TWENTY-EIGHTH ANNUAL MEETING

February 22-28, 1998

Chateau Lake Louise
Alberta, Canada

WESTERN TRAUMA ASSOCIATION

28th Annual Meeting
Chateau Lake Louise
Banff, Alberta, Canada
1997-1998

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WESTERN TRAUMA ASSOCIATION

PAST PRESIDENTS

President	Year	Location
Robert G. Volz, M.D.	1971	Vail
Robert G. Volz, M.D.	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. Neviaser, 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

**** The 1999 WESTERN TRAUMA ASSOCIATION Meeting will be:**
Crested Butte, Colorado
February 28 - March 6, 1999

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EARL G. YOUNG AWARD RECIPIENTS

Resident	Institution	Year
Joseph Schmocker, M.D.	University of Vermont	1991
Joseph Schmocker, M.D.	University of Vermont	1992
Charles Mock, 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

WESTERN TRAUMA ASSOCIATION

Schedule

Sunday, February 22, 1998

5:00 - 7:00 pm	Registration / NASTAR Sign-up Welcome Reception

Monday, February 23, 1998

6:30 - 7:00 am	Breakfast*
6;30 - 9:00 am	Registration / NASTAR Sign-up
7:00 - 9:00 am	Scientific Paper Session I
4:00 - 6:00 pm	Scientific Paper Session II
6:00 - 7:00 pm	Past Presidents' Meeting

Tuesday, February 24, 1998

6:30 - 7:00 am	Breakfast*
7:00 - 8:00 am	Scientific Paper Session III
8:00 - 9:00 am	Invited Speaker - Dr. John McGill "Doctors' without Borders" 2nd Annual "Paint the Ceiling" Lecture
4:00 - 5:00 pm	Scientific Paper Session IV
5:00 - 6:00 pm	Presidential Address - Dr. James Benjamin "Mentoring and the Art of Medicine"
6:00 - 8:00 pm	WTA Board of Directors' Meeting

Wednesday, February 25, 1998

6:30 - 7:00 am	Breakfast*
7:00 - 9:00 am	Scientific Paper Session V
10:00 -12:00	NASTAR Race
12:00 - 1:30 pm	Mountain Picnic & Picture
4:00 - 5:00 pm	Scientific Paper Session VI
5:00 - 6:30 pm	WTA Members Business Meeting
5:00 - 6:30 pm	Broomball - "Face Off"

Thursday, February 26, 1998

6:30 - 7:00 am	Breakfast*
7:00 - 8:00 am	Scientific Paper Session VII
8:00 - 8:30 am	R. Lawrence Reed II, M.D. "Update on the Use of Blood, Blood Products, and Risks in Trauma Patients"
8:30 - 9:00 am	Patrick J. Offner, M.D. "Current Clinical Status of Blood Substitutes"
4:00 - 5:00 pm	Scientific Paper Session VIII
5:00 - 6:00 pm	Panel Discussion - "Managed Care and the Trauma Patient: Can the Two Coexist?"
7:00 pm	Annual Reception / Dinner

Friday, February 27, 1998

6:30 -7:00 am	Breakfast*
7:00 - 8:00 am	Case Report Session
8:00 - 9:00 am	Scientific Paper Session IX
4:00 - 6:00 pm	Scientific Paper Session X

*Spouses', children's, significant others' breakfast served daily from 7:30-9:00 am

IN MEMORIAM

Gerald S. Gussack, M.D.
August 25, 1997

SCIENTIFIC PAPER SESSION I
MONDAY AM, February 23, 1998
MODERATOR: James Benjamin, M.D.

7:00 AM

01 INCIDENCE AND OUTCOME OF DELAYED GASTROINTESTINAL INJURY AFTER BLUNT ABDOMINAL TRAUMA: AN ANALYSIS OF 569 PATIENTS**
T Huynh MD, J Guy MD, E Rutherford, MD, R Rutledge, MD
Toan Huynh MD
UNC, Department of Surgery

7:20 AM

02 DO ANABOLIC STEROIDS IMPROVE OUTCOME IN TRAUMA PATIENTS? A DOUBLE BLIND PLACEBO CONTROLLED PROSPECTIVE RANDOMIZED CLINICAL TRIAL**
AA Kramer, MD, EE Zervos, MD, SE Goode, RN, AS Rosemurgy, MD
Andrew A. Kramer MD
U of So. Florida, Tampa Gen Hosp

7:40 AM

03 REDUCING THE USE OF COMPUTED TOMOGRAPHY BY USING SCREENING DIAGNOSTIC PERITONEAL LAVAGE IN BLUNT TRAUMA VICTIMS**
T Mele, MD, K Stewart, MD, G O'Keefe, MD
Tina Mele MD
University of Alberta Hospital

8:00 AM

04 THE ROLE OF CT SCAN IN SELECTIVE MANAGEMENT OF ABDOMINAL GUNSHOT WOUNDS.
E Ginzburg, MD, E Carillo, T Kopelman, MD, M Lynn, MD, L Martin, MD, M McKenney, MD, O Kirton, MD, D Shatz, MD, D Sleeman, MD, P Byers, MD
Enrique Ginzburg MD
U of Miami Medical School

8:20 AM

05 DEFINITIVE VALUES OF pHi AND MUCOSAL-ARTERIAL CO2 GAP FOR GUIDING SHOCK RESUSCITATION**
PR Miller, MD, EH Kincaid, MD, JW Meredith, MD, MC Chang, MD
Preston R. Miller MD
Bowman Gray School of Medicine

8:40 AM

06 "DAMAGE CONTROL" IN VASCULAR TRAUMA: A NEW USE FOR INTRAVASCULAR SHUNTS**
RB Ballard, MD, JP Salomone, MD, GS Rozycki, MD, N Namias, MD, WL Ingram, MD, AC Sisley, MD, DV Feliciano, MD
Robert B. Ballard MD
Emory University, Grady Mem Hosp

** Earl Young Resident Competition

SCIENTIFIC PAPER SESSION II
MONDAY PM, February 23, 1998
MODERATOR: Scott R. Petersen, M.D.

4:00 PM

07 DIRECT MONITORING OF BRAIN TISSUE OXYGENATION DURING HEMORRHAGIC SHOCK AND RESUSCITATION**
G Manley, MD, PhD, C Doyle, MD, J Gibson, MD, D Morabito, RN MPH, H Hopf, MD, L Pitts, MD, MM Knudson, MD
Geoffrey T. Manley MD
San Francisco General Hospital

4:20 PM

08 REVERSAL OF INTRACCRANIAL HYPERTENSION WITH ACUTE ABDOMINAL COMPARTMENT SYNDROME USING CONTINUOUS NEGATIVE ABDOMINAL PRESSURE**
BH Saggi, MD, GL Bloomfield, MD CR Blocher, MD, AP Marmarou, PhD, R Bullock, MD, HJ Sugerman, MD
Bob H. Saggi MD
Medical College of Virginia

4:40 PM

09 NEEDLE THORACOSTOMY IS NOT INDICATED IN THE TRAUMA PATIENT**
DC Cullinane, MD, JG Bass, EJ Rutherford, MD, JA Morris Jr, MD
Daniel C. Cullinane MD
Vanderbilt University Medical Ctr

5:00 PM

10 OPERATIVE MANAGEMENT OF INJURED CHILDREN AT AN ADULT LEVEL I TRAUMA CENTER**
DA Partrick, MD, EE Moore, MD, DD Bensard, MD, SJ Terry, BSN, FM Karrer, MD
David A. Partrick MD
Denver Health Medical Center

5:20 PM

11 THE EFFECT OF PRE-INJURY ANTICOAGULATION WITH WARFARIN ON THE MULTIPLE TRAUMA PATIENT**
RJ Leone, Jr MD PhD, JS Hammond, MD, MPH
Richard J. Leone, Jr. MD
UMDNJ-Robert Wood Johnson Med Sch

** Earl Young Resident Competition

SCIENTIFIC PAPER SESSION III
TUESDAY AM, February 24, 1998
MODERATOR: J. Scott Millikan, M.D.

7:00 AM

12 A RANDOMIZED PROSPECTIVE TRIAL OF AMPHOTERICIN B LIPID VS. DEXTROSE IN CRITICALLY ILL PATIENTS
E Barquist, MD, D Shadick Pharm D, E Gomez, Pharm D, D Shatz, MD
Erik Barquist MD
University of Rochester

7:20 AM

13 EMPIRIC THERAPY OF SEPSIS IN THE SICU WITH BROAD SPECTRUM ANTIBIOTICS FOR 72 HOURS DOES NOT LEAD TO THE EMERGENCE OF RESISTANT BACTERIA
N Namias, MD, S Harvill, RN, S. Ball, RN, JP Salomone, MD, D Sleeman, MD, J Civetta, MD
Nicholas Namias MD
Emory University, Grady Mem Hosp

7:40 AM

14 ENDOTOXIN DIFFERENTIALLY IMPAIRS RECEPTOR-MEDIATED RELAXATION IN THE PULMONARY AND SYSTEMIC CIRCULATION**
E Pulido, MD, C Selzman, MD, R McIntyre, Jr MD, B Sheridan, MD, D Bensard, MD, D Fullerton, MD
Ed Pulido MD
U of Colorado Health Sciences Ctr

** Earl Young Resident Competition

SCIENTIFIC PAPER SESSION IV
TUESDAY PM, February 24, 1998
MODERATOR: Herbert C. Thomas, M.D.

4:00 PM

15 OUTCOMES AND OBSERVATIONS IN PATIENTS WITH THORACOLUMBAR FRACTURES TREATED WITH SHORT SEGMENT PEDICLE SCREW FIXATION**
JT Tokish, MD, RF Roberto, MD, JT Ruth, MD
J.T. Tokish MD
U of Arizona, Orthopedic Surgery

4:20 PM

16 EARLY FRACTURE FIXATION MAY BE "JUST FINE" AFTER HEAD INJURY: NO DIFFERENCES IN CNS OUTCOMES
TM Scalea, MD, CH Turen MD, AR Burgess, MD, JD Scott, PhD, KA Mitchell, JA Kufera, HR Champion, MD
Thomas M. Scalea MD
Shock Trauma, U of MD Med. School

4:40 PM

17 LONG-TERM OUTCOME OF TREAMENT OF POSTERIOR/INFERIOR SHOULDER INSTABILITY BY POSTERIOR/INFERIOR CAPSULAR SHIFT
A Santini, R Neviaser, MD
Robert J. Neviaser MD
Geo. Washington U Med Ctr, Ortho

** Earl Young Resident Competition

SCIENTIFIC PAPER SESSION V
WEDNESDAY AM, February 25, 1998
MODERATOR: James A. Edney, M.D.

7:00 AM

18 EFFECTS OF TIDAL VOLUME ON GAS EXCHANGE DURING PARTIAL LIQUID VENTILATION
JA Johannigman, MD, K Davis, Jr MD, RS Campbell, RRT, FA Luchette, MD, JM Hurst, MD, DT Prembka, DO, RD, Branson, RRT
Jay A. Johannigman MD
University of Cincinnati

7:20 AM

19 EXTRACORPOREAL LIFE SUPPORT FOR SEVERE PULMONARY FAILURE FOLLOWING TRAUMA
AJ Michaels, MD, RJ Schriener, MD, S Kolla, MD, S Awad, MD, P Rich, MD, C Rieckert, MD, J Younger, MD, R Hirschl, MD RH Bartlett, MD
Andrew J. Michaels MD
U of Michigan Medical Center

7:40 AM

20 IL-11 ATTENUATES TNF-MEDIATED LUNG INFLAMMATION FOLLOWING ENDOTOXIN
B Sheridan, MD, C Dinarello, MD, E Pulido, MD, C Selzman, MD, D Meldrum, MD, R McIntyre, MD
Brett C. Sheridan MD
U of Colorado Health Sciences Ctr

8:00 AM

21 BASE DEFICIT IN THE ELDERLY: A MARKER OF SEVERE INJURY AND DEATH
J Davis, MD, K Kaups, MD
James W. Davis MD
U of So. Florida, Tampa Gen Hosp

8:20 AM

22 A NEW DIAGNOSTIC MODALITY TO SCREEN FOR BLUNT CERVICAL ARTERIAL INJURIES
FB Rogers, MD, E Baker, BS, TM Osler, MD, SR Shackford, MD, SL Wald, MD
Frederick B. Rogers MD
University of Vermont

** Earl Young Resident Competition

SCIENTIFIC PAPER SESSION VI
WEDNESDAY PM, February 25, 1998
MODERATOR: Harold F. Sherman, M.D.

4:00 PM

23 IMPROVED SURVIVAL FOLLOWING RENAL FAILURE IN BURN PATIENTS JUSTIFIES AN AGGRESSIVE APPROACH TO TREATMENT**
WJ Grant, MD, GG Eyre, BS, SE Morris, MD, JR Saffle, MD
Wendy J. Grant MD
U of Utah School of Medicine

4:20 PM

24 EARLY DETECTION OF HEMOPERITONEUM BY ULTRASOUND EXAMINATION OF THE RIGHT UPPER QUADRANT: A MULTICENTER STUDY
GS Rozycki, MD, JA Schmidt, DNSc, MG Ochsner, MD, B Thomas, DO, B Boulanger, MD, F Davis, MD, RE Falcone, MD and DV Feliciano, MD
Grace S. Rozycki MD
Emory University, Grady Mem. Hosp.

4:40 PM

25 HORNS, HOOVES, AND HARD FALLS: INJURIES CAUSED BY LARGE DOMESTIC ANIMALS**
DLS Hunt, MD, RS Smith, MD, PB Harrison, MD, SD Helmer, PhD, WR Fry, MD
Diane L. Hunt MD
U of Kansas School of Med-Wichita

** Earl Young Resident Competition

SCIENTIFIC PAPER SESSION VII
THURSDAY AM, February 26, 1998
MODERATOR: Jeffrey R. Saffle, M.D.

7:00 AM

26 AORTOGRAPHY IS NOT INDICATED IN THE YOUNGEST OF PEDIATRIC VICTIMS OF BLUNT TRAUMA
FA Mann, MD, N Patel, MD, E Hoffer, CC Blackmore, MD, JC Olson, MD, D Grossman, MD, GJ Jurkovich, MD
F.A. Mann MD
Harborview Medical Center

7:20 AM

27 IMPLEMENTATION OF A PROCEDURE TEAM IMPROVES UTILIZATION AND REDUCES COSTS FOR CRITICALLY ILL PATIENTS IN THE ICU
RG Marvin, MD, FA Moore, MS, CS Cocanour, MD, BV MacFadyen, MD
Robert G. Marvin MD
U of Texas-Houston Medical School

7:40 AM

28 THE USE OF TRAUMA DATA BASES TO DETERMINE INJURY SURVIVABILITY
WB Long, MD
William B. Long MD
Legacy Emanuel Shock Trauma Program

** Earl Young Resident Competition

SCIENTIFIC PAPER SESSION VIII
THURSDAY PM, February 26, 1998
MODERATOR: James W. Davis, M.D.

4:00 PM

29 FACTORS AFFECTING MANAGEMENT AND OUTCOME IN BLUNT RENAL INJURY**
RL Kuo, MD, MJ Makhuli, MD, SR Eachempati, MD, DA Nayduch, MSN,
RL Reed MD
R.L. Kuo MD
Duke University Medical Center

4:20 PM

30 THE INCIDENCE AND OUTCOME OF LIVER AND SPLENIC INJURIES WITH MINIMAL OR NO INTRAPERITONEAL FLUID
MG Ochsner, MD, MM Knudson, MD, DB Hoyt, MD, TH Cogbill, MD, HL Pachter, MD, CE McAuley, MD
M. Gage Ochsner MD
WTA Multicenter Trial Group

** Earl Young Resident Competition

CASE REPORT SESSION
FRIDAY AM, February 27, 1998
MODERATOR: Thomas F. Phillips, M.D.

7:00 AM

31 HEMIPELVECTOMY AND THIGH FILET FLAP CLOSURE FOR NEAR-FATAL PELVIC OSTEOMYELITIS COMPLICATIONG NEAR-FATAL PELVIC FRACTURE
J Bergstein, MD, G Schmeling, MD, W Dzwierzynski, MD
Jack M. Bergstein MD
U of Illinois Coll of Med-Peoria

7:10 AM

32 CHOLEDOCHO-CAVAL FISTULA AS A RESULT OF A RIGHT FLANK STAB WOUND-A CASE REPORT
CS, Cocanour, MD, RJ Andrassy, MD, RG Marvin, MD, RM Lopez, MD, M Middlebrook, MD, FA Moore, MD
Christine S. Cocanour MD
U of Texas-Houston Medical School

7:20 AM

33 INJURY PATTERNS IN A CLOSED SPACE PROPANE GAS EXPLOSION
M Lorenzo, MD, AC Guajardo, MD, P. Rodriquez, MD, A Cardona, MD, J Nazario, MD, A Suarez, MD
Manuel Lorenzo MD
University of Puerto Rico

7:30 AM

34 THE USE OF A TEMPORARY VENA CAVAL INTERRUPTION DEVICE IN HIGH-RISK TRAUMA PATIENTS UNABLE TO RECEIVE STANDARD VENOUS THROMBOEMBOLISM PROPHYLAXIS
GC Hughes, MD, TP Smith, MD, SR Eachempati, MD, SN Vaslef, MD PhD, RL Reed, II MD
G. Chad Hughes MD
Duke University Medical Center

7:40 AM

35 A CASE REPORT OF PNEUMATIC STAPLE GUN INJURY TO THE AORTA
Oleynikov, MD, P Kladar, MD, J Strigham, MD, R Barton, MD
Dimitry Oleynikov MD
U of Utah School of Medicine

7:50 AM

36 ATRIAL SEPTAL DEFECT AS A CAUSE OF HYPOXEMIA REFRACTORY TO INCREASING FIO2 AND PEEP IN A PATIENT WITH THORACIC TRAUMA
SB Shapiro, MD, SE Morris, MD, RG Barton, MD
Stephen B. Shapiro MD
U of Utah School of Medicine

SCIENTIFIC PAPER SESSION IX
FRIDAY AM, February 27, 1998
MODERATOR: Thomas F. Phillips, M.D.

8:00 AM

37 THE SAFETY OF URGENT PARALYSIS AND INTUBATION IN THE TRAUMA ADMITTING AREA: A REVIEW OF 570 CONSECUTIVE PATIENTS
DH Zonies, MS, MF Rotondo, MD, RF Sing, DO, PM Reilly, MD, WS Hoff, MD, DR Kauder, MD, CW Schwab, MD
David H. Zonies MS
U of Pennsylvania Medical Ctr.

8:20 AM

38 RESTRAINT USE MODIFIES INJURY PATTERNS IN YOUNG CHILDREN
AH Tyroch, MD, LP Sue, MD, KL Kaups, MD S O'Donnell-Nicol, RN
Alan H. Tyroch MD
Texas Tech University

SCIENTIFIC PAPER SESSION X
FRIDAY PM, February 27, 1998
MODERATOR: M. Gage Oschner, M.D.

4:00 PM

39 THE UTILITY OF HEAD CT SCANS AFTER MINIMAL HEAD INJURY
KK Nagy, MD KT Joseph, MD, SM Krosner, MD, RR Roberts, MD, CL Leslie, MD, K Duffy, MD, RF Smith MD MPH, J Barrett, MD
Kimberly K. Nagy MD
Dept of Trauma, Cook County Hosp.

4:20 PM

40 INTRACRANIAL MONITOR PLACEMENT BY MIDLEVEL PRACTITIONERS
K Kaups, MD
Krista L. Kaups MD
UCSF/Fresno

4:40 PM

41 BED OF STOOL: ARE CLOSTRIDIA DIFICILE TITRES INDICATED?
E Ginzburg, MD, R Compton, MD, S. Ball, RN, J Augenstein, MD, P Byers, MD, O Kirton, MD, M McKenney, MD, D Shatz, MD, D. Sleeman, MD, S Cohn
Enrique Ginzburg MD
U of Miami School of Medicine

5:00 PM

42 THE OPERATIVE TREATMENT OF ACETABULAR FRACTURES THROUGH THE EXTENSILE HENRY APPROACH
JT Wey, MD, D DiPasquale, MD, LE Levitt, MD, HM Quitkin, MD
Doreen DiPasquale MD
Washington Hospital Center

5:20 PM

43 SEVERE COLONIC TRAUMA REQUIRING RESECTION: COLOSTOMY VERSUS ANASTOMOSIS
JA Murray, MD, D Demetriades, MD, M Colson, MD, JA Asensio, MD, G Velmahos, MD, EE Cornwell III MD, H Belzberg, MD, J Berne, MD, TV Berne, MD
James A. Murray MD
Los Angeles County-USC Med Ctr

ABSTRACTS

Western Trauma Association

INCIDENCE AND OUTCOME OF DELAYED GASTROINTESTINAL INJURY AFTER BLUNT ABDOMINAL TRAUMA: AN ANALYSIS OF 569 PATIENTS.

T. Huynh, MD, J. Guy, MD, E. Rutherford, MD, R. Rutledge, MD
Department of Surgery, University of North Carolina.
T. Huynh, M.D.
E. Rutherford, M.D.
Chapel Hill, North Carolina

Background: Aggressive use of celiotomy after blunt abdominal trauma has been advocated to prevent complications of "delayed" GI tract injury (GITI). In this study, we hypothesized that patients sustaining delay GITI, when managed appropriately, can expect similar outcome compared to those identified on admission and undergo early operation.

Methods: Data were obtained from 67 members of the University Health System Consortium. There were 157,000 trauma patients with an ICD-9 diagnosis between 800 and 959.9. Of these, 569 (0.36%) patients selected had an injury to stomach, duodenum, small bowel or colon; defined as GI tract injury. Time to first celiotomy exceeding 1 day after admission was defined as delay GITI. Mortality, length of stay (LOS) and hospital charges were compared between patients undergoing early versus delay operation.

Organ Injured	Operation	n	Mortality (%)	Mean LOS	Charge (k)
Stomach	Early	20	20	22	$127
	Delay	3	0*	26	$133
Duodenum	Early	62	6	16	$63
	Delay	7	14*	27	$165
Small Bowel	Early	305	12	13	$61
	Delay	25	20*	23	$103
Colon	Early	214	14	15	$71
	Delay	11	9*	28	$114
All Patients	Early	469	13	14	$70
	Delay	39	15*	25	$108

* Not significant compared to Early group by Fisher's exact test.

Results: Incidence of "missed" GITI was 0.02% in 157,000 trauma admissions. Overall mortality was 12%. Distribution of organ injured and associated outcomes are shown in Table. There were 469 (82.4%) patients undergoing early operation with 13% mortality compared to 15% in the delay GITI group. Of the 19 patients operated between 3 and 9 days after admission (not shown), mortality was 21%. Mean LOS and hospital charges were not statistically different between early and delay GITI groups.

Conclusions: Our study showed that after blunt abdominal trauma, "missed" GI tract injuries were rare. Operative delays between 1 and 2 days had no measurable effect on mortality, length of stay and charges. In light of the morbidity of negative celiotomies, repeated diagnostic exams in the first 2 days after blunt abdominal trauma may be an alternative management strategy. Delays greater than 3 days do increase mortality.

NOTES

DO ANABOLIC STEROIDS IMPROVE OUTCOME IN TRAUMA PATIENTS? A DOUBLE BLIND PLACEBO CONTROLLED PROSPECTIVE RANDOMIZED CLINICAL TRIAL

A.A. Kramer, M.D., E. E. Zervos, M.D., S. E. Goode, R.N., A. S. Rosemurgy, M.D.
University of South Florida Department of Surgery, Tampa, Florida

OBJECTIVE: Prolonged catabolic states following severe injury have been implicated in poor survival. The purpose of this study was to determine whether empiric administration of an anabolic steroid would reduce morbidity and improve survival in severely injured patients.

METHODS: 140 consecutive trauma patients with ISS≥20 were randomized in a double blinded manner to receive either placebo or nandrolone (2 mg/kg IM) on hospital day #3 and each week until death or discharge. Duration of ventilator dependence and nutritional indices, including serum albumin, transferrin or nitrogen balance were measured weekly. Patient survival and length of ICU and hospital stay were used as outcome endpoints.

RESULTS: Patients receiving placebo vs. nandrolone were similar in age (38 yrs±13.3 vs 36 yrs±12.7), gender distribution (87% male vs 88% male), and mechanism of injury(82% blunt vs 84% blunt). Data ± SD.

GROUP	N	ISS	VENT (DAYS)	HOSP DAYS ICU	HOSP DAYS Total	NUTRITION % patients improved	MORTALITY %	MORTALITY ISS
Control	67	30±9.3	11±14.8	12±11.1	33±24.5	82%	9%	32±12.7
Steroid	73	28±9.2	6±5.3	12±12.1	32±28.5	86%	8%	43±17.1

Patients in both groups demonstrated improvement in nutritional indices, but the difference in this improvement between the control and treated groups was not significant. The steroid-treated patients required fewer ventilator days, but this difference did not reach statistical significance ($p=0.09$). Empiric administration of nandrolone had no significant effect on either duration of hospital and ICU stay or survival ($p>0.05$). Of note, however, is the higher ISS of the steroid-treated patients who died ($p<0.05$), documenting that these patients were more severely injured that those who died after receiving placebo.

CONCLUSION: These data document that administration of anabolic steroids to decrease the catabolic response after severe injury did not improve hospital/ICU stay or survival, though trends in improvement were noted in nutritional indices and ventilator dependence. This study does not support the empiric use of anabolic steroids after severe injury.

NOTES

REDUCING THE USE OF COMPUTED TOMOGRAPHY BY USING SCREENING DIAGNOSTIC PERITONEAL LAVAGE IN BLUNT TRAUMA VICTIMS

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Background: Abdominal computed tomography (ACT) has contributed positively to the care of blunt trauma victims by facilitating non-operative management of selected cases. However, ACT is costly, often time-consuming and insensitive to intestinal and pancreatic injuries. Diagnostic peritoneal lavage (DPL) is a rapid and less costly test, but is oversensitive. A combination of a sensitive screening test (DPL) with a specific test (ACT) may provide the most efficient and safest approach. This study proposes to evaluate this hypothesis.

Methods: This was a prospective cohort study of hemodynamically stable, adult blunt trauma victims who required evaluation for a suspected intra-abdominal injury. The patient underwent either DPL or ACT as the initial investigation at the discretion of the attending general surgeon. A positive DPL (RBC count > 100,00/mL) was followed by ACT to define the injuries. Clinical data was collected concurrently with the patient's hospital course.

Results: During an 11 month period, 167 hemodynamically stable adult blunt trauma victims underwent DPL (n=71) or abdominal CT (n=96) as an initial evaluation for suspected intra-abdominal injuries. The relevant data are displayed below.

	DPL/ACT	ACT	p value
Injury Severity Score (ISS) (mean)	21.8	17.0	0.01
Mortality	9 (13%)	6 (6%)	0.15
Positive DPL	20 (28%)	N/A	-
Positive DPL followed by ACT	10 (14%)	N/A	-
Celiotomy	13 (18%)	11 (12%)	0.21
Liver/spleen injuries	14 (20%)	23 (24%)	0.51
Other abdominal injuries	9 (13%)	13 (14%)	0.60
Time in ER department (mean)	41 min	2.5 hr	<0.001
Missed injuries	0 (0%)	7 (7%)	0.02

A larger percentage of severe head injuries was responsible for the higher ISS and mortality in the DPL group. The incidence of abdominal injury was similar in both study groups; 20 (28.2%) patients in the DPL group and 30 (29.9%) patients in the abdominal CT group. Of the 20 positive DPLs, 10 were followed by ACT and 10 by celiotomy for suspected intestinal injury or subsequent development of hemodynamic instability. Emergency department evaluation required less time in the DPL group. There were no non-therapeutic celiotomies in either group. There were 3 (4.2%) complications of DPL and 11 (11.5%) complications of abdominal CT which included 7 missed intra-abdominal injuries. The 7 missed injuries in the ACT group did not lead to mortality, but did directly result in prolonged ICU and hospital stay. There were no missed injuries in the DPL patient group.

Conclusions: In stable adult blunt trauma victims, screening DPL, followed by abdominal CT if positive, is safe, efficient, does not result in an increase in non-therapeutic celiotomies and results in fewer missed injuries than does abdominal CT.

NOTES

Scan for intraperitoneal injury in hemodynamically stable patients

THE ROLE OF CT SCAN IN SELECTIVE MANAGEMENT OF ABDOMINAL GUNSHOT WOUNDS

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Tangential injuries

OBJECTIVE: To evaluate the use of CT scan in selective management of Gunshot Wounds (GSW) to the abdomen, back, and flank to reduce rates of laparoscopies and negative laparotomies.

MATERIALS AND METHODS: The charts of patients with GSW who received CT scan from January 1993 to December 1996 were reviewed. Data collected compared positive and equivocal CT scans to intra-operative findings and negative CT scans to the hospital course of observed patients.

RESULTS: Ninety-six patients (97 scans) with low suspicion GSW to the abdomen were entered. The majority of these injuries were tangential back, flank, and lower anterior quadrant abdominal wounds in hemodynamically stable patients with low suspicion intraperitoneal penetration.

Sixty-six (69%) patients had CT scans defined as negative for peritoneal penetration. All of these patients were observed for 23 hours and discharged from the trauma service. There were no missed injuries in this group consistent with 100% true negative rate.

There were 16 (16%) patients with CT scans consistent with intraperitoneal penetration. Eleven (71%) of these patients were found to have significant solid organ or hollow viscus injuries requiring exploratory laparotomy. Four out of five (29%) patients had right thoracoabdominal GSW consistent with liver injuries which were managed conservatively without surgery and were discharged with a mean of 3 days without follow-up morbidity. One out of five required surgery for continued hepatic bleeding.

There were 15 (17%) patients with equivocal CT scans. Eight (53%) patients had laparoscopy performed, of which 6 (75%) were negative and 2 (25%) were positive requiring exploration. Four patients had negative E-laps performed for equivocal CT scans resulting in a 4.6% negative laparotomy rate. Three patients had thoracoscopy for left thoracoabdominal GSW for suspicion of diaphragm injuries with 2 (67%) having injuries requiring laparotomy. The total cost comparisons (not including M.D. charges) for CT scan, diagnostic laparoscopy, and exploratory laparotomy were $1,902, $5,806 and $6,814, respectively.

CONCLUSION: CT scan is a reliable modality to manage low suspicion abdominal gunshot wounds and reduce negative laparotomy rates.

NOTES

DEFINITIVE VALUES OF pHi AND MUCOSAL-ARTERIAL CO_2 GAP FOR GUIDING SHOCK RESUSCITATION

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Introduction: The gastric intramucosal pH (pHi) and gastric mucosal-arterial CO_2 gap (GAP) estimate visceral perfusion and predict outcome. However, optimal values of these variables as resuscitation endpoints remain undefined. The purpose of this study was to develop clinically derived cutoffs for both pHi and GAP in predicting death and multiple organ failure (MOF) in trauma patients.

Design: Cohort study of 114 consecutive trauma patients who had pHi determined at 24 hours after ICU admission. The corresponding GAP for each of these values of pHi was obtained through chart review. Receiver operating characteristic curves were constructed for both pHi and GAP with respect to death and MOF. These curves were used to determine the value of each variable which maximized sensitivity and specificity in predicting outcome. Chi square and odds ratios were used to determine if significant differences in outcome occurred above and below these cutoffs. Significance is defined as $p<0.05$.

Results: Of 114 patients who had pHi determined at 24 hours after admission, 108 had corresponding GAP values available. The values of pHi and GAP which maximized positive and negative predictive ability were 7.25 and 17.6 torr respectively. Both pHi and GAP predict outcome at these values. The odds ratios are shown in the table.

Table	Cutoff	Odds Ratio	p
pHi vs. Death	7.25	4.6	<0.001
pHi vs. MOF	7.25	4.3	<0.01
GAP(torr) vs. Death	17.6	2.9	<0.05
GAP(torr) vs. MOF	17.6	3.3	<0.05

Conclusions: In trauma patients, the ability to predict death and MOF is maximized at values of pHi <7.25 and GAP >18 torr. This study represents the first report of clinically-derived threshold values for these variables and provides clinicians with scientifically sound endpoints for the evaluation of gut perfusion during trauma resuscitation.

NOTES

"DAMAGE CONTROL" IN VASCULAR TRAUMA: A NEW USE FOR INTRAVASCULAR SHUNTS

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OBJECTIVES: A review of a regional trauma center's experience with intravascular shunts used as a "damage control" maneuver for patients with severe physiologic compromise from hemorrhage and threatened limb loss.

METHODS: From July 1, 1992 - July 1, 1997, eight consecutive patients with shock and complex vascular injuries from gunshot wounds were managed using intravascular shunts as a temporary measure to allow for early lifesaving resuscitation in the ICU as well as limb salvage. No anticoagulation was used to maintain patency of shunts.

RESULTS:

Patient	Vessels Injured	Vessels Shunted	Initial pH/BD	Dwell Time (HRS)	Limb Salvage	Outcome
±*1	SFA, SFV	SFA	6.84 /-24.5	9.0	Yes	Lived
2	SFA, SFV	SFA	6.89 /-24.3	16.0	Yes	Lived
3	SFA, SFV	SFA,SFV	7.08 /-16.5	24.5	Yes	Lived
*4	Pop A, Pop V	Pop A	6.57 /-40	6.0	N/A	Death
5	(L)CFA, CFV	CFA	6.93 / -24.2	28.5	Yes	Death
	(R)Pop A, Pop V	Pop A		28.5	No	
*6	SCA, SCV	SCA	6.84 / -24.5	1.5	N/A	Death
#7	SCA, SCV	SCA	7.27/-7.7	83	N/A	Death

*= Preoperative CPR; # Multiple intra-abdominal Injuries; ±Shunt thrombosis
SC=Subclavian; EI=External Iliac; SF=Superficial Femoral; CF=Common Femoral; Pop=Popliteal; A=Artery; V=Vein

CONCLUSION: Intravascular shunts were effective in salvaging life and limb in 75% of patients with unilateral peripheral vascular injuries. Shunts were not effective in improving survival for patients with complex truncal vascular or bilateral peripheral vascular injuries. Dwell times may be extended for several days with relatively low risk of occlusion.

NOTES

DIRECT MONITORING OF BRAIN TISSUE OXYGENATION DURING HEMORRHAGIC SHOCK AND RESUSCITATION

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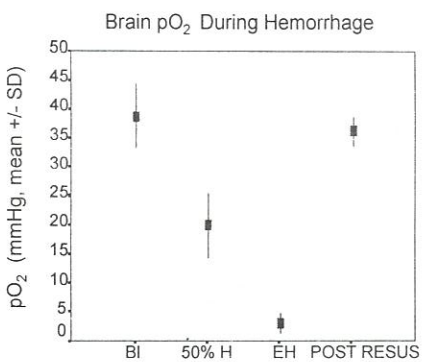
Background: Hemorrhagic shock, hypoxia, and hypotension are significant causes of brain ischemia and death following major trauma. A goal of resuscitation is rapid restoration and maintenance of cerebral oxygenation, however, current systemic monitoring modalities may not reflect tissue oxygen debt in critical areas of the brain. Flexible, polargraphic Clark-type micro-probes have been developed that are capable of continuously monitoring tissue oxygenation. **Purpose:** The aim of this study was to investigate the feasibility and utility of directly monitoring cerebral oxygenation during hemorrhage and resuscitation. **Methods**: Licox ' CMP tissue oxygen probes, tissue temperature probes, and ICP monitors were inserted into the brains of anesthetized Yorkshire swine (n=6). Standard physiologic measurements were collected. After stabilization, the animals were subjected to controlled hemorrhage through iliac arterial catheters to 50% of estimated blood volume. Rapid resuscitation was performed with the total amount of shed blood and crystalloids at a rate of 40ml/kg. Animals surviving the resuscitation phase of the protocol were observed for a minimum of 3 hours prior to euthanasia. **Results**: The mean baseline (Bl) brain tissue oxygen prior to hemorrhage was 39.2 ± 5.7 mmHg. Brain oxygen rapidly declined to 20.4 ± 6.0 mmHg in response to a graded hemorrhage of 50% estimated blood volume (50%H). Continued hemorrhage to a MAP of 20 mm or cardiac arrest (end hemorrhage, EH) resulted in a brain oxygen of 3.7 ± 0.7 mmHg. Successfully resuscitated animals (n=3) achieved brain oxygen levels comparable to baseline measurements (35.83 ± 3.5mmHg). Brain tissue oxygen never exceeded 10.8 mmHg in animals that expired. **Conclusions:** We have demonstrated that direct monitoring of brain tissue oxygenation is a highly responsive and reliable method for detecting cerebral ischemia during graded hemorrhage and resuscitation. Furthermore, this model of hemorrhagic shock, utilizing direct monitoring of cerebral oxygenation as an endpoint, appears to be ideal for evaluating a variety of cerebral resuscitation methods and responses to secondary brain insults.



Same technology as flap monitors

NOTES

REVERSAL OF INTRACRANIAL HYPERTENSION WITH ACUTE ABDOMINAL COMPARTMENT SYNDROME USING CONTINUOUS NEGATIVE ABDOMINAL PRESSURE

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didn't work

Acute elevation in intra-abdominal pressure (IAP) increases intracranial pressure (ICP) and reduces cerebral perfusion pressure (CPP). Approximately 14% of individuals with severe abdominal trauma develop elevations of IAP leading to the acute abdominal compartment syndrome (ACS). When combined with head injury, severe derangements in ICP and CPP occur that may require abdominal decompression (AD) by laparotomy. We evaluated a non-surgical means of AD.

Methods: Three groups of swine were instrumented with an ICP catheter and an intracranial balloon-tipped catheter inflated to an ICP of 25 mmHg. In group 1 (n=5) polyethylene glycol was instilled into the abdomen to increase IAP by 25 mmHg. Simultaneous volume resuscitation was performed and ventilation adjusted to maintain cardiopulmonary stability. Continuous negative abdominal pressure (CNAP) was then applied. Group 2 (n=4) had neither IAP elevation nor CNAP. Group 3 (n=4) had CNAP without IAP elevation. ANOVA with Tukey's test was performed

Results: Elevation of IAP to 25 mmHg above baseline led to detrimental changes in ICP* (25.8±0.8 to 39.0±2.8) and CPP* (79.8±2.1 to 56.6±1.8), despite a stable cardiac index (CI#, 3.6±0.4 to 3.4±0.2) and mean arterial pressure (MAP#, 111±2 to 104±2). Application of CNAP led to reduction in IAP* (30.2±1.2 to 20.4±1.3) and improvements in cerebral perfusion (ICP* 33±2.7 and CPP* 65.6±0.68). A stable ICP# (25.8±0.25 to 28.7±1.7) and CPP# (76.0±1.8 to 74.7±1.5) were observed in group 2. In group 3, CNAP with a normal IAP decreased CI* (2.9±0.2 to 1.1±0.4), MAP* (105.2±4.0 to 38.2±12.0) and CPP* (74.0±3.8 to 11.5±10.5).

Conclusions: Elevations in IAP lead to increased ICP and decreased CPP in states of pre-existing intracranial hypertension. These changes are independent of global perfusion and pulmonary function. CNAP ameliorates these intracranial disturbances and restores cerebral perfusion towards normal. However, with normal IAP, CNAP leads to deterioration in central hemodynamics and CPP. With further refinement a CNAP device may prove useful in the treatment of intracranial hypertension associated with severe obesity or the acute ACS. (* = $p<0.05$; # = $p>0.05$)

NOTES

NEEDLE THORACOSTOMY IS NOT INDICATED IN THE TRAUMA PATIENT

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To evaluate the indications and usefulness associated with placement of needle thoracostomy catheters (NTC) by emergency services personnel.

This consecutive case control series was obtained from all patients admitted to a level I trauma center who had NTCs placed prior to arrival in the emergency department. The study was conducted from November 1996 - September 1997.

24 needle thoracostomies were performed in 19 patients. Six patients had bilateral NTC's placed. This group was 0.007% percent of trauma admissions (2801) to our center during this time period. Fifteen patients were victims of blunt trauma (79%) and four were victims of penetrating trauma (21%). The mortality for the entire group of patients was 26% (5 of 19). All 14 patients with signs of life in the emergency room survived (100%). No patients with signs of life in the emergency room were found to be hypoxic (minimum O2 saturation 90%) or in respiratory distress. Only three patients were found to have evidence of a pneumothorax with air leak (21 %). The NTC did not decompress the tension pneumothorax in one patient, the other had no respiratory distress (admission PO2 = 186). One NTC was used appropriately to relieve a tension pneumothorax. Interestingly, only 2 of 7 patients (29%) showed evidence of a pneumothorax by chest X-ray (CXR) when CXR was performed prior to chest tube placement. The 5 patients without pneumothorax required no intervention. Eleven patients (58%) were intubated prior to placement of a NTC. One patient had bilateral NTCs placed without being intubated.

In our catchment area, it does not appear that NTCs are done for the appropriate indications. They are not effective and have the potential for catastrophic complications. NTC placement should be abandoned in the pre-hospital trauma patient.

NOTES

OPERATIVE MANAGEMENT OF INJURED CHILDREN AT AN ADULT LEVEL I TRAUMA CENTER

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Background: The geographic distribution of trauma centers results in a significant number of children being treated in adult centers. The emphasis on nonoperative management of pediatric blunt trauma has heightened concern that in adult trauma centers, an aggressive operative approach will be employed. The purpose of this study was to evaluate the operative management of injured children at an adult level I trauma center with pediatric commitment.

Methods: The records of 1792 consecutively treated children admitted to the trauma service during a 6-year period (1/90 - 12/95) were reviewed. Patients were stratified into one of three age groups: 0 - 5, 6 - 11, and 12 - 17 years of age.

Results: Mean age of the study patients was 10.0 ± 0.1 years, 1147 (64%) were male, and their mean ISS was 7.3 ± 0.3. 1550 (87%) had a blunt mechanism of injury and 132 (7.4%) required laparotomy. The number of patients for each age subgroup are recorded in the table by year and injury mechanism with the percent undergoing laparotomy in parentheses.

	0 - 5 years		6 - 11 years		12 - 17 years	
	Blunt	Pen	Blunt	Pen	Blunt	Pen
1990	92 (5%)	4 (0)	64 (8%)	3 (33%)	93 (5%)	42 (24%)
1991	82 (7%)	2 (0)	48 (0)	0	84 (6%)	26 (31%)
1992	97 (3%)	3 (33%)	57 (4%)	5 (20%)	111(4%)	36 (31%)
1993	93 (0%)	4 (0)	78 (3%)	4 (25%)	100(5%)	32 (34%)
1994	95 (1%)	5 (20%)	73 (3%)	4 (0)	146(3%)	36 (25%)
1995	82 (2%)	3 (0)	56 (0)	2 (50%)	99 (4%)	31 (35%)
Total	541(3%)	21 (10%)	376(3%)	18 (22%)	633(4%)	203(30%)

In the 0-5 year old blunt mechanism group, 6% underwent laparotomy from 1990-1992. In comparison, only 1% of this age group had a laparotomy from 1993-1995 (p=.02, Fisher's exact test). A similar trend was found in the 6-11 year old children following blunt injury (4% laparotomy rate from 1990-1992; 2% from 1993-1995).

Conclusions: There has been a declining trend in the operative management of blunt pediatric trauma, especially in children less than 6 years old, while the operative management of penetrating injuries has remained stable. These data confirm that management of the injured child in an adult trauma center does not result in increased numbers of operations for blunt injuries.

NOTES

THE EFFECT OF PRE-INJURY ANTICOAGULATION WITH WARFARIN ON THE MULTIPLE TRAUMA PATIENT

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OBJECTIVE: Recent years have demonstrated a marked increase in the use of long term oral anticoagulants. We sought to determine whether multiple trauma patients anticoagulated with warfarin pre-injury are at increased risk for occult or late occurring bleeding, and whether reversal of an anticoagulated state prevents bleeding complications.

METHODS: Patients taking warfarin admitted to our Trauma/Surgical Critical Care Service over a five year period were prospectively identified, and a retrospective chart review was undertaken. Those taking other anticoagulants (aspirin, etc.) were excluded.

RESULTS: Twenty-one patients were identified as taking warfarin pre-injury. Patient age (mean ±SEM) was 73±2. Prothrombin time on admission was 18.1±0.7 sec, with an International Normalized Ratio of 2.4±1.2. Mechanism included injuries secondary to falls (9), motor vehicle crashes (6), pedestrians struck (3), assaults (2) and bicycle crashes (1). Of 16 initial brain CT scans, six were found to have at least one significant abnormality, including subarachnoid hemorrhage (3), intraventricular hemorrhage (2), subdural hematoma (1), frontal contusion (1), or non-hemorrhagic infarct (1). Reversal of anticoagulation was undertaken in six patients. Follow up brain CT scans were obtained within 48 hours in those patients with hemorrhage identified on the initial scan. Repeat CT scans demonstrated no extension of bleed or pathology in any patient in the study group, with the exception of a patient with a severe brain injury caused by a gunshot wound who subsequently died.

CONCLUSION: No worsening bleeding complications occurred in any patient, with or without reversal of anticoagulation. Patients who presented with intracranial bleeds did not clinically worsen, despite significant anticoagulation. These findings suggest that routine post-injury care and surveillance for occult injury may be all that is necessary in the warfarin-anticoagulated trauma patient.

did pretty well

NOTES

A RANDOMIZED PROSPECTIVE TRIAL OF AMPHOTERICIN B LIPID VS. DEXTROSE IN CRITICALLY ILL PATIENTS

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Amphotericin B (Am B) is associated with high incidence of nephrotoxicity following its administration for the treatment of invasive fungal infections. Despite this it remains the agent of choice for most non Candida albicans infections. Although new preparations are available, their indications are limited and the bioavailability of the Am B is not known. Previous trials in neutropenic patients have demonstrated that mixing Am B with 20% Intralipid (IL) may decrease nephrotoxicity. We began a randomized, prospective, IRB approved trial in critically ill surgical and trauma patients with positive fungal cultures from the blood, sputum or peritoneal cavities. Patients were randomized in a 2:1 fashion to receive either 1.0 mg/kg/day of Am B/ IL or 0.5 mg/kg/day of Am B Dextrose. Duration of therapy was determined by the primary care team. Weekly 24 hour creatinine clearance (CC) was measured until 2 weeks after Am B therapy was completed. Change in CC is defined as CC 2 weeks after Am B divided by CC prior to Am B.

Results:

	N	Change in CC	Total Am B dose (mg/kg)	Mortality	Age
Am B/ Intralipid-	18	0.83	16	4/18	44
Am B/ Dextrose-	9	0.60	10	2/9	46
(P Value)		(0.038)	(0.018)	(0.70)	(.76)

Conclusions: Am B can be given at a higher dose as a lipid suspension with less nephrotoxicity than conventional Am B Dextrose.

NOTES

EMPIRIC THERAPY OF SEPSIS IN THE SICU WITH BROAD SPECTRUM ANTIBIOTICS FOR 72 HOURS DOES NOT LEAD TO THE EMERGENCE OF RESISTANT BACTERIA

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Objective:

To determine if our SICU protocol of treating suspected sepsis with imipenem/cilastatin (IMP) and gentamicin (GENT) empirically for 72 hours while awaiting culture results engenders resistance to IMP.

Methods:

A prospectively collected database (10/1/95 through 4/30/97) was reviewed to determine how often the IMP/GENT protocol was ordered for the indication "empiric for sepsis." Sensitivity of isolates to IMP for which IMP would be a reasonable therapeutic option were compared between the first and last 6 months of the 18 month study period. Chi-squared analysis was performed. Statistical significance was set at $p<.05$.

Results:

328 patients were treated with IMP/GENT empirically for sepsis during the study period. 703 isolates from all sources for which IMP would be a reasonable therapeutic option had sensitivity reported for IMP. The proportion of isolates resistant to IMP during the first and last 6 months of the 18 month study period were not different (20% vs. 15%, Chi-squared, $p= .33$).

(Table 1)

Time Period	Sensitive	Resistant(%)	Intermediate
10/1/95 - 4/30/96	188	49(20%)	13
10/1/96-4/30/97	217	40(15%)	15

Table 1.Frequency of sensitive and resistant isolates during first and last 6 months of study.

Conclusions:

A protocol of empiric therapy of suspected sepsis in the SICU with imipenem/cilastatin and gentamicin for 72 hours, at which time the antibiotic spectrum is narrowed, did not lead to the emergence of resistant strains of bacteria during the 18 month study. The benefit of broad coverage was not negated by the development of resistance.

imepenem does 'not' cause resistant strains

NOTES

ENDOTOXIN DIFFERENTIALLY IMPAIRS RECEPTOR-MEDIATED RELAXATION IN THE PULMONARY AND SYSTEMIC CIRCULATION

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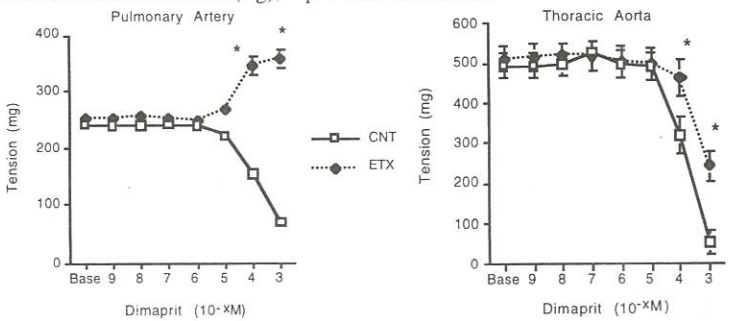
The hemodynamic response to endotoxin (ETX) is characterized by systemic hypotension and pulmonary hypertension. Vascular smooth muscle tone is the balance of vasoconstriction and vasorelaxation. Previous investigations have shown that endotoxin results in greater impairment of cyclic guanosine monophosphate (cGMP)-mediated vasorelaxation in the pulmonary than in the systemic circulation. The other intracellular mediator of vasorelaxation is cyclic adenine monophosphate (cAMP).

We hypothesized that ETX impairs vasorelaxation to agonists that generate cAMP in the pulmonary but not systemic circulation leading to regional differences in the response to endotoxin. The purpose was to determine the effect of ETX on vasorelaxation in the pulmonary and systemic circulations to: 1)β-adrenergic receptor(isoproterenol, ISO), 2) Histamine$_2$ receptor(dimaprit, Dim), and 3) adenylate cyclase(forskolin, FSK) stimulation.

Methods: Rats were injected with ETX(20 mg/kg ip) or saline, $N \geq 6$ in all groups. Six hours later dose-response to ISO, Dim, and FSK was determined in pulmonary artery(PA) and thoracic aortic(Ao) rings preconstricted with phenylephrine. Comparison was by ANOVA, *$p < 0.05$.

Results: ETX impaired vasoconstriction to PE in the Ao but not in the PA. ETX caused impairment to ISO in the PA(62 vs. 94%* relaxation), but the response in the Ao was not different(94 vs. 83% relaxation, p=0.19). ETX did not affect the response to FSK in either PA or Ao rings. ETX caused vasoconstriction to Dim in the PA and dysfunction of vasorelaxation in the Ao (fig), * $p < 0.05$ vs. control.



From these data we conclude that ETX causes regional specific changes in vascular reactivity. These changes result in preserved vasorelaxation in the systemic circulation and impairment of vasorelaxation in the pulmonary circulation, favoring systemic hypotension and pulmonary hypertension.

NOTES

OUTCOMES AND OBSERVATIONS IN PATIENTS WITH THORACOLUMBAR FRACTURES TREATED WITH SHORT SEGMENT PEDICLE SCREW FIXATION

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Treatment of thoracolumbar burst fractures is controversial. Traditional treatment has been with Harrington rod placement and long fusions. More recently, attempts to reduce fusion lengths by using shorter constructs relying upon pedicle screw fixation has been utilized. The purpose of this study is to evaluate the functional outcome of patients with thoracolumbar burst fractures who were treated with short segment pedicle screw fixation.

Materials and Methods

Between August 1992 and March 1997, 24 patients were treated for thoracolumbar burst fractures using short segment pedicle screw fixation (Synthes, Isola, and TSRH). Seventeen patients were available for complete review. There was 1 fracture at T-12, 3 at L-1, 7 at L-2, 3 at L-3, and 3 at L-4. A review of each patient's clinical and radiographic progress was undertaken. Clinical data included injury level, mechanism, associated injuries, injury severity score, time to surgery, GCS, alcohol on admission, use of steroids, pre and post-operative neurologic status, brace use, complications, and return to work. Radiographs were measured for kyphosis and loss of vertebral height pre-operatively, post-operatively, and at most recent follow up. Canal compromise was determined from pre-operative and post-operative CT scans. Functional outcomes were determined using the SF-36 survey. Patients were excluded if follow-up was less than 6 months, or if they could not be reached for SF-36 questioning.

Results

Average follow-up was 16.5 months. Patients were more likely male (82%), involved in an MVA (47%) or fall (35%), and to have associated injuries (avg ISS =24). Hardware failure(broken screw at L-5) occurred in 1 patient. There was an 87.5% fusion rate. Compromise in pre-operative canal diameter was improved by a mean of 36 % and pre-operative kyphosis was corrected by 58%. These parameters did not change during the follow up period. One patient had slight neurologic deterioration (4/5 Quad weakness post-op and at follow-up).

The average SF-36 score for physical limitations was 62.5 (compared to 45 for dialysis and 66 for a normal population). Fifty percent of patients working at the time of injury returned to work, but none to the previous level of employment. Eighteen percent of patients remained on narcotic pain medication at latest follow-up. Patients with increased age, neurologic injury, higher ISS score, and alcohol on admission were much more physically limited at follow-up. Level of injury, kyphosis, initial canal compromise, and loss of vertebral height were not predictive of outcome.

Short segment pedicle screw fixation is a reasonable treatment alternative for thoracolumbar burst fractures. Further study with a larger patient population and longer follow-up is suggested.

NOTES

EARLY FRACTURE FIXATION (FF) MAY BE "JUST FINE" AFTER HEAD INJURY: NO DIFFERENCES IN CNS OUTCOMES

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Presenter: TM Scalea, MD*

OBJECTIVE: Recent reports suggest early FF worsens CNS outcomes. We compared discharge-Glasgow Coma Score (D-GCS), CNS complications and discharge destination of severely injured adults with head injury and pelvic/lower extremity fracture (FXs) treated with early vs. late fixations.
METHODS: Between 1991-1995, we treated 179 patients ages 14-65 (mean age 32) with head injury (admission GCS [A-GCS] of $\leq$ 13 or positive head CT) and FXs who underwent early FF ($\leq$ 24 hrs. of admission) vs. late FF (> 24 hours.) FF was defined as ORIF or external fixation. We excluded interhospital transfers, deaths or discharges within 48 hours, acetabular FX, or spine injuries.
RESULTS: 85% (152) were treated with early FF. Patients were severely injured as evidenced by mean A-GCS 9, RTS 6.2, and ISS 37, LOS 27 days, and 19 ICU days. There were no statistically significant differences in early vs. late FF for age, A-GCS, ISS, RTS, ICU days, LOS, presence of shock, use of vasopressors/inotropes, early major non-fracture surgeries, and death. Differences in fluid resuscitation within the first 24 hours were largely explained by significantly higher use of fresh frozen plasma and platelets in the early FF. In survivors, there were no statistically significant differences by D-GCS ($p = .6$), CNS complications ($p = .8$) or discharge disposition ($p = .2$).
CONCLUSIONS: Early FF does not increase CNS complications in severely injured adult trauma patients.

Comments - no 'shock' during op

NOTES

LONG-TERM OUTCOME OF TREATMENT OF POSTERIOR/INFERIOR SHOULDER INSTABILITY BY POSTERIOR/INFERIOR CAPSULAR SHIFT

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Purpose: to review the long-term outcome of treatment of posterior/inferior shoulder instability using a posterior/inferior capsular shift (PICS) via a posterior approach.

18 shoulders (17 patients) with symptomatic posterior/inferior shoulder instability who failed non-operative treatment underwent PICS. There were 6 females & 11 males, 13 right & 5 left shoulders, one patient with bilateral disorders, and an average of 23.9 yrs. (range 18-30). All recalled specific antecedent trauma - direct force in 9, indirect in 9. 7 had generalized ligamentous laxity. All had failed prior treatment elsewhere - 8 by therapy alone, 4 by therapy & surgery, 6 by surgery alone. The primary complaint was pain, instability was secondary. Indication for surgery was pain & instability that interfered with function. All could be subluxated posteriorly and had a positive sulcus sign. All procedures were performed through a posterior approach. Average follow-up was 4.7 yrs. (range 2-10). ASES objective & subjective evaluations were done on all patients.

Avg. loss of forward elevation was 10^{0} (range 0-20), & of internal rotation 2.4 vertebral segments (range 1-4). External rotation was retained. There was no instability in 16 (88%). Two had significant post-op trauma leading to recurrent instability & were considered failures. 16 had no or minimal pain, normal strength, returned to pre-op employment/athletic status, and were satisfied.

Most published reviews report poor results in treating posterior/inferior shoulder instability. Only two studies -one with few patients - report good long-term outcomes. Others recommend use of an anterior approach to address this problem. The results reported here show that when posterior/inferior instability of the shoulder is due to posterior/inferior capsular laxity PICS from a posterior approach can produce sustainable long-term improvement in symptoms and function with a predictable, reliable outcome.

NOTES

EFFECTS OF TIDAL VOLUME ON GAS EXCHANGE DURING PARTIAL LIQUID VENTILATION

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Purpose: To determine the effects of changes in tidal volume (V_T) on gas exchange during gas and partial liquid ventilation (PLV).

Methods: Eight patients with ARDS were studied (4 gas and 4 PLV). Initial V_T was 10 mL/kg and respiratory rate (RR) was set to maintain pH > 7.30. PEEP was set to maintain $Sa0_2$ > 92%. In random sequence, V_T was set to 7.5 and 12.5 mL/kg. RR was adjusted to maintain a constant minute ventilation. After 30 mins at each V_T arterial and mixed venous blood were drawn for analysis of pH and blood gases. Expired gases were collected for calculation of deadspace to tidal volume ratio (V_D/V_T). Systemic and pulmonary vascular pressures were recorded and cardiac output (CO) was determined in triplicate. Airway pressures and volumes were continuously monitored.

Results: Table 1 reveals data at each V_T (mL/kg) for PLV and gas ventilation.

	PLV			Gas		
	7.5	10.0	12.5	7.5	10.0	12.5
PaO_2/FiO_2	95±18	139±23*	166±27*	181±12	224±19	227±27
DO_2 (mL/min)	1455±20	1670±267	1708±273	1699±304	1695±281	1665±336
CO (L/min)	13.7±2.5	13.4±4.8	13.0±4.7	12.3±4.1	12.3±4.1	11.9±5.0
V_D/V_T (%)	57±3	49±4*	40±3*†	48±14	43±16	45±18
$PaCO_2$ (mmHg)	51±5	48±6	43±4*	36±5	35±7	33±6

*$p<0.05$ vs 7.5 †$p<0.05$ vs 10.0

Discussion: Our results for gas ventilation are consistent with previous work. During PLV, increasing V_T resulted in a consistent improvement in PaO_2/FIO_2 and significant reductions in V_D/V_T. CO was not effected in either group. These findings suggest that gas exchange during PLV is sensitive to changes in V_T. Potential mechanisms for improved gas exchange include increasing pressure above the gas/liquid interface, increasing the size of the gas/liquid interface, and alterations in perfusion which enhance blood flow to non-dependent, gas ventilated alveolar units.

NOTES

EXTRACORPOREAL LIFE SUPPORT (ECLS) FOR SEVERE PULMONARY FAILURE FOLLOWING TRAUMA

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Presenter: AJ Michaels, MD Sponsor: WB Long, MD

OBJECTIVE: To present a series of 30 adult trauma patients who received ECLS for severe pulmonary failure and to review factors related to their outcome.
METHODS: In a Level I trauma center between 1989 and 1997, ECLS with continuous heparin anticoagulation was instituted in 30 injured patients, age>15 yrs, with PaO_2:FiO_2 ratio < 100 on 100% FiO_2 despite pressure mode inverse ratio ventilation, optimal PEEP, diuresis, transfusion, and prone positioning. Retrospective analysis included demographics [age, sex, Injury Severity Score (ISS), mechanism], pre-ECLS pulmonary physiologic and gas exchange values [pre-ECLS ventilator days (VENT days), PaO_2:FiO_2 ratio (PF), S_vO_2, and blood gas], pre-ECLS cardiopulmonary resuscitation (CPR), complications of ECLS [bleeding, circuit problems, leukopenia, infection, pneumothorax, renal failure (ARF), and pressors on ECLS], and survival. Data are reported as percent (%) or mean ± SEM if significant for survival at 95% ($p < 0.05$). χ^2 analysis, independent samples T-test, and logistic regression were used.
RESULTS: The subjects were 25.5 ± 2.4 (15 - 59) years old, 53% male, and had blunt injury in 80%. Pulmonary recovery sufficient to wean ECLS occurred in 60%, and 47% survived to discharge. Bleeding complications (requiring intervention or additional transfusion) occurred in 58% and were not associated with decreased survival.

	non-survivors (n = 16)	survivors (n = 14)	p-value
VENT days	6.8 ± 1.2	3.25 ± 0.7	0.012
pre-ECLS pH	7.28 ± .03	7.38 ± .02	0.025
S_vO_2	44.2 ± 18.5%	60.8 ± 8.9 %	0.025
ARF	11 of 15 (73%)	3 of 13 (23%)	0.025
pre-ECLS CPR	6 of 15 (40%)	0 of 13 (0%)	0.013
ISS	21.8 ± 3.1	18.5 ± 3.2	n.s.
PF ratio	56.13 ± 8.86	57.1 ± 6.23	n.s.

Univariate analysis is shown above. Pre-ECLS pH and VENT days were associated with increased survival in a regression model ($p < 0.047$). The inverse relationship between VENT days and survival predicts 50% survival at 3.67 days of conventional management prior to ECLS. ISS and pre-ECLS PF ratio were not related to outcome.
CONCLUSIONS: ECLS can be safely utilized in multiply injured trauma patients with severe pulmonary failure. Early implementation to prevent secondary lung injury, and pre-ECLS resuscitation from acidosis yield improved survival.

NOTES

IL-11 ATTENUATES TNF-MEDIATED LUNG INFLAMMATION FOLLOWING ENDOTOXIN

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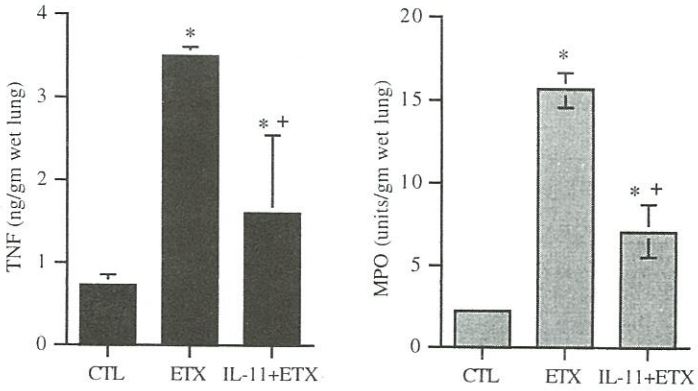
The pathophysiology of endotoxin (ETX) induced lung injury is complex. Cytokine production, specifically tumor necrosis factor (TNF), is known to mediate lung neutrophil accumulation and subsequent lung injury. Interleukin (IL)-11, a clinically used hematopoietic stimulant and gp130 receptor agonist, attenuates *in vitro* macrophage production of TNF after ETX.

We hypothesized that IL-11 attenuates endotoxin induced pulmonary TNF production and neutrophil sequestration The purpose of this study was to examine the influence of IL-11 on ETX induced lung TNF and neutrophil accumulation.

Methods: Five rats in each of 4 groups received i.p. saline, ETX (20 mg/kg) alone, IL-11 (200μg/kg) alone, or IL-11 and ETX. After 6 hrs, the lungs were excised and assessed for TNF (ELISA) and neutrophil sequestration (myeloperoxidase, MPO). Comparisons between groups were done by ANOVA. $p < 0.05$ accepted as significant.

Results: IL-11 attenuated ETX-induced lung TNF and neutrophil accumulation. IL-11 alone did not influence either measured parameter.
*p<0.05 vs Control, +p<0.05 vs ETX (ANOVA)



Conclusion: Endotoxin increased lung TNF and neutrophil sequestration. Pretreatment with IL-11 attenuated this endotoxin induced lung inflammation. These data suggests that IL-11 may be a clinically useful anti-inflammatory agent to attenuate acute lung injury.

NOTES

BASE DEFICIT IN THE ELDERLY: A MARKER OF SEVERE INJURY AND DEATH

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OBJECTIVE: To determine the utility of admission base deficit (BD) in assessing older trauma patients versus a younger cohort.

METHODS: Concurrent and retrospective data was obtained on trauma patients admitted to a Level I trauma center. Arterial blood gases were obtained within 1 hour of arrival in 2631 patients and, of these, 258 patients were ≥ 55 years of age (OLD). Data are presented as mean ± standard error of the mean. Statistical analysis was done by paired t-test. Significance was attributed to a p value < 0.05.

RESULTS:

Group	AGE	BD	RTS	ISS	ICU	SURVIVAL
BD ≥ -5						
Young	27.9 ± .2	-1.4 ± .1	7.0 ± .0	16.4 ± .3	2.8 ± .2	94 %
OLD	68.0 ± .6	-0.2 ± .3	7.1 ± .1	19.5 ± .8	7.6 ± 1.0	76 %
p value	< 0.001	<0.001	NS	0.013	< 0.001	< 0.001
BD ≤ -6						
Young	28.4 ± .4	-10.4 ± .2	5.7 ± .1	27.5 ± .7	5.7 ± .5	70 %
OLD	78.1 ± 9.5	- 9.6 ± .6	5.8 ± .3	29.1 ± 2.3	6.2 ± 1.5	33 %
p value	< 0.001	NS	NS	NS	NS	< 0.001

CONCLUSIONS: BD ≤ -6 is a marker of severe injury and significant mortality in all trauma patients, and is particularly ominous in patients > 55 years of age. However, significant injuries may be present in OLD victims even with a BD ≥ -5.

NOTES

A NEW DIAGNOSTIC MODALITY TO SCREEN FOR BLUNT CERVICAL ARTERIAL INJURIES

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Recognition of blunt carotid and vertebral artery trauma is hampered by their infrequent occurrence, delay in appearance of clinical symptoms and association with other severe multisystem injuries. Traditional diagnostic modalities have significant drawbacks: arteriography is invasive and time-consuming, and ultrasound can not visualize distal extracranial and intracranial vessels (a frequent origin for arterial dissection). Beginning 1/94 we began using CT angiography (CTA) as a screening modality for blunt cervical trauma (BCT) in selected patients undergoing CT (head and abdomen) as part of their blunt trauma diagnostic workup. Results: CTA was rapidly and easily incorporated into the diagnostic workup of the blunt trauma patient adding literally seconds to CT scan time and involving no additional dye load.

	Pre CTA ('88-93)	CTA ('94-present)
Total Admissions	9,649	5,728
Total BCT (%)	6 (.06)	11 (.19)*
Mean Time to Dx (hrs)	138±135	12.6±5.5
Total Strokes	3	0**

* (p=.02; Fisher's Exact; Pre-CTA vs. CTA)
** (p=.07; Fisher's Exact; Pre-CTA vs. CTA)

An unexpected benefit of CTA was the identification of non-arterial injuries of the neck including 3 cervical fractures, 3 mandibular fractures and 1 laryngeal injury.

Conclusion: 1) CTA can be easily inserted into workup of blunt multisystem trauma that involves CT. 2) The introduction of CTA in our institution was associated with a significant increase in the number of BCT diagnosed. 3) Earlier identification of BCT may allow for more timely therapeutic intervention and potentially prevent permanent neurologic sequelae.

CANADIAN PACIFIC
HOTELS
HÔTELS
CANADIEN PACIFIQUE

Indications

Head & neck: hydrocephalus

Basilar skull fx

Focal neuro defs not explained by CT

Non-vascular syndrome

Ischemia on CT

Horner's syndrome

discretion

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NOTES

IMPROVED SURVIVAL FOLLOWING RENAL FAILURE IN BURN PATIENTS JUSTIFIES AN AGGRESSIVE APPROACH TO TREATMENT

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In burn patients, acute renal failure (ARF) now rarely develops from burn shock, but it continues to occur from sepsis and multiple organ failure syndrome (MOFS). In the past, ARF has been almost invariably fatal in burn patients. However, we have observed a number of patients who survived dialysis and burn injury. This prompted us to examine experience with ARF in our burn center over a 15-year period.

METHODS: We reviewed our registry of all patients admitted during the period 1982-1997 for treatment of acute burns. Forty-nine patients who developed ARF–defined as serum creatinine ≥ 2.0mg/dl or BUN ≥ 40mg/dl–were identified by ICD-9 coding. For each patient, burn size (%TBSA), presence of inhalation injury (INHALE), survival and development of sepsis (defined as positive blood cultures) were recorded, as well as the need for dialysis, based on standard criteria of acidosis, hyperkalemia, fluid overload or uremia. In some patients, dialysis was withheld as part of a decision to withdraw aggressive treatment.

RESULTS: All patients were resuscitated successfully using Parkland formula guidelines, and received standard wound care (including early excision and skin grafting) and nutritional support. Aminoglycoside antibiotics were used in 49% of patients prior to onset of ARF, but were not thought to have caused ARF. Mean time from admission to onset of ARF was 11.8 days, with mean time to first dialysis run being 13.9 days.

Patient group	n	Age	%TBSA	%INHALE	%Sepsis	%Survival
Dialysis not needed	16	56±4.4	35±5.3	62.5	50.0	37.5
Dialysis withheld	9	73±4.3*	26±6.2*	33.3	88.9	0
Dialysis used	24	46±3.2	44±4.2	54.2	100.0	33.3
TOTAL	49	54±2.7	38±3.0	53.1	81.6	28.6

*$p < 0.05$ vs. total population

In one third of patients, ARF resolved with supportive treatment, and dialysis was not needed. In those patients who were dialyzed, the mortality rate did not change during the review period; however, during the first 10 years only 30% patients with ARF underwent dialysis. This increased to 62% during the most recent 5 years, indicating our more aggressive approach to treatment of this complication. The nine patients in whom dialysis was withheld (5 during the first 10 years, 4 patients during the past 5 years) were significantly older and had smaller burns, than the sample as a whole. Survival among dialyzed patients could not be predicted based on burn size, inhalation injury or incidence of MOSF.

CONCLUSIONS: Though ARF remains a serious complication of burn injury, death is not inevitable. An aggressive approach to treatment of these patients, including dialysis, is justified. Decisions to withdraw support should be based on assessments of quality of life, and not the development of ARF *per se*. Aggressive burn wound excision utilizing allograft coverage, continued nutritional support, and treatment of sepsis are important adjuncts to successful treatment.

NOTES

EARLY DETECTION OF HEMOPERITONEUM BY ULTRASOUND EXAMINATION OF THE RIGHT UPPER QUADRANT: A MULTICENTER STUDY

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Introduction: The Focused Assessment for the Sonographic examination of the Trauma patient (FAST) detects blood in the pericardium and abdominal areas: right upper quadrant (RUQ), left upper quadrant (LUQ), and pelvis. To validate that an abdominal ultrasound (US) evaluation begins with the RUQ, we hypothesized that blood is detected most often in the RUQ independent of organ injury.

Methods: Positive abdominal US examination results were reviewed from four Level I trauma centers during a three-year period. CT scan, celiotomy, or autopsy confirmed each examination. Organ(s) injured and US area(s) positive were recorded. McNamara's Chi-Square test assessed associations between US area(s) and organ(s) injured. ($p<0.05$ is significant)

Results:

Intra-abdominal Injuries	#Pts*	⊕ RUQ	⊕ LUQ	⊕ Pelvis	p value
Multiple	114	97	63	49	0.001**
Single:					
Spleen	69	49	23	21	0.001**
Liver	53	41	18	20	0.001**
Hollow viscera only	26	16	7	19	0.578
Retroperitoneal only	13	10	4	2	0.013***

* 275 patients had 439 areas positive ** RUQ vs LUQ or Pelvis *** RUQ vs Pelvis

Conclusion: Blood is most often found on US examination in the RUQ area in patients with multiple intraperitoneal injuries, or isolated injury to the spleen, liver, or retroperitoneum.

Recommendation: For the earliest detection of hemoperitoneum, the abdominal part of the FAST should begin with evaluation of the RUQ.

NOTES

HORNS, HOOVES, AND HARD FALLS: INJURIES CAUSED BY LARGE DOMESTIC ANIMALS

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Based on recent clinical experience, we surmised that large domestic animals cause a significant number of injuries in rural and suburban populations. To assess the significance of this mechanism of injury, we retrospectively reviewed trauma registry data from three university-affiliated, ACS Verified Trauma Centers serving a mixed urban-rural population.

Between January 1990 and December 1995, 11,201 trauma patients from 2 ACS Verified Level 1, and 1 ACS Verified Level 3 Trauma Centers were evaluated. Horses and cattle caused injuries to 1.7 percent of patients (n=193). The injury severity score ranged from 1 to 36 (mean 9.7 $\pm$ 7.3). The male to female ratio was 1.3:1 (110 males and 83 females) and the average hospital stay was 5.3 $\pm$ 7.4 days. There was no mortality in this series. The 36 bovine mediated injuries resulted from trampling (n=17), crushing (n=7), falls (n=5), kicks (n=4), dragged (n=1), and gored (n=1) with 5 patients having two mechanisms. The 155 equine mediated injuries were caused by falls (n=101), kicks (n=23), crush injuries (n=16), trampled (n=5), dragged (n=2), and by other mechanisms (n=8) with 10 patients having two mechanisms. Specific injuries most commonly encountered were fractures (n=121; 62.7%), specifically rib (n=37), long bone (n=33), vertebral (n=16), facial (n=14), pelvic (n=13), and cranial fractures (n=10). Chest tube placement for pneumothorax/hemothorax was required in 19 patients. There were 51 patients with closed head injuries, eight of whom required operative intervention. Exploratory laparotomy was performed in 18 patients for splenic (n=10), pancreatic (n=4), hepatic (n=3), urethral/bladder (n=2), and diaphragmatic (n=1) injuries. Thoracotomy for repair of a right atrial rupture was required in one patient.

We conclude that large domestic animals cause a significant number of serious injuries. Furthermore, we believe that this mechanism of injury is an indication for trauma team activation.

NOTES

●AORTOGRAPHY IS NOT INDICATED IN THE YOUNGEST OF PEDIATRIC VICTIMS OF BLUNT TRAUMA

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Purpose: Determine indications for aortography in pediatric victims of blunt trauma (PVBT)
Design: Retrospective, single-institution prevalence study
Setting: University-affiliated, urban county hospital, Level I Adult and Pediatric Trauma Center (>4000 annual "major" trauma admissions)
Materials & Methods: Emergency Department case records, Hospital Trauma Registry and Radiology Information Systems were used to identify all pediatric ($\leq$ 15 yo) victims of blunt (non-penetrating) trauma evaluated ($n_e = 6750$), hospitalized ($n_h = 4700$), undergoing aortography ($n_a = 62$) and having sustained an acute traumatic aortic injury [ATAI] ($n_{ATAI} = 4$) January 1985 - August 1997, inclusive. Study group consisted of the 62 patients (18 mo - 15 yo) receiving aortography. Modulating variables included: mechanism of injury (including motor vehicle crash [MVC], pedestrian-vehicle accident [PVA], fall from greater than 10 feet, bicycle accident, other), length of hospitalization [LOS], Abbreviated Injury Scores [AIS], and Injury Severity Score [ISS].
Results: Age of 4 ATAIs was 9 - 14 yo. Among patients receiving aortography, those with ATAI were more likely to have sustained their injury in PVA or MVC; sustained pulmonary contusions, closed head injury, extremity fractures; and, especially, be older than 9 yo. In general, PVBT receiving aortography were more seriously injured and had longer LOS than those not receiving aortography.
Discussion: Aortic laceration in young PVBT ($\leq$ 7 yo) is reportably rare. Aortography is not indicated as the primary diagnostic procedure. On cost-effectiveness grounds, an argument can be made to omit evaluation for ATAI on all patients below 7-9 yo. Alternatively, contrast-enhanced helical CT or transesophageal ultrasound [TEE] may be useful as screening procedures if appropriate clinical expertise is available.

NOTES

IMPLEMENTATION OF A PROCEDURE TEAM IMPROVES UTILIZATION AND REDUCES COST FOR CRITICALLY ILL PATIENTS IN THE ICU

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Senior Sponsor: Frederick A. Moore, M.D.
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In March 1996, as part of an ongoing performance improvement program, we created a Procedure Team (PT)to facilitate routine surgical or endoscopic procedures for patients in our neurosurgical and shock-trauma ICUs. These procedures were previously performed in the OR. Objectives were to improve utilization of resources, overcome persistent OR scheduling delays and reduce costs. Procedures performed at bedside included percutaneous tracheostomy (Perc T), percutaneous endoscopic gastrostomy (PEG), and endoscopically placed nasojejunal tubes (NJT). The PT consists of a surgical faculty member, a surgical resident, an OR technician, a respiratory therapist (RT), and the bedside ICU nurse. The key ingredients which help ensure safe and efficient performance of these procedures has been the utilization of a single OR technician, 2 specially educated RTs, and 4 faculty surgeons familiar with the techniques. During the 12 month period ending September 30, 1997, 362 bedside procedures were performed. These included 133 Perc Ts, 126 PEGs, and 103 NJTs. The majority (102) of the Perc Ts and PEGS were done as a combined procedure. To determine utilization and cost, a focused chart review was performed on 40 patients, 20 who underwent bedside Perc T and PEG and 20 who underwent open tracheostomy and PEG in the OR prior to March 1996. Independently derived data from the hospital accounting office was used to compare direct cost. The factors considered significant are shown below.

	OR	Bedside ICU
Number of Personnel	7	5
Training Level of Personnel	anesthesia faculty anesthesia resident or CRNA anesthesia tehnician OR nurse	ICU nurse respiratory tehnician
Additional Medications	inhalational anesthetic	
Procedure Time	133 minutes	42 minutes
Cost	$1,739.35	$806.52

The number of personnel needed for procedures was reduced. Bedside procedures did not require as many highly trained members to maintain adequate analgesia, sedation and monitoring. The use of inhalational anesthesia was eliminated. Procedure time, which includes transport time, was decreased. The average time at bedside was 42±5.5 minutes vs. 138 ± 28.2 minutes for the OR. Cost reduction was seen in equipment, OR block time, anesthetic set-up, and transport. Procedures in the OR cost a mean of $1,739.35 vs. a mean of $806.52 at bedside. This translates to a cost savings of $932 (54%) per combined procedure. Since the inception of the PT, the average length of hospital stay of trauma patients has been reduced. We feel the PT is a contributing factor. Development of the PT for our ICUs has been a success. The benefits include improved utilization, significant reduction of cost, and enhanced delivery of care.

NOTES

THE USE OF TRAUMA DATA BASES TO DETERMINE INJURY SURVIVABILITY

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N/S

Introduction: Expert witnesses frequently provide testimony in malpractice suits. Survivability of an injury or a group of injuries can be stated as a matter of opinion, based on anecdotal experience or a review of the literature. Trauma data bases can provide accurate information from large populations of trauma patients. Data from four state trauma registries and two trauma centers proved the rarity of the injury and poor survival in contrast to TRISS and expert witnesses.

Methodology: The patient's injuries were coded according to AIS-90 after a review of the ED records, operating report and autopsy. The .38 caliber bullet injured the liver, duodenum, pancreas, and origin of superior mesenteric artery and vein. The probability of survival according to TRISS was .65 and ACSOT .80. Registry personnel in four states and two trauma centers did a retrospective review of years 1985-1994 for total number of patients with ICD 9 Codes 902.25 (SMA) and 902.31 (SMV) and outcomes (live/die).

RESULTS

TOTAL # OF PATIENTS	SMA/SMV	SURVIVAL	
	#	#	%
12,416	5	1	20
35,206	7	0	0
14,067	2	0	0
3,180	2	0	0
111,863	1	0	0
24,554	6	2	33
201,289	23	3	(13)

Conclusion: Combined injuries to the SMA and SMV are rare injuries. (.01%) and no civilian surgeon is likely to accumulate any personal experience. The devascularization of the bowel makes the combined injuries highly lethal. TRISS and ASCOT Ps calculations overestimate actual survival. Trauma data bases can be useful for determining actual survival for injuries treated at trauma centers.

NOTES

FACTORS AFFECTING MANAGEMENT AND OUTCOME IN BLUNT RENAL INJURY

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Objective: Patients with blunt renal trauma often have multiple injuries. We hypothesized that certain factors might be predictive of outcome and the need for nephrectomy in these patients.

Methods: Patients with a diagnosis of blunt renal injury admitted to a single Level I trauma center from 1991-1996 were identified and reviewed. Multiple factors including age, grade of renal injury, and subsequent management were examined.

Results: Of 8,572 trauma patients admitted during the study period, 57 (0.66 %) suffered blunt renal injury. Their ages ranged from 5 to 76 with a mean age of 30.3 and an average ISS of 22.5. The number of deaths and nephrectomies by grade of renal injury are shown in Table 1. 6 deaths occurred among the 57 patients.

Table 1	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
# of patients	25	7	11	8	6
# of deaths	1	0	1	3	1
# of nephrectomies	0	0	1	2	4

In no patient was the renal injury the primary source of death. 7 of the 57 patients received nephrectomies (13%). All nephrectomies were performed within 24 hours of the patient's admission. 6 of the 7 total nephrectomies were left-sided (86%). The grade of renal injury directly correlated with the need for nephrectomy, as did the transfusion of greater than 5 units of blood within 24 hours, ISS greater than 25, and shock on admission. Overall, 18 of the 57 patients received laparotomies, 7 of whom required splenectomies.

Conclusions: Renal injuries represent a significant source of morbidity in the blunt trauma patient but are not lethal themselves. Most nephrectomies appear to occur within 24 hours of the patient's admission. Factors predisposing to nephrectomy in these trauma patients include grade of injury, left-sided trauma, the severity of other injuries, and early transfusion needs.

NOTES

THE INCIDENCE AND OUTCOME OF LIVER AND SPLENIC INJURIES WITH MINIMAL OR NO INTRAPERITONEAL FLUID

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Background and Objectives: Ultrasound examination of the abdomen is becoming the modality of choice for screening for blunt intraabdominal solid organ injury. One potential pitfall of this technique lies in those patients with liver (L) and splenic (S) injury who have minimal, or no free intraperitoneal fluid. We sought to determine the incidence and outcome of L and S injury with minimal or no free intraperitoneal fluid.

Study Design: A retrospective registry review

Methods: Patients with blunt L and/or S injury were identified over a four year period. Inclusion criteria were L and S injury, identified by CT scan, with minimal (<250 ccs) or no intraperitoneal fluid. Exclusion criteria included >250 cc's of free fluid or death within 24 hours. CT scans of patients meeting inclusion criteria were reviewed by radiologists, graded for severity of injury based on the AAST organ injury scale (OIS) for L and S, and for the volume of free intraperitoneal fluid. Outcome variables included mortality, operative intervention and complications. Demographic data, length of stay, Injury Severity Score (ISS) and number of CT scans was also tabulated. Statistical analysis included Chi Square and Fishers exact tests.

Results: From 1/ 1992 through 12/1995, 859 patients were identified with L and/or S injury. Of these, 188 (22%) met inclusion criteria. The number of L and/or S injuries with and without free fluid are listed below.

	Liver (%)	Spleen (%)	Both (%)	Total (%)
Minimal Fluid	43 (37)	62 (54)	10 (9)	115 (61)
No Fluid	33 (45)	37 (51)	3 (4)	73 (39)
Total	76 (40)	99 (53)	13 (7)	188 (100)

Nonoperative management was successful in 183 (97%), five patients (3%) underwent surgery for bleeding. Of these, surgery was performed in 1/89 (1%) L and 4/112 (3.6%) S injuries. Complications occurred in 7/89 (8%) and 5/112 (4.5%) L and S injuries, respectively. There were six deaths (3%), unrelated to L or S injury. The average OIS for L and S were 2.08 and 1.85, respectively. The average ISS was 18 and 104/188 (55%) had one, 67/188 (36%) had two and 17/188 (9%) had three CT scans performed. There was no significant difference found with subset analysis comparing L and S injury and the presence or absence of free fluid regarding operative intervention, complications or mortality. There did appear to be a trend towards increased need for operation for bleeding among patients with splenic injury.

Conclusions: We found that injuries to the liver and spleen associated with minimal or no free intraperitoneal fluid: 1) occurred among 22% of all patients with injuries to these organs, 2) represented less severe injury 3) can almost always be successfully managed nonoperatively, 4) were associated with a minimal complication rate and low mortality. Furthermore, there appears to be a trend towards:1) increased bleeding in patients with splenic injury and 2) fewer CT scans performed for following liver and splenic injury.

NOTES

HEMIPELVECTOMY AND THIGH FILET FLAP CLOSURE FOR NEAR-FATAL PELVIC OSTEOMYELITIS COMPLICATING NEAR-FATAL PELVIC FRACTURE

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OBJECTIVE: To describe a novel solution to a desperate problem.

CASE REPORT: A young man was crushed between a truck and a loading dock, resulting in massive pelvic fracture with 17-unit acute hemorrhage, bladder neck rupture, bilateral sacral nerve root avulsion, and abdominal compartment syndrome. During a complicated 14-month initial hospital stay, he developed osteomyelitis of his right sacral fragment and iliac bone, with severe chronic pain and recurrent draining sinus tracts. A prolonged trial of antibiotics, wound irrigation, and aggressive enteral nutritional support failed, resulting in ongoing inanition, progressing to lethargy and stupor. With readmission and aggressive parenteral therapy, the patient was convinced to undergo resection of the infected bone. Hemipelvectomy was followed two days later by thigh filet flap reconstruction.

RESULTS: Within days, the patient became anabolic, gaining weight and strength rapidly. All fears of disability were displaced by his mounting independence and discontinuation of medications prescribed for pain and depression. His wounds have healed, and he is now completely independent, and has returned to school.

CONCLUSION: Staged hemipelvectomy and filet thigh flap reconstruction are well tolerated, and should be considered early for severe pelvic fractures complicated by osteomyelitis.

NOTES

CHOLEDOCHO-CAVAL FISTULA AS A RESULT OF A RIGHT FLANK STAB WOUND--A CASE REPORT

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Traumatic injuries to the extrahepatic biliary ducts are relatively rare. This case report details the late presentation of a choledocho-caval fistula. A 30 year old male was stabbed in the right flank. Initially hypotensive in an outlying hospital, he responded to crystalloid. An abdominal CT revealed a right retroperitoneal hematoma in the psoas muscle displacing the right kidney. He was managed nonoperatively for a presumed renal injury and required 6 units of blood to maintain his hemoglobin (hgb) greater than 8 gm/dl. He was discharged home day 7. Three weeks after discharge he presented complaining of intermittent melena, hematochezia, and syncopal episodes. He also complained of dark colored urine, jaundice and abdominal pain associated with shortness of breath. His hemoglobin was 4.3 gm/dl, total bilirubin of 6.7 mg/dl, prothrombin time of 19 seconds, alkaline phosphatase 450 u/L, AST 119 u/L, ALT 116 u/L, and GGT 619 u/L. He was aggressively resuscitated with 8 units of packed cells and 6 units of FFP. An abdominal CT revealed a 2.5 x 4 cm focal area of increased density within the common bile duct that represented an obstructing intraluminal lesion. There was also moderate to severe, diffuse dilatation of the intra-and extrahepatic biliary tree, gallbladder and pancreatic duct. He was transferred to our level I facility when a post-traumatic AV malformation or pseudo-aneurysm could not be ruled out. An arteriogram and venogram did not reveal an aneurysm or ongoing bleeding. An ERCP showed dilatation of the bile duct system with a 2.5 x 3.5 cm ovoid filling defect resembling a stone in the distal common bile duct (CBD). Attempts at removing the supposed stone by ERCP were unsuccessful. At operation, the gall bladder was dilated and necrotic. The CBD was dilated. The CBD was opened, and a large amount of old, clotted blood was evacuated. After a Kocher maneuver was performed, a small fibrous band was found between the inferior vena cava (IVC) and the posterior pancreas at the level of the CBD. Choledochoscopy revealed a corresponding defect in the CBD. This band was transected and a small lumen containing old blood was seen. The IVC defect was repaired with nonabsorbable suture. The defect on the distal CBD was repaired with absorbable suture. The distal CBD was ligated and a proximal choledochojejunostomy was constructed for drainage. The patient did well post-operatively and was discharged home on post-operative day 8.

NOTES

INJURY PATTERNS IN A CLOSED SPACE PROPANE GAS EXPLOSION.

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On November 21, 1996, a large propane gas explosion at a local retail store resulted in 33 deaths and non-fatal injuries to 24 other victims. Trauma literature to date is devoid of reports of mass-casualty injuries in the civilian population involving this type of energy source.

In this retrospective study, we report the pattern of injuries sustained as well as relating those injuries to the properties of the explosion itself. The majority of the fatalities (78%) are associated if not directly attributable to head injuries.

Fatal Injuries

	N	%
Head only	7	21
Head & chest	7	21
Head & abdomen	1	3
Head, chest, abdomen	10	30
Chest only	5	15
Chest & abdomen	3	9

Of those hospitalized, 12.5% suffered concussions and 4% pulmonary contusions. Remarkably, none sustained tympanic membrane perforations or significant thermal injuries. Recognition and reporting of these patterns is essential in preparing trauma services for disasters of this magnitude.

NOTES

THE USE OF A TEMPORARY VENA CAVAL INTERRUPTION DEVICE IN HIGH-RISK TRAUMA PATIENTS UNABLE TO RECEIVE STANDARD VENOUS THROMBOEMBOLISM PROPHYLAXIS.

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Introduction. Venous thromboembolism is a major source of morbidity and mortality in multiply injured trauma patients (pts). Pts unable to receive standard prophylaxis are at increased risk. Some centers advocate the placement of prophylactic inferior vena caval (IVC) filters in these pts, but the long term risks associated with this are unclear. We studied the utility of a temporary vena caval interruption device (TVID) in high risk trauma pts who were not candidates for standard prophylaxis.

Methods. The charts of two pts who underwent TVID placement were reviewed. The device (Protect Infusion Catheter, Neuhaus Laboratories, Inc.) is a caval interruption device placed under fluoroscopic guidance into the infrarenal IVC from a percutaneous internal jugular approach via an 8 French sheath.

Results. Pt 1 was a 47 year old male who was struck by a car and sustained a closed head injury (CHI) with traumatic subarachnoid hemorrhage, splenic laceration, pelvic fracture (fx), and bilateral upper and lower extremity fxs. On hospital day 5, he underwent TVID placement. The catheter remained in place for a total of ten days. A venogram performed following TVID removal was negative for pelvic or lower extremity thrombus. The pt was eventually transferred to a skilled nursing facility on hospital day 138. Pt 2 was an 18 year old male involved in a motor vehicle crash whose injuries included a CHI with scattered areas of focal intracerebral hemorrhage as well as bilateral upper and lower extremity fxs. He underwent placement of a TVID on hospital day 2. The device remained in place for 6 days. A venogram immediately preceding device removal was negative for clot. The pt was transferred to a rehabilitation facility on hospital day 29. Neither pt had clinical evidence for venous thromboembolism, and no complications from TVID placement were noted. Both pts were placed on low molecular weight heparin for deep venous thrombosis (DVT) prophylaxis following TVID removal.

Conclusions. A TVID may be an alternative to permanent IVC filter placement in certain trauma pts at high risk for DVT and pulmonary embolism (PE). The device may prove particularly useful in pts with short term contraindications to standard prophylaxis. Larger studies are needed to further evaluate the efficacy and safety of this device. We report the safe employment of this device in two trauma pts with significant risk for DVT and PE.

NOTES

A CASE REPORT OF PNEUMATIC STAPLE GUN INJURY TO THE AORTA

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Injury as a result of pneumatic nail gun misfire is well documented in the literature. Most involve extremity trauma and relatively few cases have been described with injury to the chest and heart. Industrial staple guns use compressed air to activate a piston and propel a two prong staple up to 4 inches in length. The force generated by this device, results in injuries similar to those caused by other high-velocity instruments. We report a case of staple gun induced injury to the aorta treated at our institution.

A 24 year old, male, laborer, suffered an accidental, self inflicted, staple gun injury to his anterior chest. He was seen at a referring emergency room where he was initially noted to have stable vital signs. The patient was then transported, by helicopter, to our level I trauma center. In route his condition deteriorated and upon arrival the patient suffered a cardiopulmonary arrest characterized by pulseless electrical activity.

The staple had penetrated the sternum 1cm to the right of the midline at the level of the 3rd intercostal space. Immediate left lateral thoracotomy was performed and a large hemopericardium was drained relieving cardiac tamponade and restoring pulses. As a result of continued massive bleeding, the thoracotomy was extended across the lower portion of his sternum and bleeding from the anterior aortic root was controlled with Satinsky clamp. The patient was taken to the operating room where a median sternotomy was performed to complete the repair.

Upon exploration, a 7 mm defect with friable edges was noted in the root of the aorta just superior to the right coronary orifice. The defect in the aorta was repaired with a 2 cm circular Gore-Tex patch. Primary repair was not possible because of extensive tension. The patient's recovery was uneventful and after 8 days he was discharged home.

This case demonstrates potentially severe and life threatening injuries that may result from industrial pneumatic staple guns. A fired projectile carries appreciable velocity and, in the case of nail guns, has been associated with serious and fatal injuries. If a high index of suspicion exists, prompt referral to a center with experience in penetrating trauma can be lifesaving.

NOTES

ATRIAL SEPTAL DEFECT AS A CAUSE OF HYPOXEMIA REFRACTORY TO INCREASING FI02 AND PEEP IN A PATIENT WITH THORACIC TRAUMA

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Hypoxemia is common in critically ill patients and most often results from ventilation/perfusion mismatch. Other etiologies include low FiO2, hypoventilation, diffusion abnormality and right to left shunt. Intracardiac right to left shunt is a rare but potentially significant cause of hypoxemia in the patient with thoracic trauma and should be considered when hypoxemia is refractory to PEEP and increased FiO2.

A previously healthy 42-year old male sustained a transection of the thoracic aorta, multiple rib fractures and a pulmonary contusion in a motor vehicle accident. The aortic injury was repaired successfully and he recovered uneventfully until the seventh post operative day. At that point, he developed rapidly progressive hypoxemia characterized by an increase in the alveolar-arterial oxygen tension difference (p(A-a)O2) from 185 to 525 mm Hg over eight hours. The hypoxemia was refractory to increasing FiO2 and worsened when PEEP was increased from 5 to 10 cm H2O. Chest radiograph was unchanged from the previous day and revealed resolving pulmonary contusion without pulmonary edema, new infiltrates, or worsening atelectasis. Because of concern over a possible pulmonary embolus, we obtained a ventilation/perfusion scan which was read as "intermediate probability" for pulmonary embolism. Subsequently, pulmonary angiography was negative for pulmonary embolus. However, this study revealed a 12 mm atrial septal defect (ASD). An atrial systolic pressure gradient from 16 to 14 mm Hg produced a right to left shunt through the atrial defect. Whether this patient's ASD was congenital or traumatic is unknown.

Treatment included reduction in PEEP to lower transthoracic pressure and an angiotension converting enzyme inhibitor to reduce pulmonary artery resistance and promote blood flow through the pulmonary artery circuit rather than through the ASD. Although hypoxemia is common in victims of thoracic trauma, right to left shunt must be considered in patients with profound hypoxemia.

NOTES

THE SAFETY OF URGENT PARALYSIS AND INTUBATION (UPI) IN THE TRAUMA ADMITTING AREA (TAA): A REVIEW OF 570 CONSECUTIVE PATIENTS

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OBJECTIVE: Despite growing support and a decade of investigation, there is still a lack of consensus across specialties regarding the use of UPI in trauma patients. The purpose of this study is to investigate the safety and success of UPI in the TAA.
METHODS: A protocol for UPI of trauma patients by PGY 2 and 3 anesthesia residents has been in place since January 1990. Between January 1990 and July 1995, 570 consecutive spontaneously breathing patients underwent UPI in the TAA at an urban Level I university trauma center. Records were reviewed for demographics, injury scoring, indications for UPI, pharmacologic regimens (pentothal/succinylcholine vs. versed/vecuronium), intubation mishaps (IM - multiple attempts, malposition, aspiration, hypotension, hypoxia, arrhythmia), pulmonary complications (PC - pneumonia, atelectasis, persistent infiltrates), cricothyroidotomies and deaths. Variables were analyzed using a continuous Wilcoxon Rank Sum Test and categorical Fisher's exact test (significance $p \leq 0.05$).
RESULTS: Mean age was 34.7 $\pm$ 13.9 yrs. with 47% penetrating, 52% blunt and 1% burn injuries. Mean ISS and RTS were 14.2 $\pm$ 10.1 and 6.9 $\pm$ 1.4 respectively; 490 patients (86%) survived to discharge. UPI indications included: shock (31%), combativeness (26%), airway protection (19%), mental status change (12%), impending surgery (9%), and other (3%). 97 IM occurred in 48 (8.4%) of 570 patients. 45 PC occurred in 39 (8.8%) of 443 patients with a length of stay or survival $\geq$ 72 hours. Only 5 patients with IM developed PC and there was no relationship between IM and PC. There was no relationship between the pharmacologic regimen and IM. AIS Face for patients with IM was higher than for those without (0.8 $\pm$ 1.0 vs. 0.5 $\pm$ 0.8, $p=0.075$); AIS Chest was significantly higher in patients with PC (1.9 $\pm$ 1.7 vs. 0.8 $\pm$ 1.4, $p<0.05$), as was ISS (22.5 $\pm$ 12.5 vs. 13.5 $\pm$ 8.5, $p<0.05$). UPI was successful 98.6% of the time; 93.4% on the first attempt. There were 8 (1.4%) cricothyroidotomies performed. No deaths were related to UPI.
CONCLUSION: UPI in the TAA is safe with a high success rate. IM rate is low and unrelated to pharmacologic regimen, PC or deaths. When performed using a standing protocol, UPI is the method of choice for spontaneously breathing trauma patients in need of intubation in the TAA.

NOTES

RESTRAINT USE MODIFIES INJURY PATTERNS IN YOUNG CHILDREN

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OBJECTIVE: Adult seat belt use reduces injury rates in motor vehicle collision (MVC), but is associated with defined injury patterns. Restraint use for infants and young children is mandated in every state, but injury patterns for this population are unknown. The purpose of this study was to examine severity and types of injury resulting from MVC in restrained (R) and unrestrained (U) young children.

METHODS: Medical records of all MVC patients $\leq$ 6 years old evaluated at a Level I trauma center and a children's hospital from 6/90-3/97 were reviewed, as were coroner's records. Age, weight, restraint use and type, location in vehicle, vehicle speed and impact site, ISS, injury type and outcome were recorded. Chi-square and t-test were used for statistical analysis.

RESULTS: Six hundred children were included. Restraint use was unknown in 18.

	N	Age(yr)	Wt(kg)	Injuries	Deaths	ISS $\geq$ 16	Mean IS
R	320	3	14.8	206	8	21	3
U	262	3	14.8	217	18	38	8
p value		NS	NS	<0.001	<0.001	<0.001	<0.001

		Intracranial		Intra-abdominal			Vascular Injuries & Fractures			
	N	Face	Brain	Neck	Chest	Abd	Arm	Leg	Pelvis	Back
R	53	14	23	0	2	7	0	4	1	2
U	146	34	44	4	10	20	11	17	6	0

Evaluation of intracranial, intra-abdominal, vascular injuries and fractures showed that all injuries except back fractures were reduced (χ^2, $p < .001$) in the R population.

CONCLUSIONS: In infants and young children, restraint use reduced overall injury severity. Additionally, restraints decreased all types of injuries except back fractures.

NOTES

THE UTILITY OF HEAD CT SCANS AFTER MINIMAL HEAD INJURY

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Objective: To determine if patients who present with a history of loss of consciousness who are neurologically intact (minimal head injury) should be managed with head CT, observation or both.

Methods: We prospectively studied patients who presented to our urban level I trauma center with a history of loss of consciousness following blunt trauma and a Glasgow Coma Score (GCS) of 15. All patients had CT scanning of the head and were subsequently admitted for 24 hours of observation.

Results: 1170 patients with minimal head injury were studied over a 35 month period. All patients had a GCS of 15 on arrival and had a history of either loss of consciousness or amnesia to the event. 247 patients (21.1%) were intoxicated with drugs or alcohol on admission. 39 patients (3.3%) had an abnormality on their CT scan including 18 intracranial bleeds. 21 (1.8%) patients had a change in therapy as a direct result of their CT scan, including 4 operative procedures. No patient with a negative CT scan deteriorated during the subsequent observation period.

Conclusion: CT scanning is a useful test in patients with minimal head injury as it may lead to a change in therapy in a small but significant number of patients. Subsequent inhospital observation adds nothing to the CT scan and is not necessary in patients with isolated minimal head injury.

NOTES

INTRACRANIAL MONITOR PLACEMENT BY MID-LEVEL PRACTITIONERS

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OBJECTIVE: The treatment of patients with neurosurgical injuries at trauma centers involves commitment by neurosurgeons (NS). Manpower and availability issues affect the degree of participation at both an individual and hospital level. Utilization of mid-level practitioners (MLP) may permit better neurosurgical coverage. Among the most frequently necessary neurosurgical procedures is intracranial pressure monitoring. The purpose of this study is to examine the placement of intracranial pressure (ICP) monitors by MLP.

METHODS: Medical and trauma registry records for a Level I trauma center during a four-year period were reviewed. Patient data recorded included age, mechanism of injury, injury type, ICP monitor placement and length of placement, complications of ICP monitor use and outcomes.

RESULTS: One hundred thirty-three patients had 137 ICP monitors placed. The mean age of patients was 34 (range 1-93 years) and mean GCS was 7. Most patients (56) had injury due to MVA.

ICP monitors were placed by NS (78), MLP (50) and general surgery residents (9), and remained in place for a mean of 4.0 days. No major complications (bleeding, infection) due to ICP monitor placement occurred; 14 minor complications (malfunction, dislodgment) were noted (11 placed by NS, 2 by MLP, 1 by resident.

CONCLUSIONS: ICP monitor placement by MLP is safe and may allow more efficient use of neurosurgical resources.

place art. lines
PA caths
intracranial monitors

NOTES

BED OF STOOL: ARE CLOSTRIDIA DIFICILE TITRES INDICATED?

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OBJECTIVE: To assess the value of clostridia dificile toxin assay in management of trauma intensive care patients with diarrhea.

DESIGN: Retrospective Study

MATERIALS AND METHODS: Clostridia dificile titres are routinely sent on patients on broad spectrum antibiotics who develop diarrhea in the TICU. Records of 101 patients with suspected C. dificile colitis were reviewed within a 20 month period. The antibiotics, number of days of diarrhea, and type of nutritional support of patients were correlated.

RESULTS: One (1%) of patients were positive for C. dificle toxin. Thirty-three (33%) of the patients were empirically begun on metronidazole P.O. and had full therapeutic regimen completed prior to results of titres returning. The hospital cost of metronidazole 250mg QID is 20 cents per day resulting in $1.40 for a one week therapeutic regimen. The cost of one clostridia dificle titre assay is $42.00.

CONCLUSION: The cost savings, efficacy, and low risk of treatment with metronidazole for ICU suspected Clostridia dificile colitis favors empiric use without the need for C. dificile toxin assay.

empirically tx C metronidazole

NOTES

10 Sciatic injuries
Start at top the way I posi

THE OPERATIVE TREATMENT OF ACETABULAR FRACTURES THROUGH THE EXTENSILE HENRY APPROACH

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The purpose of this study was to evaluate the previously unreported application of the extensile Henry approach to the operative treatment of acetabular fractures.

From 1990 to 1996, all surgically treated acetabular fractures were managed by the senior two authors using the extensile Henry approach. The patient is in a lateral decubitus position. An incision is made along the iliac crest, proceeding along the greater trochanter and then curving posteriorly towards the gluteal folds. The inter-nervous interval of the iliotibial tract and gluteus maximus is split. Gluteus is reflected as a flap. With short external rotators detached, the entire posterior pelvis and sciatic nerve are directly visualized. Through the extensile exposure, fractures of the anterior column could be indirectly reduced using manual manipulation through the sciatic notch. The reduction was evaluated by C-arm, palpation of the quadrilateral plate, and direct visualization of the joint. Post-operatively, either low dose radiation or Indocin was used for heterotopic ossification prophylaxis.

Thirty-one cases were retrospectively reviewed at an average follow-up of 18.5 months. There were 6 posterior wall, 1 T-type, 13 associated transverse and posterior wall, 2 transverse, 6 both column, and 3 posterior column and posterior wall fracture patterns. The average time from injury to surgery was 9 days thus allowing for hematoma stabilization. The average operative time was 4.5 hours (range 2.5 hours to 8 hours) with an average blood loss of 1160 ml (range 350 ml to 2500 ml). Reduction was anatomic in 26 cases (84%), satisfactory in 4 cases (13%), and unsatisfactory in 1 case (3%). Radiographic results at follow-up were 25 excellent results (81%), 4 good results (13%), and 2 poor results (6%). No heterotopic ossification occurred in 24 cases (77%). There were 4 cases of low grade (Brooker Class I, II) and 3 cases of high grade heterotopic ossification (Class III, IV). The low grade cases occurred in 2 patients who received low dose radiation treatment, 1 patient treated with Indocin, and 1 patient who received no prophylaxis. The 3 cases of high grade heterotopic ossification all occurred in patients who underwent prophylaxis with Indocin. An additional complication was 2 cases of superficial wound infection. There were no iatrogenic injuries to the sciatic nerve or development of flap necrosis.

Indocin as prophylaxis 2 cases poor

The extensile Henry approach is a versatile approach offering an excellent exposure for the surgical treatment of acetabular fractures. The direct exposure of the posterior pelvis significantly minimizes the risk of iatrogenic injury to the sciatic nerve. In addition, the incidence of clinically significant heterotopic ossification may be reduced through the use of low dose radiation prophylaxis.

use low dose irradiation as prophylaxis against ectopic ca

NOTES

SEVERE COLONIC TRAUMA REQUIRING RESECTION: COLOSTOMY VERSUS ANASTOMOSIS

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Purpose: To evaluate the outcome of severe colonic trauma requiring resection, comparing the results of colostomy versus anastomosis.
Patients and Methods: Retrospective review of 134 patients with colonic injuries requiring resection. Patients were evaluated by assessing the injury of severity score (ISS), abdominal trauma index (ATI), mechanism of injury, preoperative hypotension, time from injury to operation number of associated abdominal injuries, transfusion requirements. Colonic related complications were collected.

Results:

Abdominal Complications

	Colostomy	Ileocolostomy	Colocolostomy	p*
n	27	53	54	
ISS/ATI	18.4/32.3	14.8/25.4	18.2/28.8	
Abscess	8 (30%)	9 (17%)	16 (34%)	NS
Anastomotic Leak	0	3 (6%)	6 (11%)	NS
Enterocutaneous Fistula	0	3 (6%)	5 (9%)	NS
Wound Infection	8 (30%)	13 (25%)	15 (28%)	NS
Fascial Dehiscence	4 (15%)	11 (21%)	10 (19%)	NS
Death	1 (4%)	3 (6%)	4 (7%)	NS
Total Pts with Comp.	11 (39%)	18 (34%)	22 (49%)	NS

* chi-square, NS=not significant ($p < .05$)
The ileocolostomy group demonstrated a significantly lower ISS compared to the colostomy group ($p = .02$, t-test)

Patients who underwent primary anastomosis did not demonstrate a significantly greater morbidity or mortality than those who had colostomies performed. There was an 11% anastomotic leak rate in the colocolostomy group, and 6% for the ileocolostomy group. Two deaths were directly attributed to anastomotic leaks, and the resulting abdominal sepsis, one from the ileocolostomy group, and one from the colocolostomy group.

Conclusion: 1) The incidence of colon related abdominal complications is high, especially with respect to intra-abdominal abscess formation. This is similar in each group and may be a reflection of the severity of the trauma and not the method of colonic repair.

2) This retrospective analysis of colonic resection and primary anastomosis in severe colonic trauma does not demonstrate a significant increase in the morbidity and mortality of these patients.

3) Anastomotic leak and fistula formation were rare occurrences and can be managed expectantly.

NOTES

BYLAWS

BYLAWS OF
WESTERN TRAUMA ASSOCIATION

ARTICLE I

Name, Objectives, Organization, and Jurisdiction

SECTION 1: Name
The name of this organization is the Western Trauma Association.

SECTION 2: Objectives
The objectives of the Association are 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.

SECTION 3: Organization
This is a non-profit membership corporation entity, duly incorporated on this 25th day of January, 1971 under, and by virtue of, the provisions of the laws of the State of Colorado.

SECTION 4: 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 throughout the "free world".

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

SECTION 2: Qualifications
Active members shall be limited to Doctors of Medicine who are Board Certified in their particular medical specialty. The Board of Directors is hereby given discretionary powers to interpret if foreign physicians who apply for membership have the credentials comparable to Board Certification. Certified members of other (non-M.D.) health care disciplines with a special interest or expertise in trauma may be elected to associate membership with the approval of the Board of Directors and the membership. Associate members shall have all the rights and privileges and must satisfy the same requirements for election to and retention of membership as active members except the right to vote or hold office. For applications to be considered, candidates must submit a completed application with a letter of support (sponsorship) from a member of the Association, and submit an abstract for consideration by the Program Chairman. A new member must attend a prior meeting in which he/she is voted on for membership in the capacity of a resident, physician or certified specialist.

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 or the annual meeting and to remain current in the payment of same.

At age 55, members in good standing will automatically accept the position of senior membership in the West Trauma Association. A senior member must pay dues annually and retains all voting privileges and rights of active members, but does not have to attend the meetings, and his membership is not counted as part of a given specialty's membership quota or the total membership number.

SECTION 4: Board Action Concerning Membership
Applicants to the Association can obtain membership on a two-thirds vote of the Board of Directors.

Termination of membership can only be obtained on a two-thirds vote of the Board of Directors for a violation of one or more of the items set forth in Article II, Section 3 of the Bylaws of this association.

ARTICLE III

Meetings

SECTION 1: Annual Meetings
There shall be an annual meeting of the membership of the Association held in some suitable locati chosen by the Board of Directors. Funds shall be made available for the conduct of the scientific program at the annual meeting (the exact amount of the funds shall be set by the Board of Director

SECTION 2: Special Meetings
Special meetings of the Association may be called by the Board of Directors or two-thirds of the membership in good standing, entitled to vote. The location for a special meeting of the Associatic 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.

SECTION 4: Quorum
One-fourth of the membership present at any meeting of the Association shall constitute a quorum.

ARTICLE IV

Meetings of the Directors

Section 1: Annual Meetings
The annual meetings of the Board of Directors shall be held on the same day or days and at the sar place as the annual meeting of the Association.

SECTION 2: Special Meetings
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 sh 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.

SECTION 3: Quorum
A majority of the Board of Directors shall constitute a quorum.

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 shall be determined by the treasurer and president 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 prior to the annual meeting. Failure to pay dues 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 to respective members at their last address on record with the Association, postage pre-paid.

SECTION 4: Waiver of Dues
All requirements for retention of membership including payment of dues and attendance at meetings may be waived by the Board of Directors upon petition. Eligibility for such waivers shall include inductions into the Armed Forces of the United States on a temporary basis, physical disability, or other reasons which would place unreasonable hardship, physical disability, or other reason upon the petitioner.

ARTICLE VI

Voting

SECTION 1: Voting Rights
Each 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.
12) 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.
13) 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: Cumulative Voting
Cumulative voting shall not be allowed.

SECTION 5: 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 6: Elections
Elections and all other matters raised to a vote of the membership cannot be held unless a quorum i 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 tl Board of Directors. The President, President-Elect, Vice-President, Secretary, Historian, and Treasu shall be elected at the annual meeting of the members.

SECTION 2: Terms and Vacancies
The Secretary, Historian, and Treasurer shall each hold office for the term of three years. The remaining officers shall be elected at the annual meeting of the members. In the event that an offic cannot fill his term, his successor shall be chosen by the Board of Directors to fill the vacancy for tl unexpired term of the office.

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 of Officers

SECTION 1: President
Following his ascension to the chair, the president shall preside at all meetings of the members and shall serve as ex-officio member at 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 shall assign to him.

SECTION 3: Vice President
The vice president shall preside at all business meetings in the absence of the president.

SECTION 4: Secretary
The secretary shall keep the minutes of all meetings of the members and the Board of Directors; shall keep all records and information pertaining to the history of the Association; and be responsible for applications for membership, approvals, and deletions as well as communications to the membership, especially those whose membership is in jeopardy.

SECTION 5: Treasurer
The treasurer shall have the following duties:

(1) Shall keep the books of account of the Association and shall cause to be prepared an annual audit for presentation at the annual meeting.
(2) Shall have custody of, and be responsible for all funds, securities, 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 selected by the Board of Directors.
(3) Shall assist the secretary in keeping the roster of the membership which is current and accurate.
(41 Shall engage a certified public accountant, approved by the president, to audit annually the books of the Association. The accountant's report shall be reviewed by the auditing committee.

SECTION 6. Historian
The Historian should maintain and safeguard 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 otherwise, 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.

ARTICLE IX

Board of Directors

SECTION 1: Composition
The Board of Directors of the Association shall consist of the following individuals:

(1) The president, president-elect, vice president, secretary, and treasurer, immediate past president, and six members-at-large.
(2) Two members of the Association in good standing shall be elected annually to replace two existing members-at-large of the Board unless the membership should, by majority vote, elect to retain the then existing Board of Directors.
(3) 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: 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.

ARTICLE X

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 and a Committee including a General Surgeon, a Orthopedic Surgeon, another specialist, and the Chairman of the Publications Committee (ex-officio), all appointed by the President. The Chairman is appointed for a two year term. This Committee will be responsible for the organization and conduct of the program at the annual meeting.

SECTION 3: Membership Committee
The Membership Committee shall consist of the Board of Directors. 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 a General Surgeon, an Orthopedic Surgeon, a Plastic Surgeon, another specialist, and the Chairman of the Program Committee (ex-officio), all appointed by the President. 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.

ARTICLE XI

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.

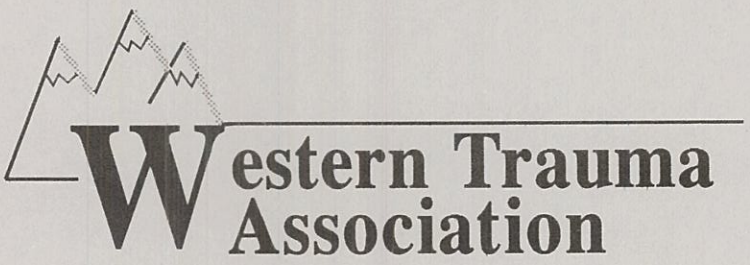
SECTION 2: Order of Business
The President shall set the agenda and where possible should follow Robert's Rules of Order.

ARTICLE XII

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.

MEMBERSHIP



WESTERN TRAUMA ASSOCIATION
1998 - 1999
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*Denotes senior members

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Drawings
Talk - radiology, etc
? mm cuts, etc

"standard CAT" refs

Talk
Ref slides
Case first
sequential X-rays

Metzger - ACL
Shoulifwd - thumb
- shoulder dislocation
Bernstein - patella

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