemodynamic status, initial and subsequent base deficit, blood and fluid requirements, length of stay, and mortality. Statistical analysis was performed using Student's t-test, and univariate and multivariate analysis, significance was assigned to $p < 0.05$.

Results: During the study period, 4918 patients were admitted with traumatic injuries. Five hundred forty four (11.1%) patients had pelvic fractures. Angiography was performed in 26 (4.8%) of these patients. Arterial hemorrhage was diagnosed initially on 15 (57.8%) patients requiring embolization. Three (20%) of these embolized patients required repeat angiography and embolization due to ongoing pelvic hemorrhage. Of the initial 11 patients with negative angiograms, 5 (45.4%) had repeat angiograms due to continued hypotension and acidosis. Four (36.7%) of these 11 patients were found to have arterial hemorrhage requiring embolization. Of the 7 (26.9%) patients requiring repeat angiography for control of ongoing pelvic hemorrhage, three independent factors were predictive: continued or recurrent hypotension ($SBP < 90$), absence of intraabdominal or intrathoracic bleeding, and persistent base deficit of -10 for greater than 6 hours. The presence of all three independent predictors was associated with a 97% probability of pelvic bleeding ($p=0.001$).

Conclusion: Angiographic embolization is highly effective in controlling arterial bleeding associated with pelvic fractures. However, repeat angiography should be performed in patients with pelvic fractures with ongoing evidence of hemorrhage demonstrated by persistent base deficit and hypotension once other potential sources of bleeding have been excluded.

Notes

UNSAFE AT ANY AGE: A RETROSPECTIVE REVIEW OF ATV INJURIES IN TWO LEVEL I TRAUMA CENTERS 1995-2002

Lou M. Smith, M.D., Alan B. Marr, M.D., Kevin Swan, B.S., Gloria Caldito, Ph.D., Michelle A. Pittman, M.D., Rosa Vidal, M.D., William R. Wise, M.D. and Frederick A. Moore, M.D.
Louisiana State University Health Sciences Center in Shreveport, La. and Memorial Hermann Hospital, Houston, Texas

Presenter: Michelle A. Pittman, M.D.

Senior Sponsor: Frederick A. Moore, M.D.
Houston, Texas

Introduction: All terrain vehicles (ATVs) are popular recreational and utility vehicles weighing up to 600 lbs. and capable of speeds up to 60mph. Mid-1980s, Cogbill, et. al presented data at the WTA and published regarding dangers associated with three-wheelers (JAMA 1985;254(8):1037.) Three-wheeler sales were subsequently banned by the Consumer Product Safety Commission in 1988 due to a high rate of injury and death. Safety laws governing ATV use vary, but in both Louisiana and Texas, there are no age restrictions and safety education/equipment is required by law only on Texas public lands.

Purpose: To retrospectively review injured patients admitted to two level I trauma centers with regard to demographics, mechanism, type and severity of injuries to assess prevention/ safety strategies.

Methods: Retrospective chart and registry review of pts. admitted January 1995-August 2002. Pts. were identified by trauma registry. Analysis was performed with the SAS V8.2 statistical computing and p values < 0.05 were deemed significant.

Results: 208 pts. were identified. There were no statistically significant differences in the pts. from the two different institutions with regard to: age, sex, race, type of ATV (3 vs. 4 wheels), injury mechanism, type of injuries, ISS, and ethanol use.

Males were injured more than females (75.5%). 84% of the patients were white. Mean rider age was 23+/-13. The average ISS was 12.3+/-9 and the mean GCS was 13.1+/-3.7. The injury mechanisms were: loss of stability (33%), separation of rider/ATV (32%); ATV vs. stationary object (27%) and other (9%). Using nonparametric regression analysis, there was no difference in ISS between 3 and 4 wheeled ATV (p=.73). The average ISS for ages 12-15 yrs. was significantly higher than other age groups including young children and those old enough to have some driving experience. (14.5 vs. 11.5 p=0.04, Wilcoxon rank-sum test [Wr-st]). This age group also had a significantly more major head injury (40.4% vs. 21.8%, p=.009, Wr-st.) and less spinal cord (3.9% vs. 15.4%, p=.03, Wr-st) and pelvic injury (0% vs. 9%, p=.02 Wr-st.) The avg. initial GCS in pts. age 12-15 was 12.3 vs. 13.4 in all others (p=.03 Wr-st.)

Conclusions: Four wheel ATVs are not safer than the banned 3 wheeler. Adolescents age 12-15 have a higher ISS and are more likely to sustain head injuries. If states continue to allow young riders access to ATVs, age restrictions, rider supervision, and mandatory safety education/equipment (such as helmets) for the under 16 age group may prevent the more devastating injuries.

Notes

PREDICTING SIGNIFICANT TORSO TRAUMA IN MOTOR VEHICLE CRASHES: A TOOL TO FACILITATE AUTOMATIC CRASH NOTIFICATION SYSTEMS

R. Nirula, K. Brasel, D. Talmor

Department of Surgery, Medical College of Wisconsin

Presenter: Ram Nirula, MD, MPH Senior Sponsor: Karen Brasel, MD, MPH
Milwaukee, WI

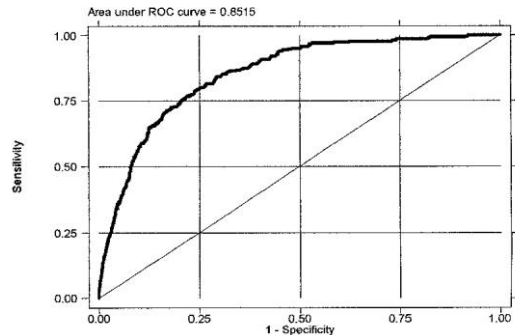
Background: Inaccurate triage for motor vehicle related trauma remains problematic. Identification of specific crash and occupant characteristics associated with an increased risk of thoracoabdominal injury would permit the development of automatic crash notification systems to improve response times and emergency resource utilization. Motor vehicles equipped with sensors to detect these crash characteristics could relay this information via global tracking satellite systems so that appropriate medical resources could be deployed. Currently there is considerable debate as to the proprietary nature of the information contained within these vehicle sensors, which may serve to undermine widespread implementation of automatic crash notification systems. Our objective was to determine the relationships between specific crash and occupant characteristics to significant thoracoabdominal trauma in order to develop a predictability model of torso injury related to motor vehicle crashes.

Methods: We reviewed the National Automotive Sampling System (NASS) from 1993 to 2001 focusing upon injured drivers only. The relationship between significant chest (chest AIS>2) and/or significant abdominal (abdomen AIS>2) injury and occupant as well as crash related variables was assessed using multivariate logistic regression while controlling for covariates. A backwards, stepwise approach was used to develop the predictive model. A receiver operating curve was generated to determine the sensitivity and specificity of the final model.

Results: There were a total of 56,466 drivers within the weighted NASS dataset which is equivalent to a population of 28,877,696 drivers. Airbags deployed in 21.3% of crashes and drivers were restrained in 53.4% of cases. The primary direction of impact for the majority of crashes (60.3%) was frontal. Variables found to be associated with increasing or decreasing the odds of significant thoracoabdominal trauma included age, ejection, braking, velocity, restraint use, and vehicle type ($p<0.05$). The area under the ROC for the final model was 85.2% (figure 1).

Conclusions: We have developed an accurate probability model for thoracoabdominal injury based upon occupant and crash characteristics. This model may be instrumental in improving the triage of patients to appropriate medical care when utilized with a global automated crash notification system. Further studies in this field will help affect the political will to ensure widespread implementation of automated crash notification systems.

Figure 1: ROC of Torso Injury Model



Notes

LAPAROSCOPY IS SUFFICIENT TO EXCLUDE OCCULT DIAPHRAGM INJURY AFTER PENETRATING THORACOABDOMINAL TRAUMA

R. Friese, M.D., C. Cohn, M.D., and L. Gentilello, M.D.

University of Texas Southwestern Medical Center

Presenter: Randall S. Friese, M.D.

Senior Sponsor: Larry M. Gentilello, M.D.

Dallas, Texas

Background: Occult diaphragm injury sustained from penetrating thoracoabdominal trauma can be difficult to diagnose. Furthermore, missed diaphragm injury may remain occult with clinical presentation delayed for months to years. Although laparoscopy has been proposed for diaphragmatic evaluation after penetrating injury, without a confirmatory procedure or long term follow up true sensitivity and specificity remain unknown. The purpose of this study was to determine the sensitivity and specificity of laparoscopy for the detection of diaphragm injury after penetrating thoracoabdominal trauma by performing a confirmatory operative procedure on every patient. We hypothesized that laparoscopy alone is sufficient to exclude diaphragm injury after penetrating thoracoabdominal trauma.

Methods: Prospective case series of 31 hemodynamically normal asymptomatic patients with thoracoabdominal penetrating injuries. All patients underwent diagnostic laparoscopy to evaluate the diaphragm for the presence of injury. All patients then underwent confirmatory celiotomy (n=27) or video-assisted thoracoscopy (n=4).

Results: All patients were male aged 18-54 years. There were 30 stab wounds and one gun shot wound. The average lowest preoperative systolic blood pressure recorded was 120 ± 18 mmHg. Penetrating injuries were stratified by anatomic location

		Diaphragm Injury	
		Present	Absent
Laparoscopy	Positive	6	0
	Negative	1	24

(anterior 14, posterior 6, flank 8 or not specified 3). There were six true positive, 24 true negative, no false positive, and one false negative result. Specificity, sensitivity, and negative predictive value were 100%, 86%, and 96% respectively. The single missed injury occurred in a patient with hemoperitoneum from associated splenic injury which warranted celiotomy.

Conclusions: In asymptomatic hemodynamically normal patients with penetrating thoracoabdominal injury laparoscopy alone is sufficient to exclude diaphragmatic injury in the absence of associated intraperitoneal injury that would mandate exploration.

Notes

ENTERAL ARGININE, AN IMMUNE ENHANCING AGENT, IMPAIRS GUT BARRIER FUNCTION FOLLOWING MESENTERIC ISCHEMIA/REPERFUSION

R Kozar, S Schultz, E Verner-Cole, R Bick, R DeSoignie, B Poindexter, F Moore
University of Texas - Houston

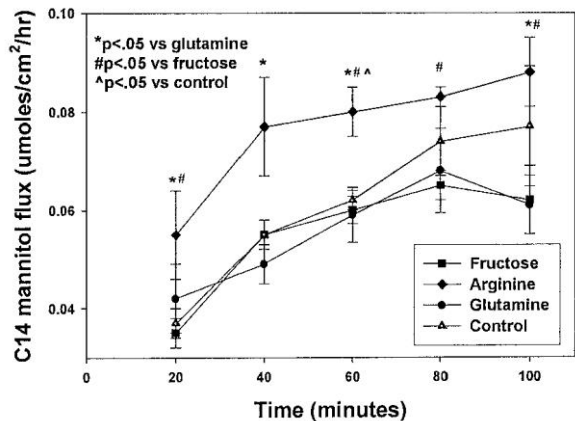
Presenter: Rosemary Kozar, MD PhD
Senior Sponsor: Frederick Moore, MD
Houston, Texas

Immune enhancing agents (IEA) when added to enteral diets have been shown to improve patient outcome. Recent reports, however, suggest that arginine may be harmful. One potential mechanism is via alteration in the intestinal barrier function. We have previously demonstrated that glutamine maintains barrier function in a rodent model of mesenteric ischemia/ reperfusion (I/R). The purpose of the current study was to determine if the IEAs glutamine and arginine differentially modulate barrier function.

Methods: At laparotomy, rats had jejunal sacs filled with 10 mm arginine (actively absorbed, not metabolized) glutamine (actively absorbed, metabolized), fructose (passively absorbed, metabolized), or magnesium sulfate (not absorbed, osmotic control) followed by superior mesenteric artery clamping for 60 minutes and 2 hrs of reperfusion or sham laparotomy. Jejunum was harvested for deconvolution microscopy, fluorescent measurement of F:G actin ratio, or determination of intestinal permeability in a Ussing chamber. Data analyzed by ANOVA, $n > 6$ /group.

Results: Deconvolution microscopy revealed preservation of the actin cytoskeleton by glutamine and fructose but disruption by arginine. Controls demonstrated moderate disruption though less than arginine. The F:G actin ratio was significantly higher for fructose (0.734 ± 0.43) and glutamine (0.605 ± 0.042) compared to arginine (0.266 ± 0.059) and controls (0.340 ± 0.016). Intestinal permeability was highest for arginine and lowest for glutamine and fructose.

Conclusions: Arginine resulted in disruption of the actin cytoskeleton and enhanced intestinal permeability while glutamine and fructose were protective. The IEA arginine appears harmful, possibly by increasing the metabolic demand of the gut. This has important clinical implications in critically injured patients.



Notes

LIPOPOLYSACCHARIDE-INDUCED NEUTROPHIL ACTIVATION AND PROINFLAMMATORY MEDIATOR SYNTHESIS IS DOWNREGULATED BY PHOSPHODIESTERASE INHIBITION: ROLE OF PENTOXIFYLLINE

R Coimbra MD, PhD, W Loomis BS, H Melbostad BS, DB Hoyt MD

Division of Trauma University of California San Diego

Presenter: Raul Coimbra, MD, PhD

Senior Sponsor: David B. Hoyt, MD

San Diego, CA

Excessive production of reactive oxygen species by PMN's is associated with tissue damage during inflammation. LPS interacts with the cell surface receptor CD14 which generates transmembrane signals through Toll-like protein 4 leading to mitogen activated protein kinase (MAPK) p38 activation, cytokine synthesis, PMN Beta2-integrin expression and oxidative burst. Phosphodiesterase inhibition decreases proinflammatory cytokine production and tissue injury after LPS challenge. Its effects on PMN function after LPS stimulation, however, have not been fully investigated. We hypothesized that LPS-induced TNF-alpha synthesis and subsequent PMN Beta2-integrin expression and oxidative burst are downregulated by concomitant treatment with the phosphodiesterase inhibitor pentoxifylline (PTX).

Whole blood was incubated with HBSS (control), LPS (100 microg/mL) and LPS+PTX (2 mM) for 60 min at 37C. Oxidative burst, CD14, and CD-11b expression were measured by flow cytometry. Serum TNF-alpha levels were measured by ELISA. In an attempt to localize the site of action of PTX (proximal or distal to PKC) cell surface receptors were bypassed by PMA (1 microg/mL) stimulation and oxidative burst was measured with and without PTX.

Upregulation of CD14 expression was observed in LPS and LPS+PTX groups. LPS stimulation caused a significant increase in PMN oxidative burst, CD11b expression, and TNF-alpha serum levels. In addition, PMA stimulation also caused significant increase in oxidative burst compared to controls. Concomitant addition of PTX to LPS led to a significant decrease in PMN oxidative burst (65%; $p < 0.0001$), PMN CD11b expression (20%; $p = 0.012$), and TNF-alpha levels (93%; $p < 0.0001$). Also, PMA-induced PMN oxidative burst was significantly decreased by PTX (80%, $p < 0.0001$).

These results suggest that PTX-inhibition of oxidative burst occurs distal to PKC and may be either due to direct inhibition of NADPH oxidase or inhibition of MAPK phosphorylation, leading to decreased adhesion molecule expression and TNF-alpha synthesis. In conclusion, PTX downregulates PMN activation and proinflammatory cytokine production following LPS stimulation. Its use in clinical scenarios in which PMN's are primed may be clinically relevant.

Notes

MEDICARE'S BUNDLING OF TRAUMA CARE CODES VIOLATES RELATIVE VALUE PRINCIPALS

R Reed, F Luchette, K Davis, T Esposito, S Poulakidas, J Santaniello, G Silver, K Pyrz, and R Gamelli

Department of Surgery, Loyola University Medical Center

Presenter: R. Lawrence Reed, MD

Senior Sponsor: R. Lawrence Reed, MD

Maywood, IL

Background: Since January 1, 1992, Medicare has paid for physician services using a resource-based relative value scale (RBRVS). Subsequently, Medicare introduced the Correct Coding Initiative (CCI), designed to detect "inappropriate" coding by physicians who would separately bill procedures normally included as components of other procedures. Initially unavailable to physicians, these CCI edits have recently been made freely available through Medicare's website, consisting of rows of paired CPT codes. Payment is not provided for the code in Column 2 ("component") if a charge is submitted for the code in Column 1 ("comprehensive"). We hypothesized that Medicare's rebundling process ignored the relative value concepts originally applied to physician services and procedures.

Methods: The CCI tables were downloaded from Medicare's website and imported into a relational database (Microsoft Access). These were linked to a previously developed physician charge entry database. Each comprehensive code's RVUs were compared to those for the purported component code to determine the RVU difference. The CPT codes performed by our Trauma, Burn, and Critical Care Surgeons (TBC) were analyzed to determine which services had been undervalued.

Results: 209,422 active CCI edits were downloaded from Medicare's website. Of these, 674 of the comprehensive codes were services performed by the TBC group. Surprisingly, there were 3,012 "component" CPT codes with total RVUs greater than the RVUs of their paired "comprehensive" codes. Indeed, individual pair analysis indicates that some of the pairings appear erroneous. For example, direct repairs of a carotid artery (CPT 35261, 26.85 RVUs) is considered a component in the placement of a pulmonary artery (Swan-Ganz) catheter (CPT 93503, 3.76 RVUs) and will not be paid separately when billed simultaneously with 93503. If the undervalued comprehensive codes had been valued at their highest component's value over the past 4 years, the minimum additional revenue would have been over \$2.9 million or an average of \$101,574.30 per surgeon per year.

Conclusion: A relative value scale depends upon equity in value units. Arbitrary designations of procedures as being components of other procedures without consideration of the inherent worth violates the RVU scale and results in severe physician underpayment.

Notes

REPAIR OF DUODENAL INJURIES WITH ELASTIN BIOMATERIAL HETEROGRAFTS IN A PORCINE CONTAMINATED ABDOMINAL TRAUMA MODEL

P. Cordts, COL, MC; M. Mayfield, CPT, MC; J. Freeman, MD; M. Sawyer, MD; C. Morrison, LTC, MC; R. Probst, MAJ, VC; P. Cordts, COL, AN; R. McDonald, MAJ, AN; C. Campbell, MSC; K. Gregory, MD; C. Uyehara, PhD

Tripler Army Medical Center, HI; William Beaumont Army Medical Center, El Paso, TX

Presenter: Paul R. Cordts, COL, MC

Senior Sponsor: Jeffrey Lau, MD

El Paso, TX

Objective: High velocity weapons may create duodenal injuries which are difficult to repair by primary closure. The purpose of this study was to determine the efficacy of elastin biomaterial heterografts in repair of complex duodenal injuries in a porcine abdominal trauma model.

Methods: Duodenal injury was created via excision of duodenal tissue (50% circumference, 4 cm length, 3-8 cm distal to pylorus) in 30 Yucatan miniswine (*Sus scrofa*). Pigs were randomized into 3 subgroups: Group I - elastin patch (Oregon Medical Laser Center, Portland, OR) repair alone; Group II - elastin patch repair followed by exposure to bacterial contamination (10^5 E. Coli and *S. aureus* for 30 minutes), and Group III - antibiotic-impregnated (cefotetan) elastin patch with bacterial contamination. Elastin patches were sutured over duodenal defects and covered with omentum. Post-operatively, miniswine were observed with endpoints of survival, weight gain, sepsis and bowel obstruction. At euthanasia, each underwent UGI series and culture of the peritoneal cavity/paraduodenal area. Light microscopy (H&E and Verhoeff/Van Gieson's stains for elastin) and transmission electron microscopy (TEM) with tannic acid elastin stains were performed.

Results: Of 30 duodenal injuries repaired, one failed due to technical error. All remaining 29 miniswine thrived until tissue harvest (average: 8 weeks). All 29 pigs resumed normal growth ($0.32 \pm 0.03\%$ of initial body weight/day) after implant. No intra-abdominal infection or bowel obstruction occurred. UGI studies revealed prompt flow through patched duodenal segments. Stenosis averaged less than 5% with no statistical difference (ANOVA) between subgroups. Peritoneal/paraduodenal cultures were negative for contaminating bacteria and contamination did not influence patch incorporation. Tissue examination revealed microscopic incorporation of elastin from the patch in repaired duodenal segments as early as 6 weeks post-implantation. Although healing was not complete after 9 weeks (H&E stains showed focal disruption of muscular layer with fibrosis, inflammation and foreign body giant cell reactions), near-complete mucosal coverage occurred. TEM showed contact projections and bridges between elastin, fibroblasts and collagen.

Conclusion: Elastin patches functioned effectively in the duodenum, even with gross bacterial contamination. The benefit of an antibiotic-impregnated patch is undefined. The results of this study suggest that heterograft implants may be a viable option for management of complex bowel trauma.

Notes

FAMILIES' PERCEPTION OF THE VALUE OF TIMED DAILY "FAMILY ROUNDS" IN A TRAUMA ICU

A.J. Mangram, M.D., T. McAuley, M.D., D. Villarreal, M.D., J. Berne, M.D., D. Howard, R.N., A. Dolly, R.N., S. Norwood, M.D.

Methodist Health System

Presenter: Alicia Mangram, M.D.

Senior Sponsor: Clyde Edward McAuley, M.D.

Dallas, Texas

Objective – A significant number of trauma patients are initially admitted to the intensive care unit (ICU). These patients are admitted by the trauma surgeon often with one or more consultants (i.e., orthopedic surgeon, and neurosurgeon). Family members typically arrive sometime later, receive information regarding the patients' condition at that time, and then are updated usually sporadically. At our level I trauma center, the trauma team has developed 'Family Rounds' (FR). Our FR occur at the same time every day, in the ICU. During FR the surgeon updates family members, in the room with the patient, and all questions are answered at this time. This is the only time the family will talk with the trauma surgeon during the day, unless there is a special circumstance. We sought to determine if the scheduled daily FR are valued by family members, improve communication, and favorably impact the family-trauma surgeon relationship.

Design – mailed surveys, which contained 19 items of which 13 were closed-ended questions using the Likert scale.

Participants – Two hundred and fifty surveys were sent to family members of trauma patients who were admitted for > 3 days in ICU.

Main Outcome Measures – Overall patient satisfaction with designed FR.

Results – A total of 55 (22%) families responded, 47.3% male, 73.6% Caucasian, 13.2% Hispanic, and 9.4% Black. Responders varied in age from 18 - >60 years. Parents, spouses, and children made up the majority of responders. We combined percents for excellent-good responses and found 86.5% of families looked forward to having a specific time of day to speak with the doctor, and 90% liked having rounds in the ICU room with the patient. However, 36% did not like having only scheduled time to talk to the doctor. Surprisingly, 84.1% of families thought the time we selected for FR was a good time. The majority, 75% felt all concerns were addressed during FR, and 84.9% rated their overall experience as excellent-good.

Conclusion – Trauma surgeons could improve communication, establish a good family relationship, avoid family confusion, and limit multiple daily calls if a small amount of time was taken daily for families. FR should be an integral part of our residency teaching with the same importance as daily ICU patient rounds.

Notes

SHOCK RESUSCITATION: IS A 'STARLING CURVE' BENEFICIAL FOR NON RESPONDERS?

BA McKinley PhD, JH Selby MD JD, AB Marr MD, CS Cocanour MD, *A Valdivia RN, RM Sailors PhD, RA Kozar MD PhD, FA Moore MD

University of Texas-Houston Medical School/ *Memorial Hermann Hospital STICU

Presenter: Bruce A McKinley PhD

Senior Sponsor: Frederick A Moore MD

Houston, TX

Preload directed shock resuscitation is standard of care, and most patients respond to it. We analyzed data from 'non responders,' and questioned how patients who do not respond to initial volume loading then respond to 'Starling Curve' intervention (SC) [series of fluid boluses then cardiac index(CI) – preload (PCWP) measurements to optimal CI-PCWP]. Previously reported (WTA 2000), nipride to control BP during active resuscitation is safe and associated with good CI response, low preload (PCWP), less volume loading, and decreased afterload (SVRI; dyne-sec/cm⁵-m²). 'Non responders,' who undergo SC, have the opposite early response. Of 147 patients resuscitated by protocol over 24 mo, 36 (24%) received SC. SC optimization, done 6.5±0.8 hr after start of resuscitation, required 36±5 min, 4±0.4 fluid boluses, and caused PCWP to increase from 18±1 to a maximum of 25±2 mmHg, and CI to increase from 3.2±0.1 to 4.5±0.4 L/min-m². SC algorithm logic determined PCWP=24±2 to be optimal preload at maximum CI=4.8±0.4, and maintained PCWP=24±2 as volume load threshold for the remainder of ICU day 1. We found that SC improves hemodynamics, but the cost is increased intravascular pressure and volume, which promote edema. To compare initial response, we examined the 1st 4 hr of ICU resuscitation of patients who later had SC to those in whom SC was not indicated. Data were analyzed with t tests and ANOVA (mean±SEM; * p<0.05 SC vs no SC; ^ p<0.05 t=0 vs 4).

Results: The table compares early response of the two groups.

t (hr)	No Starling Curve				Starling Curve			
	CI	PCWP	SVRI	crys vol	CI	PCWP	SVRI	crys vol
0	*3.4±0.2	13±1	2132±106	0±0	2.8±0.2	14±1	2568±180	0±0
1	*3.9±0.2	*12±1	*1834±110	*0.5±0.1	2.9±0.2	15±1	2259±176	1.0±0.1
2	*4.1±0.2	*13±1	1789±102	*0.8±0.1	3.0±0.2	17±1	2083±148	1.9±0.2
3	*4.3±0.2	*13±1	1773±121	*1.1±0.2	3.3±0.2	17±1	2016±161	2.6±0.3
4	^*4.4±0.2	*14±1	^*1560±81	*1.4±0.2	3.2±0.2	^17±1	2069±153	3.2±0.3

Both groups started with similar PCWP, but the SC group had lower CI, higher SVRI and received more crystalloid volume. This resulted in increased PCWP, but insignificant CI increase. In contrast, 'no SC' patients had less volume loading and significant CI increase. In 'no SC' patients, SVRI started lower and decreased over the 1st 4 hr. SVRI remained high in 'SC' patients.

Conclusion: 'SC' patients declare themselves as 'non responders' with low CI and high SVRI within 4 hr of volume loading, and could benefit from afterload reduction. This would permit less preload, less volume, and promote 'survivor' response.

Notes

NEUROLOGIC EXAMINATION CAN BE MISLEADING FOLLOWING GUNSHOT WOUNDS TO THE HEAD

KK Nagy MD, F Bokhari MD, KT Joseph MD, GC An MD, AJ Dennis DO and RR Roberts MD
Stroger Cook County Hospital Department of Trauma; Chicago, IL

Presenter: Kimberly Nagy MD

Senior Sponsor: Barbara Latenser MD

Chicago, IL

Introduction: Most patients who sustain gunshot wounds to the head (GSWH) present with notable changes in mental status. An occasional patient, however will present with a GCS of 15 following GSWH. Many of these patients will have no history of loss of consciousness (LOC). We sought to determine whether these patients require further work-up or if they could be discharged on the basis of physical exam alone.

Methods: Information on consecutive patients who presented to our urban level I trauma center following a GSWH but were neurologically intact was prospectively collected. All patients received a CT scan of the head (CTH) upon admission and were admitted for a minimum of 24 hours for observation. Any abnormal intracranial finding on the CTH prompted neurosurgical consultation. CTH findings, neurosurgical interventions and patient outcome were included in our database.

Results: 71 patients were admitted with a GCS = 15 following a GSWH. All patients were immediately evaluated with CTH. Only 2 patients (2.8%) experienced a neurologic deterioration. 31 patients (43.7%) had an abnormal CTH defined as intracranial bleed, air or foreign body. 11 patients (15.5%) required neurosurgical intervention for their injuries. There was no difference in abnormal CTH or need for intervention in the 12 patients (17%) with LOC compared to the 59 (83%) without LOC (fisher's exact ?). No patient with a normal CTH deteriorated during the subsequent observation period.

Conclusion: Patients who sustain a GSWH may harbor significant injury and need intervention despite a normal examination. We recommend continued work-up of these patients using CTH. Such patients with normal CTH may be safely discharged home.

Notes

PLACEMENT OF INTRACRANIAL PRESSURE (ICP) MONITORS: ARE “NORMAL” COAGULATION PARAMETERS NECESSARY

JW Davis MD, LD Bennink BSN, IC Davis MS, SE Hysell MD, BV Curtis MD, KL Kaups MD, MM Quilty BSN, JJ Kohut MD, JF Bilello MD, SN Parks MD

University Medical Center, Fresno, California

Presenter: JW Davis MD

Senior Sponsor: JW Davis MD

Fresno, California

Introduction: Patients with head injuries frequently have elevated coagulation studies. Monitoring ICP in head injured patients is common practice, but no best practice guidelines exist for coagulation parameters for ICP monitor placement.

Purpose: to determine if ICP placement complications vary with coagulation test values.

Methods: Retrospective review of all patients who underwent fiberoptic intraparenchymal ICP monitoring over a 3 year period. Inclusion criteria were coagulation studies (prothrombin time (PT), partial thromboplastin time (PTT), international normalized ratio (INR), platelet count) prior to monitor insertion and follow up head CT scans to assess for hemorrhage after placement. Data included age, Glasgow coma score (GCS), head region abbreviated injury score (H_AIS), complications and outcomes.

Results: From 8/1/00 through 7/31/03, 5163 trauma patients were admitted, and 157 met inclusion criteria. Patients were stratified by INR as normal (0.8 – 1.2), borderline (1.3-1.6) and increased (> 1.7) at the time of ICP insertion.

Category	(n)	PT	PTT	INR
Normal	(103)	11.8 + 0.7	27.7 + 4.1	1.10 + 0.04
Borderline	(42)	13.5 + 0.6	30.0 + 4.7	1.34 + 0.39
Increased	(12)	20.5 + 8.2	47.4 + 26.6	2.21 + 0.97
	p value	< 0.0001	< 0.003	< 0.0001

There was no difference between the groups in age, H_AIS, or outcomes. Twenty one patients had component therapy to correct coagulopathy, but 10 had INR's in the borderline group and 8 remained with INR's > 1.7 prior to ICP insertion. Eleven patients had platelet counts 50,000–100,000 (despite platelet transfusions). Overall, there were 3 trivial petechial hemorrhages (1.8%); one in a patient in each group, with INR's of 1.2, 1.3 and 2.5 respectively.

Conclusions: In patients with INR < 1.6, hemorrhagic complications were infrequent. The use of FFP to “normalize” PT/INR below this threshold is unwarranted.

Notes

THE RATE OF INDUCTION OF HYPOTHERMIC ARREST DETERMINES THE OUTCOME IN A SWINE MODEL OF LETHAL HEMORRHAGE

H.B. Alam, MD., Z. Chen, MD, PhD., H. Kaneatsu, MD., R. Querol, MD., E. Koustova, PhD., R. Inocencio, BS., A. Jaskille, MD., T. Hancock, BS., P. Rhee, MD. MPH.

Department of Surgery, Uniformed Services University of the Health Sciences

Presenter: H. Alam, MD

Senior Sponsor: P. Rhee, MD

Bethesda, MD

We have shown that lethal vascular injuries can be repaired under asanguinous hypothermic arrest (suspended animation) with excellent outcome. However, the optimal rate for the induction of hypothermic arrest following uncontrolled lethal hemorrhage (ULH) is unknown. This experiment was designed to test the impact of different cooling rates on survival and cognitive function.

Methods: ULH was induced in 32 female swine (80-120 lbs) by creating an iliac artery and vein injury, followed 30 minutes later (simulating transport time) by laceration of the descending thoracic aorta. Through an emergency thoracotomy approach, a double lumen catheter was placed in the aorta and hyperkalemic organ preservation solution was infused using a cardiopulmonary bypass machine. The core temperature was either maintained at baseline (group 1), or hypothermic arrest was induced at a rate of: 2 degree C/min (group 2), 1 degree C/min (group 3) or 0.5 degree C/min (group 4) (n=8/group). Profound hypothermia (core temperature of 10 degree C) was maintained for 60 minutes and vascular injuries were repaired in all animals during this time. Hyperkalemia was reversed by hypokalemic fluid exchange, and blood was infused for resuscitation during the re-warming. The warming rate was kept constant at 0.5 degree C/minute. The animals were observed for 6 weeks and monitored for neurologic deficits. Furthermore, cognitive function (learning) was evaluated based on the concept of operant conditioning, and compared to 15 normal animals.

Results: The survival rates for groups 1-4 were 0%, 100%, 62.5% and 37.5% respectively (p<0.05 groups 2&3 vs. 1). Normothermic arrest (group 1) universally resulted in brain death, whereas all of the surviving hypothermic arrest animals were neurologically intact and displayed normal learning capacity. Only two animals developed late septic complications (groups 2&3). Aside from a transient increase in liver enzymes, no hepatic, renal, pancreatic, or pulmonary dysfunction was seen in the survivors (regardless of the cooling rate).

Conclusion: Hypothermic metabolic arrest can be induced via a thoracotomy approach to maintain viability of brain and other key organs during repair of lethal vascular injuries. Survival is influenced by the rate of cooling with the best outcome following rapid induction of hypothermia.

Notes

CRUSHED BY A BACKHOE: ONE APPROACH TO MULTI-VASCULAR, MULTI-ORGAN TRAUMA

R.S. Ambay, M.D., S.P. Zietlow, M.D.
Mayo Clinic

Presenter: R. Ambay
Senior Sponsor: S.P. Zietlow, M.D.
Rochester, MN



This is a case report of an 18-year-old male who was crushed and pinned by a 55-ton backhoe at a construction site. The patient was found at the scene awake and alert complaining of back pain and a lack of sensation of his lower extremities. He had no palpable femoral pulses. After a 37-minute, door-to-door helicopter transport time, our patient was emergently taken to the operating room for a damage control procedure. Intraoperatively, our patient was found to have a hepatic transection with a resultant avulsion of the left hepatic artery and hepatic vein from the suprahepatic vena cava. A grade 3 splenic injury, avulsion of the splenic artery from the celiac trunk and avulsion of the splenic vein at its confluence with the portal vein was also found. Further exploration revealed a small SMV tear and an infrarenal aortic transection with a large thrombus. Multiple areas of contusion were observed in the small bowel along with an edematous transverse colon and contusions of the entire pancreas. During the damage control

procedure, our patient required 40 units of packed red blood cells and on two occasions required CPR along with manual occlusion of the aorta to maintain blood pressure. Later, studies demonstrated traumatic pancreatitis and, to a lesser degree, injuries to the lung, thoracic cage, scapula, and the lumbar spine. Twenty-eight days later the patient was discharged from the hospital ambulatory and neurologically intact. This is an exciting case that exemplifies the importance of a quick transport time and a step-wise approach to multi-organ trauma.

Notes

GUNSHOT CAUSING A COMMON CAROTID – INTERNAL JUGULAR FISTULA REPAIRED BY ENDOVASCULAR STENTING: CASE REPORT

M. Self, M.D., A. Mangram, M.D., S Slonim, M.D., K. Kollmeyer, M.D.
Methodist Health System

Presenter: Michael Self, M.D.

Senior Sponsor: Alicia Mangram, M.D.

Dallas, Texas

Gunshot wounds to the neck with injury to the carotid are not unusual. Surgical dictum mandates operative exploration of Zone II neck injuries that penetrate the platysma. However, over the previous five years there has been a trend toward a more conservative approach in hemodynamically stable patients. This includes arteriogram, esophagram, and bronchoscopy. We describe a case of a Zone II penetrating wound with injury to the common carotid artery creating a traumatic fistula that was repaired non-operatively.

A 32-year-old man sustained a gunshot wound to the right upper chest that exited the right lateral neck. On presentation to the emergency department, the patient had a substantial hematoma of the right neck and was hemodynamically stable with a Glasgow Coma Scale of 15. Emergency department intubation was performed due to airway control concerns.

Chest radiograph revealed several bullet fragments in the right superior chest with a clavicle fracture without hemo/pneumothorax. Lateral and anteroposterior cervical spine radiographs demonstrated vertebral body fractures of cervical vertebrae 2, 3, and 4. These findings were confirmed on computed axial tomography (CT) and were felt, by the neurosurgeon, to be unstable. Neck CT also revealed a large hematoma with significant tracheal deviation. CT angiography of the neck revealed a right common carotid artery (CCA) laceration/posterolateral pseudoaneurysm with a traumatic CCA-internal jugular (IJ) fistula.

The findings on the CT angiography prompted transfer to the angiography suite for further evaluation. Right CCA arteriogram demonstrated a laceration of the CCA in the neck at the level of the 5th cervical vertebrae. There was a fistulous communication to the right jugular vein as well as a posterolateral pseudoaneurysm. Two stent grafts (Wallgraft 830 and 1050) were deployed over the area of injury. This resulted in a significant reduction of filling of the pseudoaneurysm without fistulous communication to the IJ. After deploying the stents, a small amount of dye extravasated into the pseudoaneurysm. No immediate intervention was undertaken to resolve this as it was felt to be secondary to the patient's anticoagulated status. Repeat angiography 8 hours later demonstrated no evidence of extravasation or filling of the pseudoaneurysm. All carotid and cerebral arteries remained patent.

Notes

DIAPHRAGMATIC TRANSPOSITION: AN ELEGANT TREATMENT FOR TRAUMATIC CHEST WALL DEFECTS

T. Cogbill, M.D., N. Patel, M.D.
Gundersen Lutheran Medical Center

Presenter: T. Cogbill, M.D.
Senior Sponsor: T. Cogbill, M.D.
La Crosse, Wisconsin

Objective: Large traumatic chest wall defects present a formidable surgical challenge. While several techniques exist for elective repair, there are few options available in the emergent setting. We report two cases of large full thickness chest wall injury successfully repaired with diaphragmatic transposition.

Results: Case 1 is an 83-year-old man with a self-inflicted 12-gauge shotgun wound to the left abdomen and chest. A large exit wound of the thoracoabdominal region was debrided and the diaphragm was transposed to more superior ribs to effectively close the chest cavity. The patient later expired for reasons related to small cell lung cancer.

Case 2 is a 28 year-old man with a self-inflicted shotgun wound to the left abdomen exiting out the left flank. The patient ultimately underwent left nephrectomy, splenectomy, resuscitative thoracotomy, diaphragmatic transposition, small bowel resection, transverse colostomy and Hartman's pouch. He was discharged home on post-trauma day 15. Follow-up chest fluoroscopy 8 months after injury demonstrated normal diaphragmatic function.

Diaphragmatic transposition involves detaching the diaphragm anteriorly, laterally and posteriorly and suturing it more cranially to ribs or intercostal muscles. This technique closes the thoracic cavity and converts the wound into an abdominal defect alone, which can be treated with less physiologic impact. Transposition has the advantage of avoiding prosthetic material and unlike myocutaneous flaps, can be performed in the acute setting.

Conclusion: Our cases demonstrate successful application of diaphragmatic transposition. This important technique is not well represented in the literature. Surgeons may be unaware of this treatment for an unusual problem.

Notes

THOSE WHO LIVE BY THE SWORD...: NONOPERATIVE MANAGEMENT OF ESOPHAGEAL PERFORATION

M. Martin**, M.D., P. Mullenix**, M.D., S. Steele**, M.D., W. Long*, M.D., S. Izenberg*, M.D.

*Legacy Emanuel Hospital, Portland, Oregon **Madigan Army Medical Center, Tacoma, Washington

Presenter: Matthew J. Martin, M.D.

Senior Sponsor: William B. Long, M.D.

Portland, Oregon

Objectives: Perforation of the esophagus can present a significant diagnostic and therapeutic challenge. Although traditionally managed surgically, conservative management has been reported in select cases. We describe a case of esophageal perforation managed nonoperatively and present a review of the literature.

Methods: Case report of an esophageal perforation from sword-swallowing. Systematic review of the literature comparing operative versus nonoperative management of esophageal perforations.

Results: A 35-year-old female performer presented with fever, self-limited hematemesis and hoarseness following a sword-swallowing act. Plain xray of the neck and chest were unrevealing. CT scan and esophagram demonstrated a contained posterior perforation of the cervical esophagus. The patient was managed conservatively with nasogastric suction, intravenous antibiotics, and enteral feeds. Her fever resolved within 8 hours, no surgical intervention was required and the patient recovered uneventfully. Seventeen case series were identified from 1965-2000 with a total of 886 esophageal perforations. The etiology of perforation was esophageal instrumentation (65%), spontaneous (10%), foreign body (9%), surgical (7%), and trauma (9%). Management was surgical in 638 (72%) cases and 248 (28%) were initially managed conservatively. The overall mortality for operative management was 17% vs. 16% for nonoperative management (p=-NS). Nineteen patients (8%) failed initial conservative management and required subsequent surgical procedures, with no mortality. Examining only the last decade (1990-2000) reveals an operative mortality of 12.2% compared to 5.5% for nonoperative management and a nonoperative failure rate of 7%.

Conclusions: Select cases of esophageal perforation may be managed without surgical intervention and can achieve equal or better results compared to surgical therapy. Modern reports show improving mortality rates with nonoperative management. The most important selection criteria are minimal symptoms, contained perforation, and patient stability on serial exams.

Notes

**PNEUMATOSIS INTESTINALIS AND ABDOMINAL COMPARTMENT SYNDROME
ASSOCIATED WITH ENTERAL FEEDINGS AFTER GUNSHOT WOUND TO THE
ABDOMEN AND SPLENECTOMY**

P. Kougias MD, G. M. Testerman MD, J. R. Hall MD

Dept of Surgery, East Tennessee State University, and Trauma Center at Holston Valley Medical Center

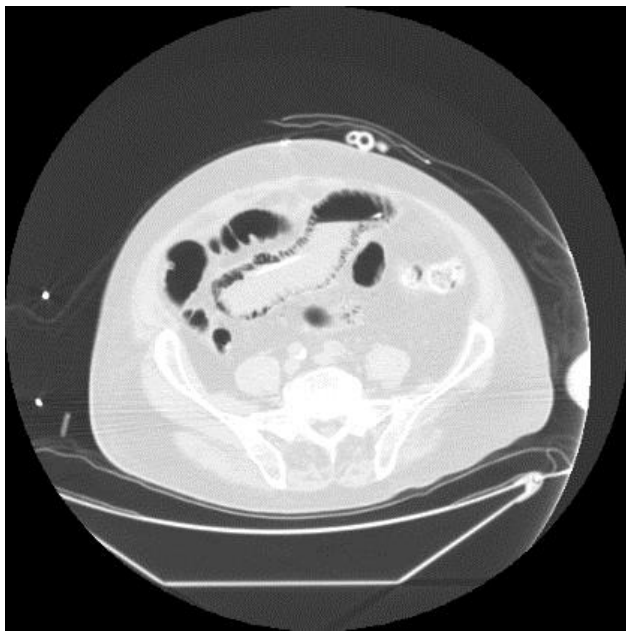
Presenter: Panos Kougias MD

Senior Sponsor: J. R. Hall MD

Johnson City, TN

Intestinal necrosis as an early complication of enteral feedings has been described, especially in the clinical context of acute pancreatitis.

We present a 72 year old patient who sustained a gunshot wound in the abdomen and underwent splenectomy and primary repair of a gastric injury. Enteral feedings were started on postoperative day 2 and were tolerated well. On postoperative day 14 and after a brief period of abdominal distention the patient had an episode of bloody emesis, followed by the rapid development of abdominal distention and hypotension. CT scan of the abdomen at that point demonstrated pneumatosis intestinalis and the presence of air in the portal and mesenteric venous system. Upon exploration, diffuse areas of small bowel ischemia were seen. There was excellent blood flow throughout the vascular arcades confirmed by Doppler. The abdominal wound was packed open. Twenty four hours later a "second look" showed progression of the ischemic changes. The patient expired a few hours later. High index of suspicion is necessary to early recognize this catastrophic complication. Pathophysiology, as well as diagnostic and therapeutic options are discussed. The outcome is grim and associated with the severity of the underlying trauma.



Notes

BLUNT CAROTID INJURY RESULTING FROM A HORSE BITE

G. R. Dulabon, M.D., J. J. Bednarski, M.D., J. H. Levine, M.D.

Hamot Medical Center

Presenter: George R. Dulabon, M.D.

Senior Sponsor: Edmund J. Rutherford, M.D.

Erie, PA

Introduction: Blunt carotid injury occurs infrequently with a reported incidence of 0.24% - 0.33%. These are usually a result of a rapid deceleration mechanism with hyperextension and contralateral rotation of the head and neck. Most of the reported blunt carotid injuries are intimal injuries or partial occlusions. We report a patient who was bitten by a horse on her neck resulting in a complete occlusion of her left internal carotid artery.

Case Report: A 43 year old female presented to an outside hospital after being bitten on her left shoulder and left neck by a horse. She reported the horse lifted her off the ground by her neck and threw her against the stall. She did not lose consciousness and the patient had no neurologic deficits. She did report some hoarseness but denied any respiratory difficulties. Her left neck and shoulder were bruised but she had good range of motion and the neurovascular exam of her left upper extremity was normal.

Because of the bruising on her left neck, the outside hospital performed a CT scan of the neck. This showed fluid around the left internal carotid and suggested that flow was limited in the vessel. The patient was then transferred to our trauma center for further evaluation. An arteriogram was performed which demonstrated a complete occlusion of the left internal carotid artery with filling of the left intracerebral vascular system from the right internal carotid and basilar artery through the Circle of Willis. A fine cut CT scan of the larynx did not reveal any injury. Flexible endoscopy of the upper airway revealed mild laryngeal edema. Gastrografin swallow of the pharynx and upper esophagus was normal.

The patient was started on a heparin drip and was also given steroids for her laryngeal edema. Later, she was started on Coumadin. When her INR was 1.9 the heparin was discontinued. She was placed on a steroid taper and was discharged home on Coumadin. She remained free of neurologic sequelae and her voice quality improved significantly during her hospital course.

Discussion: Reports of animal bites are frequent in the literature. The majority of these reports comment on infectious complications. We could find no reports in the literature addressing blunt carotid injury associated with an animal bite. We report a patient with an occlusion of her left internal carotid artery that resulted from a horse bite to her neck.

Notes

"SPONTANEOUS" SPLENIC RUPTURE: THE MASQUERADE OF MINOR TRAUMA

Monika Tataria, MD, Marc Melcher, MD, PhD, Rochelle A. Dicker MD, David A. Spain MD,
and Susan I. Brundage MD, MPH

Stanford University Medical Center Stanford, CA

Presenter: Monika Tataria, MD

Senior Sponsor: Susan Brundage, MD

Stanford, CA

Introduction: Splenic hemorrhage is most commonly caused by blunt abdominal injury. Rarely, splenic hemorrhage can occur "spontaneously" or more accurately, secondary to a pathologic process. A variety of underlying conditions including infection, rheumatoid diseases, and neoplasms can predispose to rupture. We present a case of pathologic splenic rupture that was mistaken for delayed hemorrhage secondary to occult trauma.

Case Report: A 27-year-old healthy female presented to the emergency department of an outside hospital with peritoneal signs, abdominal distension, and tachycardia. Ultrasound revealed an adnexal mass with free fluid in the pelvis. The patient was taken to the operating room by gynecology for a presumed ruptured ectopic pregnancy. A large dermoid cyst was found and resected. On further exploration, a large clot was noted in the left upper quadrant. Intra-operative surgery consult identified rupture of a three cm portion of the spleen with bleeding from the raw surface. The remainder of the spleen appeared normal. Splenorrhaphy was performed and hemostasis achieved. The presumed diagnosis was splenic rupture after minor blunt trauma. The patient was discharged home after an uneventful post-operative course. The patient returned to the hospital on post-operative day 15 with tachycardia, hypotension, and abdominal distention. Repeat exploratory laparotomy revealed bleeding from the distal margin of the spleen. A splenectomy was performed. Preliminary pathology revealed a normal spleen. The patient had an uncomplicated post-operative course. Eighteen days after discharge, the patient again presented with hypotension and abdominal distention. Abdominal ultrasound showed free fluid. Exploration revealed three liters of intra-peritoneal blood and multiple 1 mm to 1 cm nodules throughout the abdomen. These nodules were actively bleeding and hemostasis could not be achieved. The abdomen was packed with laparotomy sponges and the patient was transferred emergently to our tertiary medical center. After 24 hours of resuscitation and correction of her coagulopathy, the patient underwent abdominal re-exploration. The nodules had increased in number and extensively seeded the peritoneum and subcutaneous fat. Pathology revealed angiosarcoma presumably of splenic origin.

Discussion: Causes of splenic pathology leading to "spontaneous" rupture include malaria, pregnancy, infectious mononucleosis, leukemia, lymphoma, and other various neoplasms. Suspicion of the trauma surgeon should be aroused if splenic hemorrhage is inconsistent with the presenting history or mechanism of injury. If there is any concern that splenic hemorrhage is secondary to a pathologic origin, total splenectomy should be performed rather than splenorrhaphy and a through workup should be performed to determine the etiology of the splenic rupture.

Notes

ENDOVASCULAR REPAIR OF RETROHEPATIC INFERIOR VENA CAVA LACERATION

M. Buechler, W. Shillinglaw, A. Arrillaga
Mission St. Joseph Health System

Presenter: William R.C. Shillinglaw, DO
Senior Sponsor: Richard Miller, MD
Asheville, NC

Introduction: Laceration of the retrohepatic vena cava (RHC) remains one of the few traumatic injuries with no definitive operative algorithm. Direct surgical approaches to this injury carry an operative mortality of 50-90%. Such prohibitive mortality is the result of the acidosis, hypothermia and coagulopathy. This case demonstrates the successful utilization of planned perihepatic packing and endovascular stenting of a lacerated juxtahepatic inferior vena cava.

Case Report: An 18 yo male motorcyclist was struck by a sports utility vehicle. On scene, BP was 70/40. In the ED, 30 minutes after injury, BP 112/52 GCS 15, SaO₂ 82%. He was intubated, exhibited massive hemoptysis, and progressive hypotension. FAST was positive for hemoperitoneum. In the OR, massive hemorrhage from RVC was identified. The patient was coagulopathic, acidotic and hypothermic. Perihepatic packing, damage control closure and transport to the NTICU for restoration of homeostasis was accomplished. In the OR, 90mcg/kg of rVIIa was administered with dramatic reduction in microsurgical hemorrhage. The time from injury to NTICU admission was 3.5 hours.

On Day 2, returned to the OR for removal of packing. Massive retrohepatic hemorrhage recurred with immediate control with repacking. Prior arrangements had been made with Vascular Surgery (VS) and Interventional Radiology (IR) to attempt endovascular stent placement in this event. The patient was taken to the angiography suite where IR identified the laceration. VS placed a 28 x 3.75 AneurX endograft across the area of injury. Post procedure cavogram revealed no further extravasation of contrast.

On Day 4, perihepatic packing was successfully removed. The remainder of the hospital course was uneventful.

Discussion: This case represents a successful management of large RVC laceration with a combination of damage control perihepatic packing, aggressive correction of coagulopathy, including the use of rVIIa, and a planned multidisciplinary insertion of an endovascular stent graft to bridge the lacerated IVC. Endovascular stenting of RHC injury combined with a damage control approach at the initial operative event, abrogating massive blood loss, may represent a new arm of the treatment algorithm of this lethal injury.

Notes

BY-LAWS



BYLAWS OF THE
WESTERN TRAUMA ASSOCIATION

ARTICLE I
Name, Objectives, Organization, and Jurisdiction

SECTION 1: Name

The name of this organization is the Western Trauma Association, henceforth referred to as the Association.

SECTION 2: Objectives, Core Value and Mission Statement

1) Objectives to promote the exchange of educational and scientific information and principles, at the highest level, in the diagnosis and management of traumatic conditions and to advance the science and art of medicine.

2) Core value:

continuing education by participation in a diverse, multi-disciplinary scientific program with the goal of improving the care of injured patients.

3) 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

SECTION 3: Organization

This is a non-profit membership corporation entity, duly incorporated on the 25th day of January 1971 under, and by virtue of, the provisions of the laws of the State of Colorado. The Association received a final determination of its 501(c)(3) status in October 2002.

SECTION 4: Jurisdiction and Territory

The territory in which this Association shall act will be the United States of America. It shall not be constrained, however, from holding its annual meetings at any designated site.

SECTION 5: Governing Board

The affairs of the Association shall be conducted by the Board of Directors.

ARTICLE II
Membership

SECTION 1: Membership Limitation

Membership shall be limited 125 active members. No single specialty shall comprise more than 40% of this total membership of 125.

SECTION 2: Membership and Qualifications

- A. Active members shall be limited to Doctors of Medicine or Doctors of Osteopathy who are Board Certified in their particular medical specialty and are under the age of 55 years. The Board of Directors is hereby given discretionary powers to interpret if foreign physicians who apply for membership have credentials comparable to Board Certification. Active status is conferred by a two-thirds vote of the Board of Directors. Active members have the right to vote on any business presented to the organization during the business meeting, serve on, or chair any committee and be elected to any elected position within the organization.
- B. Associate members include qualified members of other (non-M.D.) health care disciplines with a special interest or expertise in trauma. Approval of a majority of the Board of Directors is required. Associate members must satisfy the same requirements for election to and retention of membership as active members. Associate members may not vote, serve on committees or hold office.
- C. Senior membership is automatically conferred on all members in good standing upon reaching the age of 55, assuming the member is in good standing. A senior member retains all voting privileges and rights of active members, and must pay dues annually but is exempt from attendance requirements. The senior member is not counted as part of a given specialty's membership quota or membership total.
- D. Retired membership: Members in good standing who retire from practice are, upon notification of the Secretary and/or Treasurer, entitled to continued membership, but are exempt from all membership requirements, including the payment of dues. They shall not have the right to vote and their membership shall not be counted towards specialty or membership quotas. The change to "retired status" is voluntary.
- E. Emeritus membership: Senior members of the Association who have made a significant contribution to the organization may be awarded Emeritus membership by a majority vote of the Board of Directors.
- F. Candidates for membership must submit a completed application and a letter of support (sponsorship) from a member of the Association. They must also submit an abstract for consideration by the Program Committee. A prospective member must attend a meeting within three (3) years prior to the meeting in which he/she is voted on for membership.

SECTION 3: Membership Retention

To retain membership in the Association, each member must comply with the following:

- A) Be a physician in good standing before his or her professional specialty board.
- B) Attend at least one out of every three consecutive meetings of the Association.
- C) Agree to be responsible for annual membership dues and any assessments as set by the Board of Directors at a special meeting or the annual meeting. He/she must remain current in the payment of dues and assessments.

D) Maintain behavior befitting a physician by adhering to the code of ethical and moral standards as described by either the American College of Surgeons or the American Medical Association.

SECTION 4: Termination of Membership

A) Membership can be terminated for a violation of one or more of the items set forth in Article II, Section 3 of the Bylaws of the Association by a vote of two-thirds of the Board of Directors.

B) Any member may resign by filing a written resignation with the Secretary; however, such resignation shall not relieve the member so resigning of the obligation to pay any dues or other charges accrued and unpaid.

ARTICLE III

Meetings

SECTION 1: Annual Meetings

There shall be an annual meeting of the membership of the Association held in some suitable location chosen by the President-elect and approved by a majority vote of the Board of Directors and the membership. Funds shall be made available for the conduct of the scientific program at the annual meeting.

SECTION 2: Special Meetings

Special meetings of the Association may be called by the Board of Directors or two-thirds of the members in good standing, entitled to vote. The location for a special meeting of the Association shall be chosen by the Board of Directors.

SECTION 3: Notice

Notice of the time and place of the annual or special meetings of the Association shall be mailed by the secretary of the Association to each and every member at his address as it last appears on the records of the Association with postage thereon prepaid. Notice shall be deemed delivered when deposited in the United States Mail, so addressed to the respective member. Notification by electronic mail (e-mail) may be substituted for regular mail.

SECTION 4: Quorum

One-fourth of the membership present at any meeting of the Association shall constitute a quorum.

ARTICLE IV

Board of Directors, Meetings, and Responsibilities

SECTION 1: Composition

1. The President, President-elect, Vice- President, Secretary, Treasurer, immediate Past President, program committee chairman and six members-at-large shall constitute the Board of Directors.
2. The President of the Association shall serve as Chairman of the Board of Directors. The Chair of the Multicenter Trials Committee, the Historian and the President of the Western Trauma Earl G. Young Foundation for Education and Research shall serve as ex-officio members of the Board of Directors. The ex-officio members shall not have any vote on matters before the board.
3. At each annual meeting, two members of the Association in good standing named by the Nominating Committee and elected by the membership, shall replace the two outgoing members-at-large of the Board unless the membership should, by majority vote, elect to retain the then existing at-large Directors.
4. The tenure of elected members of the Board of Directors shall be for no more than three years unless such member shall be elected to a position as an officer in the Association.

Section 2: Annual Meetings

- 1) The annual meeting of the Board of Directors shall be held during and in the same general location as the annual meeting of the Association, but at least one day in advance of the general business meeting. The agenda will be determined by the President of the Association who will preside at the meeting. Additional agenda items may be proposed for discussion and/or vote by any Board member.
- 2) Unless otherwise determined by a majority vote of the Directors, all meetings of the Board of Directors shall be considered executive sessions and, thus, closed to all but Board Members and invited guests.

SECTION 3: Special Meetings

1. Special meetings of the Board of Directors may be held at any time and place upon the call of the President, or a majority of the Board providing ten days prior written notice shall be given to each Director, stating the time, place and purpose of the special meeting. Notices of special meetings shall be mailed to the Directors by the Secretary of the Association in the same form and manner as provided above for mailing notices of meetings for the general membership of the Association.
2. In lieu of special meetings, the Board of Directors may conduct business by conference telephone call including a quorum of Members of the Board. The same rules for notification of special meetings shall apply to conference calls.

SECTION 4: Quorum

A majority of the Board of Directors shall constitute a quorum. (No member of the Board may vote by proxy.)

SECTION 5: Powers

Subject only to the limitations of the provisions of the Colorado Nonprofit Corporation Act, all corporate powers shall be exercised by or under the authority of, and the affairs and activities of the corporation shall be controlled by, or under the authority of, the Board of Directors.

Section 6: Ex-officio Members of Board of Directors. The President of the Western Trauma Foundation for Education and Research, Chairman of the Program Committee, Chair of the Multicenter Trials Committee and the Historian shall be ex-officio members of the Board of Directors and may participate in any meeting of the Board of Directors.

ARTICLE V

Registration, Fees, Dues, and Assessments

SECTION 1: Registration Fees

Registration fees for annual meetings shall be paid and used to defray the cost of the functions of the annual meeting. The amount of the registration fee, and additional fees, if any, shall be determined by the President, in consultation with the Treasurer, and notice thereof shall be sent to the membership along with the written notice of the annual meeting.

SECTION 2: Dues

Dues of the Association shall be set by the Board of Directors. Each member shall pay dues to the Treasurer of the Association for each fiscal year, beginning with the first new fiscal year after election to membership. The Treasurer shall notify each member of his/her dues obligation during the first quarter of the fiscal year by regular or electronic mail. This notification shall follow the rules for notification of the annual meeting. Associate members shall be required to pay the same dues required of active members. Failure to pay dues for three (3) years shall be considered cause for termination of membership.

SECTION 3: Assessments

A two-thirds majority vote of the Board of Directors of the Association can institute a special assessment of the general membership. Special assessments can be voted by the Board of Directors only for the promotion of scientific programs at the annual meetings, research papers or other purposes designed to achieve the exchange of ideas and principles pertaining to the diagnosis and management of traumatic injuries and conditions. Notice of any special assessment of the membership so voted by the Board of Directors shall be sent, by either regular or electronic mail, to all active and senior members at the last address on record with the Association, postage pre-paid.

SECTION 4: Waiver of Dues and Responsibilities

All requirements for retention of membership including payment of dues and attendance at meetings may be waived by a vote of the majority of the Board of Directors upon

petition. Eligibility for such waivers shall include induction into the Armed Forces of the United States on a temporary basis, physical disability, or other reasons that would place unreasonable hardship, physical disability, or other reason upon the petitioner.

ARTICLE VI Voting

SECTION 1: Voting Rights

Each active member or senior member in good standing shall be entitled to one vote on each matter submitted to a vote of the membership.

SECTION 2: Majority

A majority of the votes entitled to be cast on a matter at a meeting at which a quorum is present shall be deemed necessary for the adoption of such matters unless otherwise noted in the Bylaws.

SECTION 3: Manner of Voting

Each member of the Association is entitled to vote in one of three following manners:

- 1) In person.
- 2) By United States Mail, postage pre-paid, addressed to the secretary of the Association at the Association's registered office, postmarked on or before the date of the meeting of the membership where the vote is to be taken.
- 3) By proxy duly executed in writing by the member or his authorized attorney-in-fact. No voting member in attendance at a meeting shall hold or vote more than one duly executed proxy for absent members.

SECTION 4: Amendments

As to the Articles of Incorporation, consolidation or dissolution of the Association shall be passed only in the event of a two-thirds vote of the members in good standing.

SECTION 5: Elections

Elections and all other matters raised to a vote of the membership cannot be held unless a quorum is present and shall be by majority vote.

ARTICLE VII Officers

SECTION 1: Officers

The officers of the corporation shall consist of the President, President-Elect, Vice-President, Secretary, Treasurer, Historian, and such other officers as from time to time may be appointed by the Board of Directors. The President, President-Elect, Vice-President, Secretary, Historian, and Treasurer shall be elected at the annual meeting of the members by simple majority of a quorum.

SECTION 2: Terms and Vacancies

The President, President-Elect, and Vice-President shall hold office for one (1) year. The Secretary and Treasurer shall each hold office for the term of three years. All elected officers, except the Treasurer, shall be automatically inaugurated at the close of the annual meeting at which they are elected. The newly elected treasurer shall assume the responsibilities of his/her office at the beginning of the next fiscal year following his/her election. The Historian shall serve until his/her death, resignation or inability to perform the duties subsequently described in Article VIII, Section 6. If an officer cannot complete his/her term, his/her successor shall be chosen by the Board of Directors by special meeting to fill the vacancy for the unexpired term of the office. No officer shall serve more than one term.

SECTION 3: Removal

Any officer may be removed, with or without cause, by a vote of a majority of the members of the Board of Directors present at any meeting for that purpose.

SECTION 4: Resignation

Any officer may resign at any time by giving written notice to the Board of Directors and receiving their approval.

ARTICLE VIII Duties and Authority of Officers

SECTION 1: President

The President shall preside at all meetings of the members and shall serve as ex-officio member of all committees. The president shall be Chairman of the Board of Directors and shall serve as the liaison to the American Association for the Surgery of Trauma.

SECTION 2: President-Elect

The president-elect shall plan and organize the next annual meeting and assume whatever responsibilities the president or Board of Directors shall assign.

SECTION 3: Vice President

The vice president shall preside at all business meetings in the absence of the president. The Vice-President shall serve as Chair of the Website Committee and perform such other duties as requested and assigned by the President or the Board of Directors.

SECTION 4: Secretary

The secretary shall

- 1) Keep the minutes of all meetings of the association and the Board of Directors
- 2) Be responsible for applications for membership, elections and terminations of members and communications to the membership, especially those whose membership is in jeopardy because of violations of the bylaws.
- 3) Maintain the Membership database, with the help of the Treasurer.
- 4) Record the reports from the other officers and committees and any bylaw changes.

- 5) Maintain copies of all corporate documents, including contracts, except for those that specifically relate to financial matters.
- 6) Prepare a report for the membership at the annual business meeting and for the Board of Directors at each of their annual meetings.

SECTION 5: Treasurer

The treasurer shall:

- 1) Keep the books of account of the Association.
- 2) Have custody of, and be responsible for all funds, securities, financial documents, and other properties of the Association and shall deposit all such funds in the name of the Association in such banks or other depositories as shall be approved by the Board of Directors.
- 3) Assist the Secretary in keeping the roster of the membership that is current and accurate.
- 4) Engage a certified public accountant, approved by the President, to prepare such tax documents as are required by law and file said documents in a timely manner. He/she will require said certified public accountant to audit the books of the Association upon the request of the Board of Directors and present the report of that audit to the Board.
- 5) Manage all accounts receivable and payable, including such expenses as may be incurred in the name of the Association.
- 6) Send to all active and associate members a statement of dues in the first quarter of the fiscal year, and make all necessary efforts to collect those dues.
- 7) Serve on the Website Committee and prepare the website annually for the meeting registration process.
- 8) Prepare registration packets, including name badges and other items, for all those attending the annual meeting.
- 9) Organize, with assistance from the other Officers and Board Members, the registration process at the annual meeting.

SECTION 6. Historian

The Historian should maintain and safeguard the archives of the Association. The Historian shall be an ex-officio member of the Board of Directors. In case of a vacancy by reason of death, resignation, or inability to fulfill the responsibilities of the office, the vacancy may be filled by the Board of Directors until the next annual meeting of the members. The historian shall keep a continuous account of the history of the Association for the use of the membership. This shall include significant information concerning each annual meeting, including the site of the meeting, recipients of honors, invited lecturers, highlights of the scientific program, and important actions arising from the Business Meeting. The historian shall also record significant action of the Board of Directors at its meeting. Each five years the historian shall prepare the history of the Association from the time of the last recorded history to be part of the archives of the Association. Memorabilia of the Association shall be retained by the Historian.

Committees

SECTION 1: Nominating Committee

The Nominating Committee shall be composed of three (3) members of the Association appointed by the President. These individuals should represent General Surgery, Orthopedic Surgery, and another specialty. The Chairman of this Committee shall be the immediate Past President. This committee shall submit a slate of nominees for the various offices of the Association to the annual meeting of the members.

SECTION 2: Program Committee

The Program Committee shall consist of a Chairman, appointed by the President, and a Committee including at least one General Surgeon, one Orthopedic Surgeon, another specialist (if available), and as many other members as the Program Chairman and President deem necessary to a maximum of ten (10) members. The Chair and the President will appoint the committee members. The President and the Chairman of the Publications Committee shall serve as ex-officio members. The Chairman will serve a two year term and is an ex-officio member of the Board of Directors. This Committee will be responsible for the organization and conduct of the program at the annual meeting.

SECTION 3: Membership Committee

The Secretary of the Association shall serve as Chairman of the Membership Committee. The secretary shall present to the Board of Directors at its annual meeting, a list of candidates who have satisfied the requirements for membership. Upon approval of the Board of Directors, this group shall be then presented to the membership for its approval as previously outlined.

SECTION 4: Publications Committee

The Publications Committee will consist of a Chairman and a Committee including at least one General Surgeon, one Orthopedic Surgeon, one Plastic Surgeon and another specialist (if available), and as many other members as the Chairman and President deem necessary and appropriate. The Chairman of the Program Committee shall serve as an ex-officio member of the committee. The Chairman of the Publications Committee will be appointed by the President and serve a two (2) year term. The other members, selected from the membership, will be appointed by the President in consultation with the Chairman, annually. This committee will be responsible for reviewing all manuscripts submitted in association with presentations at the annual meeting and for choosing those which will be submitted to *The Journal of Trauma*. The Chairman will serve as the liaison to *The Journal of Trauma*. Should the Chairman not be an Editorial Consultant to *The Journal of Trauma*, the Chairman will consult with a member of the Editorial Board of *The Journal of Trauma* designated by the President.

Section 5: Multicenter Trials Committee

The multicenter trial committee shall consist of a Chairman and other interested members of the association. This committee will be responsible for coordinating and

reviewing all the multicenter trials conducted under the aegis of the association. The Chairman will be appointed by the President to a five (5) year term. The Chairman will report to the president and board of directors, and at the annual business meeting and serve as an ex-officio member of the Board of Directors.

Section 6: Website Committee

The Website Committee shall consist of a Chairman and four (4) members. The Vice President shall serve as the Chairman of the Committee. The Treasurer as a member. The two other members, selected from among the Association membership, will be appointed by the Vice President for a two (2) year term. The Committee shall be responsible for development and maintenance of the Association's Website.

Section 7: Other Committees

Other ad hoc committees may be established by the Board of Directors. The creation of additional standing committees, proposed by the Board of Directors, requires the approval of a majority of members in good standing.

ARTICLE X Conduct and Order of Business

SECTION 1: Business Sessions of the Members

There shall be an annual business meeting of the members during the annual meeting. It shall be preceded by a meeting of the Board of Directors also held during the annual meeting of the Association.

SECTION 2: Order of Business

The President shall set the agenda and where possible should follow Robert's Rules of Order.

ARTICLE XI Amendments

These ByLaws may be amended at any annual meeting of the Association provided that a notice stating the purpose of each proposed amendment and the reason therefore, and a copy of the proposed amendment is sent to every member in good standing not less than thirty (30) days prior to the date of the meeting at which the proposed amendment is to be voted upon. It shall require a two-thirds vote of a quorum of the membership present at the meeting to amend a Bylaw.